Appendix A

Notice of Preparation and Public Comments

ALAMEDA COUNTY COMMUNITY DEVELOPMENT AGENCY

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Notice of Preparation and Notice of Scoping Meeting for an Environmental Impact Report

Date: May 4, 2020

To: Responsible Agencies, Agencies with Jurisdiction by Law, Trustee Agencies, Involved Federal Agencies, and Agencies/Organizations/ Individuals Requesting Notice

From: County of Alameda Community Development Agency, Planning Department

Subject: Notice of Preparation of an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project, County Planning Application PLN2017-00174

The County of Alameda (Lead Agency) will prepare an Environmental Impact Report (EIR) for the proposed Aramis Solar Energy Generation and Storage Project (Project). The Project is an application for a Conditional Use Permit (CUP) to allow construction of a solar energy production (up to 100 megawatts, or MW) facility with associated battery storage using photovoltaic panels over a mostly contiguous 533-acre site, subject to the provisions of the County Zoning Ordinance (Title 17, Section 17.54.130). A parcel map subdivision to separate a roughly 150-acre portion of one Project parcel from the Project development site is also proposed.

This Notice of Preparation (NOP) is being distributed to applicable responsible agencies, trustee agencies, and interested parties as required by the California Environmental Quality Act (CEQA) and CEQA Guidelines Section 15082. Comments from agencies and interested parties are requested as to the scope and content of the environmental review in connection with the proposed Project. The County is particularly interested in hearing from public agencies regarding their objectives for environmental information to be included in the EIR that is germane to those public agencies' statutory responsibilities pertaining to the Project, and how such information in the EIR will inform such agencies when considering issuing permits or other approvals for Project-related activities. The purpose of the EIR will be to evaluate the specific environmental effects of the Project as proposed by IP Aramis, LLC, a subsidiary of Intersect Power, LLC.

Due to the time limits mandated by state law, public agencies are requested to send their responses to this Notice to the County at the address and person provided above as soon as possible but not later than 30 days after receipt of this Notice (which the County will assume is no later than May 6, 2020 unless documented otherwise). Members of the public should provide scoping comments by Friday, June 5, 2020, 5:00 p.m. Agencies and organizations are requested to provide a contact name in your organization for any further consultation.

PROJECT LOCATION

The site is comprised of large portions of four privately-owned parcels in the unincorporated North Livermore area of Alameda County, approximately 2.25 miles north of the Livermore city limits and Interstate I-580. The Project site is within Sections 16 and 17 of Township 02 South, Range 02 East and unsurveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The Project site is located within the "Tassajara, CA" and "Livermore, CA" USGS 7.5-minute quadrangles. Refer to **Figure 1** for the Project's regional location and **Figure 2** for an aerial photograph of the Project site.

APN	Total Area (acres)	Project Development Area (acres)
903-0006-001-02	536	350
903-0006-003-07	101	30
903-0007-002-01	50	44
902-0001-005-00	60	56
Total	**747**	**580**

The Project parcels (Assessor's Parcel Numbers, or APNs) are outlined in a table to the right. The largest parcel (536 acres) bears the address of 1815 Manning Road (903-0006-001-02) and lies directly west of North Livermore Avenue and south of Manning Road where these roads terminate at an L-intersection with each other. Approximately 350 acres of this large parcel is proposed for Project development; an estimated 150 acres to the northwestern is moderately to steeply sloped, and is proposed to be subdivided to legally separate it from the real property affiliated with the proposed Project development. Another estimated 36 acres of this parcel is not suitable for development of Project uses and is thus not included in the overall Project development area. To the south of this parcel is the roughly 101-acre Stanley Ranch at 4400 North Livermore Avenue (APN 903-0006-003-07), of which about 30 acres would be used for the Project. The remainder of the Ranch is used for intensive crop production, some residences and other agricultural operations and structures.

Directly north and across Manning Road from the large parcel, bordering Manning Road for about 800′ west from North Livermore Avenue, is an approximately 50-acre parcel (APN 903-0007-002-01) with no designated address. The fourth parcel (APN 902-0001-005-00), also with no address is about 60 acres in area and lies approximately 800′ north and east of the terminus of North Livermore Avenue at Manning Road (and east of the 50-acre parcel, with no frontage along on any County road). Small portions of these two parcels are not suited for development due to small stream courses. The total Project development area or 'envelope' is therefore approximately 580 acres, or all of the Project parcels excluding only the northwestern 150-acre portion of the large parcel that will be separated by the proposed subdivision, the 36-acre portion that is unsuited for development, and the majority portion of the Stanley Ranch that is not planned for Project use.

The northern three parcels (excluding the Stanley Ranch parcel) are characterized by open pasture type land, used for dryland farming, not irrigated crop production, and not containing other development, including any residence, barn structures or extensive road network. The large parcel, as noted, has a hilly northwestern section, and has only a small number of trees in its level area, near Cayetano Creek.

GENERAL PLAN LAND USE DESIGNATION AND ZONING

The majority of the Project site is designated Large Parcel Agriculture (LPA) in the East County Area Plan (ECAP), and all of the site is in the A (Agriculture) zone district of the County Zoning Ordinance (Alameda County General Ordinance Code, Title 17). The northern portions of the two parcels north of Manning Road, an area on both parcels of approximately 23 acres, are designated in the ECAP as Resource Management (RM). Additionally, a 400'-wide corridor centered along Cayetano Creek, an estimated 78 acres, is designated Water Management (WM) within the southern two Project parcels. The ECAP, as amended in November 2000 by voter approval of Measure D, also known as the *Save Agriculture and Open Space Lands Initiative*, amended the definitions of LPA, RM and WM to limit residential and non-residential floor area, and except for infrastructure as provided under Policy 13 of the ECAP (added by Measure D), requires all buildings to be located in development envelopes of no more than two acres unless necessary for agricultural uses. Policy 13 prohibits the County from developing new infrastructure that exceeds the need for development allowed by Measure D, that would be growth-inducing or otherwise result in more capacity than necessary for providing public services and utilities.

Among the allowed uses in the LPA land use designation besides agricultural and residential uses are "public and quasi-public uses, solid waste landfills and related waste management facilities, quarries, windfarms and related facilities, utility corridors, and similar uses compatible with agriculture." The RM designation "permits agricultural uses, recreational uses, habitat protection, watershed management, public and quasi-public uses, areas typically unsuitable for human occupation due to public health and safety hazards such as earthquake faults, floodways, unstable soils, or areas containing wildlife habitat and other environmentally sensitive features, secondary residential units, active sand and gravel and other quarries, reclaimed quarry lakes, and similar and compatible uses. … This designation is intended mainly for land designated for long-term preservation as open space but may include low intensity agriculture, grazing, and very low density residential use." The WM designation specifies that it "provides for sand and gravel quarries, reclaimed quarry lakes, watershed lands, arroyos, and similar and compatible uses" [1]

Within the LPA land use designation, utility-scale solar energy facilities are considered comparable to "windfarms and related facilities, utility corridors, and similar uses compatible with agriculture." (See further discussion below.) However, the County does not generally consider utility-scale solar energy facilities to be compatible with the RM land use designation and its emphasis on, in addition to agriculture, "recreational uses, habitat protection, watershed management, public and quasi-public uses", and its intent of preserving open space. Broadly speaking, the County considers the WM designation suited to established quarries with their-highly regulated reclamation plans and specialized permits, and not meant for large solar energy facilities. However, the Project has been proposed to encroach over an estimated 23 acres at the northernmost portions of the northern two parcels designated as RM, and roughly 18 acres of WM-designated land in the southern two parcels.

The A (Agriculture) zone district established by the Zoning Ordinance (Section 17.06) establishes permitted and conditionally permitted uses. The intent of the district is: "to promote implementation of general plan land use proposals for agricultural and other non-urban uses, to conserve and protect existing agricultural uses, and to provide space for and encourage such uses in places where more intensive development is not desirable or necessary." Among conditionally permitted uses are "Privately owned wind-electric generators".[2]

Although the ECAP and the Zoning Ordinance do not have provisions permitting solar panels on a utility-production scale such as the proposed Project, Section 17.54.050 of the Ordinance provides a procedure for "uses not listed", stating that "Whenever there is doubt as to the district classification of a use not listed in any part of this title, the planning department may refer the matter to the planning commission for action pursuant to Section 17.54.060. The referral shall include a detailed description of the proposed use." Section 17.54.060 directs the planning commission to:

> "… make such investigations as are necessary to compare the nature and characteristics of the use in question with those of the listed uses in the various districts. If the use is found to be, in all essentials pertinent to the intent of this title of the same character as a permitted use in any district or districts, or of the same character as a conditional use in any district or districts, the commission shall so determine and the order shall be final, unless a notice of appeal is filed pursuant to Section 17.54.670 within ten days after the date of such an order. The person requesting the determination shall be notified forthwith and the final determination shall become a permanent public record.

[1] East County Area Plan, a part of the Alameda County General Plan, 1996, as amended by Measure D, Nov. 2000 (as finally adopted and updated May 2002), pp. 47-48.
[2] Alameda County General Ordinance, Title 17, Section 17.06.040.M.

With respect to Section 17.54.050 of the Ordinance it is the County staff's view that there is no "doubt as to the district classification of a use not listed", because the County Planning Commission and other decision-makers have previously made determinations that solar electric facilities would not be contrary to the specific intent clauses or performance standards established for the A District and could be permitted under a CUP. Specifically, in June 2008 the Alameda County Planning Commission made findings pursuant to the aforementioned Sections 17.54.050 and 17.54.060 for a proposed utility-scale solar facility.[3] These findings were reiterated by the County in the approval in December 2011 of another solar facility[4] and the denial by the County Board of Supervisors in early 2012 of an appeal of the same approval.[5] In its consideration of the appeal, the Board affirmed the Planning Department's and prior determination in 2008 that a solar energy facility is allowed as a "public and quasi-public use" consistent with the LPA designation.

The proposed Project parcels are designated as "Grazing Land" by the California Department of Conservation's Farmland Mapping and Monitoring Program. The Stanley Ranch parcel is enrolled in the state's Williamson Act program. The EIR will evaluate the proposed Project's compatibility with the County's Uniform Rules and Procedures Governing Agricultural Preserves and Williamson Act Contracts. The applicant proposes continued agricultural operations co-incidental with solar electricity generation, as described under "Operations" below.

Adjacent Uses. Surrounding properties are also primarily in the A zone district; two homes along Bel Roma Road are in an R-1 (Single Family Residential) zone district for rural residential uses on typically five-acre lots, about 1,200 feet to the east. Surrounding land uses include grazing, intensive agriculture, the PG&E substation, and residential uses. Another solar energy facility is proposed by an unrelated applicant on the east side of North Livermore Avenue, north of May School Road. The area contains important plant and animal habitat, partly in association with Cayetano Creek, an intermittent waterway.

PROJECT OVERVIEW

The proposed Project includes a parcel subdivision and a utility-scale solar energy generation and battery storage facility, anticipated to generate up to 100 megawatts (MW) using photovoltaic (PV) modules connected in strings mounted onto a single-axis tracker racking system, which would be affixed to steel piles. The module strings would track the sun during the day, from east to west, to optimize power generation of the facility. Modules would be connected by low-voltage underground or under-panel, rack-mounted electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a medium voltage (MV) of 34.5 kV (or lower suitable voltage) to collect the energy generated to a Project substation. Medium-voltage lines would be buried for a majority of their length, but would emerge above-ground and be mounted on up to 2 overhead wooden utility poles on either side of Manning Avenue and up to 20 additional wooden poles to cross Cayetano Creek and its tributaries, to cross an access driveway, and where a connection to the substation must be overhead. The substation would step up the MV collected energy to the into the interconnection voltage via one or more step up transformers. The substation would meter Project energy pursuant to the Interconnection Agreement and Power Purchase Agreement(s) with the utility and offtaker(s).

[3] County of Alameda Planning Commission, June 16, 2008, Meeting Minutes, item D-165, GreenVolts, Inc.
[4] County of Alameda, East County Board of Zoning Adjustments, December 15, 2011, Resolution No. Z-11-72, Conditional Use Permit PLN2011-00009, Cool Earth Solar, Inc.
[5] County of Alameda Board of Supervisors, February 28, 2012, Planning Meeting, Summary Action Minutes.

The maximum height of the modules would be approximately 8 feet. The maximum height of the medium-voltage electrical poles would be approximately 70 feet at the Manning Avenue crossing, and would otherwise be approximately 50 feet tall.

The applicant has designed the facility such that all structures are proposed to be placed outside of the 100-year floodplain of Cayetano Creek as determined through hydrologic modeling, outside areas designated Water Management in the East County Area Plan, and in no case closer than 50 feet from the banks of Cayetano Creek or its tributaries as determined by a qualified biologist.

The applicant proposes, as a part of the large parcel subdivision, to offer dedication of an easement to Alameda County (or the Livermore Parks & Recreation District, which manages open space and trail development in conjunction with the East Bay Regional Parks District) for use as a public hiking trail along Cayetano Creek outside of the Project's development footprint.

Project Substation and Gen-Tie Lines

The Project substation would provide circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure.

The proposed Project substation is adjacent to the existing PG&E Cayetano Substation, allowing the gen-tie to be approximately 500 feet and overhead with a possibility of underground construction as well. Overhead lines would be constructed on either tubular steel poles or wood H-fames and may be constructed to be single-circuit or double-circuit. The heights of the overhead poles could vary from 30 to 100 feet, depending on the entry angle required by the interconnecting utility. A limited amount of work inside the Cayetano Substation may also be required by PG&E and would be performed by the utility. Changes to structure heights and number of structures within the substation fence could occur as a result of Project interconnection.

The northern portion of the Project site (north of Manning Road) would be connected to the southern property via medium-voltage distribution lines. Medium voltage distribution lines would be routed either overhead or underground. An encroachment permit would be obtained for the crossing of Manning Avenue, as necessary.

Energy Storage

A lithium ion battery storage system would be located on-site near the PV system transformer, which would be shared with the battery system. The battery storage system will be designed to accept up to 100 MW of electrical generation, and subsequently dispatch stored electricity during times of peak demand. Batteries would be contained in several locking metal electrical enclosures, each with individualized fire suppression systems. Low-voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer. The system would fit in four 100-foot by 180-foot buildings which would be sited near the operations and maintenance (O&M) building.

Support Facilities

The Project components would be enclosed by security fencing. Locked gates would provide two points of ingress/egress and pathways within the fence line would provide access for routine maintenance of the system. A meteorological station would collect site-specific weather data. A fiber optic telecommunications line required by the interconnecting utility would be integrated with the gen-tie line. An electrical

control enclosure would be included on site for the operations electrician to monitor and manage the system.

Shielded, downward directional security lighting would be located at the control enclosure and O&M building for emergency repairs. Night lighting would not be required except during scheduled maintenance periods and emergency repairs.

Signage would be limited to what is required by the interconnecting utility and County and would conform to County guidelines.

Project Construction

The duration of Project construction would be approximately 9 months. Project construction would consist of the installation of interconnection facilities, site preparation, cable installation, pile and skid installation, tracker and module installation, and lastly, site cleanup.

During construction, it is anticipated that up to 50,000 gallons of water would be used daily and that a total of up to 42 acre-feet would be used for construction purposes and dust suppression (including truck wheel washing). Water for dust suppression during construction (and for subsequent panel washing during operations) would be obtained via an onsite well, offsite well, or procured from a local water authority.

During construction, a maximum of 400 construction workers would be on site during the peak work period. During the peak construction period (anticipated to last up to 5 months), workers would travel to and from the site daily, at an average one-way distance of 20 miles. Local labor would be used to the maximum extent practicable.

Operations

The Project would passively generate power during daylight hours 7 days per week, 365 days per year. The facility would be tested, maintained, and inspected daily by a remotely dispatched staff of approximately 4 technicians. Emergency maintenance would occur as needed by remotely dispatched technicians. Depending on the modules ultimately installed, modules would either be washed once annually by a crew of up to 12 technicians using water trucks equipped with backpack sprayers, or be passively cleaned during rainwater events. Water for module washing would be obtained as described above. Maintenance activities would occur only during the daytime, except for the occasional emergency maintenance which may require night dispatch. At the conclusion of Project construction, operations-phase water quality best management practices (BMPs) would be installed to ensure long-term avoidance and minimization of stormwater runoff and sedimentation in Cayetano Creek or its tributaries.

Project operations would adhere to an Agricultural Management Plan (AMP) to ensure consistency of the facility with adjacent agricultural land uses. The AMP would fulfill the following project objectives:

- Promote continued agricultural use of the project site
- Promote wool production
- Promote honey-bee forage vegetation and control invasive weeds
- Promote pollination services and honey production
- Maintain soil capability and minimize agricultural water use

- Manage onsite fuel load of vegetation

The Project owner would work with commercial beekeepers and sheep operators to both ensure the Project is developed for viable sheep and bee operations and to provide for routine, periodic access to the Project site when forage conditions are favorable.

ENVIRONMENTAL TOPICS TO BE EVALUATED IN THE DRAFT EIR

Based on the Lead Agency's understanding of the environmental issues associated with the proposed Project, the topics anticipated to require analysis in the Draft EIR will include, but not be limited to: aesthetics, agriculture and forestry resources, air quality, biological resources, cultural resources, energy, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, recreation, transportation and traffic, and utilities and service systems. The Lead Agency will not prepare an Initial Study for this Project.

In accordance with Section 15082(a)(1)(C) of the State CEQA Guidelines, below is a summary of the probable (or potential) environmental effects of the proposed Project for each environmental resource to be analyzed in the Draft EIR:

Aesthetics: The proposed Project may result in environmental impacts to aesthetic resources. The EIR will evaluate whether implementation of the Project could result in significant alterations to viewsheds and visual character as well as lighting and glare conditions of the County. Visual simulations of the proposed Project under post-development conditions will be prepared.

Agricultural Resources: The proposed Project may result in environmental impacts to agricultural resources. The EIR will evaluate whether implementation of the Project could result in adverse impacts or loss of agricultural resources (temporary and permanent) in the County. The extent of potential resource loss will be identified as well as the extent of potential conflict with agricultural operations based on consultation with the County and agricultural stakeholders.

Air Quality: Air quality impacts are anticipated to be limited to construction-related emissions. The EIR will identify current ambient air quality conditions of the County and will review and identify applicable federal, state, Bay Area Air Quality Management District and County policies and regulations. The potential air quality impacts will be described based on the Project-specific technical report to be prepared.

Biological Resources: The proposed Project may result in environmental impacts to biological resources. A summary of important biological resources (habitats, known locations of special-status species, movement corridors, etc.) will be mapped and provided in the EIR. The extent of potential impacts will be described based on the Project-specific technical reports to be prepared.

Cultural Resources: The proposed Project may result in environmental impacts to cultural resources. The Cultural Resources section of the EIR will describe the known resources on the Project site and vicinity, if any, and potential for impacts to those resources. If necessary, mitigation and monitoring measures will be described. This section will be based on a Cultural Resources Technical Report to be prepared.

Assembly Bill (AB) 52 involves formal consultation by the County with the potentially affected tribes. Formal notification by the County to California Native American tribes that have requested such notification of the Project offering consultation under AB 52 was sent on April 8, 2020.

Energy: The proposed Project may result in environmental impacts to energy resources. As part of the preparation of the Project-specific Air Quality, Greenhouse Gas, and Energy Technical Report, energy consumed by the development of the proposed Project and generated by the operation of the proposed Project will be estimated and assessed.

Geology and Soils/Mineral Resources: The proposed Project may result in environmental impacts to geology and soils but is not anticipated to result in environmental impacts to mineral resources. However, the EIR will provide mapping and technical information on geologic and seismic stability of renewable sites and transmission corridors including information on soil conditions. This will also include the identification of important mineral resource sites (if any).

Greenhouse Gases: The proposed Project is anticipated to benefit the County and state efforts to reduce greenhouse gas (GHG) emissions during construction and has the potential for GHG emissions to be reduced as a result of renewable energy production. Nonetheless, the Project-specific Air Quality, Greenhouse Gas, and Energy Technical Report cited above will assess the greenhouse gas emissions that may be associated with Project construction and operation.

Hazards/Hazardous Materials: The proposed Project may result in environmental impacts with regard to hazards and hazardous materials. The extent of exposure of County residents to be exposed to hazards and hazardous materials will be addressed in the EIR. The EIR will identify and address both natural and man-made hazards (e.g., wildland fires, hazardous materials and exposure to contamination, and potential aviation impacts).

Hydrology and Water Quality: The proposed Project may result in environmental impacts to hydrology and water quality resources. The extent of the solar energy site's impact to surface water features and groundwater resources of the County will be analyzed. Any areas where groundwater resources are limited and additional demand may result in overdraft concerns will be identified. Applicable federal, state, and County policies and regulations (e.g., implementation of National Pollutant Discharge Elimination System [NPDES] permit requirements to protect water quality) will be identified and addressed.

Land Use and Planning: The proposed Project may result in environmental impacts to land use and planning. This section of the EIR will address whether the Project and development of the Project would result in conflicts with the County's General Plan and associated land use plans and ordinances that could result in physical impacts to the environment. The section will also include the identification of any land use conflicts associated with the Project's proximity to adjacent land uses.

Noise: The proposed Project may result in environmental impacts regarding noise during construction. Project construction would adhere to current County noise standards and policies. The extent of potential noise impacts will be described based on the conclusions of Project-specific Noise Analysis Technical Letter.

Population and Housing: The Project is not expected to result in any significant changes to population or housing in the County.

Public Services/Recreation/Utilities: The proposed Project may result in environmental impacts to public services and utilities but is not anticipated to have impacts to recreation resources. The EIR will

identify where transmission facilities and associated capacity is available for use by the Project. The EIR will also address potential public service and utility demands of the proposed Project (i.e., fire protection, law enforcement, water supply) based on consultation with applicable service providers. Potential conflicts with existing and planned recreational uses and activities will also be identified (if any).

Transportation/Circulation: Potential traffic impacts are anticipated to be limited to construction activities. The extent of potential traffic impacts will be described in the EIR based on the conclusions of Project-specific Transportation Impact Study.

POTENTIAL ALTERNATIVES TO BE EVALUATED IN THE DRAFT EIR

In accordance with Section 15126.6 of the State CEQA Guidelines, an EIR must "describe a range of reasonable alternatives to the Project, or to the location of the Project, which would feasibly attain most of the basic objectives of the Project, but would avoid or substantially lessen any of the significant effects of the Project, and evaluate the comparative merits of the alternatives." As required by CEQA, the Draft EIR will evaluate a No Project Alternative. Aside from the No Project Alternative, the County has not yet determined what additional alternatives to the Project will be evaluated in the Draft EIR. An alternative location is not presently under consideration, nor is it expected to be evaluated other than within the brief discussion of alternatives that were rejected. Comments on this Notice of Preparation may lead to consideration of other alternatives. Once selected, the alternatives will be analyzed at a qualitative level of detail in the Draft EIR for comparison against the impacts identified for the proposed Project, consistent with the requirements of CEQA. As required by CEQA Guidelines Section 15126.6 (e)(2) the Draft EIR will identify the environmentally superior alternative, including one other than the No Project Alternative.

INTENDED USES OF THE DRAFT EIR

The Draft EIR will evaluate the environmental effects associated with the implementation of the Aramis Renewable Energy Project. The Draft EIR is intended for public participation and disclosure, and ultimately for consideration by the County in making a decision about whether or not to approve the CUP and parcel subdivision, as well as for use by other agencies, as needed. Upon incorporation of public and agency comments on the Draft EIR, the County anticipates preparing and publishing a Final EIR. The East County Board of Zoning Adjustments will then determine whether to certify the EIR in compliance with the CEQA Statute and Guidelines, and the County and other agencies, as needed, will determine whether to issue permits for the Project. It is expected that these approvals could include, but are not limited to, the following:

County of Alameda

- Conditional Use Permit to operate a solar photovoltaic and electricity storage facility; and
- Subdivision of APN 903-0006-001-02 to modify the eastern boundary of legal parcel of the proposed solar facility and create a distinct parcel.
- Other local approvals that may be required:
    - Grading permits;
    - Encroachment permits;
    - Building permits; and,
    - Other State or Local Agencies as Required

NOTICE OF SCOPING MEETING AND REQUEST FOR WRITTEN COMMENTS

The Lead Agency solicits comments regarding the scope and content of the EIR from all interested parties requesting notice, responsible agencies, agencies with jurisdiction by law, trustee agencies, and involved agencies. Comments should focus on discussion of possible impacts on the physical environment, ways in which potential adverse effects might be minimized, and alternatives to the proposed Project in light of the EIR's purpose to provide useful and accurate information about such factors. In addition, comments may be provided at the meeting indicated below.

State CEQA Guidelines set the review and comment period for an NOP to end 30 days after publication. Therefore, the County requests comments on this NOP be received no later than the close of business (5:00 p.m.) on Friday, June 5, 2020. Please send written comments to:

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, California 94544
E-mail: andrew.young@acgov.org

Scoping Meeting: Given the current Executive Order N-33-20 by the Governor of the State of California and the State of Emergency regarding the COVID-19 crisis, a scoping meeting is tentatively scheduled for the Project via teleconference and video conference on Thursday, May 21, 2020 at 1:30 p.m. Final scheduling and instructions for joining the teleconference and video conference will be provided on the County website, at http://www.acgov.org/cda/planning/, and mailed by postcard to area residents.

ALL INTERESTED PARTIES ARE INVITED TO SUBMIT WRITTEN COMMENTS ON THE SCOPE OF THE EIR TO ASSIST IN IDENTIFYING ISSUES TO BE ADDRESSED IN THE EIR.

X _____ Date: May 4, 2020
Andrew Young, Senior Planner

NOTICE OF VIRTUAL PUBLIC HEARING TO RECEIVE COMMENTS ON THE SCOPE OF AN ENVIRONMENTAL IMPACT REPORT

The EAST COUNTY BOARD OF ZONING ADJUSTMENTS
and the
ALAMEDA COUNTY PLANNING DEPARTMENT

Will hold a Public Scoping Hearing on

ARAMIS SOLAR ENERGY GENERATION AND STORAGE PROJECT, CONDITIONAL USE PERMIT PLN2018-00117 – application to allow construction of a solar energy production facility (up to 100 megawatts, or MW) with associated battery storage using photovoltaic panels over a mostly contiguous 533-acre site, in the A (Agriculture) District, located partly at 1815 Manning Road and 4400 North Livermore Avenue, both south of Manning Road and immediately west of North Livermore Avenue, and partly on two other parcels without street addresses north of Manning Road at its intersection with North Livermore Avenue, bearing four Assessor's Parcel Numbers: 903-0006-001-02, 903-0006-003-07, 903-0007-002-01, and 902-0001-005-00.

The purpose of this hearing is only to receive comments on the scope of the Environmental Impact Report (EIR), to be prepared pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines. The County will prepare an EIR, which is intended to assess the potentially significant environmental impacts of the project, and identify mitigation measures and alternatives to the project that may avoid, reduce or mitigate such effects. Among the basic purposes of CEQA is to inform decision makers and the public about the potential effects of proposed projects subject to approval by government agencies, and to disclose to the public the reasons why a project may be approved if significant environmental impacts may result.

A notice of preparation of the EIR was provided to local, state and federal agencies and interested parties on May 8, 2020, providing a 30-day period in which such agencies and organizations may advise the County regarding their objectives for environmental information to be included in the EIR, for those agencies' statutory responsibilities and to inform them when they consider issuing permits or other approvals for project-related activities. A *Scoping Meeting* is required by CEQA for projects that meet specific criteria as having statewide, regional or areawide significance, and although it is not yet demonstrated that the subject project meets this criteria, there is a potential that the project may substantially affect sensitive wildlife habitats associated with Cayetano Creek that traverses the majority of the project site, thus meeting the criteria for areawide significance. This notice is intended to comply with CEQA notification requirements for the scoping meeting.

The notice of preparation and an updated project description is provided online on the Alameda County website – www.acgov.org/cda/planning – select "Pending Land Use Projects" – "Current Development Projects" – and under the heading "Ongoing Land Use Projects", see "Aramis Solar Energy Generation and Storage Project, PLN2018-00117".

The scoping hearing is scheduled to take place as part of the meeting agenda of the East County Board of Zoning Adjustments, after its deliberations on other matters, scheduled as follows:

Date and Time: **Thursday, May 28, 2020, 1:30 p.m.** At the time of the meeting, and within ten minutes prior to the start, you may connect on a computer, tablet or smart phone to the Zoom website or to the application. Installing the application is not required, but may improve your experience. You may use the following as a direct link: https://us02web.zoom.us/j/92158285462, or for audio only you may call 1-(669) 900-9128 (not a toll-free number), using Webinar ID# 921-5828-5462. For connecting a smart phone use this link 16699009128,,92158285462 (audio only). For readers of this print notice, simply connect to **Zoom.us** and see *Join a Meeting* and enter the Webinar ID - # 921-5828-5462.

The County website – www.acgov.org/cda/planning provides Teleconferencing Guidelines for Public Hearings for additional information on County webinar meetings and hearings.

You may contact Andrew Young at 510-670-5400 or by e-mail at andrew.young@acgov.org. for more information.

From: Horvath, Cindy, CDA <cindy.horvath@acgov.org>
Sent: Friday, June 5, 2020 1:56 PM
To: Young, Andrew, CDA <andrew.young@acgov.org>
Cc: Leander Hauri <dbdecoteau@cityoflivermore.net>
Subject: Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Aramis Solar Energy Generation and Storage Project, County Planning Application PLN2017-00174
Importance: High

Dear Andy,

Thank you for the opportunity to provide comments on the proposed project. I've reviewed the information provided in the NOP, and offer these comments for consideration as the Environmental Review commences.

The Project is an application for a Conditional Use Permit (CUP) to allow construction of a solar energy production (up to 100 megawatts, or MW) facility with associated battery storage using photovoltaic panels over a mostly contiguous 533-acre site, subject to the provisions of the County Zoning Ordinance (Title 17, Section 17.54.130). A parcel map subdivision to separate a roughly 150-acre portion of one Project parcel from the Project development site is also proposed.

The project location is approximately 3 miles from the runways of the Livermore Municipal Airport. In order to fully evaluate potential impacts to aviation operations, the Alameda County Airport Land Use Commission (ALUC) requests that the applicant contact the FAA to request an Airspace Evaluation for a solar farm at this location. Here is a link to the form: http://www.acgov.org/cda/planning/generalplans/documents/FAA-Form-7460-1-Notice-of-Proposed-Alteration-and-Construction.pdf. Additionally, I've attached an FAA Guidance Document for siting Solar Facilities on or near airports for the consultant team to use in their analysis.

Please do not hesitate to contact me during the EIR process as this project moves forward. Please note that this project will need a hearing before the Airport Land Use Commission at a regularly scheduled meeting prior to final action by the County.

Cindy Horvath | Senior Transportation Planner
Staff, Alameda County Airport Land Use Commission

510.670.6511 | cindy.horvath@acgov.org | www.acgov.org/cda
Airport Land Use Compatibility Plans can be accessed here:
http://www.acgov.org/cda/planning/generalplans/airportlandplans.htm

CONFIDENTIALITY NOTICE: *Please note that any and all communication in this email is subject to public review under the provisions of the California Public Records Act, Government Code Sections 6250-6276.48.*

East Bay Regional Park District
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June 8, 2020

Andrew Young
Alameda County Planning Department/Community Development Agency
Community Development Agency
224 West Winton Ave. Rm. 111
Hayward, CA 94544-1215

RE: Notice of Preparation and Notice of Scoping Meeting for an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project, County Planning Applications PLN2017-00174 and PLN2018-00117.

Dear Mr. Young:

The East Bay Regional Park District ('District') appreciates the opportunity to comment on the County of Alameda's (County's) Notice of Preparation (NOP) and Notice of Scoping Meeting (NOS) for an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project, County Planning Applications PLN2017-00174 and PLN2018-00117. Please note that the County's May 4, 2020 NOP (PLN2017-00174) requests comments by June 5, 2020, while the East County Board of Zoning Adjustments Wednesday, May 28, 2020 Regular Meeting Agenda sates the NOP for this project (PLN2018-00117) will circulate until June 8, 2020.

The Aramis Solar Energy Generation and Storage Project (Project) as proposed will entail the construction of a solar energy production facility of up to 100 megawatts (MW) on approximately 533 acres in the A (Agriculture) District, located on various parcels of privately owned land situated at 1815 Manning Road and 4400 North Livermore Avenue, and other parcels located north of Manning Road at its intersection with North Livermore Avenue.

The District supports renewable energy development in a responsible manner that balances the need for renewable energy production with the protection of natural, cultural, and visual resources in our region (see https://www.ebparks.org/climatesmart.htm). In addition, District Staff have an extensive record of conducting research with collaborators aimed at reducing the impacts of renewable energy generation on volant animals (birds and bats), including but not limited to changing grazing practices to redistribute raptor prey species, conducting avian and bat flight behavior observations and satellite tracking of golden eagles to inform collision hazard maps (risk maps) that inform micro-siting of wind turbines, and numerous carcass searcher and scavenger removal studies to better estimate avian and bat fatality rates in wind farms.

As Wildlife Program Manager for the East Bay Regional Park District, I recommend the Environmental Impact Report (EIR) include consideration of the following items:

1. Zoning laws. The project is proposed for land that is zoned A (Agriculture) and is designated Large Parcel Agriculture (LPA) by the East County Area Plan (ECAP). The District supports agricultural land uses for the cultural and natural resource values they provide. Dryland crops and grazing (both current uses of many of the Project's parcels), provide habitat for wildlife that would basically be lost due to

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construction of the project. The County should consider if the Project is compatible with existing zoning laws.

2. Direct and indirect impacts of industrial-scale solar energy projects on wildlife. In addition to direct impacts on wildlife and habitat related to the Project's construction, impacts associated with the Project's operation over its estimated lifespan of 50 years need to be addressed. Operational impacts would include impact trauma and mortality to volant animals striking solar arrays as well as stranding of water birds caused by attraction to the photovoltaic cells (Smith and Dwyer 2016). Indirect impacts include habitat loss, displacement, avoidance and shifts in species assemblages (Hernandez et al. 2014, Smith and Dwyer 2016, Dwyer et al. 2018). As an example of indirect impacts due to potential habitat loss, Fig. 1 (page 3) depicts satellite locations of an adult golden eagle (*Aquila chrysaetos*) that overlap the Project's footprint. Other golden eagles use the Project site as well (Bell 2017a, b). The Project would reduce golden eagle foraging habitat in the region. Many other species of raptors, grassland birds and non-volant animals such as state and federally listed amphibians will impacted by the Project. The EIR should give full consideration of direct and indirect impacts to all potential animal and plant species occurring in the region.

3. Given direct impacts to volant animals, the EIR should include an avian and bat fatality monitoring plan to assess volant animal mortality resulting from interaction with the Project's infrastructure, similar to fatality studies that have been developed for wind projects in the Altamont Pass Wind Resource Area (APWRA) and that are reviewed by the County's Technical Advisory Committee.

Thank you for this opportunity to comment on the Notice of Preparation and Notice of Scoping Meeting for an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project, County Planning Applications PLN2017-00174 and PLN2018-00117.

Sincerely yours,

Douglas A Bell

Douglas A. Bell, Ph.D.
Wildlife Program Manager

dbell@ebparks.org

Literature Cited

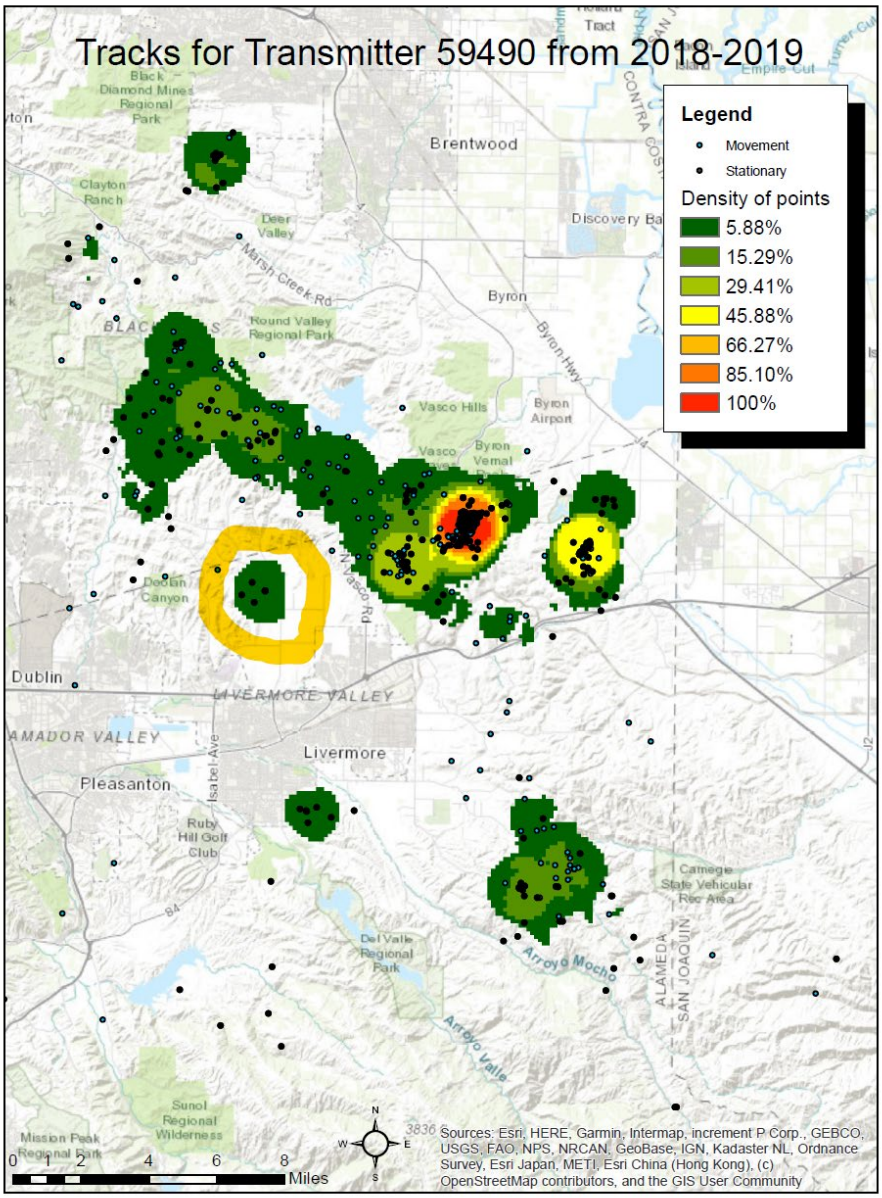
Bell, D. A. 2017a. GPS Satellite Tracking of Golden Eagles (*Aquila chrysaetos*) in the Altamont Pass Wind Resource Area (APWRA) and the Diablo Range: Final Report for Phases 1 and 2 of the NextEra Energy Settlement Agreement. Main Report - Active Birds. East Bay Regional Park District, Oakland, California.

Bell, D. A. 2017b. GPS Satellite Tracking of Golden Eagles (*Aquila chrysaetos*) in the Altamont Pass Wind Resource Area (APWRA) and the Diablo Range: Final Report for Phases 1 and 2 of the NextEra Energy Settlement Agreement. Supplement - Inactive Birds. East Bay Regional Park District, Oakland, California.

Dwyer, J. F., Landon, M.A., and E. K. Mojica. 2018. Impact of renewable energy sources on birds of prey. Pp. 303-321 *In* J. H. Sarasola, J. M Grande, J.J. Negor (eds). Birds of Prey: Biology and conservation in the XXI Century. Springer International Publishing AG, Berlin.

Hernandez R.R., Easter S.B., Murphy-Mariscal M.L., et al. 2014. Environmental impacts of utility-scale solar energy. Renew Sustain Energy Rev 29:766–779.

Figure 1. Density of location points of an adult golden eagle outfitted with satellite transmitter #59490. Note overlap of density points with the Project's footprint, as roughly highlighted in the yellow ring. Unpublished data, EBRPD.



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

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

May 27, 2020

Mr. Andrew Young, Planner
Alameda County Community Development Department
224 West Winton, Room 111
Hayward, CA 94544
andrew.young@acgov.org

Subject: Aramis Solar Energy Generation and Storage Project PLN2017-00174, Notice of Preparation of an Environmental Impact Report, SCH #2020059008, Alameda County

Dear Mr. Young:

The California Department of Fish and Wildlife (CDFW) has reviewed Alameda County's (County) Notice of Preparation (NOP) for an Environmental Impact Report (EIR) for Aramis Solar Energy Generation and Storage Project (Project). The Project is an application for a Conditional Use Permit (CUP) to allow construction of a solar energy production (up to 100 megawatts, or MW) facility with associated battery storage using photovoltaic panels over a mostly contiguous 533-acre site (of which 350 acres would be developed as part of the Project) . The purpose of the EIR will be to evaluate the specific environmental effects of the Project as proposed by IP Aramis, LLC, a subsidiary of Intersect Power, LLC (Aramis).

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

CDFW ROLE

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

REGULATORY REQUIREMENTS

California Endangered Species Act
Please be advised that a CESA Permit must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the

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Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

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

Lake and Streambed Alteration
CDFW requires an LSA Notification, pursuant to Fish and Game Code section1600 et. seq., for Project activities affecting lakes or streams and associated riparian habitat. Notification is required for any activity that may substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW will consider the CEQA document for the Project and may issue an LSA Agreement. CDFW may not execute the final LSA Agreement [or Incidental Take Permit (ITP)] until it has complied with CEQA as a Responsible Agency.

PROJECT DESCRIPTION SUMMARY

Proponent: IP Aramis, LLC, a subsidiary of Intersect Power, LLC

Description and Location: The Project includes construction and operation of a mixed-use renewable energy project using photovoltaic panels capable of generating, storing, and dispatching clean energy on up to 539 acres located in unincorporated Alameda County in the North Livermore area. The site is composed of large portions of four privately-owned parcels in the unincorporated North Livermore area of Alameda County, approximately 2.25 miles north of the Livermore city limits and Interstate 580.

The largest parcel (536 acres) bears the address of 1815 Manning Road (903-0006-001-02) and lies directly west of North Livermore Avenue and south of Manning Road where these roads terminate at an L-intersection with each other. Approximately 350 acres of this large parcel is proposed for Project development; an estimated 150 acres to the northwestern is moderately to steeply sloped, and is proposed to be subdivided to legally separate it from the real property affiliated with the proposed Project development. Another estimated 36 acres of this parcel is not suitable for development of Project uses and is thus not included in the overall Project development area. To the south of this parcel is the roughly 101-acre Stanley Ranch at 4400 North Livermore Avenue (APN 903-0006-003-07), of which about 30 acres would be used for the Project. The remainder of the Ranch is used for intensive crop production, some residences and other agricultural operations and structures.

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The NOP, p. 5, states, that Aramis has designed the facility such that all structures are proposed to be placed outside of the 100-year floodplain of Cayetano Creek as determined through hydrologic modeling, outside areas designated Water Management in the East County Area Plan, and no closer than 50 feet from the banks of Cayetano Creek or its tributaries as determined by a qualified biologist.

The NOP also states that Aramis proposes, as a part of the large parcel subdivision, to offer dedication of an easement to Alameda County (or the Livermore Parks and Recreation District, which manages open space and trail development in conjunction with the East Bay Regional Park District) for use as a public hiking trail along Cayetano Creek outside of the Project's development footprint.

COMMENTS AND RECOMMENDATIONS

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

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

In addition, although avian interactions with photovoltaic facilities are not well researched, the primary threats appear to be from collisions and electrocutions. Collisions with photovoltaic equipment can include direct collisions into guy wires or transmission lines. Other collisions are less understood such as the "lake effect", first described in Horvath et al. (2009). Utility-scale photovoltaic facilities may attract migrating waterfowl and shorebirds through the "lake effect", where birds and/or insects can mistake a reflective solar facility for a water body and collide with the structures as they attempt to land on the panels. Injuries from collisions with collectors/reflectors may result in immediate death due to fatal blunt trauma (Kagan et al. 2014), or stranding. Stranding can occur when an individual is injured by collision impact and is unable to take off or when they require a running start on the water's surface. The EIR should include measures to reduce the risks of avian collisions such as adding special patterns to the photovoltaic panels.

Linear features such as generator-tie lines, collector lines, and interior and perimeter fences present collision hazard to birds, and electric lines represent a potential electrocution hazard (Huso, et al. 2016). The EIR should include measures that require all powerlines to be placed

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underground, if feasible. All aboveground lines should be fitted with bird flight diverters or visibility enhancement devices. When lines cannot be placed underground, appropriate avian protection designs should be employed. As a minimum requirement, the collection system should conform with the most current edition of the Avian Power Line Interaction Committee guidelines to prevent electrocutions.

The EIR should include a requirement for weekly or twice-weekly avian mortality surveys to meet the following objectives:

- Estimate the total number of birds and bats killed at the Project site within a specified time period.
- Determine whether there are spatial or temporal/seasonal patterns of total bird fatality.
- Evaluate species composition and which taxonomic groups may be at risk.
- Provide results that allow comparisons with other solar sites and to evaluate changes in fatality due to adaptive management.

The EIR should include a requirement to develop an Avian and Bat Protection Plan or Bird and Bat Conservation Strategy (BBCS) in coordination with the U.S. Fish and Wildlife Service (USFWS) and CDFW. The purpose of the BBCS is to:

- Describe baseline conditions for bird and bat species present within the Project site, including results of site-specific surveys;
- Assess potential risk to birds and bats based on the proposed activities
- Specify conservation measures that will be employed to avoid, minimize, and/or mitigate any potential adverse effects to these species;
- Describe the incidental monitoring and reporting that will take place during construction; and provide details for post-construction monitoring; and specify the adaptive management process that will be used to address potential adverse effects on avian and bat species.

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

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

California red-legged frog
The Project Description in the NOP includes avoidance and minimization measures for California red-legged frog, but provides no mitigation for loss of habitat. The avoidance and minimization measures include pre-construction surveys to ensure that California red-legged frog is "not actively using the project site as a dispersal corridor" by surveying all suitable aquatic habitat on the Project site. California red-legged frog are not limited to use of aquatic habitat. The USFWS Recovery Plan for California Red-Legged Frog (USFWS 2002) beginning on p. 12 describes a variety of habitats used by the California red-legged frog such as upland areas used as important dispersal, estivation and summer habitat for this species. During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. They have been observed to make long-distance movements (up to 1.7 miles) that are straight-line, point to point migrations rather than using corridors for moving in between habitats. California red-legged frog are also known to use small mammal burrows and moist leaf litter as refuge (USFWS 2002). Because the actual movement patterns of California red-legged frog are generally not known and there are known occurrences of California red-legged frog on adjacent lands, the entire Project site should be considered suitable habitat for the species. Given their wide variety of habitat usage during different times of the year, it is highly unlikely all California red-legged frogs would be located during pre-constructions surveys. The EIR should therefore assume presence and, in addition to including avoidance and minimization measures, should include compensatory mitigation for loss of suitable California red-legged frog habitat in accordance with the EACCS for California Red-legged frog section 3.5.3.5.

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

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

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

The EIR should also include measures to avoid or minimize loss of burrowing owl foraging habitat, and mitigation for loss of habitat that cannot be fully avoided. The EACCS Mitigation Guidance (p.3-66) for burrowing owl recommends mitigating the loss of habitat by protecting habitat in accordance with the mitigation guidelines outlined in Table 3-10 (BUOW-3) through acquiring parcels, through fee title purchase or conservation easement, where known nesting sites occur or where nesting sites have occurred in the previous three nesting seasons (BUOW-1 and BUOW-2).

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

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

Pollinators
The EIR should include measures to increase use by pollinators such as dual use farming. The Project should be designed to optimize a balance between electrical generation and agricultural

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production (Jossi 2018) or native plants. Solar sites can be planted with deep-rooted native flowers and grasses that capture and filter storm water, build topsoil, and provide abundant and healthy food for bees and other insects that provide critical services to our food and agricultural systems as described on the Fresh Energy website at https://fresh-energy.org/beeslovesolar/.

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 and Game Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

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

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

Sincerely,

DocuSigned by:
Gregg Erickson
BE74D4C93C604EA...

Gregg Erickson
Regional Manager
Bay Delta Region

cc: State Clearinghouse, SCH# 2018092012
Ryan Olah, U.S. Fish and Wildlife Service – Ryan_Olah@fws.gov

REFERENCES

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

Horvath, G., Kriska, G., Malik, P., and Roberston, B.. 2009. Polarized light pollution—A new kind of ecological photopollution: Frontiers in Ecology and the Environment, v. 7, p. 317–325.

Huso, Manuela, Dietsch, Thomas, and Nicolai, Chris, 2016, Mortality monitoring design for utility-scale solar power facilities: U.S. Geological Survey Open-File Report 2016-1087, 44 p., http://dx.doi.org/10.3133/ofr20161087.

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Jossi, Frank. 2008. Scientific American. Solar Farms Produce Power—and Food. Retrieved on May 21, 2020 from https://www.scientificamerican.com/article/solar-farms-produce-power-and-food/

Kagan, R.A., Viner, T.C., Trail, P.W., and Espinoza, E.O., 2014, Avian mortality at solar energy facilities in Southern California—A preliminary analysis: National Fish and Wildlife Forensics Laboratory. Available from http://alternativeenergy.procon.org/sourcefiles/avian-mortality-solarenergy-ivanpah-apr-2014.pdf.

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

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

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

June 3, 2020

To: Andrew Young, Planner
Alameda County Community Development Agency, Planning Department

From: James & Maria De Luz, 4270 N Livermore Ave., Livermore, CA 94551
(510) 468-6341, mdeluz14@yahoo.com

Re: Concerns with proposed Aramis Solar Energy Generation & Storage Project

The Aramis Solar Energy Generation & Storage Project (Aramis Project) being proposed by Intersect Power is located adjacent to our property located at 4270 N. Livermore Ave. In response to the Scoping Meeting for the Environmental Impact Report (EIR) of May 28, 2020, we have the following concerns and questions regarding the proposed Aramis Project:

1. The access road to our home and property, bridge (over Cayetano Creek) and gate located at 4270 N. Livermore Ave. (access road granted by right of easement in perpetuity) border the southern limitations of the proposed Aramis Project location, and a portion of our north property line is coincident to the southerly limit of the Aramis Project. We share responsibility for the maintenance of the road, bridge and gate with the owners of the Stanley Ranch. Below are our concerns on these topics:
    a. Given that our road is the only existing access road at the southern border of the proposed Aramis Project, and is a shared road with the Stanley Ranch and our property, we are concerned that it may become an access road for ingress and egress to the project site. If that is the case, will Intersect Power be responsible for the maintenance costs of the road, bridge and gate?
    b. Will Intersect Power need to use our road for construction and the operation of the Aramis solar facility and any other related uses of the site? For example, will heavy construction equipment/vehicles, maintenance equipment, emergency vehicles, Aramis Project employees, and any type of possible public access use our road for ingress and egress? This will potentially cause tremendous damage and great expense to maintain the road in a usable, all-weather condition.
    c. Will our road be used for possible emergency vehicle access, i.e., the State Division of Forestry (Cal Fire requirements/operation procedures), law enforcement access, and any other related similar activities, both during construction and after the project is completed?
    d. If the road is used as described above (items a, b, c) will Intersect Power be responsible for the maintenance and repair of the bridge over Cayetano Creek? This bridge is located on our road and will be affected by any increased use beyond what exists now.
    e. A section of our northern property line abuts the southerly portion of the Aramis Project. We have installed a new cattle fence on our property lines within the last year and the fence is solely owned by us. Our fence is a cattle fence and not meant for any security needs that may be necessary for a solar project. Will security fencing be a requirement of the project? If so, Intersect Power must install any type of security fencing where necessary and shall be solely responsible for the maintenance.
    f. Our gate is a locked security gate used solely by ourselves and the Stanley Ranch as needed for access to their barn and land, and we are responsible for its maintenance and operation. Our gate is locked and the access code is not shared with the public. We have great concerns about our gate being used by Intersect Power employees for the Aramis Project and by the general public. This will not only increase the necessity of additional maintenance on the gate, but will negatively affect the security of our home and property.

2. Our concerns regarding storm water drainage from the Aramis Project site, and the possible effect on potability of ground water quality are as follows:
    a. The Aramis Project will create a disproportional increase in water runoff, created by the installation of solar panels over such a large area. The panels are impermeable and the runoff water must discharge into the existing culvert system along North Livermore Ave., which will substantially increase water flow rates. The increased water volume will negatively impact the existing system that can no longer handle storm water along North Livermore Ave. This in turn causes the existing culverted driveways to become impassable during winter storms. That, along with the County Road Department Maintenance System's inability to maintain open culverts and piped driveway culverts causes multiple failures every year during winter storms. This huge increase in water flow will only exacerbate drainage problems that affect property owners along North Livermore Ave.
    b. Ground water may be affected due to the huge quantities of water needed to maintain the solar panels. The amount of water combined with the cleaning agents will have nowhere else to go but to percolate into the existing ground water system, which may affect water potability of any existing or new wells in the area.

3. The water for our property (house and land) is provided from a well located on the Stanley Ranch and piped to our property for which we pay a monthly fee. We are greatly concerned that our water will be affected in some way:
    a. How shall we be assured that our water supply will not be interrupted during construction and after the solar project begins operation? What provisions, if any, are under consideration by Intersect Power at this time regarding water conveyance systems and assurance of water during the life of the Aramis Project?
    b. How shall any possible maintenance issues be addressed in the future and shall provisions be provided for unobstructed maintenance and repair work between the well on the Stanley Ranch and our home?
    c. If water conveyance piping must be relocated, shall provisions within the project development provide for pipe relocation and maintenance?
    d. Will provisions for conveyance of water to our property be included in the project? As a requirement of the project approval will easements or non-buildable corridors designated to insure that access for water conveyance and for maintenance purposes shall be unobstructed within the approved project area for the life of the project?

4. We have concerns regarding parking, vehicular access, lighting, dust control and site security during the construction of the Aramis Project and after project completion:
    a. Where will employee and visitor parking be located within the project site and how will it be accessed?
    b. Where will the points of vehicular and construction equipment access be located within the project site?
    c. Will there be a detailed lighting plan provided which shall indicate the location of any residences or other sources sensitive to night lighting?
    d. It is indicated in the material supplied by Intersect Power for the Aramis Project, that the project will provide 400 jobs during construction. The required parking for a project for that size will require a temporary or permanent lighting and drainage plan. How will this be addressed by Intersect Power? Will an all-weather surface material, either permanent or temporary, be provided for the employees during the project construction? Where will the drainage drain to within the temporary parking area?
    e. Will dust control be provided within the temporary parking area and within any areas that must be graded or filled to reduce/control dust and any other airborne particulates?

5. In material provided by Intersect Power for the Aramis Project, a proposed Hiking and Recreation trail is indicated west of Cayetano Creek. Our property at 4270 N. Livermore Ave., is located directly west of Cayetano Creek.
    a. With the information provided, there is no indication of either a pedestrian or vehicular access to the creek trail, nor is there any indication of parking or recreational facilities within the public access area. We request additional information to better review the impact the hiking and related uses will have on our property, such as crop planting, livestock grazing, fencing, access, and how security will be handled in this secluded area, eight tenths of a mile west of North Livermore Ave.
    b. To better analyze this proposed hiking and recreation trail, we ask that a comprehensive plan of the trail proposal and all other related infrastructure be prepared by the East Bay Regional Park District indicating the hiking trails within their jurisdiction that relate to the proposed Cayetano Creek hiking and recreation area. This should include the area of eastern Alameda County where detailed information has been compiled regarding trail locations, picnic areas, and related recreational facilities such as rest rooms and overnight camping areas.
    c. In order to access the hiking/recreation trail area, we assume there must be a staging area (or areas) and parking facilities. As previously stated in item a above, how will this affect our property?

Young, Andrew, CDA

From: Maria De Luz <mdeluz14@yahoo.com>
Sent: Friday, June 5, 2020 1:15 PM
To: Marisa Mitchell; Young, Andrew, CDA
Subject: Water Well Agreement for Our Property

Hello Marisa & Andrew,

Please consider this email as an addendum to our previous discussions about the well and water conveyance to our property at 4270 N Livermore Ave, and to comments submitted in response to the scoping meeting for the draft EIR about the Aramis Solar Energy Generation & Storage Project (Aramis Project).

The Easement Agreement between Richard Stanley and Mary Street (previous owner of 4270 N Livermore Ave) included a Water Well Agreement which allowed Mrs. Street to drill a well within or up to 300 feet from the property line into the Stanley Ranch parcel. If a viable source of water was not achieved, then water would be provided by the owners of the Stanley Ranch in exchange for a monthly fee. A viable well was not achieved by Mrs. Street and the water source and water conveyance provided by the Stanley Ranch is what we continue to have in place for our property.

When we purchased the property, the Water Well Agreement and other easements "came with the property". Conversations with Mr. Richard Stanley and review of the original Easement Agreement documentation have confirmed that we are legally entitled to pursue drilling a well at any time within the described parameters of the agreement. This is an improvement we plan to pursue in the future.

We are concerned that the footprint of the Aramis Project will make it impossible to drill a well within the above described parameters of the Water Well Agreement in our Easement Agreement. How will this be addressed in the plan so that our legal water options are not restricted and/or compromised in the future?

Regards,
Jim and Maria De Luz

**** This email was sent from an external source. If you do not know the sender, do not click on links or attachments. ****

Young, Andrew, CDA

From: Lauren de Vore <ldv9600@gmail.com>
Sent: Tuesday, June 2, 2020 7:19 PM
To: Young, Andrew, CDA
Subject: Opposition to Aramis and SunWalker Energy projects in north Livermore

Andrew Young
Senior Planner
Alameda County Planning Department

I am writing to express my strong opposition to the Aramis and SunWalker Energy solar projects that have been proposed for parcels on North Livermore Avenue. While I recognize the state's and the county's need for more renewable energy, I believe the scope and scale of these projects makes them unsuitable for their proposed location. The parcels involved are prime agricultural land, land that residents of Livermore have repeatedly voted (over the past 40 years) to preserve for agriculture. The projects are in conflict with the recently voter-approved Measure D development restrictions. They are also contrary to the Save Agriculture and Open Space Lands Initiative and the Scenic Route element of the General Plan. The proposed projects, with their enormous number of solar panels, 100-foot-high overhead lines, large battery storage buildings, perimeter fencing and other related structures, will drastically disturb the natural habitat and native wildlife, which includes a number of threatened/endangered species. It will render the land permanently unusable for future agricultural use. It will also completely and negatively alter the visual aesthetics and rural character of the area and thereby depreciate the value of nearby properties. If these facilities were built, they would increase the traffic load on already-overcrowded county roads that were never built to carry heavy trucks or intended to serve as commute routes. Compounding my concerns is the fact that this land is very fire-prone, and projects involving large concentrations of electrical equipment and the storage of large numbers of batteries pose major fire hazards (and the likelihood of toxic contamination as a result of a fire). Although the land proposed for these projects is rural, it is not remote and thus will be an eyesore for those who lives nearby and everyone who drives, bicycles, walks or runs along North Livermore Avenue, May School Road, and Manning Road. I urge you to reject the North Livermore Valley for the location of these (and any other such) projects.

Sincerely,
Lauren de Vore
40+ year resident of Livermore

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Young, Andrew, CDA

From: Emile Meylan <emeylan@sercotech.com>
Sent: Friday, June 5, 2020 12:59 PM
To: Young, Andrew, CDA
Cc: Marjie Kosic; Brenda Morris; Cheryl Johnson
Subject: Aramis project
Attachments: view.jpg; emeylan.vcf

Dear Andrew,

I live on Morgan Territory Road just above Manning road.

I do not agree with this project. This is in conflict with approved Measure D development restrictions, the Save Agriculture and Open Space Lands Initiative and Scenic Route element of the General Plan. Not only will these projects destroy wildlife and use valuable resources these facilities "will significantly change the visual character of the area and exacerbate the loss of agriculture in the county as farmland is supplanted by solar panels.

We pay a lot of money to live here because the plan from the County was to save agriculture, and now you want to destroy it.

My family and I are 100% against this project.

There are a lot of ground and space in California to do this, and there is no reason to choose the Bay Area which is already over crowded.

Best regards,

--
Emile Meylan
12520 Morgan Territory Road
Livermore, CA 94550

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CALIFORNIA
NATIVE PLANT SOCIETY
East Bay Chapter, www.ebcnps.org
PO Box 5597, Elmwood Station, Berkeley, CA 94705

June 4, 2020

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, California 94544 Via e-mail: andrew.young@acgov.org

RE: Notice of Preparation (NOP) for the proposed Aramis Solar Energy Generation and Storage Project

Dear Mr. Young,

The California Native Plant Society East Bay Chapter (EBCNPS) appreciates the opportunity to comment on the Notice of Preparation of an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project.

The California Native Plant Society is a statewide non-profit organization that works to protect California's native plant heritage and preserve it for future generations. The Society's mission is to increase the understanding and appreciation of California's native plants and to preserve them in their natural habitat. We promote native plant appreciation, research, education, and conservation through our five statewide programs and 33 regional chapters in California. The East Bay Chapter covers Alameda and Contra Costa Counties and represents some 1,000 members.

In line with our mission to support conservation of California's native plant species and habitats, CNPS submits the following comments and recommendations:

1. The EIR should include well-timed, comprehensive, and floristic surveys of special status plants, locally rare plants, and sensitive natural plant communities within the project area:

The EIR should include well-timed, comprehensive floristic surveys for special status plants, locally rare plants, and Sensitive Natural Communities following CDFW botanical survey protocols.[1] Surveys should cover all 4 parcels within the total 580 acre project area since areas outside of the direct construction impacts may be subject to construction staging, storage, or other future uses.

Consistent with CDFW protocols, the locations of special status, locally rare, and sensitive natural plant communities should be clearly marked on a project area map.

[1] Protocols for Surveying and Evaluating Impacts toSpecial Status Native Plant Populations and Sensitive Natural Communities, California Department of Fish and Wildlife, March 20, 2018

2. The proposed Project should address environmental impacts to land use and planning.

The EIR should describe the proposed Project's compliance with the County General Plan and associated land use plans and ordinances, especially since the project area is designated specifically for Large Parcel Agriculture (LPA), Resource Management (RM), and Water Management (WM) uses. This section should also identify any land use conflicts associated with the Project's proximity to adjacent land uses.

The "East County Area Plan" (as amended by Alameda County Initiative Measure D) includes several policy statements that express the intent of the LPA, RM and WM land uses. For LPA designations the County shall give priority to agriculture and agricultural support and visitor services.[2] Policy 51 states that "The County shall work with East County cities to preserve a continuous open space system outside the Urban Growth Boundary with priority given to the permanent protection of the Resource Management area between Dublin and North Livermore and the area north of the Urban Growth Boundary in North Livermore, as established through Program 19." Policy 53 states that "the County shall preserve a continuous band of open space consisting of a variety of plant communities and wildlife habitats to provide comprehensive, rather than piecemeal, habitat conservation for all of East County. This open space should, as much as possible, be outside of the Urban Growth Boundary and contiguous to large open space areas of Contra Costa, Santa Clara, and San Joaquin Counties."

Further, the NOP states that, "the County does not generally consider utility-scale solar energy facilities to be compatible with the RM (Resource Management) land use designation and its emphasis on, in addition to agriculture, "recreational uses, habitat protection, watershed management, public and quasi-public uses", and its intent of preserving open space." The NOP also states that "the County considers the WM designation suited to established quarries with their-highly regulated reclamation plans and specialized permits, and not meant for large solar energy facilities."

The current Project alternative does not appear to conform to land use designations and planning policies for Large Parcel Agriculture. In addition, the NOP notes that the proposed Project would encroach into an estimated 23 acres at the northernmost portions of the northern two parcels designated as Resource Management land, and 18 acres of Water Management-designated land in the southern two parcels.

Please describe, analyze, and mitigate for the proposed Project's impacts on land use and planning, including the development of alternatives that significantly lessen these impacts.

3. The EIR needs to conform with goals and objectives of the Eastern Alameda Habitat Conservation Plan (EAHCP) and the East Bay Regional Conservation Investment Strategy (EBRCIS)

The project area lies within the Eastern Alameda Habitat Conservation Plan (EAHCP) and East Bay Regional Conservation Investment Strategy areas. As such, it should conform to the goals and objectives of each of these documents for native plants and natural habitats.[3] The EAHCP

[2] East County Area Plan, Alameda County Planning Department, Amended Nov. 2000 by Ala. County Initiative Measure D.
[3] Eastern Alameda Habitat Conservation Plan: http://eastalco-conservation.org/documents.html and East Bay Regional Conservation Investment Strategy: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=166109&inline

provides a comprehensive list of focal plant species that should be considered as part of the project analysis. The EBRCIS document provides extensive information on natural habitats, focal plant species and mitigation guidance.

4. The EIR needs to address cumulative impacts

The NOP describes the adjacent uses on the properties surrounding the proposed Project as a combination of agricultural, grazing, and very low-density residential. The NOP also mentions a second proposed solar project on the east side of North Livermore Avenue, north of May School Road, in an area that contains important plant and animal habitat partly in association with Cayetano Creek. According to CEQA Guideline § 15355 Cumulative Impacts: "Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." The EIR should fully describe, evaluate, and mitigate for cumulative impacts to the special-status plants, locally-rare plants, sensitive natural plant communities, and wildlife.

In addition, The EIR should describe, analyze, and specify mitigations for cumulative impacts from the siting of this proposed Project at this location, including, but not limited to: aesthetics, agricultural resources, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, and public services, recreation, and utilities.

5. The EIR should include alternatives and an analysis of alternatives, including siting energy production services to significantly lessen environmental impacts.

The proposed Project is intended to supply alternative energy and thereby reduce greenhouse gas emissions. However, the NOP states that the Project is proposed to be sited within an area that the citizens of Alameda County voted be dedicated to agriculture and its related support and visitor services and for specific resource and water management uses. According to CEQA Article 9 Guideline § 15126.6(a) "Consideration and Discussion of Alternatives to the Proposed Project," the EIR "shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."

Please develop and analyze a Project alternative or alternatives to obtain most of the basic objectives of this energy supply project and that would substantially lessen any of the significant effects, including alternative siting of the project.

Thank you for the opportunity to comment on the Environmental Impact Report Notice of Preparation for the Aramis Solar Energy Generation and Storage Project and for addressing these comments in the Environmental Impact Report.

Sincerely,

Jim Hanson, Chair, Conservation Committee

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, California 94544
E-mail: andrew.young@acgov.org

Public Comments on the scope of the Environmental Impact Report (EIR)

Thank you for giving the public the opportunity to comment on the scope of the EIR on the Aramis Solar proposal in North Livermore.

Please include the following for the scope of the Environmental Impact Report (EIR) of the Aramis Solar Energy Generation and Storage Project, CUP PLN2018-0017

Resource Management and Water Management areas
Study how both the Resource Management and Water Management areas might be affected by the building and operation of the project.

Protected Species
Study the effect on Endangered, Threatened and Sensitive species including, but not limited to, the California red-legged frog, California tiger salamander, burrowing owls, white-tailed kites, Livermore tarplant and Palmate bracted bird's beak on these and other north Livermore properties.

Cayetano Creek
The Cayetano Creek runs through the area. The flood plain must be protected. 100-year floods are coming more often. Will the panels affect the watershed of the creek? Study any effects the panels might have on the creek and the animals and plants that are affected by the creek.

Viewshed
The viewshed is very important in this scenic area. On a recent Wednesday morning, there were many bicyclists enjoying the countryside. The view of the area from the higher western part of Manning Road and from Morgan Territory Road will not be shielded by the proposed vegetation buffer. What effect will the 30- and 100-foot poles have on the scenic area?

Traffic
North Livermore Avenue is a two-lane road with bicycle lanes on both sides. Manning Road is two-lane with no bicycle lanes. Morgan Territory Road is essentially a single lane road with no bicycle lanes. This is dangerous with so many bicycles. This will especially be a problem during construction with the 400 construction workers traveling to the site.

Water
Study the source of the up to 50,000 gallons of water per day needed during the 5 - 9-month construction period. Evaluate the effect on the aquifer if from onsite. Evaluate the traffic impact if brought from offsite. Effect of water on the area including Cayetano Creek. Study the effect of the proposed annual cleaning of the panels.

Agriculture Value
Will the land maintain its agricultural value? The effect of the panels on the sunlight and rain for there to be sufficient forage to support sheep for continued agricultural use of the site.
The effects of the panels on the forage when they are at their varying angles following the sun from early morning through the day until late in the afternoon.

Williamson Act
Evaluate the proposed Project's compatibility with the Williamson Act Contract on the Stanley Property.

Hiking Trail
Give more details and study the environmental impact of a public hiking trail along Cayetano Creek including impact on the creek area itself and also additional traffic and parking.

Distribution Lines
Evaluate both overhead and underground voltage distribution lines.

Potential alternative
Consider a potential alternative of placing solar panels on rooftops and parking lots.

Lee Younker
Chair Friends of Livermore

FRIENDS OF OPEN SPACE AND VINEYARDS

June 4, 2020

VIA EMAIL
Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, California 94544
E-mail: andrew.young@acgov.org

Dear Mr. Young:

Friends of Open Space and Vineyards (FOV) is a non-profit organization, founded in 1985. Our mission is to protect and preserve the agricultural, viticultural and open space resources of the Tri-Valley. FOV requests that the County consider the following comments in response to the Notice of Preparation issued for the Aramis Solar Energy Generation and Storage Project / PLN2017-00174.

FOV supports the use of renewable energy, including solar, to reduce the use of fossil fuels and counter the affects on global warming. We also believe that we must be prudent in where these facilities are located. We do not believe that the proposed site is an appropriate location for these solar facilities.

The primary concern we have with this project is the loss of agricultural land. This area north of Livermore is one of the last open areas in Alameda County that can support agriculture. It is worth noting that according to the state department of Conservation statistics, between 1984 and 2016, over 16,000 acres of grazing land in Alameda County was converted to non-agricultural uses. Measure D was intended to mitigate this kind of loss of agriculture.

The purpose of enacting Measure D was to preserve agricultural land through restrictions imposed outside of the urban growth boundary. These restrictions were imposed by the citizens of Alameda County and have limited the footprint of development. The development of solar farms was not anticipated at the time Measure D was written. Measure D did allow utilities the use of corridors and the intent of the corridors was for moving

utility products from one point to another. It was not intended as a physical plant for generation or storage of electricity. At the time the common corridor use for electricity was high-voltage power lines which have crisscrossed the valley for decades. This corridor use for generating and storing electricity is more industrial in nature than transitioning a corridor. This is contrary to the intent of Measure D. Indeed, Measure D, which amended the former East County Area Plan (ECAP), specifically deleted language from the ECAP that permitted “other industrial uses appropriate for remote areas and determined to be compatible with agriculture”. This change indicates that a land use such as a utility-scale solar energy facility was not contemplated under Measure D.

We would therefore request that the Environmental Impact Report for the Aramis Project analyze the cumulative impacts of the loss of agricultural land due to the proposed project and other planned and future potential projects, including, but not limited to, the Livermore Community Solar Farm. There is a concern that continued placement of non-agricultural uses in North Livermore will harm the future potential of the agricultural economy of the area, causing fewer ranchers to continue their operations. This is of particular concern where the area is a prime candidate for agritourism due to the presence of open space, the Livermore Wine Country, and outdoor recreational opportunities in the area. The loss of agricultural land diminishes the potential for growth of agritourism in the Livermore area.

The EIR should address the presence of rare or special status plants within the project site, and mitigation measures to protect those identified. This should include locally identified rare plant species as well as those that are recognized as Federal, State, and CNPS statewide special status plants. Analysis of the environmental impacts of the change from cattle to sheep grazing on the proposed project site should also be addressed. Sheep graze closer to the ground than cows, and the EIR should analyze the impacts of sheep grazing on any special status and rare plants which may be found on the project site.

As to other biological impacts, the Aramis Updated Project Description discusses mitigation measures to be implemented during the construction phase of the project for protection of California Red Legged Frog (CRLF) which is known to have dispersal habitat in the area. The EIR should also discuss environmental impacts and potential mitigation for protection of the CRLF during the operation phase of the project in addition to the construction phase. The East Alameda County Conservation Strategy (EACCS) should be discussed in conjunction with the analysis of the impacts during both the construction and operational phases of the project.

Cumulative impacts of the proposed project on identified biological species, both plant and animal, should be considered in light of the potential for other solar projects to be located in North Livermore, including, but not limited to the pending application for the Livermore Community Solar Farm.

The aesthetics analysis described in the Notice of Preparation should address the affect of the project on scenic vistas both at ground level in terms of screening as well as the impact on the view-shed of the surrounding area. Cumulative impacts of this and future solar projects should also be addressed due to the potentially drastic change of the landscape and aesthetic qualities of the area.

With respect to project alternatives, in addition to a no-project alternative, FOV recommends that the EIR address the potential for locating solar facilities outside of agricultural land in North Livermore, particularly focusing on urban settings in the area that would allow for the placement of solar.

We reiterate that this is not an appropriate location for a solar power plant. It seems that the county is attempting to circumvent the intent of Measure D for this application. First the county declared that solar projects are the equivalent of wind farms. They are not. The footprint of a wind farm is far different from a solar field. The affects on absorption of rainfall, the amount of vegetation that will grow are obviously fundamentally different. We submit that the only similarity is that both produce renewable energy. That is far from being equivalent. We understand the county's desire to promote the building of these types of solar fields. We can understand that the operational efficiency and cost savings with its proximity to the electrical power stations and the flat terrain at this location make it desirable. That does not alter the fact that we believe the footprint will far exceed that allowed by the Measure D FAR.

We believe this single project is in violation of the Measure D constraints but have concerns beyond this project. We are aware of the pending application for the Livermore Community Solar Farm for which a DEIR was recently issued. We believe there are at least two other proposals that are in process but not as mature. If this project is approved, in the absence of an overall guiding policy, we believe it is likely that subsequent large projects will come forward and be approved since this approval will provide a precedent. This approval will indicate that: a) solar farms are equivalent to wind-farms; b) there is not substantial harm to deny them, c) since there is no policy to adhere to, the solar companies have nothing to be in violation of; d) given the severe need to replace fossil fuel energy generation, more the better. We believe that this can easily result in virtually all of the flat area north of I-580 being used for solar farms.

If North Livermore is going to become a center for solar power generation in the near future, then it is necessary to consider the implications of all such development. Under the California Environmental Quality Act (CEQA), projects having such broad long-term impacts cannot be considered on a piecemeal-basis. The current application should not be approved without consideration of the environmental impacts of additional solar development in North Livermore.

It is especially important that Alameda County not approve individual solar power generating plants without first developing a comprehensive policy for solar development that takes Measure D requirements into account. Yes, we believe in renewable energy but we need to make sure we locate it where is makes sense and does not substantially diminish our other core values.

We thank you for the opportunity to comment on the proposed project.

Sincerely,



Tamara Reus
President

To: **Andrew Young, Senior Planner, Alameda County;**
Scott Haggerty, Supervisor; Shawn Wilson, Chief of Staff
From: **Carol Gerich, North Livermore resident**
Subject: **Proposal by Aramis Solar Energy regarding PLN20128-00117**
Date: **June 6, 2020**

As a 33-year resident of Morgan Territory Road and an over 50-year resident of Livermore, I am writing to protest the audacity of Aramis Solar Energy to propose an immense **"Sea of Solar"** in our beautiful North Livermore Valley. I strongly urge you to deny their application.

The view along North Livermore Road, which serves as the major corridor in this area, is along exceptionally beautiful rural scenery, dotted with majestic oaks and backed by stately Mount Diablo. The Aramis proposal would destroy this lovely rural scenery, threaten its many wildlife, add noise and construction, and erase the calming views.

In 1993, through Measure D, residents of Alameda County soundly defeated a proposal by Pardee Homes to fill this target area with homes. Yet, this unpopulated piece of land is still **catnip** to the developers. Now we have an Oregon company ready to fill the almost-1000 acres with shiny, boxy black solar panels. A real contrast to the lovely rural scenery colored in restful natural shades of green and blue.

This project would not benefit many (25,000) and maybe not even local residents—instead primarily others who live outside the Valley. The solar sea of panels would be ugly. It would not provide more needed agriculture. It would not protect Cayetano Creek and the wildlife that depends on its water. It would not be ecologically friendly—just a way to produce more power for more outside residents. While there is a local landowner, Gene Broadman, behind this project, he is not a climate change advocate but truly a developer wanting to make Big Money again.

I believe in solar. I believe in its ability to provide clean, inexpensive energy. But please do not forget the North Livermore rural residents who will gain little and lose huge!

We have already been saddled with approvals for **three cannabis farms** in the very same northern end of our rural Valley. Plus a huge **cell-phone tower** still looms. Please find another location that does not threaten our scenic area and place an unfair burden on the same long-time rural community members.

Thank you,
Carol Gerich
12885 Morgan Territory Road
Livermore, CA 94551

To: Andrew, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, CA 94544

From: Nancy Howe
4767 Bel Roma Rd
Livermore, CA 94551

Date: June 5, 2020.

Subject: Written Comments for NOP of Environmental Impact Report Aramis Solar Energy Generation and Storage Project Planning Application
PLN2017-00117

I am writing in comments on behalf of my husband Greg Howe and I. We live on 4767 Bel Roma Rd, our land includes an orchard of over 50 mature walnut trees, a well-established Pinot Syrah vineyard, apple trees, pear trees, plum trees, concord grapes, fig trees. It is also home to a variety of wildlife including wild owls that actively hunt the area and reside in owl boxes we had made to further promote a harmonious connection to the preservation of nature and the environment. We do not spray herbicides or pesticides for this matter. We use alternative means including but not limited to using beneficial nematodes, vinegar for weed abatement as well as regular rototilling and manual removal of obnoxious plants.

It is very concerning that as a young couple, we decided to parallel Alameda County's commitment to wildlife and open space, investing in improving land for wildlife, utilizing alternatives that can at times be less than convenient. As well as promoting a means of agriculture that is self-sustainable, creating an eco-system to aid in the process, while the county decides to take such a lax approach to the projected plan. It does not only lie on us to preserve the future from land being developed for something other than open space, it is also the county's responsibility stemming from multiple voter approved funds indicating the strong desire to keep Alameda County in direct relationship with the protection of agricultural lands and wildlife.

We have a variety of issues that arise with the promoted Aramis Solar Project.

AESTHETICS

The proposed chain link fence surrounding the area of May School Rd and N Livermore Ave, covered in vines is not only indicant that the proposed plan did not sufficiently survey the area to mitigate risks but also calls into question how this parallels the advice of the Alameda County Vector Control, which states that, 'Roof rats are found throughout Alameda County, especially in suburban areas. They are nocturnal like other rats, but have a unique preference for heights. They have a sense of security traveling on utility lines, tree branches, fence tops, etc. They nest in dense vegetation such as the tops of palm trees or vines and are the most common rodent species found in attics. The population density and their range of travel is determined by the amount of available food in the area. They normally forage in a 100 to 200 foot radius. In the wild rats eat vegetables, fruit, nuts, seeds, snails and cereal grains.[1]'

I find it concerning that an entire section encroaching our surrounding area will be covered in vines that will no doubt be a host to a variety of rats nests. This area already being the subject to pests because of an array of vegetation. It is irresponsible to try to mitigate an issue by implying that vines on a chain link fence can possibly be a good idea. Furthermore, if the project were to propose mitigation in the form of rodenticide[2] this would further be detrimental to the wildlife currently existing. Like the owls that depend on them for their food source. Some of them currently being on the endangered species list. The California Department of Fish and Wildlife also echo my sentiments on using prevention as the most effective rodent control stating, 'The most effective rodent control program uses exclusion techniques (sealing the places where rodents enter your home) and sanitation (removing plants and objects that attract rodents and potential habitat such as ivy or wood piles'[3]

I URGE you to please reconsider your proposed plan for these reasons stated.

HYDROLOGY/GROUND WATER

Another concern I have with this project is the risk of irreparable damage to our already compromised groundwater. While the projects states that this is a minor area of concern, I implore you to carefully evaluate the risks within the project. According to a United States Geological Survey 'scientists conclude that there is a 70% probability of at least one magnitude 6.7 or greater quake, capable of causing widespread damage, striking the San Francisco Bay

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[1] https://acvcsd.org/programs-services/rodents/roof-rat/

[2] https://wildlife.ca.gov/Living-with-Wildlife/Rodenticides

[3] https://wildlife.ca.gov/Living-with-Wildlife/Rodenticides#2206098-can-i-control-rodent-pests-without-using-poison-baits

region before 2030'[4]. IF you look into the proposed plan site, and with reference to the Association of Bay Area Governments, you will see that the proposed project site will be subject to VERY HIGH shaking amplification.[5] In the event of a magnitude 6.8 earthquake on the Northern Calaveras Fault, the site would be subject to VERY STRONG shaking intensity.[6] In the event of a 6.9 magnitude earthquake on the Greenville Fault, the site would be subject to VIOLENT shaking intensity. I find it very concerning that the proposed project gave very little risk to damaged panels from inclement weather. North Livermore being in area of high winds, risk of quakes and wildfires. Chemicals from solar panels can leech out and contaminate ground via fire damage. A report from the U.S Department of Energy, Office of Scientific and Technical Information states that, 'In commercial-scale applications, the risk may be larger because of the quantities of materials present and the increased probability of a fire occurring'[7]. This region is already subject and at present risk to brushfires and wildfires. With a singular groundwater source, is the county outweighing the risk to our livelihoods over the temporary lease of open space land for the purpose of economic gain and not the preservation of open space which is quickly diminishing in the Alameda County area?

PRESERVATION OF AGRICULTURAL/OPEN SPACE

A proposed policy from Alameda County dating 2011, stated that, 'Unlike urbanized land, undeveloped lands in the rural areas of Alameda County have numerous inherent natural resource and agricultural values; and soil productivity and prime agricultural land, biological resources, open space visual values, watershed and natural landforms are generally important in this area. These types of resources are vulnerable to development, and construction of large-scale solar energy facilities, the kind that can produce large amounts of energy for general supply to the electrical grid, would utilize large amounts of land that frequently bear one or more of these valuable characteristics. The impacts associated with larger facilities may result in unavoidable adverse impacts for years to come as hundreds of acres become unavailable for other uses important to East County residents, such as for agriculture and natural resource protection.'[8]

While the need for cleaner energy is very much needed. More insight needs to happen on large scale solar facilities to ensure that Alameda County is not rushing into something that can be detrimental to the future of our wildlife/open space.

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[4] https://pubs.usgs.gov/fs/old.1999/fs152-99/

[5] http://lpc1.clpccd.cc.ca.us/lpc/hanna/Earthquake/livermoreearthquakemaps.htm

[6] http://lpc1.clpccd.cc.ca.us/lpc/hanna/Earthquake/livermoreearthquakemaps.htm

[7] https://www.osti.gov/etdeweb/biblio/6675499

[8] https://www.acgov.org/cda/planning/landuseprojects/documents/Proposed_Solar_Policies.pdf

Thank you for the opportunity to voice my concerns.

Sincerely,



Nancy Howe

June 5, 2020

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, California 94544
E-mail: andrew.young@acgov.org

Public Comments on the scope of the Environmental Impact Report (EIR) on the Aramis Solar proposal in North Livermore.

Mr. Young

These lands are in the A (Agriculture) zone district.
On page 9 of the staff report it states:, A (Agriculture) - "...agricultural and other non-urban uses, to conserve and protect existing agri-cultural uses …"

I believe the lands are presently used for cattle grazing and hay production. Are these existing uses being protected? Also, there is no mention of goat grazing.

Thank you for your consideration of my concerns.

Jean King
Livermore CA

From: Marjie Kosic <homes@marjiekosic.com>
Sent: Wednesday, June 3, 2020 11:02 AM
To: Young, Andrew, CDA <andrew.young@acgov.org>
Subject: Against Proposed Aramis Renewable Energy Project

Dear Mr. Young,

Proposed Aramis Renewable Energy Project

We are 100% against the proposed Aramis Renewable Energy Project to be located along North Livermore Ave and Manning Rd. This project is in conflict with voter approved Measure D development restrictions, the Save Agriculture and Open Space Lands Initiative and Scenic Route element of the General Plan. Not only will these projects destroy wildlife and use valuable resources these facilities "will significantly change the visual character of the area and exacerbate the loss of agriculture in the county as farmland is supplanted by solar panels" as quoted by Dick Schneider, chairman of the Tri-Valley's Sierra Club and co-author of Measure D. The voters of Alameda County said a resounding 'No' to development and it was not their intent to allow hundreds of acres of agricultural land to be covered by solar panels, 72,000 sq.ft. buildings and up to 100' tall power lines to provide energy for distant San Francisco. This supposedly "green technology", uses hazardous chemicals and materials to manufacture and then once no longer usable in 20 years or so is shipped to 3rd world countries because no other countries want to dispose of the hazardous waste.

Thank you for listening and addressing these concerns.

Sincerely,

Marjorie and Thomas Kosic
12601 Morgan Territory Rd
Livermore, CA 94551

Young, Andrew, CDA

From: Susan Frost <smfrost@cityoflivermore.net>
Sent: Monday, June 8, 2020 2:00 PM
To: Young, Andrew, CDA
Cc: spriley@cityoflivermore.net; scstewart@cityoflivermore.net
Subject: NOP for County Planning Application PLN17-00174, Aramis Solar Energy Generation project

Andrew,

Thank you for the opportunity to review the Notice of Preparation of an Environmental Impact Report for the proposed Aramis Solar Energy Generation and Storage Project. The propose project is located in the North Livermore area on a 533-acre site and will produce up to 100 megawatts (MW) using photovoltaic modules. The NOP identifies the environmental topics to be evaluated in the Draft EIR.

The City of Livermore has the following comment regarding topics for evaluation in the DEIR. The proposed solar project should complete a FAA 7460 Notice of Proposed Construction or Alteration to confirm no ocular impact from glare for aircraft in the pattern or final approach.

Websites for instructions and information:
1) For Instructions and Guidance on how to register and "E-File" Form 7460-1 with the FAA:
https://oeaaa.faa.gov/oeaaa/external/portal.jsp
2) For Technical Guidance for Evaluating Selected Solar Technologies on Airports:
https://www.faa.gov/airports/environmental/policy_guidance/media/FAA-Airport-Solar-Guide-2018.pdf

For additional information, please contact David Decoteau, A.A.E., C.A.E., Airport Division Manager, at (925) 960-8220, or at dbdecoteau@cityoflivermore.net.

We look forward to reviewing the Draft EIR when available. Thank you.

Susan Frost
Special Projects Coordinator
Livermore Planning Division
(925) 960-4434
smfrost@cityoflivermore.net

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May 18, 2020

Mr. Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Rm. 111
Hayward, CA 94544

Dear Mr. Young:

Subject: Notice of Preparation for EIR – Aramis Solar Energy Project

The following are my comments and concerns regarding the subject proposed Project. These concerns are being submitted to be reviewed for the EIR. I am a resident on Bel Roma Road and I am requesting that these concerns be addressed in the forthcoming EIR. The concerns of the residents of Bel Roma Road must be addressed.

1. The Notice stated that the solar project is comparable to windfarms, utility corridors and similar uses compatible with agriculture. I herewith question how the solar project can be compatible with agriculture.

2. The EIR must address the impacts of the Project proposed to cover 23 acres of Resource Management land and 13 acres of Water Management land.

3. The proposed Project will apply for a Conditional Use Permit. The Agricultural District provisions intent is to promote agriculture and other non-urban uses, conserve and protect agricultural uses, and provide space for such uses in places where more intensive development is not desirable. My question is: Is the proposed Solar Project not considered intensive development? My concerns are that the proposed Project **is** classified as intensive development and must be strictly reviewed in the EIR.

4. The ECAP and the Zoning Ordinance does not have provisions for solar panels on a utility production scale and therefore this issue must be intensively reviewed.

5. It is stated that the County views solar electric facilities not contrary to standards of the A District. There must be extensive explanations of why the Solar Project is compatible in the A District.

6. The Project proposes continued agricultural operations with the solar electricity generation. If the current agricultural operation is grazing, or dry farming, how can the proposed solar project not interfere with these uses?

7. The Project will install a Battery Storage Facility and a Substation. Will this create a fire hazard?

8. The Project will install four 100 ft x 180 ft buildings for Energy Storage. What impacts will this have on the aesthetics of the open space area?

9. The Project will take 9 months for construction and will require 50,000 gallons of water to be used daily. This calculates to 1,500,000 gallons monthly and 13,500,000 gallons for the entire construction time. The Project will obtain water from an onsite well, or offsite well, or local water authority. **I am asserting herewith that the EIR must examine extensively the impacts this will have on the groundwater in the May Sub Basin.** The proposed Project is to be situated over the May Sub Basin. The residents of Bel Roma Road rely solely on the quality and quantity of the groundwater from the May Sub Basin.

10. The Project states that there will be modules washed once per year by using water obtained from onsite wells. The EIR must address the impacts of this activity to the quantity and quality of the ground water of the May Sub Basin. If there will be chemicals used, this must be addressed in the EIR.

11. The proposed Project states there will be control of invasive weeds. The EIR must review how this will be done in relation to the use of pesticides and the impact upon the ground water in the May Sub Basin.

12. The EIR must examine thoroughly the impacts to the viewsheds and the visual character of the area. The installation of massive amounts of solar panels, poles and buildings will definitely impact the open space characteristic of the land.

13. The EIR must examine the Project's impact and conflict with adjacent land uses. In particular, extensive examination must be done regarding the impacts to the existing Bel Roma residential area and other existing landowners. The

EIR must not only address the special status species and then ignore the impacts to existing residences.

Please accept the above concerns to be applied to the EIR and the County Planning Commission.

Yours truly,

Lona Lee McCallister

Lona Lee McCallister
4700 Bel Roma Road
Livermore, CA 94551-9196

MCR Ranch

2024-2028 Manning Rd.
Livermore CA 94551

May 27, 2020

Mr. Andrew Young, Senior Planner
Alameda County Planning Department
224 W Winton Ave Room 111
Hayward CA 94544

Via E-Mail

RE: Draft Environmental Impact Report Comments-Aramis Solar Development - Conditional use permit Application PLN 2018-00117

Dear Mr. Young:

First and foremost, the planned Aramis solar project encompassing some 533 areas will destroy the designated scenic corridor of North Livermore. There are no mitigation measures the applicant could do to change that outcome.

The proposed project is not consistent with Measure D (Save Agriculture and Open Space Initiative). The applicant states they will bring sheep to graze the lands so its an Agricultural use. Everyone knows this is just a ploy. This is an industrial scale project not a farm.

We do not agree this use conforms to zoning. It should not be given conditional use classification. Solar use is not supported by the text of the zoning ordinance. A general plan amendment should be required as a first stop, not a conditional use application.

Further, the interpretation that arrays of solar panels do not count as Floor Area Ratio is not logical. This solar array will in effect be a roof over 533 acres.

This intrusive development of the lands will have a significant effect on wildlife habitat in North Livermore. The Sierra Club has been quite clear stating it "will be devastating" to habitat in North Livermore.

Like others in this rural area we moved here and spent heavily developing our ranch. Both Cattle are grazed on our ranch and it is farmed with Oat Hay annually. We moved here because of the scenic beauty and what we believed was the Agricultural zoning and open space designation that would protect us from intrusive development. This project will destroy the areas beautiful character forever. It will also devalue our homes and property.

The applicant is for profit corporation and wants to develop these lands versus other just as easily developed lands which don't destroy scenic corridors due to these lands being adjacent to the PG&E substation. Their bottom line is improved by not having to transport their power generation any distance. So, you are asked to approve one environmental use (Solar) at the expense of destroying other environmental uses; specifically the scenic corridor, open space and habitat rich lands.

There is president of significant measures being done to protect this scenic corridor and at substantial cost. Several years back PG&E proposed high power over head transmission lines north and south on North Livermore Ave. and east and west on Manning Road. They also planned their substation at the corner of N. Livermore Ave and Manning Rd. Their governing body the CPUC recognized the special beauty and scenic quality of North Livermore and directed PG&E to locate its substation south of this corner and that PG&E underground these high-powered transmission lines, as to not disturb the scenic views. The change from overhead lines to underground cost the utility many, many more millions of dollars. The CPUC which does not answer to the public or Alamada County did this only because they recognized the importance of protecting the area.

Finally we also note these lands are encumbered by the Williams Act. It is noteworthy that the California Department of Conservation recognizes this use is in no way agricultural as they support that the proponent file for non-renewal of the Williamson Act Contract, and wait until the contract renewal status has ended before moving forward with an application

Thank you,
Christopher & Margaret OBrien
2024-2028 Manning Rd.
Livermore, Ca. 94551

ATTN: Andrew Young
Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, Ca. 94544

FROM: Charles and Lisa Ott
4757 Bel Roma Road
Livermore, Ca. 94551

RE: Aramis Solar, PLN2018-00117
North Livermore Avenue and Manning Road, Livermore

Mr Young,
We live on Bel Roma Road, within close proximity to this project.
This letter is in response to the above listed project and the impact that it will have on our "neighborhood". In short, we are completely against allowing something of this size in our back yard.
Alameda County Board of Supervisors, the Planning Department, East Bay Zoning Board and all other related County offices should ultimately finalize a plan for allowable solar in this region, the North Livermore Valley area in specific. It has been an ongoing lack of leadership to decide on whether or not solar facilities, especially ones of this size and magnitude, are to be an "allowable" function and an approved or not condition of use in an Agricultural Zoned area.
This application is simply too big to ignore and take lightly for zoning purposes and the lives of the residents of North Livermore and the agricultural community at large. To lose 733 acres to agriculture, approximately 580 acres to 320,000 solar panels is an overwhelmingly large change to the landscape of the North Livermore Valley.
To allow a solar facility of this magnitude along with the smaller one across the street that is on a separate application process at this time is a gross negligence of leadership of County Officials. If the North Livermore corridor has been classified as a "scenic Corridor" by the County and by the City of Livermore (based on sphere of influence), then we feel that this project is not in line with the current agricultural and future uses / growth of the area.

At this point in time, we ask that the powers that be with the Alameda County Planning Department and the Board of Supervisors take great care to evaluate the current wording and allowances for conditional use permits in Ag zoned areas and in particular to how this potential zoning /conditional use permit can affect such a large open space as North Livermore Valley. Making a bad decision now will affect the next generations for years beyond our time here.
The Board of Supervisors have the ability to stop this and not allow it as a acceptable conditional use permit, same as has been done with the other previous projects in the East County.

MD

The resources, open space, grazing lands and one of the last remaining open spaces is in jeopardy because of projects like this one. What is to stop the 3rd application? What is to stop the entire North Livermore Valley in becoming a solar farm? Measure "D" has stalled any future development in North Livermore, unincorporated Alameda County, but if this conditional use permit application is allowed, the County will have absolutely NO WAY of stopping the entire valley from becoming one huge area of solar panels, thousands of acres.

Please carefully consider this application and the long term impact on North Livermore. Make a once and for all final determination of what is an acceptable allowance is for conditional use permit in ag zoned North Livermore Valley specifically. Please protect the future, a scenic corridor designated area and the open space for us residents and our future generations.

Sincerely,

Charles and Lisa Ott
4757 Bel Roma Road
Livermore, Ca. 94551

REVISED FINAL

To: Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, CA 94544

Submitted via email
andrew.young@acgov.org

From: Merlin Newton Sr.
4742 Bel Roma Road
Livermore CA 94551

Date: June 7, 2020

Subject: Written Comments for NOP of Environmental Impact Report Aramis Solar Energy Generation and Storage Project County Planning Application PLN2018-00117

My wife and I live across the street from the proposed Aramis Solar Facility and adjacent to the proposed SunWalker Energy Solar Facility. I have several concerns with the Aramis Solar Facility and will be addressing some of those concerns below.

Hydrology/Groundwater

The Aramis Solar Facility is in direct conflict with "The Alameda County Department of Environmental Health (ACDEH)" and "Alameda County Public Works Agency" Clean Water Program. Alameda County either has a Clean Water Program or it does not.

The Alameda County Clean Water Program was implemented to reduce or eliminate the pollution of receiving waters, including creeks and the San Francisco Bay; and protect and enhance the water quality in county water bodies, including watercourses, wetlands, creeks, and flood control facilities.

The Aramis Solar Facility does not reduce or eliminate pollution and does not protect or enhance the water quality, but rather increases water pollution. The proposed project may result in environmental impacts to hydrology and water quality resources. Currently, the May School Road groundwater basin is already on Alameda County and Zone 7's list as an area of special concern due to high nitrates. The already compromised groundwater should not be further compromised PERIOD.

One of the Alameda County's Clean Water Programs is to protect rain runoff from roof tops and other surfaces from entering the storm drains which eventually lead to the bay. The Alameda County Clean Water Program also discourages residents from washing their cars and prefer residents utilize commercial car washes to prevent runoff from entering storm drains.

The following are directly from Alameda County's Clean Water Program concerning washing cars and stormwater washing off roof tops:

"The Best Way to Wash Your Car"

"ALWAYS USE A COMMERCIAL CAR WASH. YOU'LL PREVENT POLLUTION AND SAVE WATER TOO."

"Fred Frog and Izzy Egret want you to know that soapy, dirty, grimy water hurts. When you wash your car on the street or in your driveway, all that dirty, grimy, soapy water runs down the storm drain and into creeks and the Bay. Even biodegradable soap is harmful. Egrets, herons, red-legged frogs, turtles, seagulls, trout, stilts....all birds, fish and amphibians are at risk."

Stormwater

"When stormwater washes off our roofs, streets, driveways and gardens, it carries the dirt and pollutants from these surfaces into the storm drains and then into creeks, wetlands and eventually, the Bay."

"Our local waterscapes are one of the reasons why living in Alameda County is so special. Keeping our water free from pollution is key to maintaining the beauty of our water and helping the plants, birds, fish and insects that live there to thrive."

Despite Alameda County's Clean Water Program concerning stormwater runoff from roofs and the washing of cars, Alameda County is ignoring its own Clean Water Program when it comes to protecting our "groundwater". Unlike city water, which is monitored and treated, the only thing separating our groundwater from contaminants is the ground above. Some of the materials used to construct the solar facility consist of, but are not limited to; concrete materials, metal materials, electrical materials, and not to mention dangerous materials used in the construction of the panels themselves, such as aluminum, glass, silver, lead chromium and cadmium. How is stormwater runoff from solar panels and the washing of literally thousands and thousands of solar panels (nearly 320,000), over more than 700 hundred acres of agricultural land, any different from washing a car or stormwater runoff from roofs.

Although, Alameda County and Zone 7 currently recognize the May School Groundwater as an area of special concern, the solar facility being proposed will be constructed above the groundwater, also known as the Arroyo Las Positas Watershed/Aquifer, which the North Valley Rural Community relies on for human consumption, animals, crops etc.

I find it very troubling in the 21st Century I am having to fight to protect our already compromised groundwater, from being further compromised, especially since the project is in direct conflict with the Alameda County Clean Water Program. The solar facility must be relocated to an area of less conflict and should not be constructed over any rural community's groundwater. City Officials as responsible for protecting their communities drinking water and we should expect the same from our County Officials.

Aesthetics

The proposed site for the Aramis Solar Facility is being proposed on agricultural land along North Livermore Avenue which Alameda County identified as a Scenic Rural-Recreational Route. This route was adopted in 1966 for the protection and enhancement of scenic values "along" designated routes.

The proposed solar facility expects to install nearly 320,000 solar arrays, overhead lines from 30 to 100 feet tall, approximately 2.6 miles of cyclone fencing and occupy more than 700 acres of agricultural land, just to name a few. These industrial structures will do nothing to enhance or protect the Scenic Rural-Recreation Route and will have a major impact on the natural habitat, preventing ingress and egress into to the area, not to mention the overhead flying habitat. Not only is the area desirable for cattle grazing and the natural habitat, but many walkers, joggers, cyclists, artists, and photographers can be seen enjoying the scenic views along the Scenic Rural-Recreational Route on a daily basis. The Scenic Rural-Recreational Route has been protected for more than 54 years. If the solar facility is allowed to move forward, it will dramatically alter and transform the landscape, scenic views, and the natural habitat environment now and for future generations.

Thank you,

Merlin Newton Sr.

CC: Honorable Scott Haggerty, Supervisor
4501 Pleasanton Ave., Pleasanton, CA 94566

Shawn Wilson, Chief of Staff for Supervisor Scott Haggerty
1221 Oak Street, Suite 536, Oakland, CA 94612
Shawn.Wilson@acgov.org

SELNA PARTNERS LLP

70 Washington Street, Suite 303
Oakland, CA 94607 (415) 601-5385

June 5, 2020

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Ave. Rm. 111
Hayward, CA 94544

Dear Mr. Young:

I am an attorney representing Chris and Margaret O'Brien, homeowners at 2028 Manning Road in North Livermore. I am writing to submit comments on the Draft EIR ("DEIR") scope for a 580-acre, industrial scale, solar-electric plant proposed by the private developer Intersect Power ("Intersect proposal"). I am writing on behalf of the O'Briens and myself, as a resident of Alameda County.

I understand that the County specifically seeks comments on the DEIR scope and content. However, the County's May 4, 2020 Notice of Preparation and Notice of Scoping Meeting for an Environmental Impact ("NOP"), which invites the DEIR comment and sets the context for the public's understanding the Intersect proposal, makes representations that must first be addressed.

The NOP (p.4) claims that an industrial scale, solar-electric plant is appropriate in the project area's LPA zoning because "the County Planning Commission…previously made determinations that solar-electric facilities would not be contrary to the specific intent clauses or performance standards established for the A District and could be permitted under a CUP." The NOP goes on to list two projects that were never completed – Green Volts and Cool Earth.

Documents necessary to fully evaluate the Planning Commission's purported determinations are not readily available. If, in fact, a proper process led to determinations that Green Volts and Cool Earth were appropriate for LPA zoning, the details of those projects are relevant to determining whether the Intersect proposal also is consistent with the LPA zoning. Most notably, Green Volts and Cool Earth were envisioned to be dramatically smaller in size and intensity than the Intersect proposal. Green Volts was proposed for 62 acres Cool Earth was proposed for 140 acres. At 580 acres, the Intersect Proposal is roughly four times the size of Cool Earth and is the equivalent of **28,000 football fields**.

Concluding that a 140-acre solar-electric plant is consistent with LPA zoning may not be reasonable. Claiming that an industrial scale, solar-electric plant occupying 28,000 football fields of open Ag land is consistent with the LPA zoning, borders on the absurd. The enormous size

and intensity of the Intersect proposal places it in different use category than Green Volts and Cool Earth. Asserting that the smaller projects are the same use as Intersect's industrial scale, solar-electric plant proposal is akin claiming that a single-family home use is the same as an 100-foot tall condominium project. Given the glaring difference between the smaller projects and the Intersect proposal, the Planning Department and Commission must address anew the question of whether the Intersect proposal is indeed consistent with the LPA zoning. It appears clear that it is not.

In addition, specifically with respect to Green Volts, the East County Board of Zoning Adjustments ("ECBZA") 2008 resolution authorizing the project's conditional use permit, found that the 62-acre project was allowed under Ag zoning, in part, because the use would be "mitigated with the adoption of a requirement to maintain and cultivate on and/or off-site areas designated as Prime Farmland at a 1:1 ratio...." Which "would conserve and protect the predominant agriculture uses elsewhere on the site and in the vicinity." (p. 3). The resolution indicates that the ECBZA may not have concluded that the project was suitable for LPA zoning were it not for the specific requirement to protect farmland.

With respect to the scope of the DEIR, it is clear, and should be stated unambiguously as such in the DEIR, that the Intersect proposal would impose significant environmental impacts that simply cannot be mitigated. I summarize those impacts and the implications for the DEIR scope below. In addition, I have attached a letter from environmental specialist Doug Herring to provide more detail.

- **Aesthetics:** Intersect proposes to construct their project on a County-designated Scenic Rural Recreation Route in the line of site of several scenic ridgelines. Adding insult to injury, Intersect plans to include overhead lines and poles. This runs directly counter to the point of designating the scenic route and cannot be mitigated. Fencing and landscaping cannot mitigate will only exaggerate the blight. The massive size of the Intersect proposal makes this negative aesthetic impact even more egregious. The DEIR must reflect the reality that the Intersect proposal violates the purpose of the Scenic Rural Recreational Route and cannot be mitigated into compatibility.

- **Agricultural Resources:** The Intersect proposal would convert open pastureland will to a solar electric plant. Sheep grazing to keep weeds under solar panels at bay is not agriculture and is a cynical attempt to make the project pass as Ag. The NOP perpetuates Intersect's false narrative by stating that the proposal would adhere to the Ag Management Plan. In this vein, the DEIR must study the cumulative impacts of converting ag land to non-ag uses – which is happening at an alarming rate – in Livermore, Alameda County and statewide. These impacts cannot be mitigated and the DEIR must indicate as such.

- **Biological Resources:** As Mr. Herring's attached report and previous submissions by the Sierra Club have shown, the North Livermore area is rich in special status and threatened flora and fauna. In addition to the wildlife species noted in Mr. Herring's attached letter the DEIR must also examine the Intersect proposal's impacts on the conservancy fairy shrimp. The DEIR must review not just the Intersect proposal's negative impact on

biological resources, but also, the impact on biological resources of the loss of pasture lands in North Livermore and around the state due to solar-electric plants and other uses.

In addition to concluding that the Intersect proposal includes numerous environmental impacts that cannot be mitigated, the DEIR must thoroughly explore project alternatives, in addition to a No Project Alternative. The NOP indicates that the County has not yet determined that additional alternatives to the Intersect proposal will be evaluated in the DEIR. "An alternative location is not presently under consideration, nor is it expected to be evaluated other than with the brief discussion of alternatives that were rejected." (p. 9). The County's stated approach to (not) seeking alternatives fails as patently lacking initiative and effort. There are numerous alternatives throughout Alameda County and the state where industrial-scale solar would not destroy 580 acres of open space, and the County must review any and all such alternatives.

One need look no further than along the 580 corridor for parcels that abut freeway or other industrial/commercial uses that would be more suitable than North Livermore pasture land in a Scenic Rural Recreational Route. The test for alternatives, according to the NOP is those, which would "feasibly attain most of the basic objectives of the Project, but would avoid or substantially lessen any of the significant effects…." The pure economic interests of a privately-owned industrial scale solar-electric plant developer cannot be one of the basic objectives.

In addition to parcels that are either industrial, or abut industrial land, there are millions of square feet of space available on warehouse rooftops and other commercial buildings throughout California, conveniently situated near power substations. Intersect should – and the County and the DEIR must – must explore these and other alternatives. Intersect's convenience and profits must not be allowed to pit one environmental benefit (solar power) against others (the preservation of open space, ag land, and scenic routes) at the public's expense.

The NOP fails to acknowledge that the Intersect proposal belongs in a different zoning use category than previous solar projects reviewed by the County and perpetuates the myth that industrial-scale solar is agriculture. Even if one accepts that some industrial-scale solar projects may not be contrary to LPA zoning (and I am not suggesting that one should), the massive scale of the Intersect proposal puts it in a distinct use category, which the ECBZA must review anew to determine consistency with LPA zoning. The much smaller, previous solar approvals are neither persuasive nor precedent for evaluating the Intersect proposal.

The Intersect proposal will translate to negative environmental impacts that simply cannot be mitigated and the DEIR must review the proposal and project alternatives in that light.

Sincerely,



Selna Partners, LLP

Douglas Herring & Associates
Environmental, Policy, and Planning Services

May 29, 2020

Andrew Young, Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, CA 94544

Subject: Notice of Preparation of an Environmental Impact Report for the Aramis Solar Energy Generation and Storage Project, County Planning Application PLB2017-00174

Dear Mr. Young:

Thank you for the opportunity to comment on the scope of the environmental review for the proposed Aramis Solar Energy Generation and Storage Project in the North Livermore area of unincorporated Alameda County. I am submitting this comment letter in response to the County's May 4, 2020 Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the project on behalf of Chris O'Brien, a property owner in the vicinity of the proposed project.

The proposed project would entail construction of a solar energy production facility with photovoltaic panels providing up to 100 megawatts (MW) of output capacity, and would include onsite battery storage and an onsite substation for voltage conversion. The project would require approval of a Conditional Use Permit (CUP) to operate a solar photovoltaic and electricity storage facility. It would also require approval of parcel map subdivision to separate approximately 150 acres from one of the project parcels and exclude it from project development.

The project site would be comprised of large portions of four mostly contiguous, privately-owned parcels totaling 747 acres. Approximately 580 acres of level land would be developed with the proposed solar generation facility. The project parcels are located at or near the northern end of North Livermore Avenue, approximately 2.2 miles north of Interstate 580. The area consists predominantly of large agricultural parcels used for livestock grazing and cultivation of row crops.

The largest parcel is located on the west side of North Livermore Avenue where it terminates at Manning Road, which extends toward the west. Manning Road forms the northern boundary of this 536-acre parcel. While the majority of the parcel is flat,

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Phone: 510-237-2233 ▪ *Fax:* 510-237-2363 ▪ *Email:* info@douglasherring.us

approximately 150 acres of the parcel is moderately to steeply sloped and supports sensitive habitat; this northwestern portion of the parcel would be excluded from the proposed development and a proposed subdivision would legally separate the area from the proposed development site. The County's NOP states that another approximately 36 acres of this parcel is not suitable for development with solar arrays, and would also be excluded from the project.

The third project parcel is on the 101-acre Stanley Ranch property located immediately south of the larger parcel described above. Approximately 30 acres of this parcel would be developed with the proposed project, while the rest of the parcel would remain in its current state, which is occupied by ranch buildings or used for crop production. The other two contiguous parcels, encompassing approximately 50 and 60 acres, respectively, are located on the northern side of the L-intersection of North Livermore Avenue and Manning Road; one is west of North Livermore Avenue and the other is to the east. A stream crosses both of these parcels and would be excluded from development, reducing the development footprint by about 6 and 4 acres, respectively.

There are a number of environmental issues related to development of a utility-scale solar energy project in the North Livermore area. We are writing to request that the EIR thoroughly address the following issues of concern:

1) The property is crossed by Cayetano Creek, where water quality could be adversely affected by both construction and operational activities. The EIR should thoroughly evaluate these potential impacts and identify an adequate mitigation strategy for ensuring such impacts are minimized to the greatest extent possible. The EIR needs to clearly delineate the creek's location relative to proposed facilities as well as the required area of disturbance during project construction. Adequate buffers should be maintained throughout construction.

2) The project area is an environmentally sensitive area, where a number of special-status plant and wildlife species could be adversely affected by development of the project. For example, Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), which is included on the rare plant inventory (List 1B) maintained by the California Native Plant Society (CNPS), is known to be present in the immediate area, and is likely to be present on the project site. Additionally, three plants listed as *endangered* by the U.S. Fish and Wildlife Service (USFWS) could potentially occur in the grassland habitat on the property, including large-flowered fiddleneck (*Amsinckia grandiflora*), Contra Costa goldfields (*Lasthenia conjugens*), and palmate-bracted bird's-beak (*Cordylanthus palmatus*).

   Other special-status plants with the potential to be present include alkali milk-vetch (*Astragalus tener* var. *tener*), heartscale (*Atriplex cordulata*), crownscale (*Atriplex coronata* var. *coronata*), brittlescale (*Atriplex depressa*), San Joaquin spearscale (*Atriplex joaquiniana*), hispid bird's–beak (*Cordylanthus mollis* ssp.

hispidus), Livermore tarplant (*Deinandra bacigalupii*), diamond–petaled California poppy (*Eschscholzia rhombipetala*), hairless popcornflower (*Plagiobothrys glaber*), saline clover (*Trifolium depauperatum var. hydrophilum*), and caper-fruited tropidocarpum (*Tropidocarpum capparideum*).

Focused plant surveys should be conducted at the appropriate times during preparation of the EIR to determine whether or not any of these species is present. While avoidance of any special-status plant species identified on the site would be preferable, if avoidance is not practicable, a mitigation plan must be presented to reduce the project's impact on each affected species detected on the site to a less-than-significant level, if such mitigation is possible.

3) The California red-legged frog (*Rana aurora draytonii*), listed as *threatened* by USFWS, is known to occur in Cayetano Creek, and is therefore presumed present in the reach of the creek crossing the property, and is expected to use upland areas on the site for foraging and dispersal. The potential impacts to this sensitive species must be thoroughly evaluated and mitigated, if such mitigation is possible.

4) Another special-status wildlife species that may be present on the site is the California tiger salamander (*Ambystoma californiense*), listed as *threatened* by USFWS. Although Cayetano Creek does not provide suitable breeding habitat for this species, because the high-flow volume and velocity in the creek after storms in winter would wash away any salamander eggs that might be present, the tiger salamander could breed in temporary ponds that could be present on the site, such as vernal pools or human-made ponds that provide water for at least three months of the year; they will also utilize permanent ponds provided that aquatic vertebrate predators are not present. The upland habitat on the project property could be used by the salamander for aestivation (summer hibernation) during the hot, dry months of the year. The EIR should determine whether or not the tiger salamander is present on or near the site and evaluate potential impacts to this species. Potentially significant impacts to this species must be mitigated, if such mitigation is possible.

5) The western pond turtle (*Emys marmorata*), a California Species of Special Concern, has previously been observed in Cayetano Creek, and it may nest in upland areas adjacent to the creek. Potential impacts to this species must be evaluated and mitigated, if appropriate.

6) Another California Species of Special Concern that may be present on the site is the burrowing owl (*Athene cunicularia*), a small terrestrial owl that favors open annual and perennial grasslands on flat or gently sloped terrain, typically with sparse or nonexistent tree or shrub canopies. This species has been recorded in a number of locations in the North Livermore area, and given the suitability of

habitat on the project site, the potential for occurrence of burrowing owls on the project site is high. Surveys for the burrows of California ground squirrels that are favored by burrowing owls for shelter and nesting should be performed and documented in the EIR to further characterize the potential for their occurrence on the project site, and to inform the development of a suitable mitigation strategy.

7) The EIR should evaluate the potential for the proposed facilities to result in increased bird mortality from collisions with the solar arrays, transmission towers, transmission lines, and other equipment. The potential for electrocution should be included in the evaluation.

8) The project site is adjacent to the Caetano Creek Mitigation Habitat and to a private mitigation bank on 1,000 acres immediately west of the project site that is used as mitigation habitat for impacts to San Joaquin kit fox, California tiger salamander, Congdon's tarplant, and other sensitive species. There is at least one other mitigation bank in the vicinity, and the project site is within the Springtown Botanical Priority Protection Area and near the Springtown Wetlands Preserve. The latter includes sensitive alkali soils that are known to be endemic to just seven locations in the State of California. These soils support the endangered palmate-bracted bird's-beak previously referenced. The EIR should evaluate potential project impacts on these areas, including cumulative habitat loss and interference with migration corridors and foraging behaviors.

9) Conversion of approximately 580 acres of agricultural land to a non-agricultural use may conflict with policies promulgated in the *East County Area Plan* (ECAP). There is potential for the project to conflict with other ECAP policies, such as those protecting sensitive viewsheds and biological resources. The EIR needs to provide a detailed policy consistency analysis for all relevant ECAP policies.

10) North Livermore Avenue is identified as a Scenic Route in the Scenic Route Element of the General Plan. The EIR should evaluate the potential project conflicts with adopted policies the Scenic Route Element, including a policy stating that overhead transmission towers and lines should not be located within scenic corridors, and another stating that unsightly features should not be located within scenic corridors.

11) In addition to evaluating the project's consistency with the Alameda County General Plan and *East County Area Plan*, the EIR should include a discussion of applicable policies and other provisions of the *North Livermore Specific Plan, East Alameda County Conservation Strategy*, and any other planning documents that encompass the project site. Conflicts with policies that were adopted for purposes of avoiding or reducing adverse environmental effects would

constitute a significant impact under CEQA. These impacts should be identified and mitigated, if such mitigation is possible.

12) A quantified assessment of nighttime glare and light trespass from security lighting should be performed, as well as a daytime glare assessment from the solar arrays, including the potential for interference with avigation.

13) The EIR should evaluate the water supply impact from the estimated consumption of 42 acre-feet of water during project construction.

14) With up to 400 construction workers traveling to and from the project site each day for five to nine months, most of them likely driving their own vehicles, the traffic impact of this travel should be evaluated, and this travel should be factored into the assessment of air quality and greenhouse gas impacts during project construction.

Thank you for the County's consideration of these comments on the scope of the EIR for the proposed Aramis solar energy project. We look forward to reviewing the requested information in the Draft EIR when it is published.

Sincerely,



Doug Herring

121 Twin Oaks Lane
Livermore CA 94551
June 2, 2020

Alameda County Planning Department
Attn: Andrew Young, Senior Planner
224 W. Winton Avenue, Room 111
Hayward CA 94544

submitted via e-mail
andrew.young@acgov.org

Re: Preparation of Environmental Impact Report
Aramis Solar Energy Generation and Storage Project
County Planning Application PLN2017-00174

Dear Mr. Young and Members of Planning Board:

We would like to comment on the Aramis Solar Energy Generation and Storage Project proposed for the North end of the Livermore Valley. Specifically, the application for a Conditional Use Permit to allow construction of a 100 MW (megawatt) facility and associated battery storage on 533 acres. In addition, our comments also apply to the Conditional Use Permit PLN2016-00049, where comments were requested by April 22, and that proposal is part of what makes an even larger facility.

First, a word about us. We have lived here at the South end of Morgan Territory Road, within a mile of the Alameda County line, for 29 years. We have lived in the Tri-Valley for 52 years. We use Manning Road and N. Livermore Avenue daily.

We moved to this area because we appreciated the aesthetic beauty of the surrounding hills, valleys, and wildlife. One contributing factor to the beauty, was the fact that there were few power lines and no high voltage power lines in the area, unlike the South Livermore Valley. These 2 projects on either side of N. Livermore Avenue and Manning Road, as proposed will change the area irrevocably. We will drive next to it every day.

We should say that Susan is an artist, with Revolutionary War ancestors, who is retired from the travel business. Robert is a scientist with a Ph.D., who has worked in the energy research and development field for over 45 years and is still actively involved. For 22 of those years he managed a government funded research and development program at a large national laboratory managed by the University of California. The research budgets amounted to well over $100 million per year (1990 dollars). Among other activities, he was asked to provide input to the President's Committee of Advisors on Science and Technology as part of their studies of energy issues in the 21st century. He subsequently became the Director of Studies at the World Energy Council, headquartered in London, conducting, along with the national energy associations of almost 100 countries, assessments of the impact of technology on energy development and

standards of living throughout the world. One of the things that was/is abundantly clear is that people worldwide want less and less intrusion on the environment from energy production and distribution. Robert also served as a Director on the County Zone 7 Water Board in the 1980s.

Rather than focus on the many issues dealing with the environmental and health aspects of the N. Livermore Valley and the impact of these proposals, which our neighbors are already addressing and, by the way includes County Measure D (Urban Boundary Limit), we want to focus here on just one aspect of the proposed project, which we believe will be a great detriment to the visual and aesthetic properties of this beautiful and scenic area. The proposal mentions overhead lines on poles that "could vary between 30 and 100 feet" and that the northern part of the Aramis project would cross Manning Road "either overhead or underground." Relevant to this, around the year 2000 PG&E had proposed a series of high-voltage transmission line towers to run across the northern part of the Valley for electrical service to and from what became the substation at N. Livermore and May School Road. This was to serve San Ramon and Dublin. At that time, we suggested to the PUC that PG&E put the power wires underground for a number of aesthetic and technical (future superconducting transmission cables) reasons. To its great credit, PG&E did exactly that and thus preserved the beauty of this valley.

These two proposals, with towers up to 100 feet tall (the height of a 90 story building), as well as tree plantings along the solar panels perimeter, and having to electrically cross both Manning Road and N. Livermore Avenue, will severely impact the scenic character of the area (a County designated Scenic Rural Recreation Route). And there will be inconvenience during and after construction. At a minimum, these overhead lines, and there will be many, will be extremely significant. In 2000, PG&E placed their electrical lines underground and we suggest that this project do likewise for <u>all</u> their connections, to be in keeping with this standard. At our house we have an in-ground solar generation system and the electrical connection are all run underground, thus preserving the natural beauty of the surrounding country-side. In the case of these proposed developments, having towers up to 100 feet high and 15-foot-high plantings at the perimeter to conceal 34,974 solar panels (23,316 plus 11658) on 591acres (533 plus 58) will significantly obstruct the now expansive views from anywhere in this part of the N. Livermore Valley. This would make the perspective of this section of the rural N. Livermore Valley just like a fully developed urban area and we did not move here to live in the city.

Thank you for listening to and addressing these concerns, as well as the larger issue of a project of this size and extent, in what is a truly unique rural area with biking, driving, walking and scenic parks now utilized by all the residents of Alameda and surrounding counties. Please contact us if you have any questions.

Robert and Susan Schock

cc.
Honorable Scott Haggerty
Supervisor
4501 Pleasanton Avenue
Pleasanton CA 94566

Shawn Wilson, Chief of Staff
Supervisor Scot Haggerty
1221 Oak Street, Suite 536
Oakland CA 94612

San Francisco Bay Chapter
Serving Alameda, Contra Costa, Marin and San Francisco counties
2530 San Pablo Avenue, Suite I
Berkeley, CA 94702

June 8, 2020

Alameda County Planning Department
Attention: Andrew Young
224 W. Winton Ave., Room 111
Hayward, CA 94544

submitted via e-mail

Re.: Environmental Impact Report scoping comments for the Aramis Solar Energy Generation and Storage Project, County Planning Application PLN2018-00117

Dear Andy,

The Sierra Club appreciates the opportunity to submit scoping comments for the Environmental Impact Report of the Aramis utility scale solar energy facility proposed for the west side of North Livermore Avenue at May School Road. Our comments fall into five categories: biological impacts, aesthetic impacts, agricultural impacts, project alternatives, and miscellaneous. The first three categories include cumulative impacts.

Biological impacts: The East Alameda County Conservation Strategy (EACCS) and other studies document both the presence of and suitable habitat for numerous special status species on and in the vicinity of the project site. The EACCS analyzed 19 focal species that are known or likely to occur in eastern Alameda County. Focal species are sensitive species that would be adversely affected or their habitats adversely affected by activities or projects in the area. Of the 19 focal species in the entire east Alameda County study area, nine focal species, nearly half of all focal species analyzed, occur or have the potential to occur in the Aramis project site based on mapping in the EACCS. Nevertheless, the documents accompanying the project proposal discuss only one species, the California red-legged frog. The eight other EACCS focal species are not mentioned, much less are potential impacts to them detailed. This is a remarkable oversight. The eight other focal species are the Callippe silverspot butterfly, California tiger salamander, Foothill yellow-legged frog, Golden eagle, Tricolored blackbird, Western burrowing owl, American badger, and San Joaquin kit fox. Potential harm to these species or their habitats must be analyzed in the EIR.

Impacts both from construction and operation of the facility should be included in the analysis, and mitigations both for construction and operational impacts should be proposed. The EACCS sets forth various mitigation factors for impact to the focal species it evaluated. That is a good starting point for the Aramis EIR. Nevertheless, the EACCS is now 10 years old. Newer research should be reviewed to determine if additional species should be evaluated and if the mitigation measures for the EACCS focal species remain adequate. One particular operational impact should be evaluated fully. The project proponent indicates that sheep grazing will replace cattle grazing as the agricultural activity on the

project site. Sheep are very different animals from cattle; sheep will undoubtedly have different impacts. Sheep grazing must be specifically evaluated for its impacts to both special status plants and animals. Just the difference in number of grazers when switching from cattle to sheep could lead to significant impacts. Such impacts must be evaluated and mitigated for.

The Aramis project is proposed to operate for at least 50 years. Considerable change in climatic and other conditions may occur in north Livermore over this period. These changes could influence the biological range of plants and animals in the area including species protected under state and federal law. To the extent possible, impacts to biological resources over this time scale should be evaluated. Range changes over the past 20-30 years may give some indication of potential future changes and therefore what additional environmental impacts might occur in the future. Periodic ongoing environmental evaluations and appropriate additional mitigations should be a condition of approval in any CUP.

Cumulative impacts to biological resources must be fully evaluated. PG&E's Cayetano substation clearly is ground zero for the targeting of utility-scale solar energy facilities (SEFs) in north Livermore. The zone for additional environmental impacts will radiate away from the substation like the blast zone of a bomb. The DEIR for the Livermore Community Solar Energy Facility proposed directly east across N. Livermore Avenue from the substation is quite explicit about the potential for more utility-scale SEFs. "The Livermore Valley provides ideal physical conditions for the development of solar photovoltaic (PV) facilities, having extensive level areas of undeveloped land and a climate with an abundance of sunny days…[I]t is likely that in the near future other solar PV projects will be proposed and built in the Livermore Valley." (DEIR, P. 4.4-23, emphasis added.)

Aesthetic Impacts – North Livermore is scenic agricultural open space with views in all directions of surrounding pasturelands, rolling hills and distant mountains. The County has designated North Livermore Avenue as a Scenic Recreational Rural Route. Bicyclists, motorcyclists and sightseeing drivers frequent this area because of its scenic character. Impacts to scenic views must be honestly evaluated. The Aramis project alone will contain some 320,000 solar collectors spread across the landscape. Even when stowed, the project description indicates they will be 8 feet high. In operation, they are likely to be considerably higher. These industrial structures will blanket a large area of approximately 420 acres and be visible from a great distance. Without a doubt, they will change the visual character of the area from open farmland to a large-scale solar power plant. Any mitigations proposed to screen this vast array of collectors will themselves lead to changes in the visual character of the area since they will have to be continuous as well as tall enough to hide the arrays, and will cover large stretches of area. The environmental impact report should be an honest document so that the public and decision makers know exactly the visual changes that are being proposed for this area, and whether the impacts to visual resources will be significant and unavoidable even after mitigation.

Cumulative impacts from the Aramis project together with the neighboring Livermore Community SEF, as well as other likely projects should be evaluated. While a single project might from a distance look tolerably like a man-made lake as the project proponent suggests, north Livermore is not a lake district. It is dry farmland, lusciously green in the winter and early spring, and golden brown for the remainder of the year. The sky is blue; north Livermore is not. The cumulative change to the visual character of the area from potentially many hundreds of thousands of solar collectors covering perhaps several thousand acres of farmland must be evaluated.

Agricultural Impacts – The impact of the Aramis project on agriculture should be evaluated. The project proposes to replace cattle grazing with sheep grazing and bee keeping. Do these agricultural activities currently exist to any great degree in north Livermore? Are the proposed substitutes for cattle grazing truly viable or are they pretenses to obscure the change from agriculture to large-scale industrial power production? In most cases where non-owner grazing occurs, the land is leased out. Will the Aramis parcels actually be leased out and generate real revenue from the grazing tenant, or will the landowner accept a token payment with the sheep in effect used mainly as a form of weed control among the solar collectors? How will the sheep grazing lease compare to nearby cattle leases? The California Department of Conservation does not consider solar electric facilities to be genuine agriculture consistent with the Williamson Act. Why should the County and the public believe this is real agriculture being proposed even for the land not under the Williamson Act?

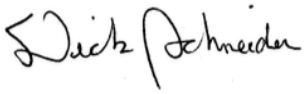
Cumulative impacts to county agriculture should be evaluated. The current agricultural production in north Livermore consists mainly of dry land farming and cattle grazing. A critical mass of agriculture may be necessary for these agricultural uses to survive. As land is taken out of production for these activities, will this lead to more land being converted to primarily non-agricultural uses? According to Department of Conservation statistics, between 1984 and 2016, over 16,000 acres of grazing land in Alameda County were converted to non-agricultural uses. This is already an alarming trend and the proposed project together with others is likely to exacerbate the cumulative loss of agriculture in the county. This impact should be evaluated.

Project Alternatives – The staff report for this EIR indicates that a No Project alternative will be evaluated, but that no other alternatives have been selected. In particular, an alternative location "is not presently under consideration." We believe that a distributed energy generation alternative should be evaluated. Distributed generation means electricity that is produced in already developed areas where the energy will be consumed. Distributed generation is generally believed to produce fewer environmental impacts than large-scale central station generation. Moreover, East Bay Community Energy, Alameda County's community choice aggregation authority, prepared an analysis showing that over 650 MW of technical solar siting potential exist on built areas of the county, and that 30% of the total comes parking lots and parking garages. The latter sites alone have the potential to generate 195 MW of solar power, very nearly twice what the Aramis project would produce. If some of these sites are not viable, there still could be the possibility of generating as much solar energy as Aramis without the environmental impacts to biological, agricultural and scenic resources.

Miscellaneous impacts – The project proposes 100 MW of lithium ion battery storage in four 100-ft x 180-ft buildings occupying 72,000 square feet of building area (1.65 acres of buildings). The EIR must analyze the environmental impact of this project component. What are the toxic substances in lithium ion batteries and associated electrical equipment? What happens to them in the event of a catastrophic fire? Do they vaporize and present an air pollution hazard to nearby residents or even for more distant Tri-Valley residents downwind? Can a large fire at a lithium ion battery facility be extinguished with water delivered by area fire trucks? What toxic materials might leach into groundwater as a result of contaminated fire-fighting water? What impact might those toxic substances have on nearby residents who derive their drinking water from wells in the vicinity? What impacts to wildlife and plants from catastrophic fires that release toxic materials. There are impacts that need to be presented in the EIR.

We hope the above comments will help lead to a thorough environmental impact review of the project. We look forward to reviewing the Draft Environmental Impact Report when it is released for public comment.

Respectfully submitted,



Dick Schneider, Sierra Club Tri-Valley Group
Richs59354@aol.com
(510) 926-0010

Young, Andrew, CDA

From: Carol Silva <7silva@comcast.net>
Sent: Friday, June 5, 2020 4:54 PM
To: Young, Andrew, CDA
Subject: EIR Scoping Comments for the Proposed Aramis Solar Generation Project

Dear Mr. Young,

I live in north Livermore and I have the following concerns about the proposed Aramis Solar Generation project:

Large-scale solar power plants raise local temperatures, creating a solar heat island effect according to the findings of three different desert ecosystems in Arizona that demonstrated that temperatures around a solar power plant were 5.4-7.2 degrees Fahrenheit warmer than nearby wildlands. The study was conducted by Mitchell A. Pavao-Zuckerman, an assistant professor from the University of Maryland's College of Agriculture and Natural Resources, with colleagues from the University of Arizona, University of Madison-Wisconsin, and the Nevada Center of Excellence. Reference a PHYS Org website: https://phys.org/news/2016-11-solar-island-effect-large-scale-power.html In addition to the increased temperatures, can reflective surfaces of solar farms shoot sunlight back into the air and prevent clouds from forming or dissipate clouds that are there? Livermore already has very hot seasons in spring, summer, and fall, with minimal rainfall. The location of the proposed project is on agricultural land which has several arroyos that wind through the area containing much wildlife and endangered native plants. In one of my environmental publications, I had read about a solar power plant located in one of the California deserts, which due to the increased temperatures from the solar project, caused nearby animals and native plants to die. Increased temperatures in north Livermore could easily dry up the arroyos, kill wildlife, dry the vegetation, increase the likelihood of fire, make drought conditions much, much worst, cause dust storms (there are numerous days in which north Livermore is very, very windy; that's why there are windmills nearby), etc. And how will the aquifer be impacted by this proposed project? Livermore residents depend upon the water from the aquifer.

Please have all possible impacts of this project thoroughly reviewed. Thank you.

Carol Silva
Livermore, CA

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June 4, 2020

Alameda County Community Development Planning Department
Attn: Andy Young
224 West Winton Avenue, Room 111
Hayward, CA 94544

RE: Written comments for NOP of Environmental Impact Report
Aramis Solar Energy Generation and Storage Project
Application # PLN2018-00117

Dear Mr. Young:

We would like to enter the following into the record regarding the proposed environmental impact report for the Aramis solar energy generation and storage project conditional use permit #PLN2018-00117. While we understand the need for alternative energy sources and own solar panels for our residence, an industrial size facility needs to be evaluated for the impact from numerous perspectives.

I. Aesthetics. This proposed change to an otherwise picturesque landscape is a visual assault. The solar edifice will have a substantial adverse effect on the scenic vista of North Livermore. The visual character of the natural environment would be permanently degraded at the site, as well as spoil the beauty of the surrounding area. While the project description from Intersect Power states "From a distance, the project would appear as a muted, dark field of panels, similar to a body of water, and would exhibit minimal glint and glare in comparison to a body of water", there are no bodies of water in the area. Lighting and signage of the utility is another concern. The solar facility would appear unnatural and alter the agricultural essence of the area. There are no mitigations that could protect the aesthetics of the area from the industrial energy generation facility. See attachment A for a current view from our deck.

II. Traffic. Aesthetics aside, one of our primary concerns is safety regarding the traffic. The planned access points off North Livermore or Manning Roads are not clearly defined in the proposal and could be hazardous during construction from either of the two roads. Both North Livermore Avenue and Manning Road are heavily traveled by commuters and bicyclists. The addition of construction vehicles would be hazardous to anyone traveling the road regardless of the distance of the entry point to the roads. The corner of N. Livermore Avenue and Manning has limited visibility at some points, and is already the location of numerous collisions, both vehicle and bicycle, as is the intersection of Manning and Morgan Territory Road. The single lane roads are designed for agriculture, not production facilities.

III. Climate. The impact of weather should be another factor studied under the EIR. All power transmission to the PG&E substation should be underground due to high winds experienced in the area, as well as the fire potential of broken or down wires in dry grass. The westside of North Livermore Avenue floods during rainy weather and should also be examined before adding more traffic or submerging power lines.

IV. Wildlife. The proposed area is inhabited by a variety of wildlife, as well as serves as a migration corridor. The area and waterway associated with Cayetano Creek is essential to native plant and animal habitat. The proposal by the applicant to add a public hiking trail along Cayetano Creek will further disturb the natural plants and wildlife, as well as increase vehicle traffic.

V. Watershed. Groundwater sources are limited in the area. We are expressly concerned with the additional demand on a precious resource, as well as the potential contamination of outside water introduced to the area and run off from panel cleaning.

VI. Compatibility with Williamson Act. While the proposed operational plan is to be co-incidental with agriculture, the sheep proposed to be housed with the solar are not currently in production on the site or anywhere on North Livermore Avenue. The proposal is to convert open grazing land to an industrial size energy production facility and add sheep to the site to claim “agricultural” use. The project is not truly an agricultural operation.

We appreciate the opportunity to comment. Thank you for your consideration in addressing these concerns in the EIR. Please contact us if you have questions.

Steve & Susan Springer

Steve & Susan Springer
9017 Doubletree Lane
Livermore, CA 94551
925-449-5481

Attachment A (photo)

Attachment A - View to the south from Morgan Territory Road

Springer



Timothy P Ryan
3333 Rice St., Apt. 203
Miami, FL 33133
Owner: 13285 Morgan Territory Rd.
Livermore, CA 94551
TimSueRyan@aol.com
786 – 999 – 5096

June 4, 2020

Andrew Young, Senior Planner
Alameda County Planning Department
224 W. Winton Avenue, Room 111
Hayward, CA 94544
Andrew.young@acgov.org

Subject: **Aramis Renewable Energy Project (County Planning Application: PLN 2017-00174)**

Dear Mr. Young:

Pursuant to your request, I would like to reemphasize and add the following information to the information that you've already prepared. In doing so, it seems to me that you have asked for the preparation of many of the items of which I would have requested if I had been in your position. Therefore, let me address the following:

1. First, I am not in favor of this project as it goes against the intent of all the previous planning regarding the north Livermore area. It is an agricultural area and has been maintained as such for many, many years including several elections which have re-emphasized this effort. This project goes against that community intent and the General Plan and Land Use Planning.
2. It is my understanding that this property is in the Williamson Act which also re-emphasizes its agricultural intent.
3. The possibility of adverse biological impacts seems imminent to include water contamination, air quality concerns (greenhouse gases), traffic increases, and other contaminations yet to be determined.
4. Along with all of this is the need to maintain the esthetic value of the pasturelands as it now is evident.

It seems to me that the best location for this project is in the Altamont Pass hills where there is already windmills for power development. It should be in this area so that it would avoid its potential unsightly appearance and accomplish the same measures.

Thank you for your attention to this matter.

Sincerely,
(Signed)
Timothy P. Ryan

Cc: Richard Ryan (Rybrew1@gmail.com)

Young, Andrew, CDA

From: tracy.wood589@gmail.com
Sent: Friday, June 5, 2020 6:58 PM
To: Young, Andrew, CDA
Cc: Haggerty, Scott, Supv BOS Dist 1; Wilson, Shawn, BOS Dist 1; tracy.wood589 @gmail.com
Subject: Re: Aramis Solar Energy PLB2018-00017
Attachments: Aramis Solar Energy PLB2018-00017.pdf

Date: June 5, 2020

Submitted via email
andrew.young@acgov.org

To: Andrew Young Senior Planner
Alameda County Planning Department
224 West Winton Avenue, Room 111
Hayward, Ca. 94554

From: Tracy Wood
100 Twin Oaks Lane
Livermore, Ca. 94551

Subject: Aramis Solar Energy Generation and Storage Project, County Planning Application PLB2018-00017

Dear Mr. Young:
Thank you for the opportunity to comment on the scope of the environmental review for the proposed Aramis Solar Energy Generation and Storage Project in the North Livermore area of unincorporated Alameda County. I am submitting this comment letter in response to the County's Map May 4, 2020 Notice of Preparation (NOP) of an Environmental Impact Report (EIR).
The proposed unsightly project would entail construction of a massive solar energy production facility with photovoltaic panels providing up to 100 megawatts of output capacity and include on site battery storage and an onsite substation for voltage conversion across four privately-owned parcels estimated at 580 acres of beautiful, scenic rural grazing land, the equivalent of 25,797 football fields.
This project would impose significant environmental impacts on NLVRC area.

- **Aesthetics**: Our North Livermore Valley Rural Community area is designated as Scenic Rural Recreational Route, having 580 acres littered with Solar Panels will remove the scenic view and instead be replaced with ugly, glaring, heat generating fire boxes. Fencing and landscaping will not negate the ugliness of the project. And one need look no further than the poorly designed landscaping of the Cayetano Creek Project to see what our city of Livermore validates as aesthetically appealing.
- **Agricultural Resources**: According to the Intersect proposal, open pastureland will be converted to a solar electric plant. A proposal for sheep grazing to keep weeds down is not agriculture and is a creepy attempt to make the project pass as ag, people are smarter than this. The DEIR must study the cumulative impacts of converting ag land to no-ag uses – which is happening at an alarming rate – in Livermore, Alameda County and statewide. These impacts cannot be mitigated, and the DEIR must indicate as such.
- **Biological Resources**: There are too many to name – starting with losing grazing land to industry which is happening at an alarming rate throughout our city and state. Multiple wildlife species would be impacted in a negative manner, including but not limited too black tail deer, wild turkey, red legged frog, tiger salamander, western pond turtle, burrowing owl, red tail hawk, squirrels, badger, black crows, coyote, and turkey vultures.
- **Hydrology/Groundwater:** This project is in direct conflict with the ACDEH and Alameda County Public Works Agency – Clean Water Program. It is interesting when tax dollars come into light that environmental issues seem to go the wayside.

The Aramis Solar Facility does not reduce or eliminate pollution and does not protect or enhance water quality, but rather increase water pollution, runoff goes directly into our drinking water, aquafers and storm drains which eventually lead to our ocean.

I find it very troubling that we now have two major initiatives on the docket that will impact our environment in the NLVRC area. The solar facility does not belong in our scenic area and must be relocated to an area that is more appropriate and one that will not impact the environment or ground water.
Lastly, has the DEIR consulted with the Chief of Fire Department to determine the impact of a fire starting and all those acres of solar panels (plastic) becoming a fire box to burn down the valley and move straight into downtown Livermore and neighboring cities (Paradise Camp Fire).

Thank you for the County's consideration of our concerns and impact on our scenic NLVRC.

Thank you,

Tracy Wood

CC: Scott Haggerty, Supervisor
Shawn Wilson Chief of Staff for Supervisor Scott Haggerty

Tracy Wood
O 925-371-6132
C 925-667-7954

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Young, Andrew, CDA

From: Laura Mercier <lmercier@trivalleyconservancy.org>
Sent: Monday, June 8, 2020 2:46 PM
To: Young, Andrew, CDA
Cc: Mark Triska; David Kent; Steve & Sue Springer; Tammy Reus
Subject: Case No. PLN2018-00117, Solar Energy Facility (SEF) comments

Hello Andy,

This email is in response to the Notice of Preparation for the EIR for Case No. PLN2018-00117, Solar Energy Facility (SEF).

Tri-Valley Conservancy believes the prepared Environmental Impact Report for the proposed Aramis Solare Energy Generation and Storage Project should address the following items.

1. **Aesthetics:** prove that this solar facility does not impact the rural "feel" and bucolic view shed.
2. **Agriculture**: this land currently considered Grazing land is equally important to the agriculture in this valley. Please address how this is being mitigated in addition to any environmental mitigation required.
3. **Alternatives sites:** adequate alternatives should be presented including existing developed areas such as covers for parking lots. The goal is to support solar facilities at the same time locations selected are where potential impacts can be minimized.
4. **Decommissioning and Restoration Plan**: include how the applicant will provide a Financial Assurance in the form of a sufficient bond with escalators for inflation prior to commencing construction for the SEF.
5. **Wildlife**: Identify, be specific and clear on all mitigation required is in compliance with the **East Alameda County Conservation Strategy (EACCS).** If the species is not identified in the EACCS then provide the tool used for calculating mitigation requirements.
6. **Williamson Act:** State of California does not accept solar projects on lands under the Williamson Act. This project includes some land that is under the Williamson act; identify the proposed method to **extinguish** the Williamson Act.

Thank you,

Laura

Laura Mercier
Executive Director
Tri-Valley Conservancy

925-449-8706: Office
925-989-3508: Cell

www.trivalleyconservancy.org

** This email was sent from an external source. If you do not know the sender, do not click on links or attachments. **

From: Chris & Diana Wyland <chrisdianawyland@gmail.com>
Sent: Thursday, May 21, 2020 2:21 PM
To: Young, Andrew, CDA <andrew.young@acgov.org>
Subject: Solar Panel Field on N. Livermore Ave.

Dear Andrew,

I'm writing to let you know that my family and I oppose the Solar Panel project proposed on N. Livermore Ave / Manning. We have lived on Morgan Territory Rd for 10 years and love the countryside. We moved here and bought our property for this reason - the countryside. Having a huge Solar Panel farm installed is not natural, not the natural landscape that brings so much beauty and peace to our area. The wildlife, landscape, and cows grazing that everyone drives by is gorgeous. Having solar panels is not gorgeous, and to profit PG&E is not popular. Livermore has grown a lot over the 20 years that we have lived here, and a big part of it's charm are the cow pastures - countryside in the North and also vineyards - wineries in the South, as well as the vibrant downtown and caring residents.

Possibly the land owners want something to bring them more income than cattle or hay, however, their land is zoned agricultural, with other measures in place to protect that. I wonder if another land conservancy organization can purchase the land and keep it open space? I'm sure everyone would love that solution. Similar to other properties nearby in Doolan Canyon - Tri Valley Conservancy, and the land near us - that Save Mt Diablo purchased.

I am the Next Door Lead for Morgan Territory and have shared the email with the information to contact you. I posted it in a neutral fashion to encourage comments, but know that most of us will oppose this project.

Please know that regular residents of Livermore are probably not aware of what's going on and so may not be able to comment. My guess is that they would be opposed also. Property values will go down if Livermore becomes known as the town with the huge solar panel farm on the outskirts. Thank you for listening to my opinion, and we look forward to a positive outcome for us all.
Please let me know if you need any other info, or have anything for me to share to my neighbors, I am happy to help.

Thank you.

Sincerely,
Diana & Chris Wyland
10580 Morgan Territory Rd.
Livermore, CA 94551

Appendix B

Mitigation Monitoring and Reporting Program

MITIGATION MONITORING AND REPORTING PROGRAM

INTRODUCTION

Mitigation Monitoring and Reporting Programs (MMRPs) are required by the California Environmental Quality Act (CEQA) Section 21081.6 to be adopted by CEQA Lead Agencies for projects having the potential to cause significant environmental impacts. The MMRP describes changes to the project or conditions of project approval that mitigate or avoid the project's potential significant effects on the environment. This MMRP addresses the Aramis Solar Energy Generation and Storage Project proposed by IP Aramis, LLC, a subsidiary of Intersect Power, LLC. A brief description of the proposed project is provided below. The proposed project is located within Alameda County (County); the County is the Lead Agency under CEQA and has discretionary authority over the proposed project.

MMRP FORMAT AND IMPLEMENTATION

Mitigation measures that would reduce or eliminate potential environmental impacts of the proposed project are identified in the Aramis Solar Energy Generation and Storage Project EIR. These mitigation measures will become conditions of project approval if the project is approved. The County is required to verify that all adopted mitigation measures are implemented properly and to ensure compliance, this MMRP (including the checklist) has been formulated. The MMRP shall be adopted, along with CEQA Findings, by the County (Lead Agency) and must be administered by County personnel from the Planning and Public Works departments. Specific responsibilities are delineated for each measure in the attached checklist table and these responsibilities may be delegated to qualified County staff or consultants.

The checklist, which follows as Table B-1, is intended to be used by the applicant, grading/construction contractors, and personnel from the above-listed County Departments, as the appointed mitigation implementation and monitoring entities. Information contained within the checklist clearly identifies each mitigation measure, defines the conditions required to verify compliance, and delineates the monitoring schedule. Following is an explanation of the three columns that constitute each MMRP checklist.

Column 1 — *Mitigation Measure*: An inventory of each mitigation measure is provided.

Column 2 — *Monitoring Responsibility*: Identifies who are responsible for determining compliance with each mitigation measure (e.g., Alameda County Planning Department, construction contractor, project applicant, qualified biologist).

Column 3 — *Implementation Schedule*: As scheduling is dependent upon the progression of the overall project, specific dates are not used within the "Schedule" column. Instead, scheduling describes a logical succession of events (e.g., prior to ground-disturbing activities, etc.) and, if necessary, delineates a follow-up program.

Column 4 — *Monitoring Compliance Record Name/Date*: Column is left blank and is to be signed and dated when compliance with the mitigation measure has been met.

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
Aesthetics			
AES-1: Long-term Landscape Maintenance. To ensure the long-term effectiveness of the proposed landscaping, the project applicant shall ensure that the proposed landscaping is adequately irrigated to establish the long-term viability of the buffer and maintained throughout the life of the project. Should any of the proposed landscape plantings not survive the initial planting or expire at any time during the life of the project, the applicant shall provide replacement plantings consistent with the initial planting to screen the solar facility within one year of plant failure.	Alameda County Planning Department; Project Owner	Ongoing; Within one year of plant failure	
Air Quality			
Prior to issuance of any Grading Permit, the County shall confirm that the Grading Plan, Building Plans, and specifications stipulate that, in compliance with the BAAQMD CEQA Air Quality Guidelines, the following basic construction mitigation measures shall be implemented for all project construction activity: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas and unpaved access roads) shall be watered two times per day. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 mph.	Alameda County Public Works Department	Prior to issuance of any grading permit	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
• All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. A publicly visible sign shall be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations. AQ-2: Prior to issuance of any Grading Permit, the County shall confirm that the Grading Plan, Building Plans, and specifications stipulate that, all diesel-powered off-road equipment with 50 or more horsepower be certified to meet the USEPA Tier 4 Final emissions standards, or be retrofitted with CARB verified diesel exhaust emissions reduction devices that reduce emissions of both NOX and PM to USEPA Tier 4 Final emissions standards.	Alameda County Public Works Department	Prior to issuance of any grading permit	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
Biological Resources			
BIO-1a: Prior to the issuance of grading or building permits, and for the duration of construction activities, the project proponent/operator shall demonstrate that it has in place a Construction Worker Environmental Awareness Training and Education Program for all new construction workers at the project site. All construction workers shall attend the Program prior to participating in construction activities. Any employee responsible for the operations and maintenance or decommissioning of the proposed project facilities shall also attend the Environmental Awareness Training and Education Program prior to starting work on the project. The Program will be developed and presented by biologist meeting the qualifications of an authorized biologist as defined by USFWS or designee. The training may be presented in video form. The Program shall include: • Information on the life history of the American badger, burrowing owl, Swainson's hawk and other raptors, desert kit fox as well as other wildlife and plant species that may be encountered during construction activities, legal protection status of each species (including all nesting birds); • A description of CRLF, CTS and its habitat, the avoidance and minimization measures that are being implemented to conserve the CRLF and CTS as they relate to the project, and the boundaries within which work may occur; • A description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an	Alameda County Planning Department; Construction Contractor	Prior to the issuance of grading or building permits; Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information shall be prepared for distribution to the previously referenced people and anyone else who may enter the project site; • The definition of "take" under the Federal Endangered Species Act and the California Endangered Species Act; • Measures the project proponent/operator is implementing to protect the species; and • Specific measures that each worker shall employ to avoid take of wildlife species, and penalties for violation of the Federal Endangered Species Act or California Endangered Species Act. The worker environmental awareness training material will be kept on-site for the duration of operations and all personnel will be instructed on the importance of CRLF and CTS, how to identify these amphibians, and what to do if CRLF or CTS is found on the facility.			
BIO-1b: Environmental tailboard trainings shall take place on an as-needed basis in the field. The environmental tailboard trainings will include a brief review of the biology of the covered species and guidelines that must be followed by all personnel to reduce or avoid negative effects to these species during construction activities. Directors, Managers, Superintendents, and the crew foremen and forewomen will be responsible for ensuring that crewmembers comply with the guidelines.	Alameda County Planning Department; Construction Contractor	Prior to any ground disturbance and as-needed	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
BIO-1c: Contracts with contractors, construction management firms, and subcontractors shall obligate all contractors to comply with these mitigation measures.	Alameda County Planning Department; Project Owner	Prior to any ground disturbance and as-needed	
BIO1d: The following shall not be allowed at or near work sites: trash dumping, firearms, open fires (such as barbecues) not required by the activity, hunting, and pets.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1e: Vehicles and equipment shall be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1f: Off-road vehicle travel shall be prohibited outside of designated areas.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1g: Vehicles shall not exceed a speed of 15 mph on unpaved roads within natural land cover types or during off-road travel.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1h: Vehicles or equipment shall not be refueled within 100 feet of a wetland, stream, or other waterway unless a bermed and lined refueling area is constructed.	Alameda County Planning Department; Construction Contractor	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
BIO-1i: Vehicles shall be washed only at approved areas. No washing of vehicles shall occur at job sites.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1j: To discourage the introduction and establishment of invasive plant species, seed mixtures/straw used within natural vegetation shall be either rice straw or weed-free straw.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1k: Pipes, culverts, and similar materials greater than four inches in diameter shall be stored so as to prevent covered wildlife species from using these as temporary refuges, and these materials shall be inspected each morning for the presence of animals prior to being moved.	Alameda County Planning Department; Construction Contractor	Each morning during project construction	
BIO-1l: Erosion control measures shall be implemented to reduce sedimentation in wetlands and drainages adjacent to the site that could be occupied by special-status animal species when activities are the source of potential erosion problems. Plastic mono-filament netting (erosion control matting) or similar material containing netting shall not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1m: Stockpiling of material shall occur such that direct effects to special-status species are avoided.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-1n: Grading shall be restricted to the minimum area necessary.	Alameda County Planning Department;	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
	Construction Contractor		
BIO-1o: Prior to ground disturbing activities adjacent to sensitive habitats, project construction boundaries and access areas shall be flagged and temporarily fenced during construction to reduce the potential for vehicles and equipment to stray into adjacent habitats.	Alameda County Planning Department; Construction Contractor	Prior to ground disturbing activities adjacent to sensitive habitats	
BIO-2a: If construction commences during the wet season and active dispersal period for these species (between approximately October 16 and May 14, depending on the precipitation year), preconstruction surveys for CRLF and CTS shall be conducted in the project site approximately two weeks prior to the initiation of construction and decommissioning activities to ensure that CRLF and CTS are not actively using the project site or adjacent areas as a dispersal corridor. Pre-construction surveys shall be conducted by a qualified biologist familiar with all life stages of the amphibians and shall cover all aquatic habitats on and immediately adjacent to the project site (Cayetano Creek and its tributaries) that are suitable for CRLF and CTS dispersal.	Alameda County Planning Department; Qualified Biologist	During wet season (October 16 and May 14)	
BIO-2b: If any life stage of CRLF and/or CTS (e.g., egg, egg mass, larvae, tadpole, juvenile, or adult) is detected within the project site during any surveys or monitoring for the project during construction or decommissioning, USFWS and CDFW shall be notified within 48 hours. The biologist shall monitor the CRLF or CTS to make sure the amphibian is not harmed and that it leaves the site on its own. Construction activities will not be allowed within 100 feet of the animal. Handling of listed species without a take permit pursuant to the FESA is not allowed.	Alameda County Planning Department; Construction Contractor; Qualified Biologist	Ongoing; notification within 48 hours	
BIO-2c: Activities associated with construction and decommissioning conducted within 200 feet of on-site drainages shall be limited to a period outside of the active season for CRLF and CTS (approximately	Alameda County Planning Department;	Outside of active season for CRLF and CTS which	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
May 15 to October 15, depending on the precipitation year). This construction window is during the dry season in which creek levels are lower to dry, providing limited aquatic dispersal habitat for CRLF. The dry season is defined generally as that time between April 15th and the first qualifying rain event on or after October 15th defined as precipitation of more than one half of an inch for 24 hours. Any extension of the work window outside of the May 15 to October 15 timeframe due to abnormally dry conditions would require coordination with the USFWS and compliance with MM BIO-2a and -2b.	Construction Contractor	occurs May 15 to October 15	
BIO-2d: Construction and decommissioning activities within 200 feet of on-site drainages shall be restricted to daylight hours to avoid CRLF and CTS that may be present in the project site during the time they are most active – between dusk and dawn. Construction and decommissioning activities shall cease one half hour before sunset and shall not begin prior to one half hour before sunrise.	Alameda County Planning Department; Construction Contractor	Daylight hours; work to cease one half hour before sunset and begin no earlier than one half hour before sunrise	
BIO-2e: Construction and decommissioning activities and clearing within the project site shall be confined to the minimal area necessary to facilitate construction activities. To ensure that construction equipment and personnel do not affect sensitive habitat outside of designated work areas, orange barrier fencing shall be erected to clearly define the habitat to be avoided. This will delineate the Environmentally Sensitive Area on the project. The integrity and effectiveness of Environmentally Sensitive Area fencing and erosion control measures shall be inspected daily. Corrective actions and repairs shall be carried out immediately for fence breaches and ineffective erosion control BMPs.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-2f: To prevent CRLF and CTS from moving through the project site during construction and decommissioning, temporary exclusion fencing shall be placed along the boundary of the project site by October 15th	Alameda County Planning Department;	By October 15th of the year prior to commencement of	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
of the year prior to commencement of construction and decommissioning. This will allow any CRLF or CTS potentially using the project site for upland refugia to leave the project site to access breeding habitat, but not return. The fence will be made of a material that does not allow amphibians to pass through, with one-way exit holes, and the bottom will be buried to a depth of two inches so that frogs cannot crawl under the fence. To avoid entanglement of amphibians and other wildlife, the use of plastic monofilament netting is prohibited. Exclusion fencing shall be removed within 72 hours of the completion of work.	Construction Contractor	construction and decommissioning; Exclusion fencing will be removed within 72 hours of the completion of work.	
BIO-2g: A biologist meeting the qualifications of an authorized biologist as defined by USFWS shall survey the project site immediately prior to installation of temporary exclusion fencing to ensure that this species is not present within the site. Once the temporary exclusion fencing is installed, the work area within the exclusion fence shall be surveyed again immediately prior to the onset of construction activities. If listed species are found in the project site during preconstruction surveys, construction activities shall not start within a 100-foot radius until the species has left the area of its own volition. Handling of CRLF or CTS without a take permit pursuant to the FESA is not allowed.	Alameda County Planning Department; USFWS-approved Biologist	Prior to installation of temporary exclusion fencing	
BIO-2h: A qualified biological monitor shall be present daily during initial construction and decommissioning activities including but not limited to equipment mobilization, site clearing, vegetation removal, and grading/ground disturbance to verify that no CRLF or CTS enter the project site during construction or are harmed. Daily monitoring can be reduced to weekly inspections at the discretion of the biological monitor once site grading has been completed and no habitat/refugia is present for CRLF or CTS on the site.	Alameda County Planning Department; USFWS-approved Biologist	Daily during initial construction and decommissioning	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
• Any mammal burrows providing potential refugia for CRLF or CTS shall be scoped to search for these animals. If CRLF or CTS are found, the burrow shall be flagged and avoided by a suitable buffer as determined by the biological monitor. • If CRLF or CTS are found during construction or decommissioning, work shall immediately stop within 100 feet and the listed amphibian will be allowed to move out of harm's way on its own accord. The biological monitor shall monitor the CRLF or CTS to make sure the amphibian is not harmed and that it leaves the site on its own Handling of listed species without a take permit pursuant to the FESA is not allowed. Sightings of special-status species will be reported to CNDDB. • Prior to the start of daily construction and decommissioning activities during initial ground disturbance, the biological monitor shall inspect the perimeter fence to ensure that it is neither ripped nor has holes and that the base is still buried. The fenced area shall also be inspected to ensure no amphibians are trapped. If listed amphibians are found inside or outside of the fence, work will immediately stop, and the animal will be allowed to leave the project site on its own accord. Any listed species shall be closely monitored until they move away from the construction area. • A permitted biologist shall be contracted to trap and move CRLF and CTS to nearby suitable habitat if they are found inside the project area and do not leave the project site of their own accord.			
BIO-2i: To ensure that amphibian diseases are not conveyed between work sites by the USFWS approved biologist or biological monitor, the	Alameda County Planning	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
fieldwork code of practice developed by the Declining Amphibian Population Task Force shall be followed at all times.	Department; Qualified Biologist		
BIO-2j: Standard construction BMPs shall be implemented throughout construction and decommissioning, in order to avoid and minimize adverse effects to the water quality within the project site. Appropriate erosion control measures shall be used (e.g., hay bales, filter fences, vegetative buffer strips or other accepted equivalents) to reduce siltation and contaminated runoff from the project site. The integrity and effectiveness of the BMPs shall be inspected on a daily basis by the resident engineer or site foreman. Corrective actions and repairs shall be carried out immediately.	Alameda County Planning Department; Construction Contractor	Throughout construction and decommissioning	
BIO-2k: Construction by-products and pollutants such as petroleum products, chemicals, or other deleterious materials should not be allowed to enter into streams or other waters. A plan for the emergency clean-up of any spills of fuel or other materials should be available when construction equipment is in use.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-2l: Equipment shall be re-fueled and serviced at designated construction staging areas. All construction material and fill shall be stored and contained in a designated area that is located away from channel areas to prevent transport of materials into adjacent streams. The preferred distance is 100 feet from the wetted width of a stream. In addition, a silt fence shall be installed to collect any discharge, and adequate materials should be available for spill clean-up and during storm events.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-2m: Construction vehicles and equipment shall be monitored and maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Leaking vehicles and equipment shall be removed from the site.	Alameda County Planning Department; Construction Contractor	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
BIO-2n: Building materials storage areas containing hazardous or potentially toxic materials such as herbicides and petroleum products shall be located outside of the 100-year flood zone, have an impermeable membrane between the ground and the hazardous material, and shall be bermed to prevent the discharge of pollutants to ground water and runoff water. The bermed area shall at a minimum have the capacity to store the volume of material placed in it.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-2o: All disturbed soils shall undergo erosion control treatment prior to October 15 and/or immediately after construction is terminated. Appropriate erosion control measures shall be used (e.g., hay bales, filter fences, vegetative buffer strips or other accepted equivalents) to reduce siltation and contaminated runoff from project sites. Erosion control blankets shall be installed on any disturbed soils steeper than a 2:1 slope or steeper.	Alameda County Planning Department; Construction Contractor	Prior to October 15 (of construction year) and/or immediately after construction is terminated.	
BIO-2p: During project activities, all trash that may attract predators shall be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas.	Alameda County Planning Department; Construction Contractor	During project construction and operation activities; Following construction completion.	
BIO-2q: To prevent inadvertent entrapment of animals during construction, all excavated, steep walled holes or trenches more than one foot deep shall be covered at the close of each working day with plywood or other suitable material or provided with one or more escape ramps constructed of earth fill or wooden planks. At the beginning of each working day and before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist, or an on-site designee identified by the USFWS-approved biologist, will immediately place escape ramps or other appropriate structures to	Alameda County Planning Department; Construction Contractor; Qualified Biologist	At the beginning of each working day and before such holes or trenches are filled	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
allow the animal to escape, or USFWS will be contacted for guidance and notified of the incident. All holes and trenches more than one foot deep shall be filled or securely covered prior to October 15.			
BIO-2r: No monofilament plastic will be used for erosion control.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-3a: If feasible, construction-related ground disturbance activities shall begin outside of the burrowing owl nesting season (February 1 through August 31) and during construction the site shall be maintained in a manner that is inhospitable to burrowing owl such as keeping the site free of vegetation, ground squirrel control (the use of poison baits or other substances that could be potentially harmful to San Joaquin kit fox shall not be allowed), and maintaining regular site disturbance by construction equipment and personnel. This will discourage burrowing owl from occupying the project site. If feasible, decommissioning-related ground disturbing activities shall begin outside of the burrowing owl nesting season (February 1 through August 31).	Alameda County Planning Department; Construction Contractor	Outside of the burrowing owl nesting season which occurs between February 1 and August 31	
BIO-3b: No more than 14 days prior to initiation of ground disturbing activities associated with project construction or decommissioning, a qualified biologist shall conduct a pre-construction survey of the project site and surrounding areas to a distance of 150 meters in accordance with the methods outlined in the CDFW Staff Report on Burrowing Owl Mitigation (2012) or most recently adopted guidance. The first pre-construction survey will cover all areas within 150 meters of the portion of the site in which construction/ decommissioning is scheduled to start. Surveys will be phased based on the construction/ decommissioning schedule such that the surveys are conducted no more than 14 days ahead of the start of ground disturbance in new	Alameda County Planning Department; Qualified Biologist	No more than 14 days prior to initiation of ground disturbing activities associated with project construction or decommissioning	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
areas. If construction/ decommissioning activities in portions of the site cease for a period of 14 days, those portions of the site will be resurveyed for burrowing owls prior to the resumption of construction/decommissioning activities. If no occupied breeding or wintering owl burrows are identified, no further mitigation will be required. If occupied burrows are identified on the site or within 150 meters, one of the following actions shall be taken: (1) permanent avoidance of the burrow or (2) establishment of a temporary avoidance buffer followed by passive relocation and compensatory mitigation for loss of habitat in conjunction with the measures below: • If an occupied wintering burrow is discovered during pre-construction surveys, a 50-meter buffer area shall be established around the burrow until the owl leaves on its own (if the burrow is more than 50 meters offsite and/or more than 50 meters from the work area, no buffer is necessary). Ground-disturbing work conducted during the nonbreeding (winter) season (September 1 to January 31) can proceed near the occupied burrow so long as the work occurs no closer than 50 meters to the burrow, and the burrow is not directly affected by the project activity. A smaller buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist. If the 50-meter buffer cannot be maintained for the duration of occupancy by the owl, owls may be excluded from an occupied wintering burrow in accordance with the conditions of the project's *Burrowing Owl Exclusion Plan*, which will be submitted for approval by CDFW prior to passive relocation of any burrowing owls. • If an occupied nesting burrow is discovered during pre-construction surveys, an avoidance buffer of 200 meters shall be established			

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around the burrow location and maintained until a qualified biologist has determined that the nest has fledged or is no longer active (a 200-meter avoidance buffer is appropriate for low-intensity impacts near nesting burrows during breeding season [CDFW 2012]). No project activities shall take place within the 200-meter buffer during the time in which it is in place. A smaller buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist. • If an occupied burrow cannot be avoided, and the burrow is not actively in use as a nest, a 200-meter buffer shall be established until the burrowing owls can be excluded from burrows in accordance with the project's *Burrowing Owl Exclusion Plan*, which will be submitted for approval by CDFW prior to passive relocation of any burrowing owls. The *Burrowing Owl Exclusion Plan* is based on the recommendations made in the Staff Report on Burrowing Owl Mitigation (CDFW 2012) or most recently adopted guidance and shall include the following information for each proposed passive relocation: o Confirmation by site surveillance that the burrow(s) is empty of burrowing owls and other species; o Type of scope to be used and appropriate timing of scoping; o Occupancy factors to look for and what shall guide determination of vacancy and excavation timing; o Methods for burrow excavation;			

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
○ Removal of other potential owl burrow surrogates or refugia on-site; ○ Methods for photographic documentation of the excavation and closure of the burrow; and ○ Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take. Methods for assuring the impacted site shall continually be made inhospitable to burrowing owls and fossorial mammals.			
BIO-3c: If an occupied burrow is identified off-site within 150 meters and passive exclusion is deemed necessary to protect the owls, burrowing owls may be excluded from burrows if permission is granted by the land owner, and in accordance with the project's *Burrowing Owl Exclusion Plan,* which will be submitted for approval by CDFW prior to passive relocation of any burrowing owls. If burrowing owls cannot be excluded from an off-site burrow and it is not feasible to maintain an avoidance buffer as stated above, coordination will be conducted with CDFW to determine appropriate measures to minimize impacts to off-site burrowing owls. Such measures could include, but are not limited to: (1) installation of barriers between the construction or decommissioning area and the occupied burrows to block noise and views of construction or decommissioning equipment and personnel, and (2) regular monitoring by a qualified biologist to determine if construction or decommissioning activities are resulting in disturbance of the owls that could lead to nest abandonment or harm to adult owls or their young. If such disturbance was occurring, the biological monitor would have the authority to halt construction or decommissioning	Alameda County Planning Department; Construction Contractor; Qualified Biologist	Prior to passive relocation of any burrowing owls	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
activities until further modifications could be made to avoid disturbance of the owls.			
BIO-3d: If burrowing owl pairs are passively relocated, compensatory mitigation for lost wintering/breeding habitat shall be provided either through dedication of 6 acres of suitable habitat (per pair of relocated owls) at an off-site location in accordance with the conditions of the project's *Burrowing Owl Exclusion Plan* or through purchase of credits at a CDFW-approved mitigation bank in the region. No compensatory mitigation is required for passive relocation or eviction of transient, unpaired owls.	Alameda County Planning Department; Project Applicant	If burrowing owl pairs are passively relocated	
BIO-3e: If permanent avoidance buffers are established, such areas shall be managed for the duration of the project to preserve current values as foraging habitat for burrowing owl. Management shall include: (1) exclusion of all project activities throughout the construction, operation, and decommissioning phases, including staging, parking, driving, or dumping; (2) vegetation management by grazing or mowing to preserve open, low-growing vegetation; (3) fencing to discourage human incursion; (4) signage identifying the area as a biologically sensitive area managed for burrowing owl, and; (5) a worker education and awareness program for all personnel working on the site including contractors and sub-contractors.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-4: A qualified biologist shall conduct a preconstruction survey for American badger no more than 14 days prior to the beginning of ground disturbance related to construction and decommissioning activities, or any other project activity likely to impact American Badger (such as staging, mowing, vegetation clearing), to determine if there are any American badger dens on the project site. If there are no American badger dens on the project site, no further mitigation is necessary. If American badger dens are located within the work area and cannot be avoided, a qualified biologist will determine if the dens are occupied. If	Alameda County Planning Department; Qualified Biologist	No more than 14 days prior to the beginning of ground disturbance related to construction and decommissioning activities	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
unoccupied, the dens will be collapsed under the supervision of the biologist. If occupied, the biologist will determine if it is a natal/pupping den or a solitary badger den. Dens of solitary badger may be collapsed under the supervision of the biologist once the animal has vacated the den. Natal/pupping dens will be avoided by establishment of an exclusion zone around the den determined by the qualified biologist until the young are old enough to leave the den and survive on their own.			
BIO-5a: A qualified biologist shall conduct a preconstruction survey no more than 14 days prior to the beginning of ground disturbance and/or construction/decommissioning activities, or any other project activity likely to impact San Joaquin kit fox, to determine if potential San Joaquin kit fox dens are present in or within 500 feet of the project site (inaccessible areas outside of the project site can be surveyed using binoculars or spotting scopes from public roads). The surveys shall be conducted in all areas of suitable habitat for San Joaquin kit fox. Surveys need not be conducted for all areas of suitable habitat at one time; they may be phased so that surveys occur within 14 days prior to disturbance of any particular portion of the site. If potential dens are observed and avoidance of the dens is determined to be feasible, the following minimum buffer distances shall be established prior to construction/decommissioning activities (consistent with USFWS 2011): • Potential den: 50 feet • Atypical den: 50 feet • Known den: 100 feet • Natal/pupping den: at least 500 feet – **USFWS must be contacted**.	Alameda County Planning Department; Qualified Biologist	No more than 14 days prior to the beginning of ground disturbance and/or construction and decommissioning activities	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
○ Buffer establishment shall follow the *USFWS Standardized Recommendations for* Protection *of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011) under "Exclusion Zones." ○ If San Joaquin kit fox or occupied San Joaquin kit fox dens are observed on the site, USFWS must be contacted.			
BIO-5b: If avoidance of the potential dens is not feasible, the following measures are required to avoid potential adverse effects to the San Joaquin kit fox: • If the qualified biologist determines that potential dens are inactive, the biologist shall excavate these dens by hand with a shovel to prevent foxes from re-using them during construction. • If the qualified biologist determines that a potential non-natal den may be active, an on-site passive relocation program may be implemented with prior concurrence from the USFWS. This program shall consist of excluding San Joaquin kit foxes from occupied burrows by installation of one-way doors at burrow entrances, monitoring of the burrow for one week to confirm usage has been discontinued, and excavation and collapse of the burrow to prevent reoccupation. After the qualified biologist determines that the San Joaquin kit foxes have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction with prior concurrence from USFWS.	Alameda County Planning Department; Qualified Biologist	Ongoing	
BIO-5c: In addition, the following avoidance and minimization measures for San Joaquin kit fox shall be implemented during construction/decommissioning of the project (USFWS 2011):	Alameda County Planning Department;	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
a. Project-related vehicles shall observe a daytime speed limit of 20 mph and a nighttime speed limit of 10 mph throughout the project site, except on County roads, state and federal highways. Additionally, vehicles shall not exceed a speed limit of 15 mph on unpaved roads within natural land cover types or during off-road travel. Off-road traffic shall be prohibited outside of designated project areas. b. To prevent inadvertent entrapment of kit foxes or other animals during the construction or decommissioning phases of the project, all excavated, steep-walled holes or trenches more than 2-feet deep should be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks should be installed. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the USFWS and the CDFW should be contacted as noted under measure l. referenced below. c. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped.	Construction Contractor; Qualified Biologist		

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
d. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in securely closed containers and removed at least once a week from a construction or project site. e. No firearms shall be allowed on the project site. f. No pets, such as dogs or cats, shall be permitted on the project site to prevent harassment, mortality of kit foxes, or destruction of dens. g. Use of rodenticides, herbicides, poison baits, or other substances potentially harmful to San Joaquin kit fox shall be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. Use of such compounds should observe label and other restrictions mandated by the EPA, CDFA, and other State and federal legislation, as well as additional project-related restrictions deemed necessary by the USFWS. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox. h. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped kit fox. The representative will be identified during the employee education program required by BIO-1a and their name and telephone number shall be provided to the Service. i. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. shall be re-contoured if necessary, and revegetated to promote restoration of the area to			

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but after project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas shall be determined on a site-specific basis in consultation with the USFWS, CDFW, and revegetation experts. j. Any contractor, employee, or military or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox should immediately report the incident to their representative. This representative should contact the CDFW immediately in the case of a dead, injured or entrapped kit fox. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or the wildlife biologist at (530) 934-9309. The USFWS should be contacted at Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, CA 95825, (916) 414-6620 or (916) 414-6600. k. The Sacramento Fish and Wildlife Office and CDFW shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. l. New sightings of kit fox shall be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed should also be provided to the USFWS at the address listed under measure l.			

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
m. Fencing of the project site, with the exception of the project substation and energy storage areas, shall incorporate wildlife-friendly fencing design. Fencing plans may use one of several potential designs that would allow kit foxes to pass through the fence while still providing for project security and exclusion of other unwanted species (i.e., domestic dogs and coyotes). Raised fences or fences with entry/exit points of at least 6 inches in diameter spaced along the bottom of the fence to allow species such as San Joaquin kit fox access into and through the project site would be appropriate designs.			
BIO-6a: If project (construction/decommissioning) ground-disturbing or vegetation clearing, and grubbing activities commence during the avian breeding season (February 1 through August 31), a qualified biologist shall conduct a pre-construction nesting bird survey no more than 7 days prior to initiation of project activities. The survey area shall include suitable raptor nesting habitat within 300 feet of the project boundary (inaccessible areas outside of the project site can be surveyed from the site or from public roads using binoculars or spotting scopes). Pre-construction surveys are not required in areas where project activities have been continuous since prior to February 1, as determined by a qualified biologist. Areas that have been inactive for more than 14 days during the avian breeding season must be re-surveyed prior to resumption of project activities. If no active nests are identified, no further mitigation is required. If active nests are identified, the following measure is required: • A suitable buffer (e.g., 660 feet for golden eagle, 300 feet for common raptors; 100 feet for passerines) shall be established by a qualified biologist around active nests and no	Alameda County Planning Department; Qualified Biologist	No more than seven days prior to initiation of project activities	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
construction/decommissioning activities within the buffer shall be allowed until a qualified biologist has determined that the nest is no longer active (i.e., the nestlings have fledged and are no longer reliant on the nest, or the nest has failed). Encroachment into the buffer may occur at the discretion of a qualified biologist. Any encroachment into the buffer shall be monitored by a qualified biologist to determine whether nesting birds are being impacted.			
BIO-6b: Should any vertical tubes, such as solar mount poles, chain link fencing poles, or any other hollow tubes or poles be used on the project site, the poles shall be capped immediately after installation to avoid entrapment of birds.	Alameda County Planning Department; Construction Contractor	Immediately after installation	
BIO-7a: Project facility lighting shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass into adjacent areas. Lenses and bulbs shall not extend below the shields. This will prevent impacts to bird species nesting and foraging in riparian areas in Cayetano Creek and other sensitive habitats adjacent to the site.	Alameda County Planning Department; Construction Contractor	Ongoing	
BIO-7b: Rodenticides shall not be used at the project site. Rodents will be controlled by encouraging raptor foraging. If additional rodent control is required to minimize impacts on adjacent agricultural operations, non-chemical methods will be employed.	Alameda County Planning Department; Construction Contractor; Qualified Biologist	Ongoing	
BIO-7c: During operations, trash – including microtrash that can be harmful to birds and other wildlife – will be regularly removed from the project site to avoid impacts to birds using the project site. The area of trash cleanup will include both the project site within the fence lines, in	Alameda County Planning Department; Project Owner	Ongoing; during project operation	

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addition to focused trash pickup along the fence on the interior and exterior sides of the fence.			
BIO-7d: The project shall be designed to underground electrical wiring to the maximum extent feasible. In particular, guy wires will be avoided to the maximum extent feasible without compromising public safety.	Alameda County Planning Department; Project Applicant	Prior to construction	
BIO-7e: In compliance with the Avian Power Line Interaction Committee's (APLIC) guidance, Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC, 2012), transmission lines and all electrical components shall be designed, installed, and maintained in accordance with APLIC (2012) guidance to reduce the likelihood of large bird electrocutions and collisions.	Alameda County Planning Department; Project Applicant; Construction Contractor	Ongoing	
BIO-7f: The Applicant shall implement the following measures to reduce the risk of bird collisions with PV panels. • A qualified biologist shall prepare an Avian Monitoring Plan to assess and monitor the potential for avian collisions with solar panels on the site. The Plan will include monitoring for levels of avian activity as well as avian mortality in treated and untreated (control) portions of the solar facility to determine if avian mortality is occurring and if there is any apparent difference in avian mortality between treated and untreated panels. The Plan shall also include methods to install visual deterrents or cues to encourage bird avoidance of the Project site. Implementation of the Plan will provide quantitative data on the effectiveness of the avian deterrent in terms of overall bird use and large-bird mortality in treated portions of the project versus an untreated control. • Within 30 days after project commissioning, avian deterrent materials shall be installed in a total of four 50-acre blocks to	Alameda County Planning Department; Project Applicant; Qualified Biologist	Prior to project construction; within 30 days after project commissioning; avian monitoring will occur once per week for a total of 12 consecutive weeks; following the initial three-month monitoring period	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
achieve coverage of a total of 200 acres within the Solar Facility on a 3-month trial basis to evaluate potential avian collision issues. These deterrents shall be made of a material that is both reflective and highly visible, such that the material reflects ambient light and is stimulated by air movement. The effect of installation will create the visual impression of continuous and varied movement, which has been shown as an avian deterrent in agricultural applications. Examples of the types of material that could be used include plastic compact discs and reflective tape. • Upon installation of deterrent measures, avian monitoring shall occur once per week for a total of 12 consecutive weeks; this will be repeated for the first three consecutive years of operation. During each monitoring event, bird abundance in each block (4 treatment blocks and one untreated control block) will be quantified using a point count method and the number, species, and behavior of birds observed within each block will be recorded. Behaviors will be recorded for each species and will reflect the modal (or typical) behavior observed for all individuals of the species, not for each individual bird. The observer will also record temperature, average wind speed, and percent cloud cover at the start of each observation period. • Mortality of large birds in each block will be assessed by surveying the block for carcasses of large birds (crow-sized and larger). During the surveys, the location and species of each carcass will be recorded using a handheld GPS receiver, a photograph will be taken of the carcass, and the cause of mortality will be noted if apparent. Carcasses will not be collected or preserved.			

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
• Overall bird abundance, species diversity, and large-bird mortality will be compared among all blocks, and between the control block and the treatment blocks combined. Analysis may include t-Test comparisons of means for overall abundance and large-bird mortality; however, statistical power may be low depending on the overall level of bird activity at the site. • Facility operator or agent will provide a brief analysis of the effects of the deterrent measures on panel performance and the feasibility of maintaining avian deterrents for inclusion in the analysis. • Following the initial 3-month period and based on the results of the Plan, visual deterrents will either be discontinued if there is no significant difference between avian mortality between the treatment and control blocks, adjusted to reduce performance issues and reexamined on a continuing 3-month basis, or if adjustments are not deemed necessary to improve panel performance, deployed on the remainder of the site and maintained for the life of the project or until determined infeasible (based on the definition of "feasible" in CEQA Guidelines §15364) or ineffective by the Project owner in consultation with CDFW and the County.			
BIO-7g: Panels shall include, if feasible, a light-colored, UV-reflective, or otherwise non-polarizing outline, frame, grid, or border, which has been shown to substantially reduce panel attractiveness to aquatic insects (Horvath, 2010) and may reduce avian mortality by avoiding collisions with panel faces (NFL, 2014).	Alameda County Planning Department; Project Applicant	Prior to construction	
BIO-7h: Dryland pasture will be established on the site and used for grazing livestock (sheep) between and under the solar panels	Alameda County Planning	Ongoing	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
throughout the year, pursuant to an Agricultural Management Plan. Portions of the site in and around the solar panels would be maintained as dryland pasture containing a combination of grassland species and non-invasive forbs and would be maintained for grazing for the duration of the life of the solar facility. The mixture of grassland and native forbs, managed by targeted sheep grazing, is expected to provide high value and consistently available habitat conditions for small mammal prey species (voles, pocket gophers, deer mice, and house mice) preferred by raptors in the region.	Department; Project Applicant		
BIO-7i: The Agricultural Management Plan shall include grazing management methods to ensure that the vegetation composition and structure provides a combination of areas with lower vegetation heights and density to provide accessibility to raptors, and areas with denser, taller vegetation to attract and maintain prey on the site. Management conditions will include ensuring that the vegetation cover is not reduced to the extent that vegetation would not naturally regenerate; there are openings in the vegetation to allow foraging access for raptors; and there are areas where the vegetation would be allowed to grow taller. In general, vegetation heights below the panels should be allowed to be higher to provide cover for prey species (12-18 inches), and the vegetation heights between the panels should be maintained at a suitable height to provide foraging accessibility (<12 inches).	Alameda County Planning Department; Project Applicant	Prior to construction	
BIO-8a: The project shall be designed to avoid impacts to jurisdictional waters on and adjacent to the site. If jurisdictional waters cannot be avoided prior to the start of construction, the project applicant shall secure any required aquatic resources permits for impacts to jurisdictional waters of the State from the San Francisco Bay RWQCB and CDFW, and shall comply with all conditions of such permits	Alameda County Planning Department; Project Applicant	Prior to project construction	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
including providing compensatory mitigation as required, to achieve no net loss of wetlands or other waters.			
BIO-8b: For those waters of the State and CDFW jurisdictional areas that are not avoided by project construction, compensatory mitigation shall be provided. As approved by the San Francisco Bay RWQCB and CDFW, the project applicant may purchase mitigation credits from an approved mitigation bank at a minimum 1:1 ratio or implement another method of mitigation satisfactory to the San Francisco Bay RWQCB and CDFW.	Alameda County Planning Department; Project Applicant	Prior to project construction	
BIO-8c: Impacts shall also be minimized by the use of Best Management Practices (BMPs) to protect preserved waters of the U.S./State adjacent to the site and to ensure that water quality standards are not compromised in preserved wetlands and other waters within the watershed. These practices can include installing orange construction fencing buffers, straw waddles to keep fill from entering preserved/avoided wetlands and other waters, and other protective measures.	Alameda County Planning Department; Construction Contractor	Ongoing	
Cultural Resources			
CUL-1: Prior to project construction, the project applicant shall retain an Architectural Historian who meets the Secretary of Interior's Professional Qualification Standards to complete photographic documentation of the historical resources located at 4400 North Livermore Avenue. The photographic documentation shall adhere to the standards and guidelines for Historical American Buildings Survey (HABS) documentation, as outlined in the updated June 2015 HABS Guidelines set by the Heritage Documentation Program instituted by the National Parks Service.	Alameda County Planning Department; Project Applicant; Qualified Architectural Historian	Prior to project construction	
CUL-2: Prior to the initiation of construction or ground-disturbing activities, all construction personnel shall be trained in the protection of cultural resources, the recognition of buried cultural remains, and the	Alameda County Planning Department;	Prior to project construction or	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
notification procedures to be followed upon the discovery of archaeological materials, including Native American burials. The training should be presented by an archaeologist who meets the Secretary of Interior's Standards for Prehistoric and Historic Archaeology and should include recognition of both prehistoric and historic resources. Personnel should be instructed that unauthorized collection or disturbance of artifacts or other cultural materials is illegal, and that violators will be subject to prosecution under the appropriate state and federal laws. Supervisors should also be briefed on the consequences of intentional or inadvertent damage to cultural resources.	Construction Contractor; Qualified Archaeologist	ground-disturbing activities	
CUL-3: In the event that cultural or tribal cultural resources are exposed during ground-disturbing activities, construction activities (e.g., grading, grubbing, or vegetation clearing) shall be halted in the immediate vicinity of the discovery. An archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards shall then be retained to evaluate the resource's significance under CEQA. If the discovery proves to be significant, additional work, such as data recovery excavation, may be warranted and shall be discussed in consultation with the County.	Alameda County Planning Department; Qualified Archaeologist	Immediately upon discovery	
CUL-4: If discovery of human remains occurs during ground-disturbing activities or construction activities (e.g., grading, grubbing, or vegetation clearing), the specific procedures outlined by the NAHC, in accordance with Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the Public Resources Code, must be followed: 1. All excavation activities within 60 feet of the remains will immediately stop, and the area will be protected with flagging or by	Alameda County Planning Department; Project Owner; County Coroner	Immediately upon discovery	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
posting a monitor or construction worker to ensure that no additional disturbance occurs. 2. The project owner or their authorized representative will contact the County Coroner. 3. The coroner will have two working days to examine the remains after being notified in accordance with HSC 7050.5. If the coroner determines that the remains are Native American and are not subject to the coroner's authority, the coroner will notify NAHC of the discovery within 24 hours. 4. NAHC will immediately notify the Most Likely Descendant (MLD), who will have 48 hours after being granted access to the location of the remains to inspect them and make recommendations for their treatment. Work will be suspended in the area of the find until the City approves the proposed treatment of human remains.			
Geology, Soils, Mineral Resources, and Paleontological Resources			
GEO-1: Prior to issuance of a grading permit, the project applicant shall retain a geotechnical firm with local expertise in geotechnical investigation and prepare a site-specific geotechnical report. The report shall be prepared by a licensed geotechnical engineer or engineering geologist and be submitted to the County building department for approval prior to the issuance of a grading permit. This report shall be based on data collected from subsurface exploration, laboratory testing of samples and surface mapping, and address the potential for surface fault rupture, ground shaking, slope failure, expansive soils, and unstable cut or fill slopes, and make recommendations based on those findings. The project applicant shall implement the recommendations identified in the site-specific geotechnical report.	Alameda County Public Works Department; Project Applicant; Licensed Geotechnical Engineer or Engineering Geologist	Prior to issuance of any Grading Permit	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
GEO-2: In the event a paleontological or other geologically sensitive resources (such as fossils or fossil formations) are identified during any phase of project construction, all excavations within 100 feet of the find shall be temporarily halted until the find is examined by a qualified paleontologist, in accordance with Society of Vertebrate Paleontology standards. The paleontologist shall notify the appropriate representative at the County of Alameda who shall coordinate with the paleontologist as to any necessary investigation of the find. If the find is determined to be significant under CEQA, the County shall implement those measures which may include avoidance, preservation in place, or other appropriate measures, as outlined in Public Resources Code Section 21083.2.	Alameda County Planning Department; Construction Contractor; Qualified Paleontologist	Immediately upon discovery	
Hydrology and Water Quality			
HYD-1: The project applicant shall file an NOI to comply with the Construction General Permit with the San Francisco Bay RWQCB prior to each phase of construction and project decommissioning. Individual SWPPPs shall be prepared for each NOI (project construction and project decommissioning) and shall detail the treatment measures and BMPs to control pollutants that shall be implemented and complied with during the construction and post-construction phases of the project. The SWPPP(s) required for decommissioning will specify BMPs to be implemented during that final project phase. The SWPPPs are subject to approval by the San Francisco Bay RWQCB, which makes the final determination on which BMPs are required for the project. The construction contracts for each project phase and for the decommissioning phase will include the requirement to implement the BMPs in accordance with the SWPPPs, and proper implementation of the specified BMPs is subject to inspection by the San Francisco Bay RWQCB staff. Example BMPs may include practices such as: designation of restricted-entry zones, sediment tracking control measures (e.g.,	Alameda County Planning Department; Project Applicant	Prior to each phase of construction and project decommissioning.	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
crushed stone or riffle metal plate at construction entrance), truck washdown areas, diversion of runoff away from disturbed areas, protective measures for sensitive areas, outlet protection, provision mulching for soil stabilization during construction, and provision for revegetation upon completion of construction within a given area. The SWPPPs will also prescribe treatment measures to trap sediment once it has been mobilized, such as straw bale barriers, straw mulching, fiber rolls and wattles, silt fencing, and siltation or sediment ponds.			
Noise			
NOI-1: Prior to issuance of any project Grading Permit or Building Permit, the County shall confirm that the Grading Plan, Building Plans, and construction specifications stipulate that the following construction noise mitigation measures shall be implemented for all project construction activity: • Restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 7:00 a.m. to 7:00 p.m., Monday through Friday, and between 8:00 a.m. to 5:00 p.m. on Saturdays, Sundays, and County recognized public holidays; and • Post a publicly visible sign at the primary project construction entrance listing the permitted construction days and hours, complaint procedures, and who to notify in the event of a problem. The sign shall also include a listing of telephone numbers to be used during regular construction hours and off-hours to contact both the County and the construction contractor regarding noise complaints.	Alameda County Planning Department; Construction Contractor	Prior to issuance of any project grading or building permits	

Mitigation Measure	Monitoring Responsibility	Implementation Schedule	Monitoring Compliance Record Name/Date
• If construction activities occur outside of the specified hours, noise levels shall be subject to the limits listed in Table 6.60.040A of the Alameda County Noise Control Ordinance.			

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Appendix C

Project Site Plans

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Aramis Solar

Up to 102-MW-AC
Alameda County, CA
Conditional Use Permit Plan

PROJECT OWNER/DEVELOPER
CONTACT: MARISA MITCHELL
PHONE: (415) 846-0730

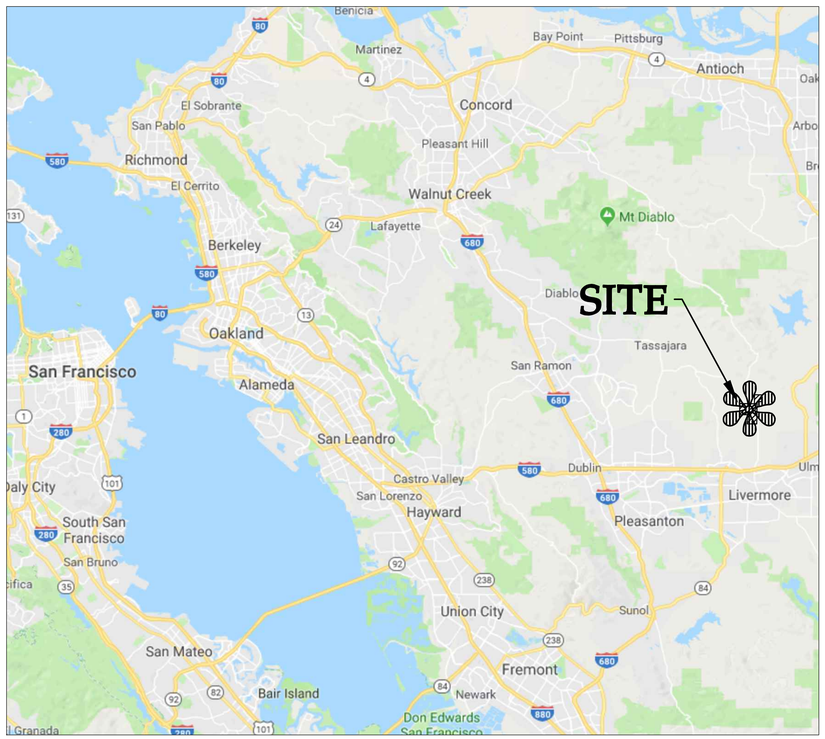
ENGINEERING PROJECT MANAGER
WESTWOOD PROFESSIONAL SERVICES, INC.
N., 2740 DALLAS PKWY. #280
PLANO, TX
CONTACT: JACK HAYS
PHONE: (972) 473-4640

PROJECT CIVIL ENGINEER OF RECORD
WESTWOOD PROFESSIONAL SERVICES, INC.
12701 WHITEWATER DRIVE SUITE #300
MINNETONKA, MN 55343
CONTACT: CHRIS CARDA, P.E.
PHONE: (952) 906-7459

Sheet List Table	
Sheet Number	**Sheet Title**
T.100	COVER
C.100	EXISTING CONDITIONS PLAN-NORTH
C.101	EXISTING CONDITIONS PLAN-SOUTH
C.200	CIVIL SITE PLAN-NORTH
C.201	CIVIL SITE PLAN-SOUTH
C.400	CONSTRUCTION DETAILS
C.401	CONSTRUCTION DETAILS

DIRECTIONS TO SITE
HEADING EAST ON I-580
1. TAKE EXIT 52 FOR N. LIVERMORE AVE. TOWARD LIVERMORE.
2. TURN LEFT ONTO N. LIVERMORE AVE.
3. DRIVE APPROXIMATELY 2.9 MILES NORTH.
4. THE SITE ENTRANCE WILL BE ON THE LEFT.

Regional Map



SOURCE: MAP DATA ©2018 GOOGLE (NOT TO SCALE)

Vicinity Map



SOURCE: MAP DATA ©2018 GOOGLE (NOT TO SCALE)

PROJECT LOCATION
LATITUDE= 37° 44' 57.29"
LONGITUDE= -121° 46' 25.79"

PROJECT COORDINATE SYSTEM
NSRS 2011 CALIFORNIA STATE PLANE, ZONE III, US FOOT

FEMA MAPPING
FIRM PANELS 06001C0332G AND 06013C0500F

APN
903-0007-002-01
903-0006-003-07
903-0006-001-02

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westwoodps.com
Westwood Development Consultants, LLC

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Drawn: PDC
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Revisions:

A	08/13/20	ADDED UTILITY CROSSING LOCATIONS
B	08/31/20	SUBSTATION RELOCATED

Prepared for:

IP Aramis, LLC

IP Aramis, LLC

Alameda County, CA

Cover

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Drawing No: T.100

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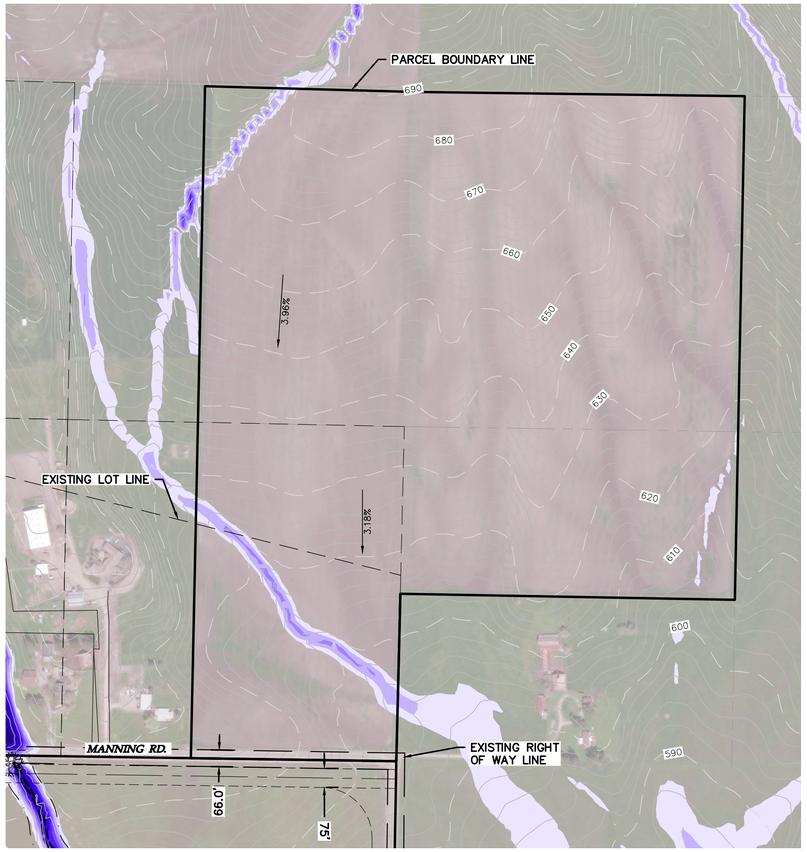


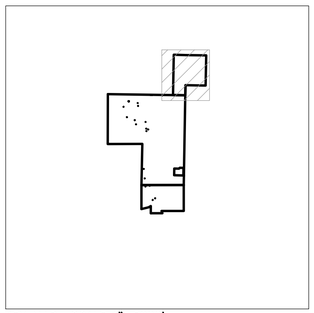
LEGEND:

- PROJECT BOUNDARY LINE
- EXISTING EASEMENT LINE
- EXISTING RIGHT–OF–WAY LINE
- EXISTING OVERHEAD POWERLINE
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD
- EXISTING INDEX CONTOUR LINE (1070)
- EXISTING INTERVAL CONTOUR LINE (1071)
- EXISTING STREAM BANK
- SETBACK FROM STREAM BANK
- EXISTING FEMA REGULATORY FLOODWAY
- EXISTING FEMA FLOOD ZONE X
- EXISTING FEMA FLOOD ZONE A
- EXISTING TREE

NOTES:

1. MATURE TREES (AS SHOWN) WILL REMAIN.

100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	



KEY MAP SCALE: 1"=5000'

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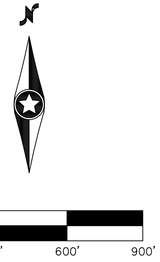

IP Aramis, LLC

Alameda County, CA

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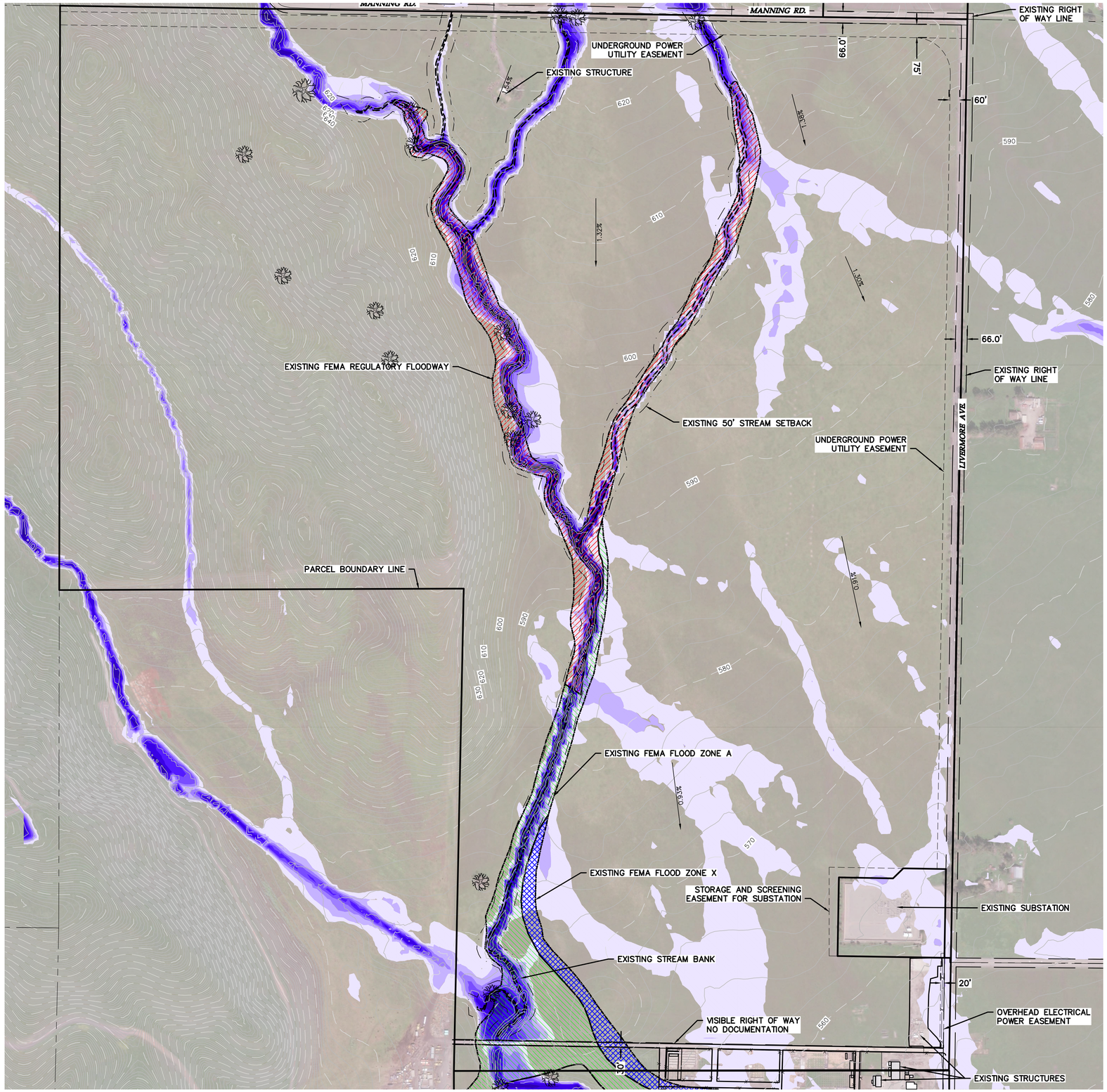

LEGEND:

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- EXISTING FEMA FLOOD ZONE A
- EXISTING TREE

NOTES:

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100 Year Max Flow Depth (ft)		
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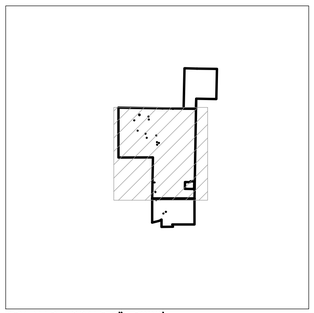

KEY MAP SCALE: 1"=5000'

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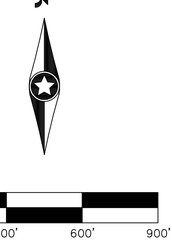

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Alameda County, CA

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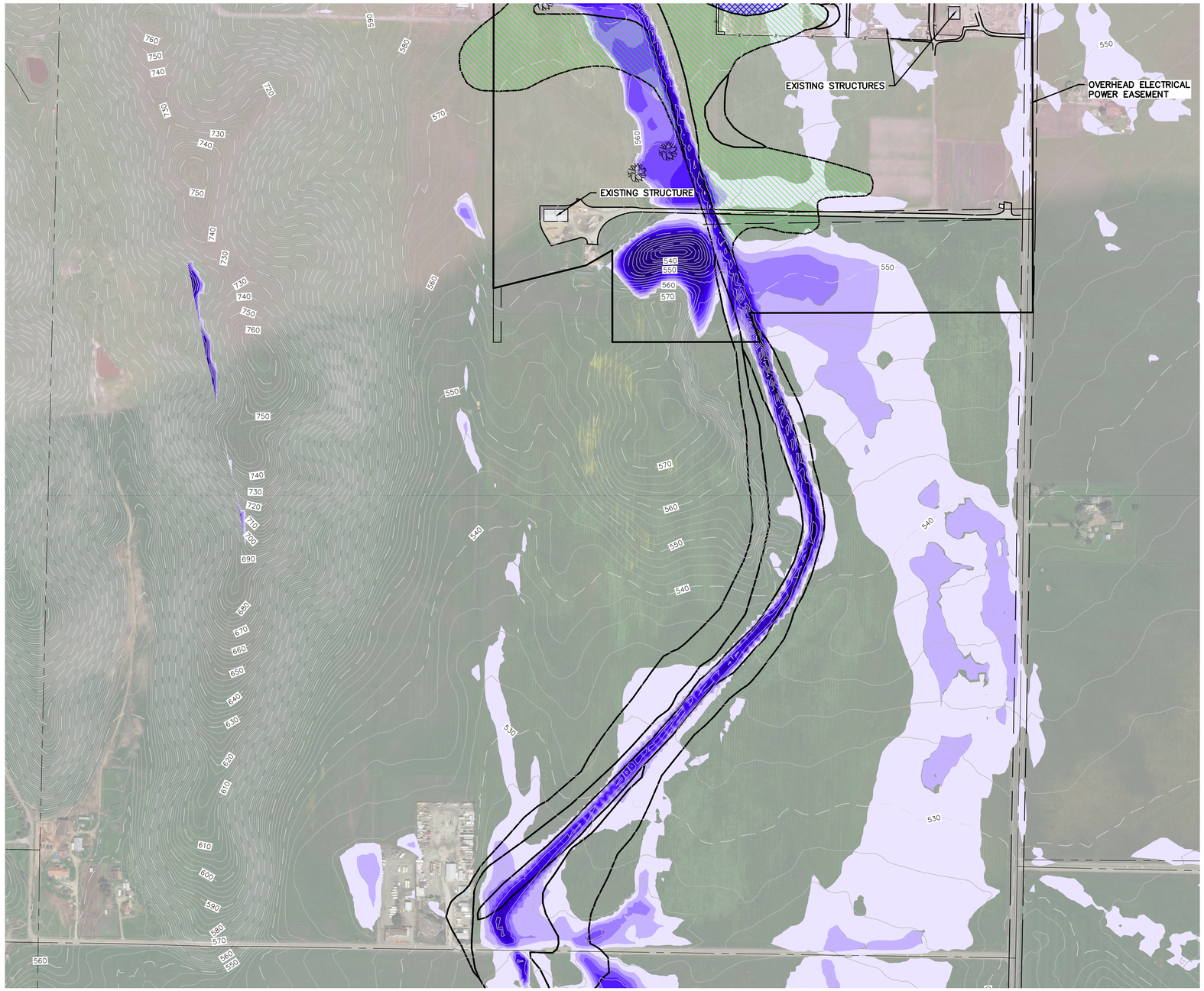

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- EXISTING TREE

NOTES:

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100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
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1.01	1.50	
1.51	2.00	
2.01	2.50	
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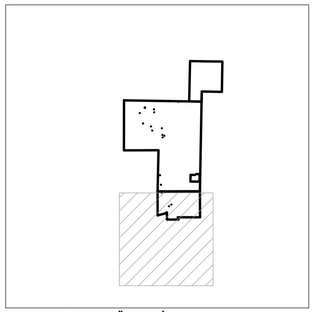
6.00	20.00	



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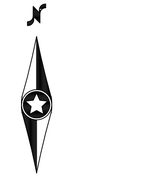

IP Aramis, LLC

Alameda County, CA

Existing Conditions Plan-South

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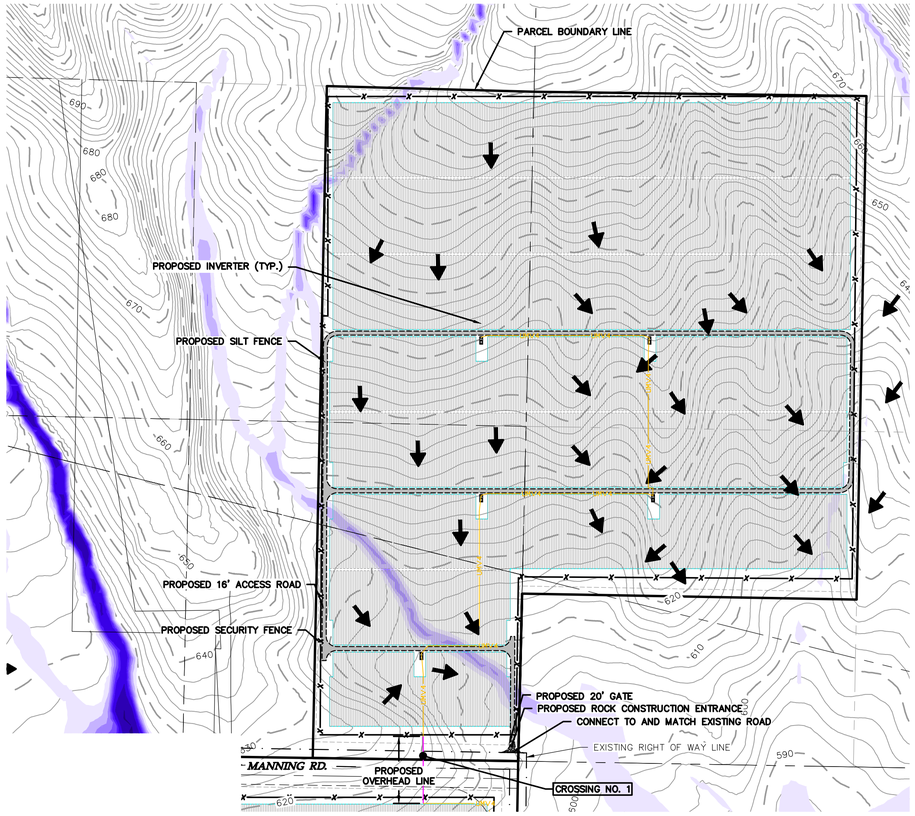

LEGEND:

- EXISTING PROPERTY LINE
- EXISTING SECTION LINE
- EXISTING EASEMENT LINE
- EXISTING RIGHT-OF-WAY LINE
- EXISTING OVERHEAD POWERLINE
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD
- EXISTING FEMA REGULATORY FLOODWAY
- EXISTING FEMA FLOOD ZONE X
- EXISTING FEMA FLOOD ZONE A
- EXISTING STREAM BANK
- EXISTING INDEX CONTOUR LINE
- EXISTING INTERVAL CONTOUR LINE
- PROPOSED SOLAR ARRAY
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED ACCESS ROAD
- PROPOSED WALKING PATH
- UNDERGROUND MVAC ROUTE OPTION 1
- UNDERGROUND MVAC ROUTE OPTION 2
- OVERHEAD MVAC ROUTE
- HDD (HORIZONTAL DIRECTIONAL DRILLING)
- PROPOSED SILT FENCE
- PROPOSED SECURITY FENCE
- MODULE SETBACK LINE
- DRAINAGE DIRECTION
- PROPOSED SUBSTATION
- PROPOSED LAYDOWN YARD
- PROPOSED BATTERY ENERGY STORAGE SYSTEM

100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	

Project Module Setbacks

Item	Required
SIDE	10' FROM PROPERTY LINE
REAR	10' FROM PROPERTY LINE
FRONT	30' FROM PROPERTY LINE
STREAM BANK	50'

Disturbance Limits

Item	Area
TOTAL CLEARING AND GRUBBING (WITHIN PROPOSED SECURITY FENCE).	415 acres

Fenced Area

Location	Area (acres)
BOARDMAN (NORTH)	105
CROSBY (CENTRAL)	270
STANLEY (SOUTH)	40
TOTAL	415

Location	Crossing Equipment	Existing Infrastructure	Infrastructure Owner/Responsible Party
1	overhead power line, 34.5kV	66' county road ROW (Manning)	Alameda County
		75' power line easement	Pacific Gas & Electric
		75' underground electrical easement	Pacific Gas & Electric
2	underground power line, 2kV	waterway	Alameda County and/or local water district
3	overhead power line, 34.5kV	waterway	Alameda County and/or local water district
4	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
5	underground power line, 34.5kV	paved road (Hartman)	Alameda County (no public ROW evident)
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
6	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
7	underground power line, 34.5kV	66' county road ROW (Livermore)	Alameda County
		20' communications easement	Pacific Telephone & Telegraph (AT&T)

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A	08/13/20	ADDED UTILITY CROSSING LOCATIONS
B	08/31/20	SUBSTATION RELOCATED

Prepared for:

IP Aramis, LLC

0' 300' 600' 900'

IP Aramis, LLC

Alameda County, CA

Civil Site Plan-North

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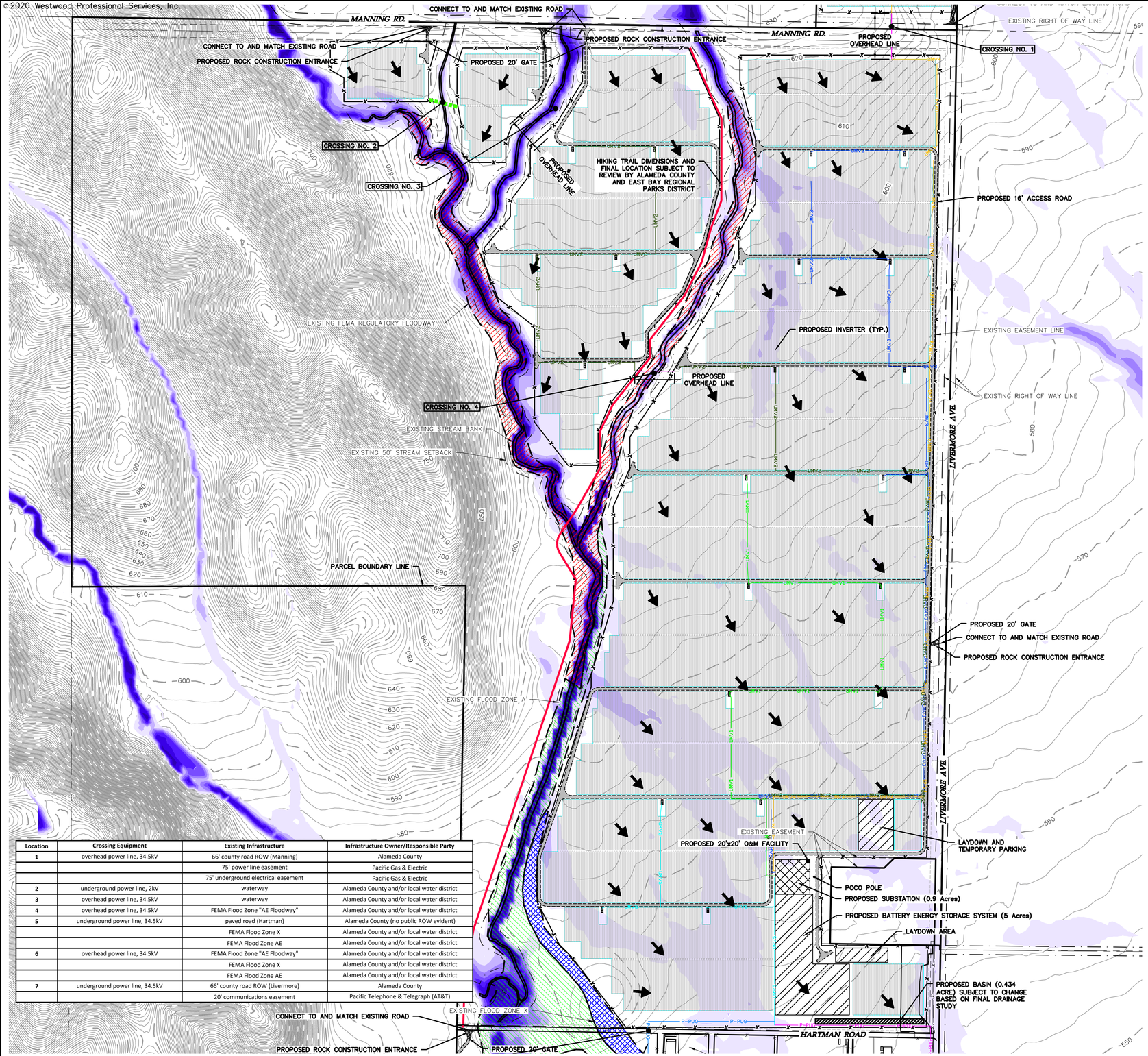

Location	Crossing Equipment	Existing Infrastructure	Infrastructure Owner/Responsible Party
1	overhead power line, 34.5kV	66' county road ROW (Manning)	Alameda County
		75' power line easement	Pacific Gas & Electric
		75' underground electrical easement	Pacific Gas & Electric
2	underground power line, 2kV	waterway	Alameda County and/or local water district
3	overhead power line, 34.5kV	waterway	Alameda County and/or local water district
4	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
5	underground power line, 34.5kV	paved road (Hartman)	Alameda County (no public ROW evident)
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
6	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
7	underground power line, 34.5kV	66' county road ROW (Livermore)	Alameda County
		20' communications easement	Pacific Telephone & Telegraph (AT&T)

LEGEND:

- EXISTING PROPERTY LINE
- EXISTING SECTION LINE
- EXISTING EASEMENT LINE
- EXISTING RIGHT-OF-WAY LINE
- EXISTING OVERHEAD POWERLINE
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD
- EXISTING FEMA REGULATORY FLOODWAY
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- EXISTING FEMA FLOOD ZONE A
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100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	

Project Module Setbacks	
Item	Required
REAR	10' FROM PROPERTY LINE
FRONT	30' FROM PROPERTY LINE
STREAM BANK	50'

Disturbance Limits	
Item	Area
TOTAL CLEARING AND GRUBBING (WITHIN PROPOSED SECURITY FENCE).	415 acres

Fenced Area	
Location	Area (acres)
BOARDMAN (NORTH)	105
CROSBY (CENTRAL)	270
STANLEY (SOUTH)	40
TOTAL	415

0' 300' 600' 900'

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IP Aramis, LLC

Alameda County, CA

Civil Site Plan-Central

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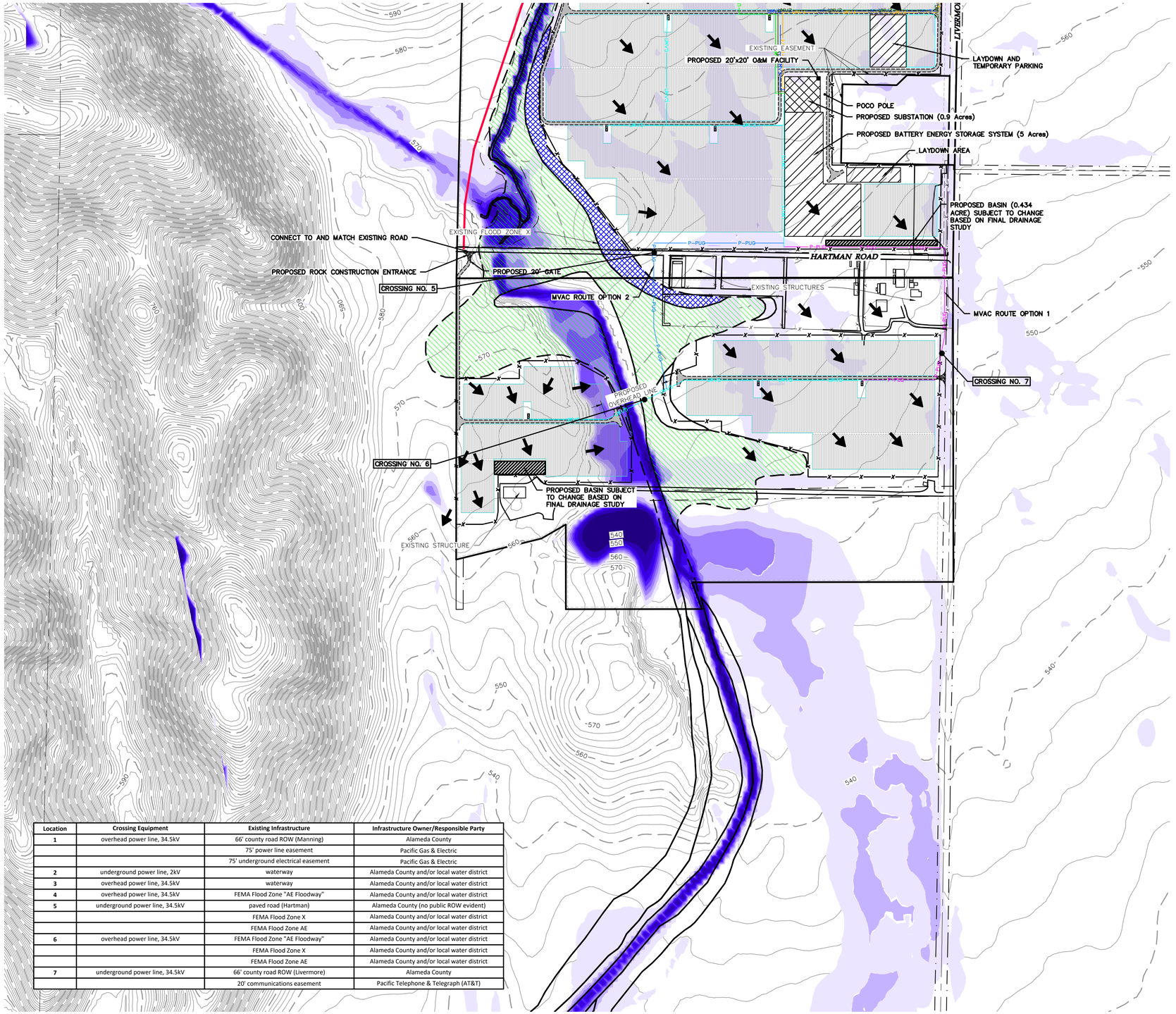

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		FEMA Flood Zone X	Alameda County and/or local water district
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- EXISTING EASEMENT LINE
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- EXISTING OVERHEAD POWERLINE
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- PROPOSED SECURITY FENCE
- MODULE SETBACK LINE
- DRAINAGE DIRECTION
- PROPOSED SUBSTATION
- PROPOSED LAYDOWN YARD
- PROPOSED BATTERY ENERGY STORAGE SYSTEM

NOTES:

1. WATER LINE EASEMENT PENDING; TO BE AVOIDED OR RELOCATED

100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	

Project Module Setbacks	
Item	Required
SIDE	10' FROM PROPERTY LINE
REAR	10' FROM PROPERTY LINE
FRONT	30' FROM PROPERTY LINE

Disturbance Limits	
Item	Area
TOTAL CLEARING AND GRUBBING (WITHIN PROPOSED SECURITY FENCE).	415 acres

Fenced Area	
Location	Area (acres)
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0' 300' 600' 900'

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IP Aramis, LLC

Alameda County, CA

Civil Site Plan-South

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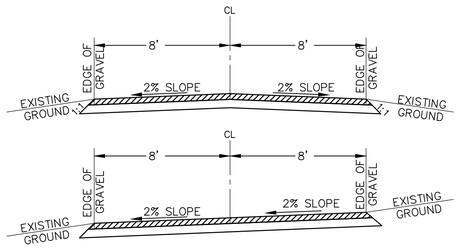
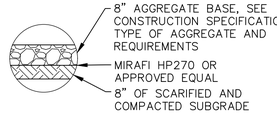


16' ACCESS ROADWAY

NOTES:

1. CONTRACTOR SHALL CONSTRUCT CROSS-SLOPE ROAD SECTION WHERE ACCESS ROADS ARE CONSTRUCTED ON A SIDE SLOPE, AND WHERE OTHERWISE NOTED ON PLANS, TO ENSURE THAT ROADS AND SHOULDERS REMAIN WELL DRAINED AT ALL TIMES.

Westwood	TYPICAL SOLAR ACCESS ROAD	LAST REVISED: 11/07/14
		RD01

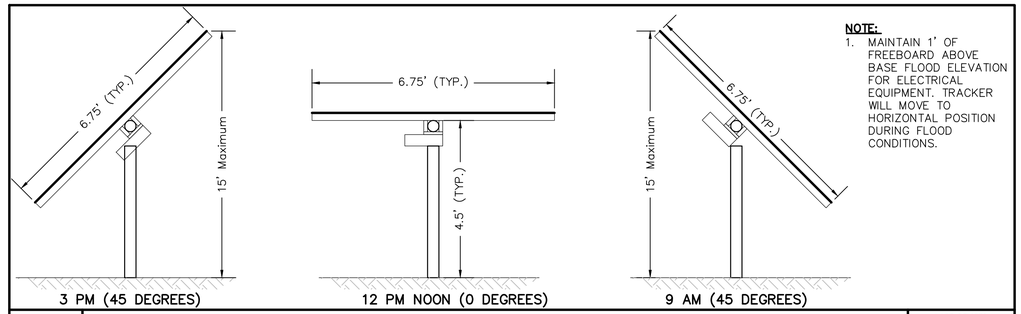


16' ACCESS ROAD CROSS SECTION

NOTE:

1. STRUCTURAL SECTIONS SHOWN ARE THE MINIMUM THICKNESS REQUIREMENTS DURING NORMAL FIELD CONDITIONS. THE SECTIONS MAY NEED TO BE INCREASED BASED ON ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION. CONDITIONS INCLUDE BUT ARE NOT LIMITED TO CONSTRUCTION DURING UNUSUALLY WET PERIODS, OR IN LOW/WET AREAS.
2. FINAL DESIGN MAY PROVIDE A DIFFERENT CROSS SECTION

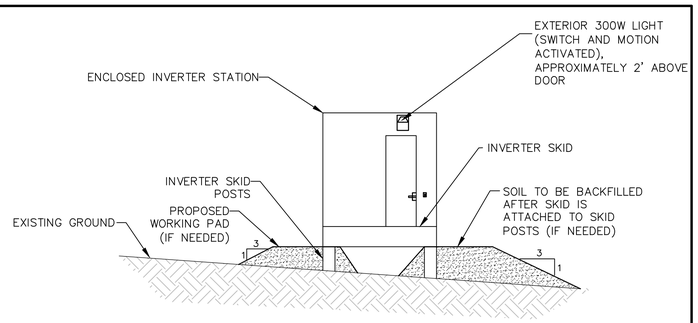
Westwood	TYPICAL STRUCTURAL CROSS SECTIONS	LAST REVISED: 11/07/14
		RD02



NOTE:

1. MAINTAIN 1' OF FREEBOARD ABOVE BASE FLOOD ELEVATION FOR ELECTRICAL EQUIPMENT. TRACKER WILL MOVE TO HORIZONTAL POSITION DURING FLOOD CONDITIONS.

Westwood	TYPICAL SOLAR TRACKER PROFILE VIEWS (9 A.M., 12 P.M., 3 P.M.)	LAST REVISED: 09/29/15
		TRK01

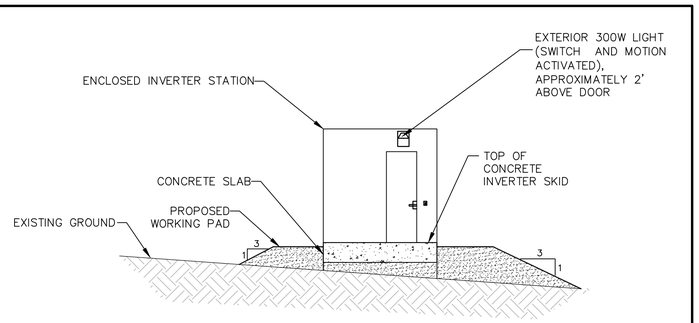


SECTION VIEW

NOTE:

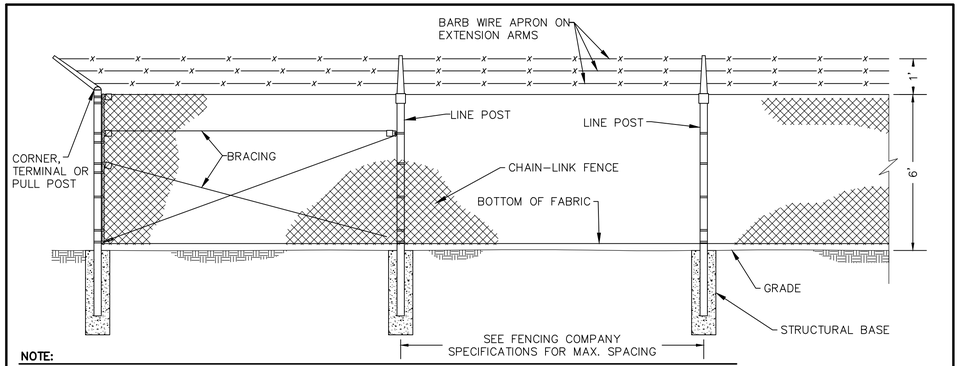
1. SOIL SHALL BE BACKFILLED AROUND INVERTER PAD IF A WORKING SURFACE IS NEEDED FOR ELECTRICAL EQUIPMENT

Westwood	TYPICAL SOLAR INVERTER ON DRIVEN PILES	LAST REVISED: 08/20/15
		INV01



SECTION VIEW

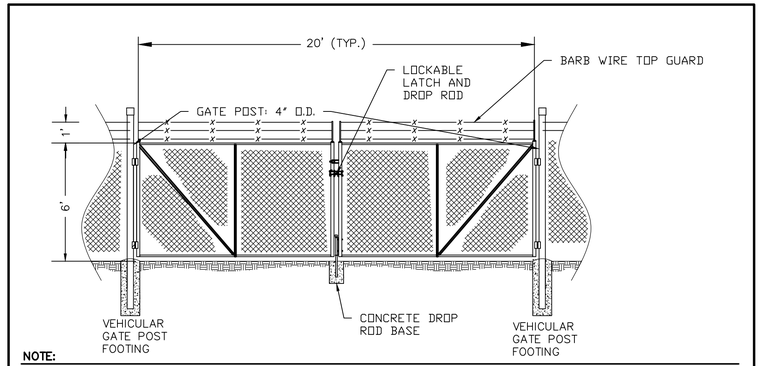
Westwood	TYPICAL SOLAR INVERTER ON CONCRETE SLAB	LAST REVISED: 08/20/15
		INV02



NOTE:

1. FENCE AND GATE TYPE TO BE APPROVED BY OWNER PRIOR TO CONSTRUCTION
2. STRUCTURAL DESIGN TO BE PROVIDED BY FENCE SUPPLIER
3. DIMENSIONS AND INFORMATION SHOWN ABOVE ARE FOR REFERENCE ONLY. ACTUAL DIMENSIONS AND INFORMATION TO BE PROVIDED BY MANUFACTURER/SUPPLIER
4. FENING TO BE USED SHALL BE BLACK VINYL CHAIN LINK

Westwood	CHAIN-LINK SECURITY FENCE DETAIL (NOT TO SCALE)	LAST REVISED: 08/04/16
		FN01



NOTE:

1. FENCE AND GATE TYPE TO BE APPROVED BY OWNER PRIOR TO CONSTRUCTION
2. STRUCTURAL DESIGN TO BE PROVIDED BY FENCE SUPPLIER
3. DIMENSIONS AND INFORMATION SHOWN ABOVE ARE FOR REFERENCE ONLY. ACTUAL DIMENSIONS AND INFORMATION TO BE PROVIDED BY MANUFACTURER/SUPPLIER
4. A KNOX PAD LOCK WILL BE PLACE ON CHAINED GATES OR KNOX BOX WITH GATE ACCESS KEYS WILL BE MOUNTED AT THE MAIN ENTRANCE FOR FIRE DEPARTMENT ACCESS.

Westwood	CHAIN-LINK SECURITY SWING GATE	LAST REVISED: 08/04/16
		FN05

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Designed: PDC
Checked: MPG
Drawn: PDC
Record Drawing by/date:

Revisions:

A	08/13/20	ADDED UTILITY CROSSING LOCATIONS
B	08/31/20	SUBSTATION RELOCATED

Prepared for:

IP Aramis, LLC

IP Aramis, LLC

Alameda County, CA

Construction Details

Issued For Review
Not For Construction

Date: 08/31/2020
Drawing No: C.400

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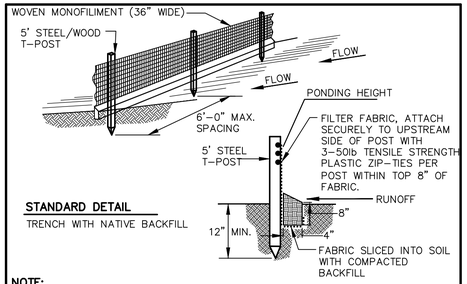


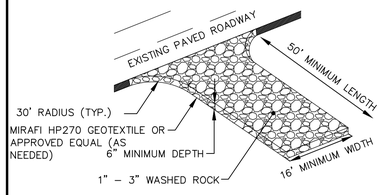
STANDARD DETAIL

TRENCH WITH NATIVE BACKFILL

NOTE:

1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED TO 1/2 THE HEIGHT OF THE FABRIC OR MORE.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
4. ALL ENDS OF THE SILT FENCE SHALL BE WRAPPED UPSLOPE SO THE ELEVATION OF THE BOTTOM OF FABRIC IS HIGHER THAN "PONDING HEIGHT".

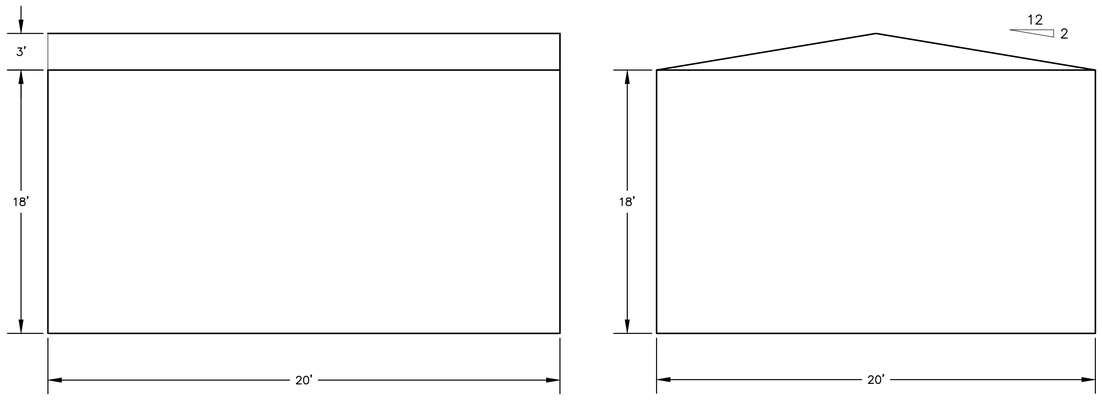
Westwood	SILT FENCE	LAST REVISED: 11/24/14



NOTE:

ROCK CONSTRUCTION ENTRANCE SHOULD BE A MINIMUM THICKNESS OF 6" AND CONTAIN MAXIMUM SIDE SLOPES OF 4:1. ROCK ENTRANCE SHOULD BE INSPECTED AND MAINTAINED REGULARLY. ROCK ENTRANCE LENGTH MAY NEED TO BE EXTENDED IN CLAY SOILS.

Westwood	ROCK CONSTRUCTION ENTRANCE	LAST REVISED: 02/02/15
		GD05



NOTE:
1. NOT TO SCALE

Westwood	O&M AND SCADA STRUCTURE ELEVATION	LAST REVISED: 12/13/17
		OM01

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B	08/31/20	SUBSTATION RELOCATED

Prepared for:

IP Aramis, LLC

IP Aramis, LLC

Alameda County, CA

Construction Details

Issued For Review
Not For Construction

Date: 08/31/2020
Drawing No: C.401

00145425-DTF01.dwg

Appendix D

Air Quality, Energy, and Greenhouse Gas Technical Report

HELIX Environmental Planning

Aramis Solar Energy Generation and Storage Project

Air Quality, Energy and Greenhouse Gas Technical Report

September 2020 | IPO-01.03

Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

Aramis Solar Energy Generation and Storage Project

Air Quality, Energy and Greenhouse Gas Technical Report

Prepared for:

Alameda County Planning Department
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Prepared by:

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September 2020 | IPO-01.03

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ACRONYMS AND ABBREVIATIONS

AAM	Annual Arithmetic Mean
AB	Assembly Bill
AC	alternating current
APN	Assessor's Parcel Number
BAAQMD	Bay Area Air Quality Management District
BCMM	basic construction mitigation measure
BTU	British thermal unit
C_2F_6	hexafluoroethane
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CF_4	tetrafluoromethane
CFC	chlorofluorocarbon
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
County	Alameda County
CPSF	Clean Power San Francisco
CPUC	California Public Utilities Commission
CUP	Conditional Use Permit
DC	direct current
DPM	diesel particulate matter
EBCE	East Bay Clean Energy
EO	Executive Order
GHG	greenhouse gas
GPA	General Plan Amendment
GWP	global warming potential

ACRONYMS AND ABBREVIATIONS (cont.)

HFC	hydrofluorocarbon
HR	House of Representatives
I-580	Interstate 580
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolt
kW	kilowatt
kWhr	kilowatt hour
LCFS	Low Carbon Fuel Standard
LOS	Level of Service
LST	localized significance threshold
MBtu	million British thermal units
mg/m^3	milligrams per cubic meter
MMT	million metric tons
MT	metric tons
mpg	miles per gallon
mph	miles per hour
MPOs	Metropolitan Planning Organizations
MV	medium voltage
MW	megawatt
MWh	megawatt hour
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NHTSA	National Highway Traffic Safety Administration
NO	nitrogen oxide
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_X	nitrogen oxides
O_3	ozone
O&M	operations and maintenance
Pb	lead
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric Company
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns

ACRONYMS AND ABBREVIATIONS (cont.)

ppm	parts per million
PV	photovoltaic
ROG	reactive organic gas
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
SB	Senate Bill
SCS	Sustainable Communities Strategy
SF_6	hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
TAC	toxic air contaminant
TIS	Traffic Impact Study
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geologic Survey
VMT	vehicle miles traveled
VOC	volatile organic compound
WRCC	Western Regional Climate Center
WRI	World Resources Institute

EXECUTIVE SUMMARY

This report presents an assessment of potential air quality, energy and greenhouse gas (GHG) impacts associated with the proposed Aramis Solar Energy Generation and Storage Project (project). The report evaluates the potential for criteria air pollutant emissions, energy use, and GHG emission impacts during the construction, operation, and decommissioning of the project. All analyses comply with the Bay Area Air Quality Management District's (BAAQMD) *California Environmental Quality Act Air Quality Guidelines* (May 2017) to satisfy California Environmental Quality Act (CEQA) requirements.

The project would construct a photovoltaic (PV) solar energy generation and storage facility with a capacity of 100 megawatts (MW) on approximately 410 acres in unincorporated Alameda County. The project would result in emissions of criteria air pollutants and GHGs during construction, operation, and decommissioning. Construction emissions would include fugitive dust, heavy construction equipment exhaust, and vehicle exhaust associated with workers commuting to and from the site and trucks delivering materials. Construction activities are assumed to begin in January 2022 and would be completed in September 2022. Upon the end of its useful life in 50 or more years, the project would be reequipped with new PV equipment, or decommissioned and the land restored. Decommissioning emissions would include fugitive dust, heavy construction equipment exhaust, and vehicle exhaust associated with workers commuting to and from the site and trucks removing equipment from the site. In place of a quantitative threshold for fugitive dust, BAAQMD recommends implementation of Basic Construction Mitigation Measures (BCMMs) to control fugitive dust. Mitigation Measure AQ-1 requires implementation of the BCMMs for all on-site project construction activities. Project emissions of criteria pollutants during construction would remain below the BAAQMD emissions thresholds for all pollutants with the exception of nitrogen oxides (NO_X). Construction-period NO_X emissions would be reduced to a less than significant level with the incorporation of Mitigation Measures AQ-2, which requires all off-road diesel-powered construction equipment with 50 or more horsepower to be certified to meet U.S. Environmental Protection Agency Tier 4 Final emission standards. Project operational emissions would include pollutants generated by vehicular traffic associated with staff activities and hauling water to the project site, occasional use of off-road equipment for maintenance and panel washing, the disposal and decompositions of solid waste, and periodic maintenance painting. Project emissions of criteria pollutants during operations and decommissioning would be below the BAAQMD emissions thresholds for all pollutants. Project decommissioning activities would be similar or less intense in equipment use and duration compared to construction emissions, and on-road and off-road vehicle and equipment exhaust standards would be more stringent than current rules. Therefore, emissions of criteria pollutant during decommissioning activities emissions would be below the BAAQMD emissions thresholds.

The project's generation and storage of renewable energy would support State renewable energy programs and the mandate to procure 100 percent of California's electricity from renewable or zero carbon sources by 2045. The project's temporary energy use for construction and long-term operational and maintenance energy use would be an inconsequential fraction of the renewable energy generated over the anticipated 50-plus-year project lifespan. The project would not result in inefficient or wasteful use of energy and the project would not conflict with state and local renewable energy plans.

The project's direct and indirect GHG emissions from construction, operation and maintenance, and decommissioning activities would not exceed the BAAQMD project-level threshold, adjusted for the GHG reduction mandates of Senate Bill 32. The project would generate eligible renewable energy in accordance with California's Renewables Portfolio Standard. After accounting for the annual electricity generated by the project, there would be a net decrease of emissions of GHGs over the lifetime of the project because it would replace the use of fossil fuels that would have otherwise been used to generate similar amounts of energy. The project would be consistent with state and regional GHG reduction plans including the BAAQMD 2017 Clean Air Plan and the Alameda County Community Climate Action Plan.

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report analyzes potential air quality, greenhouse gas emissions and energy usage impacts associated with the proposed Aramis Solar Energy Generation and Storage Project (project), which includes an evaluation of existing conditions in the project vicinity and an assessment of potential impacts associated with project construction and project operation. As appropriate, the analysis identifies measures that can be taken to avoid adverse air quality, greenhouse gas emissions, and energy usage impacts.

1.2 PROJECT LOCATION

The approximately 410-acre project site is located in the northeast area of unincorporated Alameda County, approximately 2.5 miles north of the City of Livermore. The project site is bounded by Manning Road to the north, North Livermore Avenue to the east, and a private driveway to the south. The western project site boundary generally follows the natural topography of Cayetano Creek and the adjacent hills. The project site comprises portions of four privately-owned parcels – Assessor's Parcel Numbers (APNs) 903-0006-001-02, 903-0007-002-01, 903-0006-003-07, and 902-0001-005-00. The project site consists of four noncontiguous development areas that are split into the following sections: the northern section, measuring approximately 103 acres; the central section, measuring approximately 269 acres; the southeastern section, measuring approximately 23 acres; and the southwestern section, measuring approximately 15 acres. The project site is within Sections 16 and 17 of Township 02 South, Range 02 East and unsurveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" U.S. Geologic Survey (USGS) 7.5-minute quadrangles (see Figure 1, *Regional Location*, and Figure 2, *Aerial Map*).

1.3 PROJECT DESCRIPTION

The project is proposed by IP Aramis, LLC (a subsidiary of Intersect Power, LLC). The project applicant has applied to the Alameda County Community Development Agency for a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) and electric storage facility for at least 50 years and a Parcel Subdivision of APN 903-0006-001-02 to modify the eastern boundary of legal parcel of the proposed solar facility and create a distinct parcel. The solar facility would generate a 100 megawatts (MW) of PV power on approximately 410 acres. The project would provide solar power to utility customers by interconnecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E) existing Cayetano 230 kilovolt (kV) substation located adjacent to the project site. The project would serve East Bay Community Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract.

The project would include individual PV modules arranged in rows onto a single-axis tracker racking system, which would in turn be affixed to steel piles. Each row (or array) would track the sun during the day, from east to west, to optimize power generation of the facility. The arrays would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a medium voltage (MV) of 34.5 kV (or lower suitable voltage) to match the collection system voltage. The

power output from the inverter station would be conveyed to the on-site substation via collection cables. Medium-voltage lines would be buried for a majority of their length but would emerge above-ground and be mounted on up to two overhead wooden utility poles on either side of Manning Avenue and up to 10 additional wooden poles to cross Cayetano Creek and its tributaries, to cross an access driveway, and where a connection to the PG&E Cayetano substation must be overhead.

The project substation would provide the circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure. The substation would step up the MV collected energy to the interconnection voltage via one or more step up transformers. The project substation would occupy an approximately 5,000-square-foot area in a 0.9-acre dedicated area and would be located adjacent to the west of the PG&E Cayetano substation, allowing the gen-tie to be either overhead or underground. The project substation would be set back from North Livermore Avenue by at least 250 feet. Overhead lines would be constructed on either tubular steel poles or wood H-frames and may be constructed to be single-circuit or double-circuit.

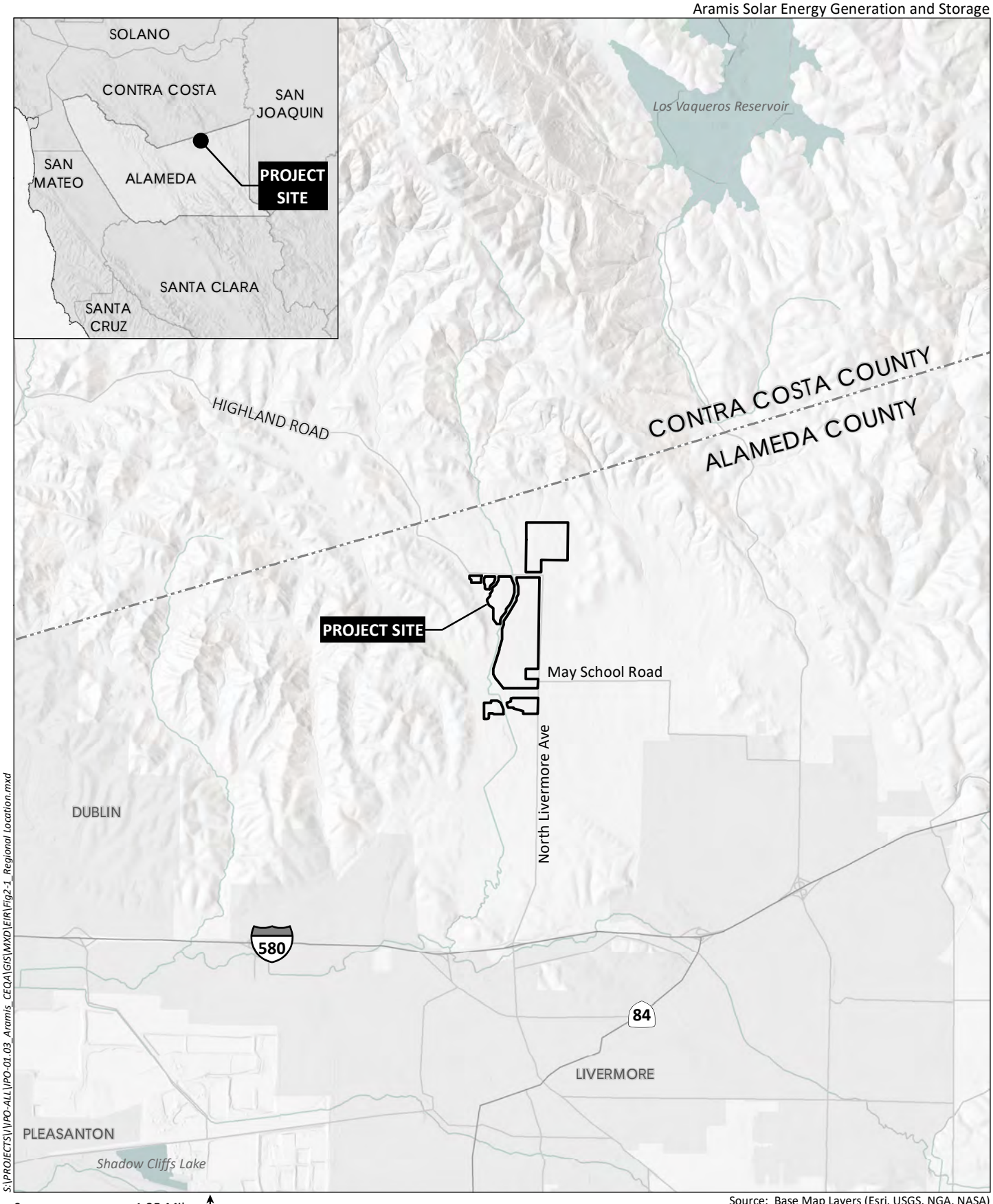
A battery storage system would be located on-site to the west of the PG&E Cayetano substation, which would be shared with the battery system. The battery storage system would be designed to accept between 75 and 100 MW of system charging, and subsequently dispatch stored electricity during times of peak demand. The system would either be housed in electrical containers or in up to four 100-foot by 180-foot buildings. Various sizes and numbers of electrical enclosures would be used depending on the final battery vendor selected. Up to 50 large electrical enclosures or up to 1,000 small electrical enclosures would be clustered together to make up the battery storage system. Battery buildings or containers would have foundations with a cumulative floor area of 3 acres or less. Low voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer.

An approximately 400-square-foot operation and maintenance (O&M) building located near the project substation would be used to accommodate up to four permanent O&M staff. Water for the O&M building would be stored in a 5,000-gallon water tank and filled on a quarterly basis. Wastewater would be held in a septic tank system and removed routinely (see Figure 3, *Site Plan*).

Long-term operation of the project would involve monitoring of the site remotely and up to four permanent staff on the site at a time for ongoing facility maintenance and repairs. Up to 12 workers could be on site once annually for module washing. The project would promote continued agricultural use of the project site. The proposed program for concomitant agricultural land uses during operation of the solar facility would be outlined in an Agricultural Management Plan prepared for the project and could include livestock grazing and commercial beekeeping operations.

1.4 CONSTRUCTION ACTIVITIES AND PHASING

Project construction activities would consist of site preparation, installation of interconnection facilities and battery storage system, cable installation, pile and skid installation, tracker and module installation, and general construction operations, site clean-up and restoration. Construction of the solar facility would commence between October 2021 and February 2022, depending on final construction plans and building permit requirements. Construction would last for approximately nine months. Construction equipment would operate between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, for up to a maximum of eight hours per piece of equipment, daily. Weekend



S:\PROJECTS\V\PO-ALL\PO-01.03_Aramis_CEQA\GIS\MXD\EIR\Fig2-1_Regional Location.mxd

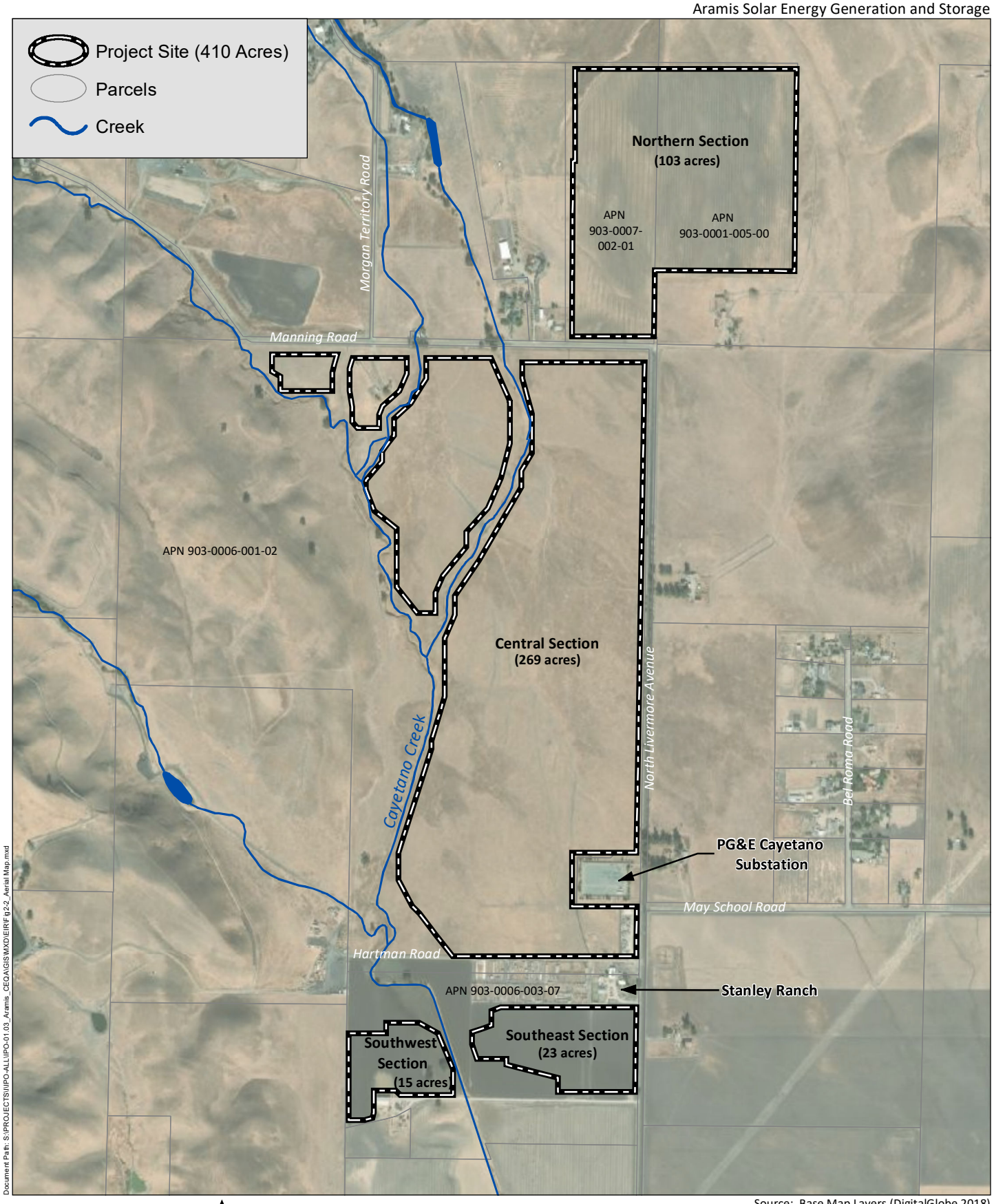
0 1.25 Miles

Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX Environmental Planning

Regional Location

Figure 1

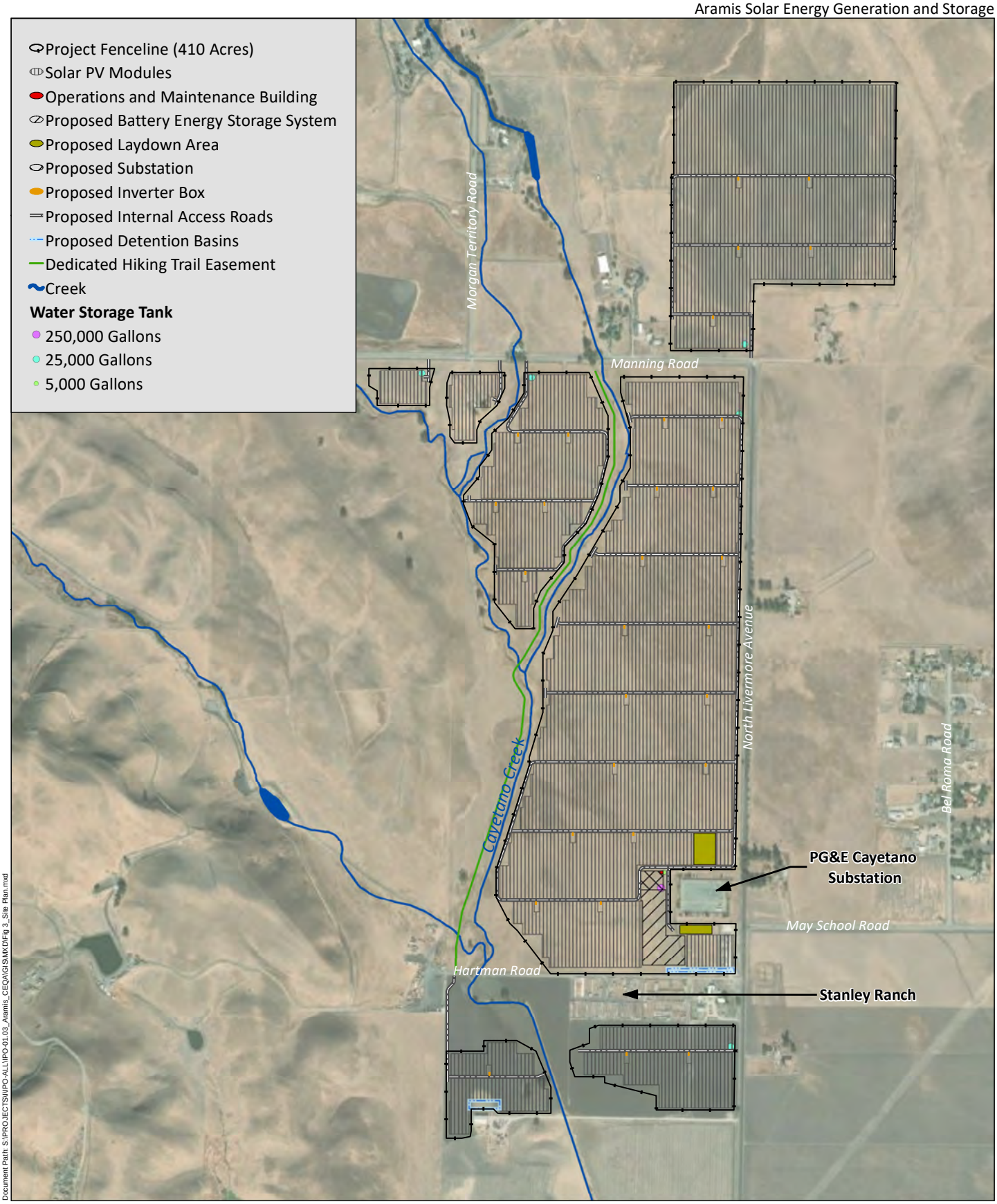


Source: Base Map Layers (DigitalGlobe 2018)

HELIX Environmental Planning

Aerial Map

Figure 2



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Source: Base Map Layers (DigitalGlobe 2018)

HELIX Environmental Planning

Site Plan

Figure 3

construction work is not anticipated, but may occur on occasion, depending on schedule considerations.

2.0 AIR QUALITY

2.1 AIR QUALITY REGULATORY SETTING

The project site is located within the San Francisco Bay Area Air Basin (SFBAAB). Air quality in the SFBAAB is regulated by the U.S. Environmental Protection Agency (USEPA) at the federal level, by the California Air Resources Board (CARB) at the state level, and by the Bay Area Air Quality Management District (BAAQMD) at the regional level.

2.1.1 Air Pollutant Descriptors and Terminology

2.1.1.1 Criteria Air Pollutants

Criteria pollutants are defined by state and federal law as a risk to the health and welfare of the general public. In general, criteria air pollutants include the following compounds:

- Ozone (O_3)
- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Particulate matter (PM), which is further subdivided:
  - Coarse PM, 10 micrometers or less in diameter (PM_{10})
  - Fine PM, 2.5 micrometers or less in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Lead (Pb)

Criteria pollutants can be emitted directly from sources (primary pollutants; e.g., CO, SO_2, PM_{10}, $PM_{2.5}$, and lead), or they may be formed through chemical and photochemical reactions of precursor pollutants in the atmosphere (secondary pollutants; e.g., ozone, NO_2, PM_{10}, and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ can be both primary and secondary pollutants. The principal precursor pollutants of concern are reactive organic gases ([ROGs] also known as volatile organic compounds [VOCs])[1] and nitrogen oxides (NO_X).

The descriptions of sources and general health effects for each of the criteria air pollutants are shown in Table 1, *Summary of Common Sources and Human Health Effects of Criteria Air Pollutants*, based on information provided by the California Air Pollution Control Officers Association ([CAPCOA] 2018). Specific adverse health effects on individuals or population groups induced by criteria pollutant emissions are highly dependent on a multitude of interconnected variables such as cumulative concentrations, local meteorology and atmospheric conditions, and the number and characteristics of exposed individuals (e.g., age, gender). Criteria pollutant precursors (ROG and NO_X) affect air quality on

[1] CARB defines and uses the term ROGs while the USEPA defines and uses the term VOCs. The compounds included in the lists of ROGs and VOCs and the methods of calculation are slightly different. However, for the purposes of estimating criteria pollutant precursor emissions, the two terms are often used interchangeably.

a regional scale, typically after significant delay and distance from the pollutant source emissions. Health effects related to ozone and NO_2 are, therefore, the product of emissions generated by numerous sources throughout a region. Emissions of criteria pollutants from vehicles traveling to or from the project site (mobile emissions) are distributed nonuniformly in location and time throughout the region, wherever the vehicles may travel. As such, specific health effects from these criteria pollutant emissions cannot be meaningfully correlated to the incremental contribution from the project.

Table 1
SUMMARY OF COMMON SOURCES AND HUMAN HEALTH EFFECTS OF CRITERIA AIR POLLUTANTS

Pollutant	Major Man-Made Sources	Human Health Effects
Carbon Monoxide (CO)	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, affecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.
Nitrogen Dioxide (NO_2)	A reddish-brown gas formed during fuel combustion for motor vehicles and industrial sources. Sources include motor vehicles, electric utilities, and other sources that burn fuel.	Respiratory irritant; aggravates lung and heart problems. Precursor to ozone and acid rain. Contributes to climate change and nutrient overloading, which deteriorates water quality. Causes brown discoloration of the atmosphere.
Ozone (O_3)	Formed by a chemical reaction between reactive organic gases (ROGs) and nitrogen oxides (NO_X) in the presence of sunlight. Common sources of these precursor pollutants include motor vehicle exhaust, industrial emissions, gasoline storage and transport, solvents, paints, and landfills.	Irritates and causes inflammation of the mucous membranes and lung airways; causes wheezing, coughing, and pain when inhaling deeply; decreases lung capacity; aggravates lung and heart problems. Damages plants; reduces crop yield. Damages rubber, some textiles and dyes.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Produced by power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, automobiles, and other sources.	Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).
Sulfur Dioxide (SO_2)	A colorless, nonflammable gas formed when fuel containing sulfur is burned, when gasoline is extracted from oil, or when metal is extracted from ore. Examples are petroleum refineries, cement manufacturing, metal processing facilities, locomotives, and ships.	Respiratory irritant. Aggravates lung and heart problems. In the presence of moisture and oxygen, sulfur dioxide converts to sulfuric acid, which can damage marble, iron and steel. Damages crops and natural vegetation. Impairs visibility. Precursor to acid rain.
Lead	Metallic element emitted from metal refineries, smelters, battery manufacturers, iron and steel producers, use of leaded fuels by racing and aircraft industries.	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ. Affects animals, plants, and aquatic ecosystems.

Source: CAPCOA 2018

2.1.1.2 Toxic Air Contaminants

Toxic air contaminants (TACs) are a diverse group of air pollutants that may cause or contribute to an increase in deaths or in serious illness, or that may pose a present or potential hazard to human health. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage, or short-term acute effects such as eye watering, respiratory irritation (a cough), runny nose, throat pain, and headaches. TACs may be carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For carcinogenic TACs, there is no level of exposure that is considered safe, and impacts are evaluated in terms of overall relative risk expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material. The solid material in diesel exhaust is referred to as diesel particulate matter (DPM). Almost all DPM is 10 microns or less in diameter, and 90 percent of DPM is less than 2.5 microns in diameter (CARB 2018a). Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung. In 1998, CARB identified DPM as a TAC based on published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects. DPM has a notable effect on California's population—it is estimated that about 70 percent of total known cancer risk related to air toxics in California is attributable to DPM (CARB 2018a).

2.1.2 Federal Regulations

2.1.2.1 Clean Air Act

Air quality is defined by ambient air concentrations of specific pollutants identified by the USEPA to be of concern with respect to the health and welfare of the general public. The USEPA is responsible for enforcing the Federal Clean Air Act (CAA) of 1970 and its 1977 and 1990 Amendments. The CAA required the USEPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the USEPA established both primary and secondary standards for several criteria pollutants, which are introduced above. Table 2, *Ambient Air Quality Standards*, shows the federal and state ambient air quality standards (AAQS) for these pollutants.

Table 2
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary[1]	Secondary[2]
O_3	1 Hour	0.09 ppm (180 µg/m^3)	–	–
	8 Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
PM_{10}	24 Hour	50 µg/m^3	150 µg/m^3	Same as Primary
	AAM	20 µg/m^3	–	Same as Primary
$PM_{2.5}$	24 Hour	–	35 µg/m^3	Same as Primary
	AAM	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
NO_2	1 Hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	–
	AAM	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary
SO_2	1 Hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	–
	3 Hour	–	–	0.5 ppm (1,300 µg/m^3)
	24 Hour	0.04 ppm (105 µg/m^3)	–	–
Lead	30-day Avg.	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 µg/m^3	
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles (0.07 per km – ≥30 miles for Lake Tahoe)	**No Federal Standards**	
Sulfates	24 Hour	25 µg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m^3)		

Source: CARB 2016

[1] National Primary Standards: The levels of air quality necessary, within an adequate margin of safety, to protect the public health.

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

O_3: ozone; ppm: parts per million; µg/m^3: micrograms per cubic meter; PM_{10}: large particulate matter; AAM: Annual Arithmetic Mean; $PM_{2.5}$: fine particulate matter; CO: carbon monoxide; mg/m^3: milligrams per cubic meter; NO_2 nitrogen dioxide; SO_2: sulfur dioxide; km: kilometer; –: No Standard.

The CAA allows states to adopt ambient air quality standards and other regulations provided they are at least as stringent as federal standards. Areas that do not meet the NAAQS for a particular pollutant are considered to be "nonattainment areas" for that pollutant. The area air quality attainment status of the SFBAAB, including Alameda County, is shown in Table 3, *San Francisco Bay Area Air Basin Attainment Status*. The SFBAAB is currently in nonattainment for federal and state ozone and $PM_{2.5}$ standards. The SFBAAB is in state nonattainment for PM_{10} standards. Concentrations of all other pollutants meet state and federal standards.

Table 3
SAN FRANCISCO BAY AREA AIR BASIN ATTAINMENT STATUS

Pollutant	State of California Attainment Status	Federal Attainment Status
Ozone (1-hour)	Nonattainment	No Federal Standard
Ozone (8-hour)	Nonattainment	Nonattainment (marginal)
Suspended Particulate Matter (PM_{10})	Nonattainment	Attainment/Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment (moderate)
Carbon Monoxide (CO)	Attainment	Attainment/Unclassified
Nitrogen Dioxide ($N0_2$)	Attainment	Attainment/Unclassified
Lead	Attainment	Attainment/Unclassified
Sulfur Dioxide (SO_2)	Attainment	Attainment/Unclassified
Sulfates	Attainment	No Federal Standard
Hydrogen Sulfide	Unclassified	No Federal Standard
Visibility Reducing Particles	Unclassified	No Federal Standard

Sources: BAAQMD 2017a; CARB 2018b.

2.1.3 State Regulations

2.1.3.1 California Clean Air Act

CARB has established the more stringent California Ambient Air Quality Standards (CAAQS) for the seven criteria air pollutants listed above through the California Clean Air Act of 1988 (CCAA), and has also established CAAQS for additional pollutants, including sulfates, hydrogen sulfide (H_2S), vinyl chloride and visibility-reducing particles (see Table 2). Areas that do not meet the CAAQS for a particular pollutant are considered to be "nonattainment areas" for that pollutant. The SFBAAB is currently classified as a nonattainment area under the CAAQS for ozone (1-hour and 8-hour), PM_{10}, and $PM_{2.5}$ (BAAQMD 2017a). The current state attainment status for the SFBAAB is provided in Table 3.

CARB is the state regulatory agency with the authority to enforce regulations to both achieve and maintain the NAAQS and CAAQS. The BAAQMD is responsible for developing and implementing the rules and regulations designed to attain the NAAQS and CAAQS, as well as the permitting of new or modified sources, developing of air quality management plans, and adopting and enforcing air pollution regulations within the SFBAAB.

2.1.3.2 State Implementation Plan

The CAA requires areas with unhealthy levels of ozone, inhalable particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide to develop plans, known as State Implementation Plans (SIPs). SIPs

are comprehensive plans that describe how an area will attain the NAAQS. The 1990 amendments to the CAA set deadlines for attainment based on the severity of an area's air pollution problem.

SIPs are not single documents—they are a compilation of new and previously submitted plans, programs (e.g., monitoring, modeling, permitting), district rules, state regulations and federal controls. Many of California's SIPs rely on a core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB forwards the SIP revisions to the USEPA for approval and publication in the Federal Register. The Code of Federal Regulations (CFR) Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items that are included in the California SIP (CARB 2009). At any one time, several California submittals are pending USEPA approval.

2.1.3.3 California Energy Code

The California Code of Regulations (CCR), Title 24, Part 6 is the California Energy Efficiency Standards for Residential and Nonresidential Buildings (also known as the California Energy Code). Future buildings associated with implementation of the project would be required to be designed to meet applicable the Title 24 energy efficiency standards in effect at the time of construction, including (but not limited to): insulation of conditioned spaced; lighting energy efficiency; appliance energy efficiency; and plumbing fixture water efficiency.

2.1.3.4 Toxic Air Contaminants

The Health and Safety Code (§39655, subd. (a)) defines a TAC as “an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health.” A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the CAA (42 United States Code Sec. 7412[b]) is a TAC. Under State law, the California Environmental Protection Agency (CalEPA), acting through CARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

2.1.4 Local Regulations

2.1.4.1 Bay Area Air Quality Management District

2017 Clean Air Plan

The BAAQMD is responsible for preparing plans to attain ambient air quality standards in the SFBAAB. The BAAQMD prepares ozone attainment plans for the national ozone standard and clean air plans for the California standard, both in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG).

The BAAQMD adopted the 2017 Clean Air Plan, *Spare the Air Cool the Climate*, in April 2017. The plan addresses nonattainment of the federal 1-hour and state 1-hour and 8-hour ozone standards in the SFBAAB, as well as nonattainment of federal and state PM standards. The 2017 Clean Air Plan establishes a program of rules and regulations directed at reducing air pollutant emissions and achieving California and national air quality standards. The plan’s pollutant control strategies are based on the

latest scientific and technical information and planning assumptions, updated emission inventory methodologies for various source categories, and the latest population growth projections and vehicle miles traveled (VMT) projections for the region. The 2017 Clean Air Plan defines a control strategy that the BAAQMD and its partners will implement to: (1) reduce emissions and decrease ambient concentrations of harmful pollutants; (2) safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily impacted by air pollution; and (3) reduce greenhouse gas emissions to protect the climate. In addition to updating the previously prepared ozone plan, the 2017 Clean Air Plan also serves as a multipollutant plan to protect public health and the climate. In its dual role as an update to the state ozone plan and a multipollutant plan, the 2017 Clean Air Plan addresses four categories of pollutants (BAAQMD 2017b):

- Ground-level ozone and its key precursors, ROG and NO_X
- Particulate matter: primary $PM_{2.5}$, as well as precursors to secondary $PM_{2.5}$
- Air toxics (e.g., TACs)
- Greenhouse Gasses (GHGs)

The 2017 Clean Air Plan includes local guidance for the State Implementation Plan, which includes the framework for air quality basins to achieve attainment of the state and federal ambient air quality standards.

Regulations and Rules

The following BAAQMD regulations and rules would be applicable to the project:

Regulation 6, Rule 6, Prohibition of Trackout: limits the quantity of fugitive dust in the atmosphere through control of trackout of solid materials onto paved public roads outside the boundaries of large construction sites (more than 1 acre).

Regulation 8, Rule 3, Architectural Coatings: limits the VOC content of architectural coatings (e.g., paint) manufactured, sold, supplied, or applied in the SFBAAB.

2.2 AIR QUALITY EXISTING CONDITIONS

The project site is located in a rural agricultural area of the County. The project site lies at an elevation of roughly 500 to 700 feet above mean sea level (amsl) and is undeveloped. The site is currently used for oat and hay cultivation and cattle grazing. Land uses surrounding the project site include row crop cultivation, cattle grazing, electric utilities, rural residential housing, agricultural outbuildings, small-scale ground-mounted solar systems, and open space associated with Cayetano Creek. The existing PG&E Cayetano substation is located west of the terminus of May School Road at North Livermore Avenue. The project site surrounds the existing PG&E Cayetano substation to the north, west, and south. An approximately 59-acre solar PV facility is proposed by SunWalker Energy, east of project site and northeast of the intersection of North Livermore Avenue and May School Road (see Figure 2).

2.2.1 Climate/Meteorology

The project site is located within the Livermore Valley climatological subregion of the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern portion of Sonoma, and the southwestern

portion of Solano County. During the summer, the large-scale meteorological condition that dominates the West Coast is a semi-permanent high-pressure cell centered over the northeastern Pacific Ocean, called the Pacific high, which keeps most storms from affecting the California coast. Hence, the SFBAAB experiences little precipitation in the summer months. Winds tend to blow on shore out of the north/northwest. The steady northwesterly flow induces upwelling of cold water from below. This upwelling produces a band of cold water off the California coast. When air approaches the California coast, already cool and moisture-laden from its long journey over the Pacific, it is further cooled as it crosses this bank of cold water. This cooling often produces condensation, resulting in a high incidence of fog and stratus clouds along the Northern California coast in the summer. During the winter, the Pacific high generally weakens and shifts southward, winds tend to flow offshore, upwelling ceases and storms occur.

Temperature inversion layers (inversions; layers of warmer air over colder air) affect air quality conditions significantly because they influence the mixing depth (i.e., the vertical depth in the atmosphere available for diluting air contaminants near the ground). The highest air pollutant concentrations in the SFBAAB generally occur during inversions. There are two types of inversions that occur regularly in the SFBAAB. The frequent occurrence of elevated inversions in summer and fall months acts to cap the mixing depth, limiting the depth of air available for dilution. Elevated inversions are caused by subsiding air from the subtropical high-pressure zone, and from the cool marine air layer that is drawn into the SFBAAB by the heated low-pressure region in the Central Valley. The inversions typical of winter, called radiation inversions, are formed as heat quickly radiates from the earth's surface after sunset, causing the air in contact with it to rapidly cool. Radiation inversions are strongest on clear, low-wind, cold winter nights, allowing the build-up of such pollutants as carbon monoxide and particulate matter. Mixing depths under these conditions can be as shallow as 50 to 100 meters, particularly in rural areas.

The Livermore Valley climatological subregion is a sheltered inland valley near the eastern border of SFBAAB. The western side of the valley is bordered by 1,000 to 1,500-foot-high hills with two gaps connecting the valley to the central SFBAAB, the Hayward Pass and Niles Canyon. The eastern side of the valley also is bordered by 1,000- to 1,500-foot-high hills with one major passage to the San Joaquin Valley called the Altamont Pass and several secondary passages. To the north lie the Black Hills and Mount Diablo. A northwest-to-southeast channel connects the Diablo Valley to the Livermore Valley. The south side of the Livermore Valley is bordered by mountains approximately 3,000 to 3,500 feet high. Air pollution potential is high in the Livermore Valley, especially for photochemical pollutants (e.g., ozone) in the summer and fall—high temperatures increase the potential for ozone to build up. The Livermore Valley not only traps locally generated pollutants but can be the receptor of ozone and ozone precursors from San Francisco, Alameda, Contra Costa and Santa Clara counties. On northeasterly wind flow days, most common in the early fall, ozone may be carried west from the San Joaquin Valley to the Livermore Valley (BAAQMD 2017c).

The predominant wind direction in the vicinity of the project site is from the west and the average wind speed is approximately 8 miles per hour (mph; Iowa Environmental Mesonet [IEM] 2019). The annual average maximum temperature at the project site is approximately 72 degrees Fahrenheit (°F), and the average annual minimum temperature is approximately 47°F. Total precipitation in the vicinity of the project site averages approximately 14 inches annually. Precipitation occurs mostly during the winter and is relatively infrequent during the summer (Western Regional Climate Center [WRCC] 2016).

2.2.2 Existing Air Quality

The BAAQMD operates a network of ambient air monitoring stations throughout the SFBAAB. The air quality monitoring station closest to the project site is the Livermore 793 Rincon Avenue Station, approximately 3.2 miles south of the project site. There are no monitoring stations in Alameda County with data for PM_{10}, SO_2 or Lead concentrations. The ambient pollutant concentrations collected at the stations during the last 3 available years (2016 through 2018) are shown in Table 4, *Air Quality Monitoring Data*. The data indicates: exceedance of the state 1-hour and state/federal 8-hour ozone standards on multiple days in 2016 through 2018; and exceedance of the federal $PM_{2.5}$ standard on multiple days in 2017 and 2018. Data for NO_2 showed no exceedances from 2016 through 2018.

Table 4
AIR QUALITY MONITORING DATA

Pollutant Standard	2016	2017	2018
Ozone (O_3) – Livermore 793 Rincon Avenue Station			
Maximum 1-hour concentration (ppm)	0.102	0.109	0.099
Days above 1-hour state standard (0.09 ppm)	2	5	2
Maximum 8-hour concentration (ppm)	0.085	0.086	0.078
Days above 8-hour state standard (0.070 ppm)	6	6	3
Days above 8-hour federal standard (0.070 ppm)	4	6	3
Fine Particulate Matter (PM2.5) – Livermore 793 Rincon Avenue Station			
Maximum 24-hour concentration (μg/m^3)	22.3	41.5	172.6
Estimated Days above federal standard (35 μg/m^3)	0.0	2.0	14.4
Nitrogen Dioxide (NO_2) – Livermore 793 Rincon Avenue Station			
Maximum 1-hour concentration (ppm)	41.3	45.4	56.4
Days above state 1-hour standard (180 ppb)	0	0	0

Source: CARB 2020a.
ppb = parts per billion; ppm = parts per million; μg/m3 = micrograms per cubic meter.

2.2.3 Sensitive Receptors

CARB and the Office of Environmental Health Hazard Assessment (OEHHA) have identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, infants (including in utero in the third trimester of pregnancy), and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis (CARB 2005; OEHHA 2015). Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved and are referred to as sensitive receptors. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers.

The closest existing sensitive receptors to the project site are rural single-family homes located:

- North of Manning Road, approximately 80 feet west of the project site;
- Northeast of Manning Road, approximately 600 feet south of the project site;
- East of North Livermore Avenue, approximately 300 feet east of the project site;
- West of North Livermore Avenue, approximately 180 feet south of the project site; and
- East of North Livermore Avenue, approximately 240 feet east of the project site;

There are no schools, hospitals, or daycare facilities within 1 mile of the project site.

2.3 AIR QUALITY METHODOLOGY

Air emissions from mobile, area, and energy sources were calculated using CalEEMod, version 2016.3.2. CalEEMod is a computer model used to estimate air emissions resulting from land development projects throughout the state of California. CalEEMod was developed by CAPCOA in collaboration with the California air quality management and pollution control districts, primarily the South Coast Air Quality Management District (SCAQMD). The calculation methodology, source of emission factors used, and default data is described in the CalEEMod User's Guide, and Appendices A, D, and E (CAPCOA 2017).

In brief, CalEEMod is a computer model that estimates criteria air pollutant and greenhouse gas emissions from mobile (i.e., vehicular) sources, area sources (fireplaces, woodstoves, and landscape maintenance equipment), energy use (electricity and natural gas used in space heating, ventilation, and cooling; lighting; and plug-in appliances), water use and wastewater generation, and solid waste disposal. Emissions are estimated based on land use information input to the model by the user.

In the first module, the user defines the specific land uses that will occur at the project site. The user also selects the appropriate land use setting (urban or rural), operational year, location, climate zone, and utility provider. The input land uses, size features, and population are used throughout CalEEMod in determining default parameters and calculations in each of the subsequent modules. The input land use information consists of land use subtypes (such as the residential subtypes of single-family residential and multi-family medium-rise residential) and their unit or square footage quantities.

Subsequent modules include construction (including off-road vehicle emissions), mobile (on-road vehicle emissions), area sources (architectural coatings [painting], consumer products [cleansers, aerosols, solvents]), water and wastewater, and solid waste. Each module comprises multiple components including an associated mitigation module to account for further reductions in the reported baseline calculations. Other inputs include trip generation rates, trip lengths, vehicle fleet mix (percentage autos, trucks, etc.), trip distribution (percent work to home, etc.), duration of construction phases, construction equipment usage, grading areas, season, and ambient temperature, as well as other parameters.

In various places the user can input additional information and/or override the default assumptions to account for project- or location-specific parameters. For this assessment, the default parameters were not changed unless otherwise noted. The CalEEMod output files are included in Appendix A to this report.

2.3.1 Construction Emissions

2.3.1.1 Construction Activities

Construction emissions were estimated based on the timeline provided by the project applicant, which assumes construction would begin in January 2022 and would be completed by September 2022, for a total construction period of approximately nine months. The quantity, duration, and intensity of construction activity influence the amount of construction emissions and related pollutant concentrations that occur at any one time. As such, the emission forecasts provided herein reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction activity is occurring in a relatively intensive manner. Because of

this conservative assumption, actual emissions could be less than those forecasted. If construction is delayed or occurs over a longer time period, emissions could be reduced because of (1) a more modern and cleaner-burning construction equipment fleet mix than assumed in CalEEMod, and/or (2) a less intensive buildout schedule (i.e., fewer daily emissions occurring over a longer time interval).

Project construction would be completed in four phases: Phase 1 site preparation (30 days), Phase 2 photovoltaic installation (150 days), Phase 3 electrical and gen-tie installation (75 days), and Phase 4 general construction operations, site clean-up and restoration (175 days). Phases 2 and 3 would occur concurrently and Phase 4 would span the entire construction duration (concurrent with Phases 1, 2 and 3). Phase 3 includes building construction and architectural coatings for the O&M and energy storage buildings. All earth-moving, cut and fill activities, and excavation of soil, were assumed to be balanced on site (i.e., no import or export of soil). The construction schedule assumed in the modeling is shown in Table 5, *Anticipated Construction Schedule.*

Table 5
ANTICIPATED CONSTRUCTION SCHEDULE

Construction Activity	Construction Period		
	Start	End	Number of Working Days
Phase 1 Site Preparation	1/1/2022	2/11/2022	30
Phase 2 Photovoltaic Installation	2/12/2022	9/9/2022	150
Phase 3 Electrical and Gen-Tie Installation	5/28/2022	9/9/2022	75
Phase 4 General Construction Operations, Site Clean-up and Restoration	1/8/2022	9/9/2022	175

Source: Intersect Power 2020.

2.3.1.2 Construction Off-Road Equipment

Construction would require the use of heavy off-road equipment. Construction equipment assumptions were based on equipment estimates from the project applicant (Intersect Power 2020). Table 6, *Construction Equipment Assumptions*, presents a summary of the assumed equipment that would be involved in each stage of construction. Because some of the off-road equipment is not included in the CalEEMod equipment selection lists, the pile drivers were modeled as bore/drill rigs. The horsepower (HP) and load factor for each equipment type was modeled using CalEEMod default values.

Table 6
CONSTRUCTION EQUIPMENT ASSUMPTIONS

Equipment	Horsepower	Number	Hours/Day
Bulldozer	212	20	7
Grader	187	15	7
Roller/Compactor	80	8	7
Portable Water Trailers with Pump	84	1	7
Trencher	78	1	7
Frontend Loader	203	2	7
Skid Steer Loader	65	4	7
Crane	231	2	2
Forklift	100	50	7
Backhoe	97	1	7
Pile Driver	221	4	7
Aerial Lift	63	2	4
Welder	46	10	4

Source: Intersect Power 2020; CalEEMod.

Although it was assumed that all of the BAAQMD Basic Construction Mitigation Measures (BCMMs) would be implemented to control fugitive dust, to model the most conservative fugitive dust estimates, only application of water twice per day and limiting vehicle speed to 15 mph during on unpaved surfaces were taken into consideration (BAAQMD 2017c) for off-road equipment modeling. The control efficiency for the application of water twice daily (55 percent) was based on the CalEEMod default (CAPCOA 2017).

2.3.1.3 Construction On-Road Trips

Worker commute trips and truck trips hauling material to and from the project site were modeled based on the analysis in the Transportation Impact Study (TIS) prepared for the project (CHS 2020). Workers were assumed to commute individually each day 28.8 miles each way. In addition, each worker was assumed to travel off-site once per day, 4.6 miles. Construction material would be hauled on trucks to the site assuming each truck trip would be 34.1 miles (from/to the Port of Oakland). Phase 4 was assumed to be completed by workers on-site from the other phases and would not generate new worker trips. Project construction would require approximately 50,000 gallons of water per day (Intersect Power 2020). Because the source of the water was not known at the time of this analysis, 30 one-way trips per day were assumed in the modeling to haul water for dust control from Livermore, (approximately 4.6 miles each way). The estimated project construction trips and miles are shown in Table 7, *Daily Construction Trips*.

Table 7
DAILY CONSTRUCTION TRIPS

Phase and Type	One-Way Trips	One-Way Distance
Phase 1		
Worker Commute Trips	200	28.8
Worker Midday Trips	200	4.6
Truck Haul Trips	46	34.1
Phase 2		
Worker Commute Trips	500	28.8
Worker Midday Trips	500	4.6
Truck Haul Trips	52	34.1
Phase 3		
Worker Commute Trips	250	28.8
Worker Midday Trips	250	4.6
Truck Haul Trips	10	34.1
Phase 4		
Truck Haul Trips	59	34.1
Water Truck Trips	30	4.6

Source: CHS 2020.

The material hauled to the project site would be delivered to the final use location on the project site or would be transferred from a staging area on the project site by a flatbed truck. To account for trucks traveling on unpaved roads while delivering material within the project site, 0.5 mile of each one-way trip was assumed to be on unpaved roads. Although it was assumed that all of the BAAQMD BCMMs would be implemented to control fugitive dust on unpaved roads, to model the most conservative fugitive dust estimates, only limiting vehicle speed to 15 mph and watering unpaved roads to maintain a minimum of 12 percent moisture content were taken into consideration (BAAQMD 2017c).

2.3.2 Operational Emissions

While daily monitoring of the site would occur remotely, up to four permanent staff could be on the site at a time for ongoing facility maintenance and repairs. Up to 12 workers could be on site once annually for module washing. To model the most conservative (highest) daily operational emissions, 12 workers were assumed be onsite each day with the same trip and distance assumptions as use for construction workers: Two commute trips per employee per day (approximately 28.8 miles per trip) and two off-site trips per employee per day (approximately 4.6 miles per trip). To account for the use of highway vehicles (e.g., pickups) to transport workers around the project site, 0.5 mile of unpaved road was assumed for each trip.

The project would require approximately 5 acre-feet (1,629,255 gallons) of water annually for provisioning the O&M building, panel washing, and livestock drinking water. Water would either be obtained via an on-site well or from an off-site water purveyor and trucked to the site. To be conservative, the modeling assumes two loads of water (3,000 to 4,000 gallons per load) would be trucked to the project site from Livermore (approximately 4.6 miles) each workday. To account for the water truck trips and the use of pickups for O&M activities, the modeled fleet mix for the project operational trips was set to 60 percent autos, 25 percent light duty trucks, and 15 percent heavy duty trucks.

The project O&M activities would require the use of off-road vehicles, as shown in Table 8, *Operational Off-Road Equipment*. The size and engine type of the anticipated off-road equipment was not known at the time of this analysis. Therefore, to be conservative (highest emissions), all off-road equipment was assumed to be diesel-powered. CalEEMod default horsepower and load factors were used in the modeling. The modeling assumes the CalEEMod default use of consumer products (cleansers, aerosols, solvents) and architectural coatings (painting for maintenance).

Table 8
OPERATIONAL OFF-ROAD EQUIPMENT

Equipment	Units	Horsepower	Estimated Usage	
			Hours per Day	Days per Year
All-Terrain Vehicles	2	88	4	20
Small Tractors	2	97	8	120
Portable Generators	1	84	2	12
Portable Water Trailers with Pump	2	84	10	20

2.4 AIR QUALITY SIGNIFICANCE CRITERIA

The following significance thresholds are based on Appendix G of the state CEQA Guidelines. A significant impact is identified if the project would result in any of the following:

(1) Conflict with or obstruct implementation of the applicable air quality plan;

(2) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;

(3) Expose sensitive receptors to substantial pollutant concentrations; or

(4) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The final determination of whether or not a project has a significant effect is within the purview of the lead agency pursuant to CEQA Guidelines Section 15064(b). The BAAQMD has adopted thresholds that lead agencies can use to determine the significance of a development project's short-term construction and long-term operational pollutant emissions. The BAAQMD's 2017 thresholds of significance for criteria pollutant and precursors are shown in Table 9, *BAAQMD Significance Thresholds* (BAAQMD 2017c). Refer to Section 8.VII, *Greenhouse Gas Emissions* for a discussion of GHG emissions. For construction fugitive dust, rather than a numeric threshold BAAQMD recommends that lead agencies consider projects that implement the BCMMs to have a less than significant impact related to fugitive dust (BAAQMD 2017c).

Table 9
BAAQMD SIGNIFICANCE THRESHOLDS

Pollutant	Construction	Operation	
	Average Daily Emissions (pounds/day)	Average Daily Emissions (pounds/day)	Maximum Annual Emissions (tons/year)
Reactive Organic Gasses (ROG)	54	54	10
Nitrogen Oxides (NO_X)	54	54	10
Particulate Matter Exhaust (PM_{10})	82	82	15
Fine Particulate Matter Exhaust ($PM_{2.5}$)	54	54	10
PM_{10} and $PM_{2.5}$ Fugitive Dust	BCMMs[1]	none	none
Local Carbon Monoxide (CO)	none	9.0 ppm (8-hour average), 20.0 ppm (1-hour average)	
Sulfur Oxides (SO_X)	none	none	none

Source: BAAQMD 2017c.

[1] For construction fugitive dust, rather than a numeric threshold BAAQMD recommends that lead agencies consider projects that implement the Basic Construction Mitigation Measures to have a less than significant impact related to fugitive dust.

ppm = part per million; BCMMs = Basic Construction Mitigation Measures.

2.5 AIR QUALITY IMPACT ANALYSIS

2.5.1 Issue 1: Consistency with the Regional Air Quality Plan

Consistency with the air quality plan is determined by whether the project would hinder implementation of control measures identified in the air quality plan or would result in growth of population or employment that is not accounted for in local and regional planning. The BAAQMD's 2017 Clean Air Plan is the applicable air quality plan for the SFBAAB and the County, adopted on April 19, 2017 (BAAQMD 2017b).

The project would not result in population growth in the County, and the anticipated 4 to 12 O&M workers would represent an inconsequential growth in County employment and would not exceed the employment growth accounted for in the County General Plan and the East County Area Plan.

The Clean Air Plan contains control measures that identify actions to be taken by the air district, local government agencies, and private enterprises to reduce stationary and mobile sources of criteria pollutants and ozone precursors, TACs, and GHG emissions in the SFBAAB. As a PV electricity generation and energy storage facility, the project would be consistent with the Energy Control Measure EN1, *Decarbonize Electricity Production*, which strives to maximize the amount of renewable energy contributing to the production of electricity within the SFBAAB as well as electricity imported into the region (BAAQMD 2017b). None of the other control measures in the 2017 Clean Air Plan would be directly applicable to the project. Therefore, the project would not conflict with or obstruct implementation of the 2017 Clean Air Plan and the impact would be less than significant.

2.5.2 Issue 2: Cumulatively Considerable Net Increase of Nonattainment Criteria Pollutants

The project would generate criteria pollutants in the short-term during construction and the long-term during O&M. To determine whether a project would result in a cumulatively considerable net increase in criteria pollutant emissions that would violate an air quality standard or contribute substantially to an

existing or projected air quality violation, a project's emissions are evaluated based on the quantitative emission thresholds established by the BAAQMD (as shown in Table 9).

2.5.2.1 Construction Criteria Pollutant and Precursor Emissions

The project's temporary construction emissions were estimated using CalEEMod as described in Section 2.3. The results of the modeling of the project's construction emissions of criteria pollutants and ozone precursors are shown in Table 10, *Unmitigated Maximum Daily Construction Emissions*. The data are presented as the maximum anticipated daily emissions for comparison with the BAAQMD thresholds. The complete CalEEMod output is provided in Appendix A to this report.

Table 10
UNMITIGATED MAXIMUM DAILY CONSTRUCTION EMISSIONS

Construction Activity	Pollutant Emissions (pounds per day)							
	ROG	NO_X	CO[1]	SO_X	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
Phase 1 Site Preparation	11.4	119.0	77.5	0.2	15.1	4.3	2.4	4.0
Phase 2 Photovoltaic Installation	12.3	89.5	108.0	0.3	16.7	3.5	3.8	3.2
Phase 3 Electrical and Gen-Tie Installation	29.8	96.2	93.7	0.2	10.2	4.2	2.1	3.9
Phase 4 General Construction Operations, Site Clean-up and Restoration	1.2	13.3	16.6	<0.1	0.4	0.5	<0.1	0.5
Concurrent Phases 1 and 4	12.6	132.3	94.1	0.2	15.5	4.8	2.5	4.5
Concurrent Phases 2, 3 and 4	43.3	199.0	218.3	0.5	27.2	8.3	5.9	7.6
Maximum Daily Emissions	**43.3**	**199.0**	**218.3**	**0.5**	**27.2**	**8.3**	**5.9**	**7.6**
BAAQMD Thresholds	*54*	*54*	*none*	*none*	*BCMMs*	*84*	*BCMMs*	*54*
Exceed Thresholds?	***No***	***Yes***	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod (output data is provided in Appendix A).

[1] The maximum daily emissions of CO would occur during summer. The maximum of all other pollutants would occur during winter.

For construction fugitive dust, rather than a numeric threshold BAAQMD recommends that lead agencies consider projects that implement the BCMMs to have a less than significant impact related to fugitive dust (BAAQMD 2017c). The County does not have a uniformly applied development policy or standard (e.g., ordinance or General Plan policy) that requires implementation of the BAAQMD's recommended BCMMs. Therefore, Mitigation Measure AQ-1 requires implementation of the BCMMs for control of fugitive dust during construction.

As shown in Table 10, the construction period maximum emissions of NO_X would be 199 pounds per day during concurrent phases 2, 3 and 4 construction activity. This would exceed the BAAQMD emissions threshold for NO_X of 54 pounds per day. Mitigation Measure AQ-2 requires all diesel-powered off-road equipment with 50 or more HP to be USEPA Tier-4 certified or be retrofitted with CARB-approved diesel emissions reduction devices meeting Tier 4 standards. The project's construction emissions of criteria pollutants and precursors, with implementation of Mitigation Measures AQ-1 and AQ-2, are shown in Table 11, *Mitigated Maximum Daily Construction Emissions*.

Table 11
MITIGATED MAXIMUM DAILY CONSTRUCTION EMISSIONS

Construction Activity	Pollutant Emissions (pounds per day)							
	ROG	NO_X	CO[1]	SO_X	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
Phase 1 Site Preparation	3.9	10.8	101.3	0.2	9.5	0.3	1.8	0.3
Phase 2 Photovoltaic Installation	7.2	15.8	123.2	0.3	14.5	0.5	3.6	0.5
Phase 3 Electrical and Gen-Tie Installation	23.6	14.7	109.3	0.2	8.1	0.4	1.9	0.4
Phase 4 General Construction Operations, Site Clean-up and Restoration	0.3	1.6	19.5	<0.0	0.1	<0.1	<0.1	<0.1
Concurrent Phases 1 and 4	4.3	12.4	120.8	0.2	9.6	0.4	1.8	0.4
Concurrent Phases 2, 3 and 4	31.2	32.1	252.1	0.5	22.7	1.0	5.4	0.9
Maximum Daily Emissions	**31.2**	**32.1**	**252.1**	**0.5**	**22.7**	**1.0**	**5.4**	**0.9**
BAAQMD Thresholds	*54*	*54*	*none*	*none*	*BCMMs*	*84*	*BCMMs*	*54*
Exceed Thresholds?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod (output data is provided in Appendix A).

[1] The maximum daily emissions of CO would occur during summer. The maximum of all other pollutants would occur during winter.

As shown in Table 11, with implementation of Mitigation Measures AQ-1 and AQ-2, all project construction emissions of criteria pollutants and precursors would be less than the BAAQMD thresholds. Therefore, the project's construction activities would not result in a cumulatively considerable net increase of criteria pollutants that would violate any air quality standard or contribute substantially to an existing or projected air quality violation, and the impact would be less than significant with mitigation incorporated.

2.5.2.2 Operation Criteria Pollutant and Precursor Emissions

The project's long-term average daily and maximum annual operational emissions were estimated using CalEEMod as described in Section 2.3. The results of the modeling of the project's operational emissions of criteria pollutants and precursors are shown in Table 12, *Operational Emissions*. The data are presented as the maximum anticipated daily emissions and maximum annual emissions for comparison with the BAAQMD thresholds. The complete CalEEMod output is provided in Appendix A to this report.

Table 12
OPERATIONAL EMISSIONS

Source Category	Pollutant Emissions							
	ROG	NO_X	CO	SO_X	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
Average Daily Emissions (pounds per day)								
Area	1.8	<0.1	<0.1	<0.1	-	<0.1	-	<0.1
Mobile	<0.1	1.1	1.1	<0.1	10.3	<0.1	1.1	<0.1
Off-Road	1.4	12.2	16.6	<0.1	-	0.6	-	0.6
Average Daily Total [1]	**3.2**	**13.3**	**17.9**	**<0.1**	**10.3**	**0.6**	**1.1**	**0.6**
BAAQMD Thresholds	*54*	*54*	*none*	*none*	*none*	*84*	*none*	*54*
Exceed Thresholds?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
Maximum annual Emissions (tons per year)								
Area	0.3	<0.1	<0.1	<0.1	-	<0.1	-	<0.1
Mobile	<0.1	0.1	0.2	<0.1	1.3	<0.1	0.1	<0.1
Off-Road	<0.1	0.2	0.2	<0.1	-	<0.1	-	<0.1
Maximum Annual Total[1]	**0.3**	**0.3**	**0.4**	**<0.1**	**1.3**	**<0.1**	**0.1**	**<0.1**
BAAQMD Thresholds	*10*	*10*	*none*	*none*	*none*	*15*	*none*	*10*
Exceed Thresholds?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod (output data is provided in Appendix A)

[1] Total may not sum due to rounding.

As shown in Table 12, all project long-term operational emissions of criteria pollutants and precursors would be less than the BAAQMD thresholds. Therefore, the project's operational activities would not result in a cumulatively considerable net increase of criteria pollutants that would violate any air quality standard or contribute substantially to an existing or projected air quality violation and the impact would be less than significant.

2.5.2.3 Decommissioning and Site Reclamation Pollutant and Precursor Emissions

The solar facility is anticipated to have an operating life of at least 50 years. Once the operating life of the facility is over, it would be either repowered or decommissioned. If repowering were to be pursued, it would require the facility owner to obtain all required permit approvals. Project decommissioning would occur in accordance with the expiration of the CUP and would involve the removal of above-grade facilities, buried electrical conduit, and all concrete foundations in accordance with a Decommissioning Plan. Equipment would be repurposed off-site, recycled, or disposed of in a landfill as appropriate.

Decommissioning is anticipated to take approximately six months to complete and would occur in 2073 or later. Decommissioning would be completed in three phases: Phase 1 would involve shutting down the systems and removing hazardous materials and wiring; Phase 2 would include removing the PV modules, inverters, substation(s), switching station, and energy storage system; Phase 3 would include removing site fencing and driveways and the final soils reclamation process. Decommissioning and reclamation activities are anticipated to require approximately 200 workers, generating 800 maximum daily worker trips and 40 daily truck trips.

Current California emissions modeling programs and data (i.e., CalEEMod, EMFAC2017, OFFROAD2017) do not estimate emissions beyond the year 2050. However, because it is anticipated that the intensity of project decommissioning and reclamation activities would be similar to or less than construction

activities, the off-road equipment and water use for decommissioning are assumed to be similar or less than that required for project constructions. In addition, in accordance with current CARB regulations, in 50 plus years (2073 or later), all diesel-powered off-road equipment with 25 or more HP used in construction fleets would be required to meet USEPA Tier 4 standards or better (CARB 2020b). Therefore, due to the shorter duration and equal or lesser intensity of activity compared to project construction, emissions of criteria pollutant and precursors from decommissioning and reclamation activities would be less than the mitigated emissions calculated for project construction. As discussed above, the project's mitigated construction emissions would not exceed the BAAQMD thresholds. Therefore, Therefore, the project's decommissioning and reclamation activities would not result in a cumulatively considerable net increase of criteria pollutants that would violate any air quality standard or contribute substantially to an existing or projected air quality violation and the impact would be less than significant.

Mitigation Measures

AQ-1 Prior to issuance of any Grading Permit, the County shall confirm that the Grading Plan, Building Plans, and specifications stipulate that, in compliance with the BAAQMD CEQA Air Quality Guidelines, the following basic construction mitigation measures shall be implemented for all project construction activity:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign shall be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

AQ-2 Prior to issuance of any Grading Permit, the County shall confirm that the Grading Plan, Building Plans, and specifications stipulate that, all diesel-powered off-road equipment with 50 or more horsepower be certified to meet the USEPA Tier 4 Final emissions standards, or be retrofitted with CARB verified diesel exhaust emissions reduction devices that reduce emissions of both NO_X and PM to USEPA Tier 4 Final emissions standards.

2.5.3 Issue 3: Impacts to Sensitive Receptors

Sensitive receptors are described as residences, schools, day-care centers, playgrounds, medical facilities, or other facilities that may house individuals with health conditions (medical patients or elderly persons/athletes/students/children) that may be adversely affected by changes in air quality. Impacts to sensitive receptors are typically analyzed for CO hot spots and exposure to TACs. An analysis of the project's potential to expose sensitive receptors to these pollutants is provided below.

2.5.3.1 Localized Carbon Monoxide Hotspots

Vehicle exhaust is the primary source of CO. In an urban setting, the highest CO concentrations are generally found in close proximity to congested intersections. Under typical meteorological conditions, CO concentrations tend to decrease as distance from the emissions source (e.g., congested intersection) increase. Project-generated traffic has the potential of contributing to localized "hotspots" of CO off-site. Because CO is a byproduct of incomplete combustion, exhaust emissions are worse when fossil-fueled vehicles are operated inefficiently, such as in stop-and-go traffic or through heavily congested intersections. Because CO disperses rapidly, hotpots are most likely to occur in areas with limited vertical mixing such as tunnels, long underpasses, or below-grade roadways. The BAAQMD CEQA guidelines provide that, if a project is consistent with the applicable congestion management plan and would not increase traffic volumes at intersections to more than 44,000 vehicles per hour for regular intersections, or would not increase traffic volumes at intersections to more than 24,000 vehicles per hour for intersections with limited vertical mixing zones, the impacts from CO hotpots would be less than significant (BAAQMD 2017c).

The project TIS concluded that the highest project construction traffic-affected intersection would be the intersection of North Livermore Avenue and Eastbound Interstate 580, which would carry approximately 2,742 vehicles during the PM peak hour under the existing plus project conditions. This intersection traffic volume would not exceed the BAAQMD guideline of hourly intersection traffic volumes with more than 44,000 vehicles per hour, or 24,000 vehicles per hour for intersections with limited mixing zones. Therefore, Impacts related to CO hotspots would be less than significant.

2.5.3.2 Construction Diesel Particulate Matter Emissions

Implementation of the project would result in the use of heavy-duty construction equipment, haul trucks, and construction worker vehicles. These vehicles and equipment could generate DPM, which is a TAC. Generation of DPM from construction projects typically occurs in a localized area (e.g., near locations with multiple pieces of heavy construction equipment working in close proximity) for a short period of time. Because construction activities and subsequent emissions vary depending on the phase of construction, the construction-related emissions to which nearby receptors are exposed to would also vary throughout the construction period. During some equipment-intensive activities such as grading and excavation, construction-related emissions would be higher than other less equipment-intensive phases such as PV panel installation. Concentrations of mobile-source DPM emissions are

typically reduced by 70 percent at approximately 500 feet (CARB 2005). It is not anticipated that the use of heavy diesel power equipment would be concentrated within 500 feet of any existing sensitive receptors (rural single-family residences) for more than a few days duration.

The dose (of TAC) to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance in the environment and the extent of exposure a person has with the substance; a longer exposure period to a fixed amount of emissions would result in higher health risks. Current models and methodologies for conducting cancer health risk assessments are associated with longer-term exposure periods (typically 30 years for individual residents based on guidance from OEHHA) and are best suited for evaluation of long duration TAC emissions with predictable schedules and locations. These assessment models and methodologies do not correlate well with the temporary and highly variable nature of construction activities. Cancer potency factors are based on animal lifetime studies or worker studies where there is long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime (Office of Environmental Health Hazard Assessment [OEHHA] 2015).

In addition, as shown in Tables 11 and 12, USEPA Tier 4 Final certified engines (required by Mitigation Measure AQ-2 for all project construction equipment with 50 or more HP) would reduce Exhaust PM_{10} emissions (approximately equivalent to DPM) by 85 percent. Considering this information, the highly dispersive nature of DPM, and the fact that any concentrated use of heavy construction equipment would occur at various locations throughout the project site only for short durations, construction of the project would not expose sensitive receptors to substantial DPM concentrations, and the impact would be less than significant.

2.5.3.3 Operation Diesel Particulate Matter Emissions

O&M activities could require the use of diesel-powered off-road equipment. As described in Section 2.3, above, up to seven pieces of off-road equipment could be used during maintenance and panel washing. However, only two small tractors are anticipated to be used on more than 20 days per year. Therefore, due to the limited use of diesel-powered off-road equipment and the fact that O&M activities would occur at various locations throughout the project site for short durations and would not be concentrated near sensitive receptors, operation of the project would not expose sensitive receptors to substantial DPM concentrations, and the impact would be less than significant.

2.5.4 Issue 4: Odors

Construction of the project would require the use of diesel-powered equipment. Diesel exhaust can be a temporary source of odors. Due to the temporary and intermittent nature of construction activities, and due to the dispersion of construction activities thorough the large project site (410 acres), construction of the project would not result in emissions leading to odors that would adversely affect substantial numbers of people.

The BAAQMD CEQA Guidelines contain a table of odor screening distances for siting new land uses/operations that are typical sources of odors. The project would be a PV electricity generation facility, which is not considered to be a typical significant source of objectionable odors. The proposed program for concomitant agricultural land uses during project operation could include seasonal livestock grazing. Seasonal livestock grazing is not considered a typical source of objectionable odors in the

BAAQMD CEQA guidelines. In additions, the majority of the project site is currently used for seasonal livestock grazing and future concomitant agricultural land uses on the project site would not result substantially different odors than those generate by the existing land use. Therefore, operation of the project would not result in emissions leading to odors that would adversely affect substantial numbers of people, and the impact would be less than significant.

3.0 ENERGY

This section provides an evaluation of existing energy production/consumption conditions and potential energy use and related impacts from the project. The units of energy used in this section are the British thermal units (BTU), megawatt hours (MWh)[2], therms, and gallons. A BTU is the quantity of heat required to raise the temperature of one pound of water one °F at sea level. Because the other units of energy can all be converted into equivalent BTU, the BTU is used as the basis for comparing energy consumption associated with different resources. A MWh is a unit of electrical energy, and one MWh is equivalent to approximately 3.413 million BTU (MBTU), taking into account initial conversion losses (i.e., from one type of energy, such as chemical, to another type of energy, such as mechanical) and transmission losses. Natural gas consumption is described typically in terms of cubic feet or therms; one cubic foot of natural gas is equivalent to approximately 1.05 MBTU, and one therm represents 0.1 MBTU. One gallon of gasoline/diesel is equivalent to approximately 0.125/0.139 MBTU, respectively, taking into account energy consumed in the refining process.

3.1 ENERGY REGULATORY FRAMEWORK

3.1.1 Federal Energy Regulations

3.1.1.1 Energy Independence and Security Act of 2007

House of Representatives Bill 6 (HR 6), the federal Energy Independence and Security Act of 2007, established new standards for a few energy-consuming equipment types not already subject to a standard, and updated some existing standards. The most substantial new standard that HR 6 established is for general service lighting that is being deployed in two phases. First, phased in between 2012 through 2014, common light bulbs were required to use about 20 to 30 percent less energy than previous incandescent bulbs. Second, by 2020, light bulbs were required to consume 60 percent less energy than previous incandescent bulbs; this requirement will effectively phase out the incandescent light bulb.

3.1.2 California Energy Regulations

3.1.2.1 Renewable Energy Programs and Mandates (SB 1078, SB 107, SB 2 X1, SB 350 and SB 100)

A series of substantive and far-reaching legislative initiatives have been advanced at the State level in the last two decades. These initiatives focused on increasing the generation of electricity via renewable energy sources and promoting a shift from fossil- or carbon-based fuels as a key strategy to reduce GHG emissions, air pollution, and water use associated with the energy sector.

[2] MWh is the most common measure or electrical energy when discussing utility-scale electrical generation. Kilowatt hours (kWh; 1,000 kWh = 1 MWh) and gigawatt hours (GWh; 1,000 MWh = 1 GWh).

In 2002, California established the Renewables Portfolio Standard (RPS) with SB 1078, requiring electric utilities in the State to increase procurement of eligible renewable energy resources to achieve a target of 20 percent of their annual retail sales by the year 2010. In 2011, Governor Jerry Brown approved the California Renewable Energy Resources Act, SB 2 X1. SB 2 X1 legislatively broadens the scope of the State RPS to include retail electricity sellers; investor- and publicly owned utilities; municipal utilities; and community choice aggregators under the mandate to obtain 33 percent of their retail electrical energy sales from renewable sources by 2020.

Approved by Governor Brown on October 7, 2015, SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. This will increase the use of Renewables Portfolio Standard eligible resources, including solar, wind, biomass, and geothermal. In addition, large utilities are required to develop and submit Integrated Resource Plans to detail how each entity will meet their customers resource needs, reduce GHG emissions, and increase the use of clean energy.

Approved by Governor Brown on September 10, 2018, SB 100 extends the renewable electricity procurement goals and requirements of SB 350. SB 100 requires that all retail sale of electricity to California end-use customers be procured from 100 percent eligible renewable energy resources and/or zero-carbon resources by the end of 2045.

3.1.2.2 California Energy Plan

The California Energy Commission (CEC) is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the fewest environmental and energy costs. To further this policy, the plan identifies a number of strategies, including providing assistance to public agencies and fleet operators.

3.2 ENERGY EXISTING CONDITIONS

3.2.1 State Energy Supply

3.2.1.1 Electricity

California's electricity needs are satisfied by a variety of entities, including investor-owned utilities, publicly owned utilities, electric service providers, and choice aggregators.[3] As of 2018, California electricity demand totaled 285,488 gigawatt hours (GWh).In-state generating facilities accounted for about 194,842 GWh, or 68 percent of the total electric power used in the state, with the remaining electricity coming from out-of-state imports (CEC 2019a).

[3] Community choice aggregation is authorized in California by AB 117 (Chapter 836, Statutes of 2002), which allows cities, counties, and groups of cities and counties to aggregate the electric load of the residents, businesses and institutions within their jurisdictions to provide them electricity.

Since deregulation in 1998, the CEC has licensed or given small power plant exemptions to 91 power plants, including:

- 66 projects representing 22,965 MW currently on-line;
- 4 projects totaling 2,635 MW currently under construction or pre-construction;
- 2 projects totaling 795 MW currently on hold or under suspension; and
- 15 projects totaling 5,844.5 MW approved but then cancelled by applicants, or license expired or terminated before construction.

In addition, as of February 2020, the CEC had five proposed projects under review, totaling approximately 453 MW (CEC 2020a). One additional geothermal steam turbine project, representing a total of 250 MW, has been announced but has not yet filed with the CEC.

On the demand side, Californians consumed 284,060 GWh of electricity in 2017; this is a decrease from the 285,434 GWh demanded in 2016 (CEC 2018). CEC staff forecasts of future electricity demand anticipate that consumption will grow by between 0.99 and 1.59 percent per year from 2017 to 2030, with peak demand forecasts growing by 0.30 to 1.52 percent annually from 2017 to 2030 (CEC 2018).

3.2.1.2 Natural Gas

Natural gas continues to play an important and varied role in California. In 2012, nearly 45 percent of the natural gas burned in California was used for electricity generation, and much of the remainder was consumed in the residential (21 percent), industrial (25 percent), and commercial (9 percent) sectors (CEC 2019b). Natural gas supplies are currently plentiful and relatively inexpensive as a result of technological advances that allow recovery of natural gas from formations such as shale reservoirs that were previously inaccessible. However, potential environmental concerns are causing decision makers to reexamine the development of shale resources and consider tighter regulations, which could affect future natural gas supplies and prices.

3.2.1.3 Transportation Fuels

Automobiles and trucks consume gasoline and diesel fuel, which are nonrenewable energy products derived from crude oil, which in turn is derived from petroleum. In addition to energy consumption associated with on-road vehicle use, energy is consumed in connection with construction and maintenance of transportation infrastructure. Passenger cars and light-duty trucks are by far the largest consumers of transportation fuel. Retail sales of transportation fuel in California totaled 15.6 billion gallons of gasoline and 1.9 billion gallons of diesel in 2017 (CEC 2018).

3.2.2 Local Energy Supply

3.2.2.1 Electricity

The primary provider of electricity in Alameda County is PG&E. PG&E provides electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California. The electrical grid (a network of transmissions lines that links powerplants, other utility providers, and end-use customers) operated by PG&E includes 106,681 circuit miles of electric

distribution lines and 18,466 circuit miles of interconnected transmission lines (PG&E 2020a). PG&E generates or procures energy from a variety of sources that may include fossil fuel powerplants (e.g., natural gas, coal), nuclear power plants, large hydroelectric facilities, and renewable sources (e.g., solar, wind, geothermal, biomass, small hydroelectric). In 2018, PG&E's electrical power mix comprised 39 percent renewable sources, 34 percent nuclear power plants, 15 percent natural gas power plants, and 13 percent large hydroelectric facilities (PG&E 2020b). PG&E customers consumed 52.5 GWh of electricity in 2018 (CEC 2019b).

3.3 ENERGY METHODOLOGY

Construction and operational energy used were calculated based on the off-road equipment use and on-road vehicle trips and distances described in Section 2.3. Fuel consumption factors in terms of gallons per hour of diesel for off-road equipment were calculated using data from the CARB Mobile Source Emissions Inventory online database –OFFROAD2017 version 1.0.1 (CARB 2020c). Fuel consumption factors in terms of gallon of diesel and gasoline per mile travel were calculated from the CARB Mobile Source Emissions Inventory online database – EMFAC2017 version 1.0.2 (CARB 2020d). The energy calculation sheets are included as Appendix B to this report.

3.4 ENERGY SIGNIFICANCE CRITERIA

According to Appendix G of the CEQA Guidelines, a project would have a significant environmental impact if it would:

(1) Result in the wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

(2) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The CEQA Guidelines Appendix F, *Energy Conservation*, provides guidance for environmental impact reports (EIRs) regarding potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing the inefficient, wasteful and unnecessary consumption of energy. In addition, though not described as thresholds for determining the significance of impacts, Appendix F seeks inclusion of information in an EIR addressing the following topics:

- The project's energy requirements and its energy-use efficiencies by amount and fuel type for each stage of the project, including construction, operation, maintenance, and/or removal. If appropriate, the energy intensiveness of materials may be discussed.
- The effects of the project on local and regional energy supplies and on requirements for additional capacity.
- The effects of the project on peak and base period demands for electricity and other forms of energy.
- The degree to which the project complies with existing energy standards.

- The effects of the project on energy resources.
- The project's projected transportation energy use requirements and its overall use of efficient transportation alternatives.

3.5 ENERGY IMPACT ANALYSIS

3.5.1 Issue 1: Result in the wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation

3.5.1.1 Construction Energy

Energy consumed for project construction would primarily consist of fuels in the form of diesel and gasoline. Fuel consumption would result from: the use of on-road trucks for the transportation of construction materials and water; construction worker vehicles traveling to and from the project site; and from the use of off-road construction equipment. The estimated fuel and total energy consumed during project construction is shown in Table 13, *Construction Energy Use*. The full construction energy consumption calculation sheets are included as Appendix B to this report.

Table 13
CONSTRUCTION ENERGY USE

Phase	Gallons Diesel	Gallons Gasoline	MBtu
Site Preparation	7,336	6,671	1,847
General Construction Operations	58,320	12,519	9,659
Photovoltaic Installation	41,759	83,387	16,144
Electrical and Gen-Tie Installation	4,098	20,847	3,155
TOTAL	**111,513**	**123,423**	**30,805**

Source: CalEEMod; OFFROAD2017; EMFAC2017
MBtu = million British thermal units

While construction activities would consume petroleum-based fuels, consumption of such resources would be temporary and would cease upon the completion of construction. The BCMMs, required to be implemented by Mitigation Measure AQ-1, would reduce the inefficient use of fuels by requiring proper maintenance and tuning of off-road vehicles and limiting idling time. The petroleum consumed during project construction would be typical of similar solar PV generation projects and would not require the use of new petroleum resources beyond those typically consumed in California annually for construction activities. Based on these considerations, construction of the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources and the impact would be less than significant.

3.5.1.2 Operational Energy

During long-term operation of the project, energy would be consumed in the form of: diesel and gasoline used by worker/company vehicles and water trucks traveling to and from the project site for O&M; diesel and gasoline used in the operation of off-road equipment for facility maintenance; natural gas for heating and hot water in the O&M building; and electricity required to source and treat water used by the project.

The project would be capable of generating up to 100 MW of AC electricity under peak solar conditions. The energy generated by the project is estimated by multiplying the electrical power capacity by the number of hours in a year and by a capacity factor. The capacity factor accounts for: the available hours of sunlight in a year (daylight hours); climate (the amount of cloud cover); the efficiency of the PV panel tracking system; the efficiency of the inverters, transformers, transmission lines, and energy storage system; and the electricity consumed in operation of the project (e.g., building electricity, PV panel tracking motors, equipment cooling fans, security lighting). Data from the CEC for existing solar PV facilities with one or more MW capacity was used to estimate the capacity factor for the project. Using data collected from the eastern and southern Bay Area counties with similar climates to the project site (the counties of Alameda, Contra Costa, Santa Clara, and Solano), the average capacity factor for solar generation facilities in 2019 was 20.2 percent (CEC 2020b). The project's estimated annual energy generated would be 177,207 MWh (100 MW times 8,766 hours per year times 20.2 percent). Because the project would utilize a battery storage system, some of the electricity generated during off-peak hours could be stored and released during hours of peak demand.

The project's net operational energy use in gallons of fuel, electricity, and equivalent MBtu is shown in Table 14, *Operational Net Energy Use*. The energy calculation sheets are included in Appendix B to this report.

Table 14
OPERATIONAL NET ENERGY USE

Source	Diesel (gallons)	Gasoline (gallons)	Electricity (MWh)	Energy (MBtu)
Mobile	5,504	5,950	-	1,503
Off-Road	1,568	-	-	278
Natural Gas	-	-	-	7
Water/Wastewater	-	-	9	30
Electricity Generation	-	-	(-177,207)	(-604,657)
TOTAL[1]	**10,620**	**5,970**	**(-177,198)**	**(-602,839)**

Source: CalEEMod; OFFROAD2017; EMFAC2017

[1] Totals may not sum due to rounding.

MWh = megawatt hours; MBtu = million British thermal units

As shown in Table 14, the project would generate a net of approximately 177,198 MWh (602,839 MBtu of energy) of renewable electricity delivered to the state and regional electrical distribution system. Operation of the project would consume approximately 2,314 MBtu of energy, or approximately 0.4 percent of the energy generated by the project. Because the amount of energy consumed by project operation would be inconsequential compared to the amount of energy generated by the project, the operation of the project would not result in the wasteful, inefficient, or unnecessary consumption of energy resources, and the impact would be less than significant.

3.5.2 Issue 2: Conflict with or obstruct a state or local plan for renewable energy or energy efficiency

As a solar PV energy generation facility, the project would directly support the State's Renewable Energy Programs and the renewable source electricity procurement mandates of 50 percent by 2030 from SB 350 and 100 percent by 2045 from SB 100 (described in Section 3.1). The project would also support the BAAQMD 2017 Clean Air Plan Energy Control Measure EN1, *Decarbonize Electricity Production*, which strives to maximize the amount of renewable energy contributing to the production of electricity

within the SFBAAB as well as electricity imported into the region (BAAQMD 2017b). Therefore, the project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency and there would be no impact.

4.0 GREENHOUSE GAS EMISSIONS

4.1 GHG SETTING

4.1.1 Climate Change Overview

Global climate change refers to changes in average climatic conditions on Earth including temperature, wind patterns, precipitation, and storms. Global temperatures are moderated by atmospheric gases. These gases are commonly referred to as GHGs because they function like a greenhouse by letting sunlight in but preventing heat from escaping, thus warming the Earth's atmosphere.

GHGs are emitted by natural processes and human (anthropogenic) activities. Anthropogenic GHG emissions are primarily associated with: (1) the burning of fossil fuels during motorized transport, electricity generation, natural gas consumption, industrial activity, manufacturing, and other activities; (2) deforestation; (3) agricultural activity; and (4) solid waste decomposition.

The temperature record shows a decades-long trend of warming, with 2018 ranked as the fourth warmest year on record with an increase of 1.5 degrees Fahrenheit compared to the 1951-1980 average. Globally, 2018's temperatures rank behind the three warmest years on record—2016, 2017 and 2015 (National Aeronautics and Space Administration [NASA] 2019). GHG emissions from human activities are the most significant driver of observed climate change since the mid-20th century (United Nations Intergovernmental Panel on Climate Change [IPCC] 2013). The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The statistical models show a "high confidence" that temperature increase caused by anthropogenic GHG emissions could be kept to less than two degrees Celsius relative to pre-industrial levels if atmospheric concentrations are stabilized at about 450 parts per million (ppm) carbon dioxide equivalent (CO_2e) by the year 2100 (IPCC 2014).

4.1.2 Greenhouse Gases

The GHGs defined under California's Assembly Bill (AB) 32 include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Carbon Dioxide. CO_2 is the most important and common anthropogenic GHG. CO_2 is an odorless, colorless GHG. Natural sources include the decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungi; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of CO_2 include burning fuels, such as coal, oil, natural gas, and wood. Data from ice cores indicate that CO_2 concentrations remained steady prior to the current period for approximately 10,000 years. The atmospheric CO_2 concentration in 2010 was 390 ppm, 39 percent above the concentration at the start of the Industrial Revolution (about 280 ppm in 1750). As of April 2020, the CO_2 concentration exceeded 413 ppm (National Oceanic and Atmospheric Administration [NOAA] 2020).

Methane. CH_4 is the main component of natural gas used in homes. A natural source of methane is from the decay of organic matter. Geological deposits known as natural gas fields contain methane, which is

extracted for fuel. Other sources are from decay of organic material in landfills, fermentation of manure, and cattle digestion.

Nitrous Oxide. N_2O is produced by both natural and human-related sources. N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic (fatty) acid production, and nitric acid production.

Hydrofluorocarbons. Fluorocarbons are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. Chlorofluorocarbons are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere (the level of air at Earth's surface). Chlorofluorocarbons were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. Because hydrofluorocarbons destroy stratospheric ozone, their production was stopped as required by the 1989 Montreal Protocol.

Sulfur Hexafluoride. SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas. SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semi-conductor manufacturing, and as a tracer gas for leak detection.

GHGs have long atmospheric lifetimes that range from one year to several thousand years. Long atmospheric lifetimes allow for GHG emissions to disperse around the globe. Because GHG emissions vary widely in the power of their climatic effects, climate scientists have established a unit called global warming potential (GWP). The GWP of a gas is a measure of both potency and lifespan in the atmosphere as compared to CO_2. For example, because methane and N_2O are approximately 25 and 298 times more powerful than CO_2, respectively, in their ability to trap heat in the atmosphere, they have GWPs of 25 and 298, respectively (CO_2 has a GWP of 1). CO_2e is a quantity that enables all GHG emissions to be considered as a group despite their varying GWP. The GWP of each GHG is multiplied by the prevalence of that gas to produce CO_2e.

Historically, GHG emission inventories have been calculated using the GWPs from the IPCC's Second Assessment Report (SAR). In 2007, IPCC updated the GWP values based on the latest science at the time in its Fourth Assessment Report (AR4). The updated GWPs in the IPCC AR4 have begun to be used in recent GHG emissions inventories. In 2013, IPCC again updated the GWP values based on the latest science in its Fifth Assessment Report (AR5) (IPCC 2013). However, United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines for national inventories require the use of GWP values from the AR4. To comply with international reporting standards under the UNFCCC, official emission estimates for California and the U.S. are reported using AR4 GWP values, and statewide and national GHG inventories have not yet updated their GWP values to the AR5 values.

By applying the GWP ratios, project related CO_2e emissions can be tabulated in metric tons per year. Typically, the GWP ratio corresponding to the warming potential of CO_2 over a 100-year period is used as a baseline. The atmospheric lifetime and GWP of selected GHGs are summarized in Table 15, *Global Warming Potentials and Atmospheric Lifetimes*.

Table 15
GLOBAL WARMING POTENTIALS AND ATMOSPHERIC LIFETIMES

Greenhouse Gas	Atmospheric Lifetime (years)	Global Warming Potential (100-year time horizon)
Carbon Dioxide (CO_2)	50-200	1
Methane (CH_4)	12	25
Nitrous Oxide (N_2O)	114	298
HFC-324a	14	1,430
PFC: Tetrafluoromethane (CF_4)	50,000	7,390
PFC: Hexafluoroethane (C_2F_6)	10,000	12,200
Sulfur Hexafluoride (SF_6)	3,200	22,800

Source: IPCC 2007
HFC: hydrofluorocarbon; PFC: perfluorocarbon

4.2 GHG REGULATORY FRAMEWORK

All levels of government have some responsibility for the protection of air quality, and each level (federal, State, and regional/local) has specific responsibilities relating to air quality regulation. GHG emissions and the regulation of GHGs is a relatively new component of air quality management.

4.2.1 Federal GHG Regulations

4.2.1.1 Federal Clean Air Act

The U.S. Supreme Court ruled on April 2, 2007, in *Massachusetts v. U.S. Environmental Protection Agency* (USEPA*)* that CO_2 is an air pollutant, as defined under the CAA, and that the USEPA has the authority to regulate emissions of GHGs. The USEPA announced that GHGs (including CO_2, CH_4, N_2O, HFC, PFC, and SF_6) threaten the public health and welfare of the American people. This action was a prerequisite to finalizing the USEPA's GHG emissions standards for light-duty vehicles, which were jointly proposed by the USEPA and the United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA). The standards were established on April 1, 2010 for 2012 through 2016 model year vehicles and on October 15, 2012 for 2017 through 2025 model year vehicles (USEPA 2017; USEPA and NHTSA 2012).

4.2.1.2 Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards

The USEPA and the NHTSA worked together on developing a national program of regulations to reduce GHG emissions and to improve fuel economy of light-duty vehicles. The USEPA established the first-ever national GHG emissions standards under the CAA, and the NHTSA established Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. On April 1, 2010, the USEPA and NHTSA announced a joint Final Rulemaking that established standards for 2012 through 2016 model year vehicles. This was followed up on October 15, 2012, when the agencies issued a Final Rulemaking with standards for model years 2017 through 2025. On August 2, 2018, the agencies released a notice of proposed rulemaking—the Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule). The purpose of the SAFE Vehicles Rule is "to correct the national automobile fuel economy and greenhouse gas emissions standards to give the American people greater access to safer, more affordable vehicles that are cleaner for the

environment." The direct effect of the rule is to eliminate the standards that were put in place to gradually raise average fuel economy for passenger cars and light trucks under test conditions from 37 miles per gallon (mpg) in 2020 to 50 mpg in 2025. The new SAFE Vehicles Rule freezes the average fuel economy level standards indefinitely at the 2020 levels. The new SAFE Vehicles Rule also results in the withdraw of the waiver previously provided to California for that State's GHG and zero emissions vehicle (ZEV) programs under Section 209 of the CAA. The combined USEPA GHG standards and NHTSA CAFE standards resolve previously conflicting requirements under both federal programs and the standards of the State of California and other states that have adopted the California standards.

4.2.2 California GHG Regulations

There are numerous State plans, policies, regulations, and laws related to GHG emissions and global climate change. Following is a discussion of some of these plans, policies, and regulations that (1) establish overall State policies and GHG emission reduction targets; (2) require State or local actions that result in direct or indirect GHG emission reductions for the proposed project; and (3) require CEQA analysis of GHG emissions.

4.2.2.1 California Energy Code

CCR Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in GHG emissions.

The Title 24 standards are updated approximately every three years to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2019 Title 24 standards went into effect on January 1, 2020. The 2019 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings.

The standards are divided into three basic sets. First, there is a basic set of mandatory requirements that apply to all buildings. Second, there is a set of performance standards – the energy budgets – that vary by climate zone (of which there are 16 in California) and building type; thus, the standards are tailored to local conditions. Finally, the third set constitutes an alternative to the performance standards, which is a set of prescriptive packages that are basically a recipe or a checklist compliance approach.

4.2.2.2 California Green Building Standards Code

The California Green Building Standards Code (CALGreen; CCR Title 24, Part 11) is a code with mandatory requirements for new residential and nonresidential buildings (including industrial buildings) throughout California. The code is Part 11 of the California Building Standards Code in Title 24 of the CCR (CBSC 2019). The current 2019 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings went into effect on January 1, 2020.

The development of CALGreen is intended to (1) cause a reduction in GHG emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; (3) reduce energy and water consumption; and (4) respond to the directives by the Governor. In short, the code is

established to reduce construction waste; make buildings more efficient in the use of materials and energy; and reduce environmental impact during and after construction.

CALGreen contains requirements for storm water control during construction; construction waste reduction; indoor water use reduction; material selection; natural resource conservation; site irrigation conservation; and more. The code provides for design options allowing the designer to determine how best to achieve compliance for a given site or building condition. The code also requires building commissioning, which is a process for the verification that all building systems, like heating and cooling equipment and lighting systems, are functioning at their maximum efficiency.

4.2.2.3 Executive Order S-3-05

On June 1, 2005, Executive Order (EO) S-3-05 proclaimed that California is vulnerable to climate change impacts. It declared that increased temperatures could reduce snowpack in the Sierra Nevada, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To avoid or reduce climate change impacts, EO S-3-05 calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

4.2.2.4 Assembly Bill 32 – Global Warming Solution Act of 2006

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires that the CARB develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

4.2.2.5 Senate Bill 375

Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act of 2008, supports the State's climate action goals to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities.

Under the Sustainable Communities Act, CARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, CARB established these targets for 2020 and 2035 for each region covered by one of the State's metropolitan planning organizations (MPOs). CARB periodically reviews and updates the targets, as needed.

Each of California's MPOs must prepare a Sustainable Communities Strategy (SCS) as an integral part of its regional transportation plan (RTP). The SCS contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet its GHG emission reduction targets. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region. CARB must review the adopted SCS to confirm and accept the MPO's determination that the SCS, if implemented, would meet the regional GHG targets. If the combination of measures in the SCS would not meet the regional targets, the MPO must prepare a separate alternative planning strategy (APS) to meet the targets. The APS is not a part of the RTP. Qualified projects consistent with an approved SCS or Alternative Planning Strategy categorized as "transit priority projects" would receive incentives to streamline CEQA processing.

4.2.2.6 Senate Bill 743

On September 27, 2013, California Governor Jerry Brown signed SB 743 into law and started a process that changes transportation impact analysis as part of CEQA compliance. These changes include the elimination of auto delay, level of service (LOS), and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant impacts for land use projects and plans in California. Further, parking impacts will not be considered significant impacts on the environment for select development projects within infill areas with nearby frequent transit service. According to the legislative intent contained in SB 743, these changes to current practice were necessary to more appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of GHG emissions.

4.2.2.7 Senate Bill 97

SB 97 required the Governor's Office of Planning and Research to develop recommended amendments to the State CEQA Guidelines for addressing GHG emissions, including the effects associated with transportation and energy consumption. The amendments became effective on March 18, 2010.

4.2.2.8 Executive Order B-30-15

On April 29, 2015, EO B-30-15 established a California GHG emission reduction target of 40 percent below 1990 levels by 2030. The EO aligns California's GHG emission reduction targets with those of leading international governments, including the 28 nation European Union. California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in AB 32. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal established by EO S-3-05 of reducing emissions 80 percent under 1990 levels by 2050.

4.2.2.9 Senate Bill 32 and Assembly Bill 197

As a follow-up to AB 32 and in response to EO-B-30-15, SB 32 was passed by the California legislature in August 2016 to codify the EO's California GHG emission reduction target of 40 percent below 1990 levels by 2030 and requires the State to invest in the communities most affected by climate change. AB 197 establishes a legislative committee on climate change policies to help continue the State's activities to reduce GHG emissions.

4.2.2.10 Assembly Bill 1493 – Vehicular Emissions of Greenhouse Gases

AB 1493 (Pavley) requires that CARB develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State." On September 24, 2009, CARB adopted amendments to the Pavley regulations that intend to reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments bind California's enforcement of AB 1493 (starting in 2009), while providing vehicle manufacturers with new compliance flexibility. The amendments also prepare California to merge its rules with the federal CAFE rules for passenger vehicles (CARB 2017a). In January 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single packet of standards called Advanced Clean Cars (CARB 2017a).

4.2.2.11 Assembly Bill 341

The State legislature enacted AB 341 (California Public Resource Code Section 42649.2), increasing the solid waste diversion target to 75 percent statewide. AB 341 requires all businesses and public entities that generate 4 cubic yards or more of waste per week to have a recycling program in place. The final regulation was approved by the Office of Administrative Law on May 7, 2012 and went into effect on July 1, 2012.

4.2.2.12 Executive Order S-01-07 – Low Carbon Fuel Standard

This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California and directs CARB to determine whether a LCFS can be adopted as a discrete early action measure pursuant to AB 32. CARB approved the LCFS as a discrete early action item with a regulation adopted and implemented in April 2010. Although challenged in 2011, the Ninth Circuit reversed the District Court's opinion and rejected arguments that implementing LCFS violates the interstate commerce clause in September 2013. As a result, CARB continues to implement the LCFS statewide.

4.2.2.13 California Air Resources Board: Climate Change Scoping Plan

On December 11, 2008, CARB adopted the Scoping Plan (CARB 2008) as directed by AB 32. The Scoping Plan proposes a set of actions designed to reduce overall GHG emissions in California to the levels required by AB 32. Measures applicable to development projects include those related to energy-efficiency building and appliance standards, the use of renewable sources for electricity generation, regional transportation targets, and green building strategy. Relative to transportation, the 2008 Scoping Plan includes nine measures or recommended actions related to reducing VMT and vehicle GHG emissions through fuel and efficiency measures. These measures would be implemented statewide rather than on a project by project basis.

In response to EO B-30-15 and SB 32, all state agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets. CARB was directed to update the Scoping Plan to reflect the 2030 target (CARB 2014). The mid-term target is critical to help frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue driving down emissions. In December 2017, CARB adopted the *2017 Climate Change Scoping Plan Update, the Strategy for Achieving California's 2030 Greenhouse Gas Target,* to reflect the 2030 target set by EO B-30-15 and codified by SB 32 (CARB 2017b).

4.2.3 Regional GHG Policies and Plans

4.2.3.1 Bay Area Air Quality Management District

The BAAQMD provides direction and recommendations for the analysis of GHG impacts of a project and approach to mitigation measures in its CEQA Guidelines (BAAQMD 2017b). The guidance provided in the handbook was used to prepare this analysis. In addition, the 2017 Clean Air Plan, *Spare the Air Cool the Climate* defines a control strategy that the BAAQMD and its partners will implement to reduce greenhouse gas emissions to protect the climate (BAAQMD 2017b).

4.2.3.2 Association of Bay Area Governments and Metropolitan Transportation Commission

As required by the Sustainable Communities and Climate Protection Act of 2008 (SB 375), ABAG and the MTC have developed a RTP/SCS as a component of Plan Bay Area 2040 (MTC and ABAG 2017). This plan seeks to reduce GHG and other mobile source emissions through coordinated transportation and land use planning to reduce VMT.

4.2.4 Local Greenhouse Gas Plans

4.2.4.1 Alameda County

The County adopted the *Unincorporated Areas Community Climate Action Plan* (CAP) in 2014. The CAP addresses reduction of greenhouse gas emissions through a series of local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure. Implementation of the plan would reduce GHG emissions in the unincorporated County area to 15 percent below 2005 levels by 2020 and set the County on a path towards reducing emissions to 80 percent below 1990 levels by 2050 (County 2014).

4.3 GHG EXISTING CONDITIONS

4.3.1 Worldwide and National GHG Inventory

In 2014, total GHG emissions worldwide were estimated at 48,892 million metric tons (MMT) of CO_2e emissions (World Resource Institute [WRI] 2020). The U.S. contributed the second largest portion (13 percent) of global GHG emissions in 2014. The total U.S. GHG emissions was 6,319 MMT CO_2e in 2019, of which 82 percent was CO_2 emission (WRI 2020). On a national level, approximately 27 percent of GHG emissions were associated with transportation and about 38 percent were associated with electricity generation (WRI 2020).

4.3.2 State GHG Inventories

The CARB performed statewide inventories for the years 1990 to 2017, as shown in Table 16, *California State Greenhouse Gas Emissions by Sector*. The inventory is divided into six broad sectors of economic activity: agriculture, commercial, electricity generation, industrial, residential, and transportation. Emissions are quantified in MMT CO_2e.

As shown in Table 16, statewide GHG source emissions totaled 431 MMT CO_2e in 1990, 471 MMT CO_2e in 2000, 449 MMT CO_2e in 2010, and 424 MMT CO_2e in 2017. Transportation-related emissions consistently contribute the most GHG emissions, followed by electricity generation and industrial emissions.

Table 16
CALIFORNIA GREENHOUSE GAS EMISSIONS BY SECTOR

Sector	Emissions (MMT CO_2e)			
	1990	2000	2010	2017
Agriculture and Forestry	18.9 (4%)	31.0 (7%)	33.7 (8%)	32.4 (8%)
Commercial	14.4 (3%)	14.1 (3%)	20.1 (4%)	23.3 (5%)
Electricity Generation	110.5 (26%)	105.4 (22%)	90.6 (20%)	62.6 (15%)
Industrial	105.3 (24%)	105.8 (22%)	101.8 (23%)	101.1 (24%)
Residential	29.7 (7%)	31.7 (7%)	32.1 (7%)	30.4 (7%)
Transportation	150.6 (35%)	183.2 (39%)	170.2 (38%)	174.3 (41%)
Unspecified Remaining	1.3 (<1%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
TOTAL	**430.7**	**471.1**	**448.5**	**424.1**

Source: CARB 2007 and CARB 2019
MMT = million metric tons; CO_2e = carbon dioxide equivalent

4.3.3 Regional GHG Inventory

A San Francisco Bay Area regional emissions inventory for the year 2015 prepared by BAAQMD for the 2017 Clean Air Plan is presented in Table 17, *San Francisco Bay Area GHG Emissions by Sector* (BAAQMD 2017b). The sectors included in this inventory are somewhat different from those in the statewide inventory. Similar to the statewide emissions, transportation related GHG emissions contributed the most regionally.

Table 17
SAN FRANCISCO BAY AREA GHG EMISSIONS BY SECTOR

Sector	2015 Emissions MMT CO_2e (% total)[1]
Transportation	34.6 (41%)
Electricity	12.1 (14%)
Buildings	8.9 (11%)
Stationary Sources	22.0 (26%)
Waste Management	2.3 (3%)
Fluorinated Gases	3.6 (4%)
Agriculture	1.2 (1%)
TOTAL	**84.7**

Source: BAAQMD 2017b.
[1] Percentages may not total 100 due to rounding.
MMT = million metric tons; CO_2e = carbon dioxide equivalent

4.4 GHG METHODOLOGY

The project's GHG emissions were calculated using CalEEMod, as described in Section 2.3, above.

4.4.1 Construction GHG Emissions

Construction of the project would result in emissions of GHGs from the use of diesel-powered equipment, from worker vehicles traveling to and from the project site, and from trucks hauling material

and water to the project site. The anticipated construction equipment and vehicle trips required for project construction are described in Section 2.3, above.

4.4.2 Operational GHG Emissions

4.4.2.1 Area GHG Sources

The project O&M activities would result in area GHG emissions from the use of gasoline-powered landscape equipment for vegetation management.

4.4.2.2 Energy Sources

The project would generate electrical energy from PV panels and supply that energy to the electrical grid through a series of inverters and transformers and an energy storage system. Long-term operation of the project would use electrical energy for PV panel tracking motors, inverter and transformer cooling fans, security lighting, and use of the O&M building (e.g., lighting, appliances, and heating ventilation, and air conditioning [HVAC] systems). All electricity used for operation of the project was assumed to be generated on-site and would not result in direct or indirect emissions of GHGs. Natural gas or propane may be used for the O&M building heating system and/or hot water heater. The CalEEMod default natural gas consumption for the O&M building was used in the emissions modeling.

4.4.2.3 Vehicular (Mobile) GHG Sources

Operational GHG emissions from mobile source emissions are associated with vehicle trip generation and trip length. The anticipated vehicle trips associated with O&M activities are described in Section 2.3, above.

4.4.2.4 Off-Road GHG Sources

The project O&M activities would require the use of off-road vehicles for ongoing maintenance, repairs, panel washing, and vegetation management. The anticipated off-road equipment required for O&M activities is described in Section 2.3, above.

4.4.2.5 Solid Waste Sources

The disposal of solid waste produces GHG emissions from anaerobic decomposition in landfills, incineration, and transportation of waste. CalEEMod determines the GHG emissions associated with disposal of solid waste into landfills. Portions of these emissions are biogenic. CalEEMod methods for quantifying GHG emissions from solid waste are based on the IPCC method using the degradable organic content of waste. The CalEEMod default levels of solid waste generation for long-term operation of the O&M building were used in the emissions modeling.

4.4.2.6 Water Sources

The project would require approximately 5 acre-feet (1,629,255 gallons) of water annually for provisioning the O&M building, panel washing, and livestock drinking water. Water would either be obtained via an on-site well or from an off-site water purveyor and trucked to the site. GHG emissions associated with trucking water to the project site are included in the vehicular sources trip generation.

Indirect GHG emissions associated with the sourcing and treatment of water are included in the modeling.

4.5 GHG SIGNIFICANCE CRITERIA

Given the relatively small levels of emissions generated by a typical project in relationship to the total amount of GHG emissions generated on a national or global basis, individual development projects are not expected to result in significant, direct impacts with respect to climate change. However, considering the magnitude of the impact of GHG emissions on the global climate, GHG emissions from new development could result in significant, cumulative impacts with respect to climate change. Thus, the potential for a significant GHG impact is limited to cumulative impacts.

According to Appendix G of the CEQA Guidelines, a project would have a significant environmental impact if it would:

(1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

(2) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

The BAAQMD has adopted GHG thresholds of significance that a lead agency may use for determining the significance of a land use development project's GHG impacts. For development projects, the BAAQMD recommends a bright-line screening threshold of 1,100 metric tons (MT) of CO_2e per year for a project's long-term operational GHG emissions (BAAQMD 2017c). The BAAQMD's GHG thresholds were developed to meet the year 2020 statewide GHG emissions targets as mandated by AB 32 and implemented by the CARB Scoping Plan. The BAAQMD has not adopted guidance or revised thresholds to account for GHG reduction target beyond 2020. Therefore, this analysis compares the project's emissions to a reduced threshold corresponding to the SB 32 reduction target of emissions 40 percent below 1990 levels by 2030. Accordingly, a threshold reduced by 4.98 percent for each year between 2020 and 2030 would meet the mandates of SB 32. The first full year of operation for the project is anticipated to be 2023. Therefore, an adjusted threshold of 968 MT of CO_2e per year is used in this analysis.

The BAAQMD has not adopted a threshold for determining the significance of a project's construction GHG emissions. However, the BAAQMD recommends quantification and disclosure of GHG emissions that would occur during construction.

4.6 GHG IMPACT ANALYSIS

4.6.1 Issue 1: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

4.6.1.1 Construction GHG Emissions

The project's temporary construction emissions were estimated using CalEEMod as described in Section 2.3. The results of the modeling of the project's construction GHG emissions shows that construction of the project would generate a total of 2,941 MT of CO_2e, or 58.8 MT of CO_2e per year

amortized (averaged) over the anticipated 50-year lifespan of the project. Because the neither the County nor the BAAQMD has adopted thresholds to determine the significance of a project's construction-period GHG emissions, the data are presented for informational purposes. The complete CalEEMod output is provided in Appendix A to this report.

4.6.1.2 Operational GHG Emissions

The GHG emissions associated with long-term operation of the project were estimated using CalEEMod as described in Section 2.3 and Section 4.4. The results of the modeling of the project's operational GHG emissions are shown in Table 18, *Operational GHG Emissions*. The data are presented as the maximum anticipated operational GHG emissions for the first full year of operation (2023) and compared to the BAAQMD thresholds (adjusted for the year 2023). As shown in Table 18, the estimated GHG emissions associated with long-term operation of the project would not exceed the 2023 adjusted threshold.

Table 18
OPERATIONAL GHG EMISSIONS

Source	Emissions (MT CO_2e/year)
Area	<0.1
Energy	0.4
Vehicular (Mobile)	95.4
Off-Road	29.0
Solid Waste	0.2
Water and Wastewater	1.8
Total Annual Emissions[1]	**128.8**
2023 Adjusted Threshold	*968*
Exceed Threshold?	***No***

Source: CalEEMod, output data is provided in Appendix A.
[1] Totals may not sum due to rounding.
MT = metric ton; CO_2e = carbon dioxide equivalent

As described in Section 3.5, above, the installation and operation of solar facilities, such as the project, would result in a net reduction of fossil-based electricity generation and, therefore, a net reduction in CO_2e emissions relative to overall CO_2e emissions that would occur without the project. Using PG&E's electricity generation GHG intensity factors, the project's estimated generation of 177,207 MWh of electrical power would result in the offset of up to 51,730 MT CO_2e per year (CAPCOA 2017). The energy and GHG offset calculations are included in Appendix B to this report.

The project's net annual GHG emissions, accounting for project construction and operational GHG emissions and offset GHG emissions, are presented in Table 19, *Net GHG Emissions*. As shown in Table 19, the project would result in a reduction in GHG emissions of 51,542 MT CO_2e per year. Therefore, the project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment and the impact would be less than significant.

Table 19
NET GHG EMISSIONS

Source	Emissions (MT CO_2e/year)
Amortized Construction Emissions	58.8
Operation Emissions	128.8
Offset GHG Emissions (reduced fossil fuel use in state electricity procurement)	(-51,729.6)
Net Annual Emissions	**(-51,542.0)**

Source: CalEEMod; CEC 2020b; calculations and output data is provided in Appendices A and B.
MT = metric ton; CO_2e = carbon dioxide equivalent

4.6.2 Issue 2: Conflict with an applicable GHG reduction plan, policy, or regulation

As a solar PV generation project, the project would fulfill a portion of the RPS that is mandated for California and reflected in the CARB AB 32 Scoping Plan, partially satisfying the goals of the California Renewable Energy Programs (as described above under Section 3.2). Additionally, the project would help reach the AB 32 and SB 32 statewide GHG emission reduction goals for the electricity generation sector. The project would directly support the BAAQMD 2017 Clean Air Plan Energy Control Measure EN1, *Decarbonize Electricity Production*, which strives to maximize the amount of renewable energy contributing to the production of electricity within the SFBAAB as well as electricity imported into the region (BAQMD 2017b). The project would also support achievement of the County's GHG reduction goals in the CAP through expanding renewable energy generation within the unincorporated county and supporting the CAP Renewable energy Strategy E-13. Therefore, the project would not conflict with applicable plans, policies, and regulations related to GHG emission reductions, and the impact would be less than significant.

5.0 LIST OF PREPARERS

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6.0 REFERENCES

Alameda, County of. 2014. Alameda County (Unincorporated Area) Community Climate Action Plan. February. http://www.acgov.org/cda/planning/generalplans/documents/110603_Alameda_CCAP_Final.pdf.

Bay Area Air Quality Management District (BAAQMD). 2017a. Air Quality Standards and Attainment Status. Last updated January 2017. http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status#eleven.

2017b. Final Clean Air Plan – Spare the Air Cool the Climate. April 19. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en.

2017c. California Environmental Quality Act Air Quality Guidelines. May. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en.

California Air Pollution Control Officers Association (CAPCOA). 2018. Health Effects. Available at: http://www.capcoa.org/health-effects/.

2017. User's Guide for CalEEMod Version 2016.3.2. Available at: http://www.caleemod.com/.

California Air Resources Board (CARB). 2020a. iADAM Air Quality Data Statistics: Top 4 Summary. Available at: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed June 2020.

2020b. Guide to Off-Road Vehicle & Equipment Regulations. Available at: https://ww3.arb.ca.gov/msprog/offroadzone/pdfs/offroad_booklet.pdf. Accessed June 2020.

2020c. OFFROAD2017 – ORION Version 1.0.1. Available at: https://www.arb.ca.gov/orion/. Accessed June 2020.

2020d. EMFAC2017 Web Database Version 1.0.2. Available at: https://arb.ca.gov/emfac/2017/. Accessed June 2020.

2019. California Greenhouse Gas Inventory for 2000-2017 – By Sector and Activity. August 12. Available at: https://ww3.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_sector_sum_2000-17.pdf.

2018a. Overview: Diesel Exhaust and Health. Available at: https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health.

2018b. Federal Standard Area Designations. Available at: https://www.arb.ca.gov/desig/feddesig.htm.

2017a. Clean Car Standards – Pavley, Assembly Bill 1493. Accessed December. Available at: http://www.arb.ca.gov/cc/ccms/ccms.htm.

2017b. California's 2017 Climate Change Scoping Plan. Available at: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

2016. Ambient Air Quality Standards. May 4. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-03/aaqs2_0.pdf.

2014. First Update to the Climate Change Scoping Plan: Building on the Framework. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf

2009. State Implementation Plan Background. April 13. Available at: https://ww3.arb.ca.gov/planning/sip/background.htm.

2008. Climate Change Scoping Plan – A Framework for Change. December.

2007. California Greenhouse Gas Inventory – By Sector and Activity. November 19. Available at: https://ww3.arb.ca.gov/cc/inventory/archive/tables/ghg_inventory_sector_sum_90-04_ar4.pdf.

2005. Air Quality and Land Use Handbook: A Community Health Perspective. April. Available at: https://ww3.arb.ca.gov/ch/handbook.pdf.

California Building Standards Commission (CBSC). 2019. CALGreen (CCR Title 24, Part 11). Available at: http://www.bsc.ca.gov/Home/CALGreen.aspx

California Energy Commissions (CEC). 2020a. Status of All Projects – California Energy Commission Energy Facility Status, Power Plant Projects Since 1996. Available from: https://ww2.energy.ca.gov/sitingcases/all_projects_cms.html. Accessed June 2020.

2020b. California Solar Energy Statistics and Data. Available at: https://ww2.energy.ca.gov/almanac/renewables_data/solar/index_cms.php. Accessed June 2020.

2019a. 2018 Total System Electric Generation. June 24. Available at: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2018-total-system-electric-generation.

2019b. CEC S-1 Capacity/Energy Requirement Form – Pacific Gas and Electric Company. June 3. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=228509&DocumentContentId=59759.

2018. 2017 California Annual Retail Fuel Outlet Report Results (CEC-A15). September 21. Available at: https://ww2.energy.ca.gov/almanac/transportation_data/gasoline/2010-2017_A15_Results.xlsx.

CHS Consulting Group (CHS). 2020. Aramis Renewable Energy Project Transportation Impact Study. April.

Intergovernmental Panel on Climate Change (IPCC). 2014. Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

2013. Climate Change 2013: The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

2007. Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. February.

Intersect Power. 2020. Aramis Renewable Energy Project – Project Description.

Iowa Environmental Mesonet (IEM). 2019. Livermore Municipal Airport Windrose Plot. Available at: https://mesonet.agron.iastate.edu/sites/windrose.phtml?station=LVK&network=CA_ASOS.

Metropolitan Transportation Commission and Association of Bay Area Governments (MTC and ABAG). 2017. Plan Bay Area 2040. Adopted July 26. Available at: https://www.planbayarea.org/2040-plan/plan-bay-area-2040.

National Aeronautics and Space Administration, Goddard Institute for Space Studies (NASA). 2019. NASA News & Features Releases. 2018 Fourth Warmest Year in Continued Warming Trend. February 6. Available at: https://www.giss.nasa.gov/research/news/20190206/

National Oceanic and Atmospheric Administration (NOAA). 2020. Earth System Research Laboratory. Available at: http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html. Accessed July 2020.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. February. Available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.

Pacific Gas and Electric (PG&E). 2020a. Company Profile. Available at: https://www.pge.com/en_US/about-pge/company-information/profile/profile.page. Accessed June 2020.

2020b. Exploring clean energy solutions. Available at: https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page. Accessed June 2020.

U.S. Environmental Protection Agency (USEPA). 2017. Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act. Last updated July 7. Available at: https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean

U.S. Environmental Protection Agency and U.S. Department of Transportation, National Highway Traffic Safety Administration (USEPA and NHTSA). 2012. 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards. October 15.

Western Regional Climate Center (WRCC). 2016. Western U.S. Climate Summaries, California, Livermore Municipal Airport (044995). Available at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca4995.

World Resources Institute (WRI). 2020. CAIT Climate Data Explorer. Available: http://cait.wri.org/historical. Accessed April 2020.

Appendix A

CalEEMod Output

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IPO-01.03 Aramis Solar Project

Alameda County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	0.40	1000sqft	0.01	400.00	0
Unrefrigerated Warehouse-No Rail	72.00	1000sqft	1.65	72,000.00	0
Other Non-Asphalt Surfaces	537.34	Acre	537.34	23,406,530.40	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

IPO-01.03 Aramis Solar Project - Alameda County, Winter

Project Characteristics -

Land Use - Office building = O&M building
Warehouse = energy storage buildings
Other non-asphalt = photovoltaic eletrcity generation, energy storage, and substation

Construction Phase - Construction phasing, schedule, and duration per project description

Off-road Equipment -

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Trips and VMT - Trips and VMT - Project trips and trip distances per Aramis Transportation Impact Study (CHS April2020).
Haul trips for General Construction Operations includes 30 water truck trips per day (4.6 miles/trip)

On-road Fugitive Dust - On-road Fugitive Dust - % Paved reduced to account on-site unpaved roads and use of highway vehicles on-site

Grading -

Architectural Coating - No painting parking areas

Vehicle Trips - Operational trips based on 12 workers per day, 2 commute trips and 2 midday trips per worker

Road Dust - % Pave adjusted to account for highway vehicles used on-site on unpaved roads.
15 mph speed limit on on-site unpaved roads

Consumer Products - No consumer products parking area

Area Coating - No painting parking area

Energy Use - All electrical energy generated on-site
Natural gas O&M building only

Water And Wastewater - 5 acre-feet of water per year for operation and maintenance.

Solid Waste - Only O&M building generates solid waste

Construction Off-road Equipment Mitigation - MM AQ-1: Dust mitigation per BAAQMD recommended BCMMs.
MM AQ-2: Tier 4 engine mitigation for all off-road diesel equipment with 50 or more HP

Operational Off-Road Equipment - Operation and maintenance equipment per project description.
Other general industrial equipment = all terrain vehicle used for maintenance

Fleet Mix - Fleet mix = 85% autos/pickups and 15% water trucks

IPO-01.03 Aramis Solar Project - Alameda County, Winter

Table Name	Column Name	Default Value	New Value
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tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	20.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	15.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	50.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final

IPO-01.03 Aramis Solar Project - Alameda County, Winter

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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
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tblConstructionPhase	NumDays	930.00	175.00
tblConstructionPhase	NumDays	930.00	150.00
tblConstructionPhase	NumDays	930.00	75.00
tblConstructionPhase	NumDays	660.00	40.00
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblEnergyUse	LightingElect	3.88	0.00
tblEnergyUse	LightingElect	2.14	0.00
tblEnergyUse	NT24E	7.84	0.00
tblEnergyUse	NT24E	1.07	0.00
tblEnergyUse	NT24NG	0.07	0.00
tblEnergyUse	T24E	6.11	0.00
tblEnergyUse	T24E	0.32	0.00
tblEnergyUse	T24NG	3.40	0.00
tblFleetMix	HHD	0.05	0.15
tblFleetMix	LDA	0.56	0.60
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT2	0.19	0.20
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.1800e-003	0.00
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tblFleetMix	MH	7.0400e-004	0.00

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tblFleetMix	SBUS	3.3400e-004	0.00
tblFleetMix	UBUS	2.4560e-003	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOnRoadDust	HaulingPercentPave	100.00	98.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50

tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	120.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	12.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	4.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	10.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MeanVehicleSpeed	40	15
tblRoadDust	RoadPercentPave	100	97
tblSolidWaste	SolidWasteGenerationRate	67.68	0.00
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	24.16
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripNumber	0.00	46.00
tblTripsAndVMT	HaulingTripNumber	0.00	89.00
tblTripsAndVMT	HaulingTripNumber	0.00	52.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71

tblTripsAndVMT	WorkerTripNumber	88.00	400.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	105.00	1,000.00
tblTripsAndVMT	WorkerTripNumber	105.00	500.00
tblTripsAndVMT	WorkerTripNumber	1,972.00	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	6.60	4.60
tblVehicleTrips	CNW_TTP	19.00	15.00
tblVehicleTrips	CW_TL	14.70	16.71
tblVehicleTrips	CW_TTP	33.00	85.00
tblVehicleTrips	DV_TP	19.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PR_TP	77.00	100.00
tblVehicleTrips	ST_TR	2.46	0.00
tblVehicleTrips	ST_TR	1.68	0.00
tblVehicleTrips	SU_TR	1.05	0.00
tblVehicleTrips	SU_TR	1.68	0.00
tblVehicleTrips	WD_TR	11.03	120.00
tblVehicleTrips	WD_TR	1.68	0.00
tblWater	IndoorWaterUseRate	16,650,000.00	0.00
tblWater	OutdoorWaterUseRate	43,573.43	1,558,156.50

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	43.3004	198.9876	213.4698	0.4971	27.2282	8.2584	35.4867	5.9343	7.6409	13.5752	0.0000	48,397.0398	48,397.0398	10.2303	0.0000	48,652.7969
Maximum	**43.3004**	**198.9876**	**213.4698**	**0.4971**	**27.2282**	**8.2584**	**35.4867**	**5.9343**	**7.6409**	**13.5752**	**0.0000**	**48,397.0398**	**48,397.0398**	**10.2303**	**0.0000**	**48,652.7969**

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	31.2020	32.1483	252.1127	0.4971	22.6566	0.9551	23.6117	5.4445	0.9459	6.3905	0.0000	48,397.0398	48,397.0398	10.2303	0.0000	48,652.7969
Maximum	**31.2020**	**32.1483**	**252.1127**	**0.4971**	**22.6566**	**0.9551**	**23.6117**	**5.4445**	**0.9459**	**6.3905**	**0.0000**	**48,397.0398**	**48,397.0398**	**10.2303**	**0.0000**	**48,652.7969**

	ROG	NOx	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	**27.94**	**83.84**	**-18.10**	**0.00**	**16.79**	**88.44**	**33.46**	**8.25**	**87.62**	**52.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Energy	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Mobile	0.0718	1.1196	1.1833	7.7400e-003	10.3120	4.1600e-003	10.3162	1.1150	3.8900e-003	1.1189		800.2370	800.2370	0.0281		800.9405
Offroad	1.3610	12.1753	16.6177	0.0269		0.6097	0.6097		0.5905	0.5905		2,564.5162	2,564.5162	0.3534		2,573.3512
Total	**3.1950**	**13.2972**	**17.8647**	**0.0346**	**10.3120**	**0.6142**	**10.9262**	**1.1150**	**0.5947**	**1.7097**		**3,366.9973**	**3,366.9973**	**0.3819**	**4.0000e-005**	**3,376.5569**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Energy	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Mobile	0.0718	1.1196	1.1833	7.7400e-003	10.3120	4.1600e-003	10.3162	1.1150	3.8900e-003	1.1189		800.2370	800.2370	0.0281		800.9405
Offroad	1.3610	12.1753	16.6177	0.0269		0.6097	0.6097		0.5905	0.5905		2,564.5162	2,564.5162	0.3534		2,573.3512
Total	**3.1950**	**13.2972**	**17.8647**	**0.0346**	**10.3120**	**0.6142**	**10.9262**	**1.1150**	**0.5947**	**1.7097**		**3,366.9973**	**3,366.9973**	**0.3819**	**4.0000e-005**	**3,376.5569**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2022	2/11/2022	5	30	
2	General Construction Operations	Grading	1/8/2022	9/9/2022	5	175	
3	Photovoltaic Installation	Grading	2/12/2022	9/9/2022	5	150	
4	Electrical and Gen-Tie Installation	Grading	5/28/2022	9/9/2022	5	75	
5	Architectural Coating	Architectural Coating	7/17/2022	9/9/2022	5	40	

Acres of Grading (Site Preparation Phase): 249.38

Acres of Grading (Grading Phase): 0

Acres of Paving: 537.34

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 108,600; Non-Residential Outdoor: 36,200; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	10	7.00	212	0.43
Site Preparation	Graders	9	7.00	187	0.41
Site Preparation	Rollers	5	7.00	80	0.38
Site Preparation	Rough Terrain Forklifts	10	7.00	100	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Loaders	1	7.00	203	0.36
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
General Construction Operations	Excavators	0	8.00	158	0.38
General Construction Operations	Graders	0	8.00	187	0.41
General Construction Operations	Pumps	1	7.00	84	0.74
General Construction Operations	Rough Terrain Forklifts	5	7.00	100	0.40

General Construction Operations	Rubber Tired Dozers	0	8.00	247	0.40
General Construction Operations	Rubber Tired Loaders	1	7.00	203	0.36
General Construction Operations	Scrapers	0	8.00	367	0.48
General Construction Operations	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Photovoltaic Installation	Aerial Lifts	1	4.00	63	0.31
Photovoltaic Installation	Bore/Drill Rigs	2	7.00	221	0.50
Photovoltaic Installation	Cranes	1	2.00	231	0.29
Photovoltaic Installation	Crawler Tractors	5	7.00	212	0.43
Photovoltaic Installation	Excavators	0	8.00	158	0.38
Photovoltaic Installation	Graders	3	7.00	187	0.41
Photovoltaic Installation	Rollers	1	7.00	80	0.38
Photovoltaic Installation	Rough Terrain Forklifts	20	7.00	100	0.40
Photovoltaic Installation	Rubber Tired Dozers	0	8.00	247	0.40
Photovoltaic Installation	Scrapers	0	8.00	367	0.48
Photovoltaic Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Photovoltaic Installation	Trenchers	3	7.00	78	0.50
Photovoltaic Installation	Welders	6	4.00	46	0.45
Electrical and Gen-Tie Installation	Aerial Lifts	1	4.00	63	0.31
Electrical and Gen-Tie Installation	Bore/Drill Rigs	2	7.00	221	0.50
Electrical and Gen-Tie Installation	Cranes	1	2.00	231	0.29
Electrical and Gen-Tie Installation	Crawler Tractors	5	7.00	212	0.43
Electrical and Gen-Tie Installation	Excavators	0	8.00	158	0.38
Electrical and Gen-Tie Installation	Graders	3	7.00	187	0.41
Electrical and Gen-Tie Installation	Rollers	2	7.00	80	0.38
Electrical and Gen-Tie Installation	Rough Terrain Forklifts	15	7.00	100	0.40
Electrical and Gen-Tie Installation	Rubber Tired Dozers	0	8.00	247	0.40
Electrical and Gen-Tie Installation	Scrapers	0	8.00	367	0.48

Electrical and Gen-Tie Installation	Skid Steer Loaders	2	7.00	65	0.37
Electrical and Gen-Tie Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Electrical and Gen-Tie Installation	Trenchers	7	7.00	78	0.50
Electrical and Gen-Tie Installation	Welders	4	4.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	35	400.00	0.00	46.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
General Construction Operations	8	0.00	0.00	89.00	10.80	6.60	24.16	LD_Mix	HDT_Mix	HHDT
Photovoltaic Installation	42	1,000.00	0.00	52.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Electrical and Gen-Tie Installation	42	500.00	0.00	10.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.8156	0.0000	8.8156	0.9519	0.0000	0.9519			0.0000			0.0000
Off-Road	9.5336	117.1225	63.3156	0.1679		4.2761	4.2761		3.9341	3.9341		16,253.6169	16,253.6169	5.2568		16,385.0356
Total	**9.5336**	**117.1225**	**63.3156**	**0.1679**	**8.8156**	**4.2761**	**13.0917**	**0.9519**	**3.9341**	**4.8859**		**16,253.6169**	**16,253.6169**	**5.2568**		**16,385.0356**

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	0.0182	0.5548	0.1197	1.8900e-003	1.1995	1.8100e-003	1.2013	0.1276	1.7300e-003	0.1293		201.3873	201.3873	8.4500e-003		201.5987
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	1.8591	1.3179	12.7794	0.0439	5.0819	0.0307	5.1126	1.3477	0.0283	1.3760		4,378.6474	4,378.6474	0.0939		4,380.9944
Total	**1.8773**	**1.8728**	**12.8991**	**0.0458**	**6.2813**	**0.0325**	**6.3139**	**1.4753**	**0.0300**	**1.5053**		**4,580.0347**	**4,580.0347**	**0.1023**		**4,582.5931**

3.2 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9670	0.0000	3.9670	0.4283	0.0000	0.4283			0.0000			0.0000
Off-Road	2.0618	8.9345	88.3774	0.1679		0.2749	0.2749		0.2749	0.2749	0.0000	16,253.6168	16,253.6168	5.2568		16,385.0356
Total	**2.0618**	**8.9345**	**88.3774**	**0.1679**	**3.9670**	**0.2749**	**4.2419**	**0.4283**	**0.2749**	**0.7033**	**0.0000**	**16,253.6168**	**16,253.6168**	**5.2568**		**16,385.0356**

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	0.0182	0.5548	0.1197	1.8900e-003	0.4193	1.8100e-003	0.4211	0.0496	1.7300e-003	0.0513		201.3873	201.3873	8.4500e-003		201.5987
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	1.8591	1.3179	12.7794	0.0439	5.0819	0.0307	5.1126	1.3477	0.0283	1.3760		4,378.6474	4,378.6474	0.0939		4,380.9944
Total	**1.8773**	**1.8728**	**12.8991**	**0.0458**	**5.5012**	**0.0325**	**5.5337**	**1.3972**	**0.0300**	**1.4273**		**4,580.0347**	**4,580.0347**	**0.1023**		**4,582.5931**

3.3 General Construction Operations - 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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1964	13.1871	16.5751	0.0290		0.5297	0.5297		0.4982	0.4982		2,798.8714	2,798.8714	0.7567		2,817.7893
Total	**1.1964**	**13.1871**	**16.5751**	**0.0290**	**0.0000**	**0.5297**	**0.5297**	**0.0000**	**0.4982**	**0.4982**		**2,798.8714**	**2,798.8714**	**0.7567**		**2,817.7893**

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	4.5300e-003	0.1436	0.0300	4.6000e-004	0.3722	4.3000e-004	0.3727	0.0390	4.1000e-004	0.0394		48.8700	48.8700	2.3200e-003		48.9280
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.5300e-003**	**0.1436**	**0.0300**	**4.6000e-004**	**0.3722**	**4.3000e-004**	**0.3727**	**0.0390**	**4.1000e-004**	**0.0394**		**48.8700**	**48.8700**	**2.3200e-003**		**48.9280**

3.3 General Construction Operations - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.3436	1.4891	19.4997	0.0290		0.0458	0.0458		0.0458	0.0458	0.0000	2,798.8714	2,798.8714	0.7567		2,817.7893
Total	**0.3436**	**1.4891**	**19.4997**	**0.0290**	**0.0000**	**0.0458**	**0.0458**	**0.0000**	**0.0458**	**0.0458**	**0.0000**	**2,798.8714**	**2,798.8714**	**0.7567**		**2,817.7893**

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	4.5300e-003	0.1436	0.0300	4.6000e-004	0.1278	4.3000e-004	0.1282	0.0146	4.1000e-004	0.0150		48.8700	48.8700	2.3200e-003		48.9280
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.5300e-003**	**0.1436**	**0.0300**	**4.6000e-004**	**0.1278**	**4.3000e-004**	**0.1282**	**0.0146**	**4.1000e-004**	**0.0150**		**48.8700**	**48.8700**	**2.3200e-003**		**48.9280**

3.4 Photovoltaic 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					
Fugitive Dust					3.7118	0.0000	3.7118	0.4008	0.0000	0.4008			0.0000			0.0000
Off-Road	7.6335	86.0538	72.8233	0.1497		3.4175	3.4175		3.1594	3.1594		14,367.5923	14,367.5923	4.5199		14,480.5908
Total	**7.6335**	**86.0538**	**72.8233**	**0.1497**	**3.7118**	**3.4175**	**7.1292**	**0.4008**	**3.1594**	**3.5602**		**14,367.5923**	**14,367.5923**	**4.5199**		**14,480.5908**

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	4.1100e-003	0.1254	0.0271	4.3000e-004	0.2712	4.1000e-004	0.2716	0.0289	3.9000e-004	0.0292		45.5311	45.5311	1.9100e-003		45.5788
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	4.6478	3.2948	31.9485	0.1098	12.7047	0.0768	12.7815	3.3692	0.0708	3.4399		10,946.6185	10,946.6185	0.2347		10,952.4859
Total	**4.6519**	**3.4203**	**31.9756**	**0.1102**	**12.9759**	**0.0772**	**13.0531**	**3.3980**	**0.0712**	**3.4692**		**10,992.1495**	**10,992.1495**	**0.2366**		**10,998.0647**

3.4 Photovoltaic Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6703	0.0000	1.6703	0.1804	0.0000	0.1804			0.0000			0.0000
Off-Road	2.5855	12.3772	91.2581	0.1497		0.4243	0.4243		0.4243	0.4243	0.0000	14,367.5923	14,367.5923	4.5199		14,480.5908
Total	**2.5855**	**12.3772**	**91.2581**	**0.1497**	**1.6703**	**0.4243**	**2.0946**	**0.1804**	**0.4243**	**0.6047**	**0.0000**	**14,367.5923**	**14,367.5923**	**4.5199**		**14,480.5908**

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	4.1100e-003	0.1254	0.0271	4.3000e-004	0.0948	4.1000e-004	0.0952	0.0112	3.9000e-004	0.0116		45.5311	45.5311	1.9100e-003		45.5788
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	4.6478	3.2948	31.9485	0.1098	12.7047	0.0768	12.7815	3.3692	0.0708	3.4399		10,946.6185	10,946.6185	0.2347		10,952.4859
Total	**4.6519**	**3.4203**	**31.9756**	**0.1102**	**12.7995**	**0.0772**	**12.8767**	**3.3804**	**0.0712**	**3.4515**		**10,992.1495**	**10,992.1495**	**0.2366**		**10,998.0647**

3.5 Electrical and Gen-Tie 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					
Fugitive Dust					3.7118	0.0000	3.7118	0.4008	0.0000	0.4008			0.0000			0.0000
Off-Road	8.4081	93.0787	74.2676	0.1497		4.1133	4.1133		3.7944	3.7944		14,417.2873	14,417.2873	4.5783		14,531.7446
Total	**8.4081**	**93.0787**	**74.2676**	**0.1497**	**3.7118**	**4.1133**	**7.8250**	**0.4008**	**3.7944**	**4.1952**		**14,417.2873**	**14,417.2873**	**4.5783**		**14,531.7446**

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	1.5800e-003	0.0483	0.0104	1.6000e-004	0.1043	1.6000e-004	0.1045	0.0111	1.5000e-004	0.0113		17.5119	17.5119	7.4000e-004		17.5303
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	2.3239	1.6474	15.9743	0.0549	6.3523	0.0384	6.3908	1.6846	0.0354	1.7200		5,473.3092	5,473.3092	0.1174		5,476.2430
Total	**2.3255**	**1.6957**	**15.9847**	**0.0551**	**6.4566**	**0.0386**	**6.4952**	**1.6957**	**0.0355**	**1.7312**		**5,490.8212**	**5,490.8212**	**0.1181**		**5,493.7733**

3.5 Electrical and Gen-Tie Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6703	0.0000	1.6703	0.1804	0.0000	0.1804			0.0000			0.0000
Off-Road	2.3852	12.8937	91.5322	0.1497		0.3647	0.3647		0.3647	0.3647	0.0000	14,417.2873	14,417.2873	4.5783		14,531.7445
Total	**2.3852**	**12.8937**	**91.5322**	**0.1497**	**1.6703**	**0.3647**	**2.0350**	**0.1804**	**0.3647**	**0.5451**	**0.0000**	**14,417.2873**	**14,417.2873**	**4.5783**		**14,531.7445**

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	1.5800e-003	0.0483	0.0104	1.6000e-004	0.0365	1.6000e-004	0.0366	4.3100e-003	1.5000e-004	4.4600e-003		17.5119	17.5119	7.4000e-004		17.5303
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	2.3239	1.6474	15.9743	0.0549	6.3523	0.0384	6.3908	1.6846	0.0354	1.7200		5,473.3092	5,473.3092	0.1174		5,476.2430
Total	**2.3255**	**1.6957**	**15.9847**	**0.0551**	**6.3888**	**0.0386**	**6.4274**	**1.6889**	**0.0355**	**1.7244**		**5,490.8212**	**5,490.8212**	**0.1181**		**5,493.7733**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	18.8760					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**19.0806**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	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**

3.6 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	18.8760					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**18.9058**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	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**

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	0.0718	1.1196	1.1833	7.7400e-003	10.3120	4.1600e-003	10.3162	1.1150	3.8900e-003	1.1189		800.2370	800.2370	0.0281		800.9405
Unmitigated	0.0718	1.1196	1.1833	7.7400e-003	10.3120	4.1600e-003	10.3162	1.1150	3.8900e-003	1.1189		800.2370	800.2370	0.0281		800.9405

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	48.00	0.00	0.00	185,871	185,871
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	0.00	0.00	0.00		
Total	48.00	0.00	0.00	185,871	185,871

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
General Office Building	16.71	6.60	4.60	85.00	0.00	15.00	100	0	0
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No	14.70	6.60	6.60	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.600000	0.050000	0.200000	0.000000	0.000000	0.000000	0.000000	0.150000	0.000000	0.000000	0.000000	0.000000	0.000000
Other Non-Asphalt Surfaces	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704
Unrefrigerated Warehouse-No Rail	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704

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	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
NaturalGas Unmitigated	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231

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					
General Office Building	17.9397	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**1.9000e-004**	**1.7600e-003**	**1.4800e-003**	**1.0000e-005**		**1.3000e-004**	**1.3000e-004**		**1.3000e-004**	**1.3000e-004**		**2.1106**	**2.1106**	**4.0000e-005**	**4.0000e-005**	**2.1231**

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					
General Office Building	0.0179397	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**1.9000e-004**	**1.7600e-003**	**1.4800e-003**	**1.0000e-005**		**1.3000e-004**	**1.3000e-004**		**1.3000e-004**	**1.3000e-004**		**2.1106**	**2.1106**	**4.0000e-005**	**4.0000e-005**	**2.1231**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Unmitigated	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422

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	0.2069					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.5494					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.7700e-003	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Total	**1.7620**	**5.7000e-004**	**0.0622**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1334**	**0.1334**	**3.5000e-004**		**0.1422**

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	0.2069					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.5494					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.7700e-003	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Total	**1.7620**	**5.7000e-004**	**0.0622**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1334**	**0.1334**	**3.5000e-004**		**0.1422**

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
Generator Sets	1	2.00	20	84	0.74	Diesel
Other General Industrial Equipment	2	4.00	120	88	0.34	Diesel
Pumps	2	10.00	12	84	0.74	Diesel
Tractors/Loaders/Backhoes	2	8.00	20	97	0.37	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Generator Sets	0.0765	0.6789	0.9173	1.6400e-003		0.0321	0.0321		0.0321	0.0321		155.7586	155.7586	6.8500e-003		155.9299
Other General Industrial Equipment	0.1623	1.5430	1.9245	2.5600e-003		0.0889	0.0889		0.0818	0.0818		248.0182	248.0182	0.0802		250.0235
Pumps	0.8195	6.8821	9.3132	0.0164		0.3371	0.3371		0.3371	0.3371		1,557.5864	1,557.5864	0.0713		1,559.3679
Tractors/Loaders/Backhoes	0.3027	3.0714	4.4626	6.2300e-003		0.1516	0.1516		0.1395	0.1395		603.1530	603.1530	0.1951		608.0298
Total	**1.3610**	**12.1753**	**16.6177**	**0.0269**		**0.6097**	**0.6097**		**0.5905**	**0.5905**		**2,564.5162**	**2,564.5162**	**0.3534**		**2,573.3512**

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

IPO-01.03 Aramis Solar Project

Alameda County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	0.40	1000sqft	0.01	400.00	0
Unrefrigerated Warehouse-No Rail	72.00	1000sqft	1.65	72,000.00	0
Other Non-Asphalt Surfaces	537.34	Acre	537.34	23,406,530.40	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Office building = O&M building
Warehouse = energy storage buildings
Other non-asphalt = photovoltaic eletrcity generation, energy storage, and substation

Construction Phase - Construction phasing, schedule, and duration per project description

Off-road Equipment -

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Trips and VMT - Trips and VMT - Project trips and trip distances per Aramis Transportation Impact Study (CHS April2020).
Haul trips for General Construction Operations includes 30 water truck trips per day (4.6 miles/trip)

On-road Fugitive Dust - On-road Fugitive Dust - % Paved reduced to account on-site unpaved roads and use of highway vehicles on-site

Grading -

Architectural Coating - No painting parking areas

Vehicle Trips - Operational trips based on 12 workers per day, 2 commute trips and 2 midday trips per worker

Road Dust - % Pave adjusted to account for highway vehicles used on-site on unpaved roads.
15 mph speed limit on on-site unpaved roads

Consumer Products - No consumer products parking area

Area Coating - No painting parking area

Energy Use - All electrical energy generated on-site
Natural gas O&M building only

Water And Wastewater - 5 acre-feet of water per year for operation and maintenance.

Solid Waste - Only O&M building generates solid waste

Construction Off-road Equipment Mitigation - MM AQ-1: Dust mitigation per BAAQMD recommended BCMMs.
MM AQ-2: Tier 4 engine mitigation for all off-road diesel equipment with 50 or more HP

Operational Off-Road Equipment - Operation and maintenance equipment per project description.
Other general industrial equipment = all terrain vehicle used for maintenance

Fleet Mix - Fleet mix = 85% autos/pickups and 15% water trucks

IPO-01.03 Aramis Solar Project - Alameda County, Summer

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	1,404,392.00	0.00
tblAreaCoating	Area_Parking	1404390	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	20.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	15.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	50.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final

IPO-01.03 Aramis Solar Project - Alameda County, Summer

tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	360.00	30.00
tblConstructionPhase	NumDays	930.00	175.00
tblConstructionPhase	NumDays	930.00	150.00
tblConstructionPhase	NumDays	930.00	75.00
tblConstructionPhase	NumDays	660.00	40.00
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblEnergyUse	LightingElect	3.88	0.00
tblEnergyUse	LightingElect	2.14	0.00
tblEnergyUse	NT24E	7.84	0.00
tblEnergyUse	NT24E	1.07	0.00
tblEnergyUse	NT24NG	0.07	0.00
tblEnergyUse	T24E	6.11	0.00
tblEnergyUse	T24E	0.32	0.00
tblEnergyUse	T24NG	3.40	0.00
tblFleetMix	HHD	0.05	0.15
tblFleetMix	LDA	0.56	0.60
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT2	0.19	0.20
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.1800e-003	0.00
tblFleetMix	MCY	5.4910e-003	0.00
tblFleetMix	MDV	0.11	0.00
tblFleetMix	MH	7.0400e-004	0.00

tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	2.2090e-003	0.00
tblFleetMix	SBUS	3.3400e-004	0.00
tblFleetMix	UBUS	2.4560e-003	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOnRoadDust	HaulingPercentPave	100.00	98.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50

tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	120.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	12.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	4.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	10.00
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tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MeanVehicleSpeed	40	15
tblRoadDust	RoadPercentPave	100	97
tblSolidWaste	SolidWasteGenerationRate	67.68	0.00
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	24.16
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripNumber	0.00	46.00
tblTripsAndVMT	HaulingTripNumber	0.00	89.00
tblTripsAndVMT	HaulingTripNumber	0.00	52.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71

tblTripsAndVMT	WorkerTripNumber	88.00	400.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	105.00	1,000.00
tblTripsAndVMT	WorkerTripNumber	105.00	500.00
tblTripsAndVMT	WorkerTripNumber	1,972.00	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	6.60	4.60
tblVehicleTrips	CNW_TTP	19.00	15.00
tblVehicleTrips	CW_TL	14.70	16.71
tblVehicleTrips	CW_TTP	33.00	85.00
tblVehicleTrips	DV_TP	19.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PR_TP	77.00	100.00
tblVehicleTrips	ST_TR	2.46	0.00
tblVehicleTrips	ST_TR	1.68	0.00
tblVehicleTrips	SU_TR	1.05	0.00
tblVehicleTrips	SU_TR	1.68	0.00
tblVehicleTrips	WD_TR	11.03	120.00
tblVehicleTrips	WD_TR	1.68	0.00
tblWater	IndoorWaterUseRate	16,650,000.00	0.00
tblWater	OutdoorWaterUseRate	43,573.43	1,558,156.50

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	42.7088	198.0128	218.3022	0.5115	27.2282	8.2584	35.4867	5.9343	7.6409	13.5752	0.0000	49,832.1175	49,832.1175	10.2622	0.0000	50,088.6732
Maximum	**42.7088**	**198.0128**	**218.3022**	**0.5115**	**27.2282**	**8.2584**	**35.4867**	**5.9343**	**7.6409**	**13.5752**	**0.0000**	**49,832.1175**	**49,832.1175**	**10.2622**	**0.0000**	**50,088.6732**

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	30.6104	31.1735	256.9450	0.5115	22.6566	0.9550	23.6117	5.4445	0.9459	6.3904	0.0000	49,832.1175	49,832.1175	10.2622	0.0000	50,088.6731
Maximum	**30.6104**	**31.1735**	**256.9450**	**0.5115**	**22.6566**	**0.9550**	**23.6117**	**5.4445**	**0.9459**	**6.3904**	**0.0000**	**49,832.1175**	**49,832.1175**	**10.2622**	**0.0000**	**50,088.6731**

	ROG	NOx	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	**28.33**	**84.26**	**-17.70**	**0.00**	**16.79**	**88.44**	**33.46**	**8.25**	**87.62**	**52.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Energy	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Mobile	0.0813	1.0928	1.2611	8.1700e-003	10.3120	4.1200e-003	10.3161	1.1150	3.8500e-003	1.1188		842.9643	842.9643	0.0273		843.6461
Offroad	1.3610	12.1753	16.6177	0.0269		0.6097	0.6097		0.5905	0.5905		2,564.5162	2,564.5162	0.3534		2,573.3512
Total	**3.2045**	**13.2705**	**17.9425**	**0.0351**	**10.3120**	**0.6142**	**10.9262**	**1.1150**	**0.5947**	**1.7096**		**3,409.7245**	**3,409.7245**	**0.3811**	**4.0000e-005**	**3,419.2625**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Energy	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Mobile	0.0813	1.0928	1.2611	8.1700e-003	10.3120	4.1200e-003	10.3161	1.1150	3.8500e-003	1.1188		842.9643	842.9643	0.0273		843.6461
Offroad	1.3610	12.1753	16.6177	0.0269		0.6097	0.6097		0.5905	0.5905		2,564.5162	2,564.5162	0.3534		2,573.3512
Total	**3.2045**	**13.2705**	**17.9425**	**0.0351**	**10.3120**	**0.6142**	**10.9262**	**1.1150**	**0.5947**	**1.7096**		**3,409.7245**	**3,409.7245**	**0.3811**	**4.0000e-005**	**3,419.2625**

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

3.0 Construction Detail

Construction Phase

IPO-01.03 Aramis Solar Project - Alameda County, Summer

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2022	2/11/2022	5	30	
2	General Construction Operations	Grading	1/8/2022	9/9/2022	5	175	
3	Photovoltaic Installation	Grading	2/12/2022	9/9/2022	5	150	
4	Electrical and Gen-Tie Installation	Grading	5/28/2022	9/9/2022	5	75	
5	Architectural Coating	Architectural Coating	7/17/2022	9/9/2022	5	40	

Acres of Grading (Site Preparation Phase): 249.38

Acres of Grading (Grading Phase): 0

Acres of Paving: 537.34

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 108,600; Non-Residential Outdoor: 36,200; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	10	7.00	212	0.43
Site Preparation	Graders	9	7.00	187	0.41
Site Preparation	Rollers	5	7.00	80	0.38
Site Preparation	Rough Terrain Forklifts	10	7.00	100	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Loaders	1	7.00	203	0.36
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
General Construction Operations	Excavators	0	8.00	158	0.38
General Construction Operations	Graders	0	8.00	187	0.41
General Construction Operations	Pumps	1	7.00	84	0.74
General Construction Operations	Rough Terrain Forklifts	5	7.00	100	0.40

General Construction Operations	Rubber Tired Dozers	0	8.00	247	0.40
General Construction Operations	Rubber Tired Loaders	1	7.00	203	0.36
General Construction Operations	Scrapers	0	8.00	367	0.48
General Construction Operations	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Photovoltaic Installation	Aerial Lifts	1	4.00	63	0.31
Photovoltaic Installation	Bore/Drill Rigs	2	7.00	221	0.50
Photovoltaic Installation	Cranes	1	2.00	231	0.29
Photovoltaic Installation	Crawler Tractors	5	7.00	212	0.43
Photovoltaic Installation	Excavators	0	8.00	158	0.38
Photovoltaic Installation	Graders	3	7.00	187	0.41
Photovoltaic Installation	Rollers	1	7.00	80	0.38
Photovoltaic Installation	Rough Terrain Forklifts	20	7.00	100	0.40
Photovoltaic Installation	Rubber Tired Dozers	0	8.00	247	0.40
Photovoltaic Installation	Scrapers	0	8.00	367	0.48
Photovoltaic Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Photovoltaic Installation	Trenchers	3	7.00	78	0.50
Photovoltaic Installation	Welders	6	4.00	46	0.45
Electrical and Gen-Tie Installation	Aerial Lifts	1	4.00	63	0.31
Electrical and Gen-Tie Installation	Bore/Drill Rigs	2	7.00	221	0.50
Electrical and Gen-Tie Installation	Cranes	1	2.00	231	0.29
Electrical and Gen-Tie Installation	Crawler Tractors	5	7.00	212	0.43
Electrical and Gen-Tie Installation	Excavators	0	8.00	158	0.38
Electrical and Gen-Tie Installation	Graders	3	7.00	187	0.41
Electrical and Gen-Tie Installation	Rollers	2	7.00	80	0.38
Electrical and Gen-Tie Installation	Rough Terrain Forklifts	15	7.00	100	0.40
Electrical and Gen-Tie Installation	Rubber Tired Dozers	0	8.00	247	0.40
Electrical and Gen-Tie Installation	Scrapers	0	8.00	367	0.48

Electrical and Gen-Tie Installation	Skid Steer Loaders	2	7.00	65	0.37
Electrical and Gen-Tie Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Electrical and Gen-Tie Installation	Trenchers	7	7.00	78	0.50
Electrical and Gen-Tie Installation	Welders	4	4.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	35	400.00	0.00	46.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
General Construction Operations	8	0.00	0.00	89.00	10.80	6.60	24.16	LD_Mix	HDT_Mix	HHDT
Photovoltaic Installation	42	1,000.00	0.00	52.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Electrical and Gen-Tie Installation	42	500.00	0.00	10.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.8156	0.0000	8.8156	0.9519	0.0000	0.9519			0.0000			0.0000
Off-Road	9.5336	117.1225	63.3156	0.1679		4.2761	4.2761		3.9341	3.9341		16,253.6169	16,253.6169	5.2568		16,385.0356
Total	**9.5336**	**117.1225**	**63.3156**	**0.1679**	**8.8156**	**4.2761**	**13.0917**	**0.9519**	**3.9341**	**4.8859**		**16,253.6169**	**16,253.6169**	**5.2568**		**16,385.0356**

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	0.0179	0.5377	0.1141	1.9200e-003	1.1995	1.7900e-003	1.2013	0.1276	1.7200e-003	0.1293		203.7608	203.7608	8.0300e-003		203.9615
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	1.7014	1.0604	14.0690	0.0477	5.0819	0.0307	5.1126	1.3477	0.0283	1.3760		4,760.9267	4,760.9267	0.1025		4,763.4885
Total	**1.7193**	**1.5981**	**14.1831**	**0.0497**	**6.2813**	**0.0325**	**6.3139**	**1.4753**	**0.0300**	**1.5053**		**4,964.6876**	**4,964.6876**	**0.1105**		**4,967.4500**

3.2 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9670	0.0000	3.9670	0.4283	0.0000	0.4283			0.0000			0.0000
Off-Road	2.0618	8.9345	88.3774	0.1679		0.2749	0.2749		0.2749	0.2749	0.0000	16,253.6168	16,253.6168	5.2568		16,385.0356
Total	**2.0618**	**8.9345**	**88.3774**	**0.1679**	**3.9670**	**0.2749**	**4.2419**	**0.4283**	**0.2749**	**0.7033**	**0.0000**	**16,253.6168**	**16,253.6168**	**5.2568**		**16,385.0356**

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	0.0179	0.5377	0.1141	1.9200e-003	0.4193	1.7900e-003	0.4211	0.0496	1.7200e-003	0.0513		203.7608	203.7608	8.0300e-003		203.9615
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	1.7014	1.0604	14.0690	0.0477	5.0819	0.0307	5.1126	1.3477	0.0283	1.3760		4,760.9267	4,760.9267	0.1025		4,763.4885
Total	**1.7193**	**1.5981**	**14.1831**	**0.0497**	**5.5012**	**0.0325**	**5.5337**	**1.3972**	**0.0300**	**1.4273**		**4,964.6876**	**4,964.6876**	**0.1105**		**4,967.4500**

3.3 General Construction Operations - 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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1964	13.1871	16.5751	0.0290		0.5297	0.5297		0.4982	0.4982		2,798.8714	2,798.8714	0.7567		2,817.7893
Total	**1.1964**	**13.1871**	**16.5751**	**0.0290**	**0.0000**	**0.5297**	**0.5297**	**0.0000**	**0.4982**	**0.4982**		**2,798.8714**	**2,798.8714**	**0.7567**		**2,817.7893**

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	4.4300e-003	0.1401	0.0281	4.7000e-004	0.3722	4.3000e-004	0.3727	0.0390	4.1000e-004	0.0394		49.6572	49.6572	2.1800e-003		49.7117
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.4300e-003**	**0.1401**	**0.0281**	**4.7000e-004**	**0.3722**	**4.3000e-004**	**0.3727**	**0.0390**	**4.1000e-004**	**0.0394**		**49.6572**	**49.6572**	**2.1800e-003**		**49.7117**

3.3 General Construction Operations - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.3436	1.4891	19.4997	0.0290		0.0458	0.0458		0.0458	0.0458	0.0000	2,798.8714	2,798.8714	0.7567		2,817.7893
Total	**0.3436**	**1.4891**	**19.4997**	**0.0290**	**0.0000**	**0.0458**	**0.0458**	**0.0000**	**0.0458**	**0.0458**	**0.0000**	**2,798.8714**	**2,798.8714**	**0.7567**		**2,817.7893**

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	4.4300e-003	0.1401	0.0281	4.7000e-004	0.1278	4.3000e-004	0.1282	0.0146	4.1000e-004	0.0150		49.6572	49.6572	2.1800e-003		49.7117
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**4.4300e-003**	**0.1401**	**0.0281**	**4.7000e-004**	**0.1278**	**4.3000e-004**	**0.1282**	**0.0146**	**4.1000e-004**	**0.0150**		**49.6572**	**49.6572**	**2.1800e-003**		**49.7117**

3.4 Photovoltaic 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					
Fugitive Dust					3.7118	0.0000	3.7118	0.4008	0.0000	0.4008			0.0000			0.0000
Off-Road	7.6335	86.0538	72.8233	0.1497		3.4175	3.4175		3.1594	3.1594		14,367.5923	14,367.5923	4.5199		14,480.5908
Total	**7.6335**	**86.0538**	**72.8233**	**0.1497**	**3.7118**	**3.4175**	**7.1292**	**0.4008**	**3.1594**	**3.5602**		**14,367.5923**	**14,367.5923**	**4.5199**		**14,480.5908**

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	4.0400e-003	0.1216	0.0258	4.3000e-004	0.2712	4.1000e-004	0.2716	0.0289	3.9000e-004	0.0292		46.0677	46.0677	1.8100e-003		46.1130
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	4.2535	2.6509	35.1726	0.1194	12.7047	0.0768	12.7815	3.3692	0.0708	3.4399		11,902.3168	11,902.3168	0.2562		11,908.7212
Total	**4.2575**	**2.7725**	**35.1984**	**0.1198**	**12.9759**	**0.0772**	**13.0531**	**3.3980**	**0.0712**	**3.4692**		**11,948.3845**	**11,948.3845**	**0.2580**		**11,954.8342**

3.4 Photovoltaic Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6703	0.0000	1.6703	0.1804	0.0000	0.1804			0.0000			0.0000
Off-Road	2.5855	12.3772	91.2581	0.1497		0.4243	0.4243		0.4243	0.4243	0.0000	14,367.5923	14,367.5923	4.5199		14,480.5908
Total	**2.5855**	**12.3772**	**91.2581**	**0.1497**	**1.6703**	**0.4243**	**2.0946**	**0.1804**	**0.4243**	**0.6047**	**0.0000**	**14,367.5923**	**14,367.5923**	**4.5199**		**14,480.5908**

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	4.0400e-003	0.1216	0.0258	4.3000e-004	0.0948	4.1000e-004	0.0952	0.0112	3.9000e-004	0.0116		46.0677	46.0677	1.8100e-003		46.1130
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	4.2535	2.6509	35.1726	0.1194	12.7047	0.0768	12.7815	3.3692	0.0708	3.4399		11,902.3168	11,902.3168	0.2562		11,908.7212
Total	**4.2575**	**2.7725**	**35.1984**	**0.1198**	**12.7995**	**0.0772**	**12.8767**	**3.3804**	**0.0712**	**3.4515**		**11,948.3845**	**11,948.3845**	**0.2580**		**11,954.8342**

3.5 Electrical and Gen-Tie 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					
Fugitive Dust					3.7118	0.0000	3.7118	0.4008	0.0000	0.4008			0.0000			0.0000
Off-Road	8.4081	93.0787	74.2676	0.1497		4.1133	4.1133		3.7944	3.7944		14,417.2873	14,417.2873	4.5783		14,531.7446
Total	**8.4081**	**93.0787**	**74.2676**	**0.1497**	**3.7118**	**4.1133**	**7.8250**	**0.4008**	**3.7944**	**4.1952**		**14,417.2873**	**14,417.2873**	**4.5783**		**14,531.7446**

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	1.5500e-003	0.0468	9.9200e-003	1.7000e-004	0.1043	1.6000e-004	0.1045	0.0111	1.5000e-004	0.0112		17.7183	17.7183	7.0000e-004		17.7358
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	2.1268	1.3255	17.5863	0.0597	6.3523	0.0384	6.3908	1.6846	0.0354	1.7200		5,951.1584	5,951.1584	0.1281		5,954.3606
Total	**2.1283**	**1.3722**	**17.5962**	**0.0599**	**6.4566**	**0.0386**	**6.4952**	**1.6957**	**0.0355**	**1.7312**		**5,968.8767**	**5,968.8767**	**0.1288**		**5,972.0964**

3.5 Electrical and Gen-Tie Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.6703	0.0000	1.6703	0.1804	0.0000	0.1804			0.0000			0.0000
Off-Road	2.3852	12.8937	91.5322	0.1497		0.3647	0.3647		0.3647	0.3647	0.0000	14,417.2873	14,417.2873	4.5783		14,531.7445
Total	**2.3852**	**12.8937**	**91.5322**	**0.1497**	**1.6703**	**0.3647**	**2.0350**	**0.1804**	**0.3647**	**0.5451**	**0.0000**	**14,417.2873**	**14,417.2873**	**4.5783**		**14,531.7445**

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	1.5500e-003	0.0468	9.9200e-003	1.7000e-004	0.0365	1.6000e-004	0.0366	4.3100e-003	1.5000e-004	4.4600e-003		17.7183	17.7183	7.0000e-004		17.7358
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	2.1268	1.3255	17.5863	0.0597	6.3523	0.0384	6.3908	1.6846	0.0354	1.7200		5,951.1584	5,951.1584	0.1281		5,954.3606
Total	**2.1283**	**1.3722**	**17.5962**	**0.0599**	**6.3888**	**0.0386**	**6.4274**	**1.6889**	**0.0355**	**1.7244**		**5,968.8767**	**5,968.8767**	**0.1288**		**5,972.0964**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	18.8760					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**19.0806**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	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**

3.6 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	18.8760					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**18.9058**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	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**

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	0.0813	1.0928	1.2611	8.1700e-003	10.3120	4.1200e-003	10.3161	1.1150	3.8500e-003	1.1188		842.9643	842.9643	0.0273		843.6461
Unmitigated	0.0813	1.0928	1.2611	8.1700e-003	10.3120	4.1200e-003	10.3161	1.1150	3.8500e-003	1.1188		842.9643	842.9643	0.0273		843.6461

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	48.00	0.00	0.00	185,871	185,871
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	0.00	0.00	0.00		
Total	48.00	0.00	0.00	185,871	185,871

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
General Office Building	16.71	6.60	4.60	85.00	0.00	15.00	100	0	0
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No	14.70	6.60	6.60	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.600000	0.050000	0.200000	0.000000	0.000000	0.000000	0.000000	0.150000	0.000000	0.000000	0.000000	0.000000	0.000000
Other Non-Asphalt Surfaces	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704
Unrefrigerated Warehouse-No Rail	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704

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	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
NaturalGas Unmitigated	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231

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					
General Office Building	17.9397	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**1.9000e-004**	**1.7600e-003**	**1.4800e-003**	**1.0000e-005**		**1.3000e-004**	**1.3000e-004**		**1.3000e-004**	**1.3000e-004**		**2.1106**	**2.1106**	**4.0000e-005**	**4.0000e-005**	**2.1231**

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					
General Office Building	0.0179397	1.9000e-004	1.7600e-003	1.4800e-003	1.0000e-005		1.3000e-004	1.3000e-004		1.3000e-004	1.3000e-004		2.1106	2.1106	4.0000e-005	4.0000e-005	2.1231
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**1.9000e-004**	**1.7600e-003**	**1.4800e-003**	**1.0000e-005**		**1.3000e-004**	**1.3000e-004**		**1.3000e-004**	**1.3000e-004**		**2.1106**	**2.1106**	**4.0000e-005**	**4.0000e-005**	**2.1231**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Unmitigated	1.7620	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422

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	0.2069					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.5494					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.7700e-003	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Total	**1.7620**	**5.7000e-004**	**0.0622**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1334**	**0.1334**	**3.5000e-004**		**0.1422**

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	0.2069					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	1.5494					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	5.7700e-003	5.7000e-004	0.0622	0.0000		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004		0.1334	0.1334	3.5000e-004		0.1422
Total	**1.7620**	**5.7000e-004**	**0.0622**	**0.0000**		**2.2000e-004**	**2.2000e-004**		**2.2000e-004**	**2.2000e-004**		**0.1334**	**0.1334**	**3.5000e-004**		**0.1422**

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
Generator Sets	1	2.00	20	84	0.74	Diesel
Other General Industrial Equipment	2	4.00	120	88	0.34	Diesel
Pumps	2	10.00	12	84	0.74	Diesel
Tractors/Loaders/Backhoes	2	8.00	20	97	0.37	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Generator Sets	0.0765	0.6789	0.9173	1.6400e-003		0.0321	0.0321		0.0321	0.0321		155.7586	155.7586	6.8500e-003		155.9299
Other General Industrial Equipment	0.1623	1.5430	1.9245	2.5600e-003		0.0889	0.0889		0.0818	0.0818		248.0182	248.0182	0.0802		250.0235
Pumps	0.8195	6.8821	9.3132	0.0164		0.3371	0.3371		0.3371	0.3371		1,557.5864	1,557.5864	0.0713		1,559.3679
Tractors/Loaders/Backhoes	0.3027	3.0714	4.4626	6.2300e-003		0.1516	0.1516		0.1395	0.1395		603.1530	603.1530	0.1951		608.0298
Total	**1.3610**	**12.1753**	**16.6177**	**0.0269**		**0.6097**	**0.6097**		**0.5905**	**0.5905**		**2,564.5162**	**2,564.5162**	**0.3534**		**2,573.3512**

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

IPO-01.03 Aramis Solar Project

Alameda County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	0.40	1000sqft	0.01	400.00	0
Unrefrigerated Warehouse-No Rail	72.00	1000sqft	1.65	72,000.00	0
Other Non-Asphalt Surfaces	537.34	Acre	537.34	23,406,530.40	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	63
Climate Zone	4			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Office building = O&M building
Warehouse = energy storage buildings
Other non-asphalt = photovoltaic eletrcity generation, energy storage, and substation

Construction Phase - Construction phasing, schedule, and duration per project description

Off-road Equipment -

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Off-road Equipment - Construction equipment per project description

Trips and VMT - Trips and VMT - Project trips and trip distances per Aramis Transportation Impact Study (CHS April2020).
Haul trips for General Construction Operations includes 30 water truck trips per day (4.6 miles/trip)

On-road Fugitive Dust - On-road Fugitive Dust - % Paved reduced to account on-site unpaved roads and use of highway vehicles on-site

Grading -

Architectural Coating - No painting parking areas

Vehicle Trips - Operational trips based on 12 workers per day, 2 commute trips and 2 midday trips per worker

Road Dust - % Pave adjusted to account for highway vehicles used on-site on unpaved roads.
15 mph speed limit on on-site unpaved roads

Consumer Products - No consumer products parking area

Area Coating - No painting parking area

Energy Use - All electrical energy generated on-site
Natural gas O&M building only

Water And Wastewater - 5 acre-feet of water per year for operation and maintenance.

Solid Waste - Only O&M building generates solid waste

Construction Off-road Equipment Mitigation - MM AQ-1: Dust mitigation per BAAQMD recommended BCMMs.
MM AQ-2: Tier 4 engine mitigation for all off-road diesel equipment with 50 or more HP

Operational Off-Road Equipment - Operation and maintenance equipment per project description.
Other general industrial equipment = all terrain vehicle used for maintenance

Fleet Mix - Fleet mix = 85% autos/pickups and 15% water trucks

IPO-01.03 Aramis Solar Project - Alameda County, Annual

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	1,404,392.00	0.00
tblAreaCoating	Area_Parking	1404390	0
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	20.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	15.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	8.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	50.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
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tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	10.00
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final

tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	360.00	30.00
tblConstructionPhase	NumDays	930.00	175.00
tblConstructionPhase	NumDays	930.00	150.00
tblConstructionPhase	NumDays	930.00	75.00
tblConstructionPhase	NumDays	660.00	40.00
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblEnergyUse	LightingElect	3.88	0.00
tblEnergyUse	LightingElect	2.14	0.00
tblEnergyUse	NT24E	7.84	0.00
tblEnergyUse	NT24E	1.07	0.00
tblEnergyUse	NT24NG	0.07	0.00
tblEnergyUse	T24E	6.11	0.00
tblEnergyUse	T24E	0.32	0.00
tblEnergyUse	T24NG	3.40	0.00
tblFleetMix	HHD	0.05	0.15
tblFleetMix	LDA	0.56	0.60
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT2	0.19	0.20
tblFleetMix	LHD1	0.02	0.00
tblFleetMix	LHD2	5.1800e-003	0.00
tblFleetMix	MCY	5.4910e-003	0.00
tblFleetMix	MDV	0.11	0.00
tblFleetMix	MH	7.0400e-004	0.00

tblFleetMix	MHD	0.02	0.00
tblFleetMix	OBUS	2.2090e-003	0.00
tblFleetMix	SBUS	3.3400e-004	0.00
tblFleetMix	UBUS	2.4560e-003	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	3.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOnRoadDust	HaulingPercentPave	100.00	98.00
tblOnRoadDust	HaulingPercentPave	100.00	98.50

tblOnRoadDust	HaulingPercentPave	100.00	98.50
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	120.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	12.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	20.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
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tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	10.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblRoadDust	MeanVehicleSpeed	40	15
tblRoadDust	RoadPercentPave	100	97
tblSolidWaste	SolidWasteGenerationRate	67.68	0.00
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	24.16
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripLength	20.00	34.10
tblTripsAndVMT	HaulingTripNumber	0.00	46.00
tblTripsAndVMT	HaulingTripNumber	0.00	89.00
tblTripsAndVMT	HaulingTripNumber	0.00	52.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71
tblTripsAndVMT	WorkerTripLength	10.80	16.71

tblTripsAndVMT	WorkerTripNumber	88.00	400.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	105.00	1,000.00
tblTripsAndVMT	WorkerTripNumber	105.00	500.00
tblTripsAndVMT	WorkerTripNumber	1,972.00	0.00
tblVehicleTrips	CC_TTP	48.00	0.00
tblVehicleTrips	CNW_TL	6.60	4.60
tblVehicleTrips	CNW_TTP	19.00	15.00
tblVehicleTrips	CW_TL	14.70	16.71
tblVehicleTrips	CW_TTP	33.00	85.00
tblVehicleTrips	DV_TP	19.00	0.00
tblVehicleTrips	PB_TP	4.00	0.00
tblVehicleTrips	PR_TP	77.00	100.00
tblVehicleTrips	ST_TR	2.46	0.00
tblVehicleTrips	ST_TR	1.68	0.00
tblVehicleTrips	SU_TR	1.05	0.00
tblVehicleTrips	SU_TR	1.68	0.00
tblVehicleTrips	WD_TR	11.03	120.00
tblVehicleTrips	WD_TR	1.68	0.00
tblWater	IndoorWaterUseRate	16,650,000.00	0.00
tblWater	OutdoorWaterUseRate	43,573.43	1,558,156.50

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	1.9308	13.2147	13.8242	0.0331	1.8318	0.5305	2.3623	0.3904	0.4906	0.8811	0.0000	2,925.3054	2,925.3054	0.6170	0.0000	2,940.7307
Maximum	**1.9308**	**13.2147**	**13.8242**	**0.0331**	**1.8318**	**0.5305**	**2.3623**	**0.3904**	**0.4906**	**0.8811**	**0.0000**	**2,925.3054**	**2,925.3054**	**0.6170**	**0.0000**	**2,940.7307**

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	1.1361	2.0100	16.4864	0.0331	1.4890	0.0615	1.5505	0.3537	0.0609	0.4146	0.0000	2,925.3031	2,925.3031	0.6170	0.0000	2,940.7284
Maximum	**1.1361**	**2.0100**	**16.4864**	**0.0331**	**1.4890**	**0.0615**	**1.5505**	**0.3537**	**0.0609**	**0.4146**	**0.0000**	**2,925.3031**	**2,925.3031**	**0.6170**	**0.0000**	**2,940.7284**

	ROG	NOx	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	**41.16**	**84.79**	**-19.26**	**0.00**	**18.71**	**88.41**	**34.37**	**9.40**	**87.59**	**52.94**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2022	3-31-2022	4.1313	0.6748
2	4-1-2022	6-30-2022	5.0203	1.0071
3	7-1-2022	9-30-2022	5.9869	1.4579
		Highest	5.9869	1.4579

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	0.3210	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116
Energy	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515
Mobile	9.4400e-003	0.1446	0.1503	1.0200e-003	1.3380	5.4000e-004	1.3385	0.1443	5.0000e-004	0.1448	0.0000	95.3370	95.3370	3.2200e-003	0.0000	95.4175
Offroad	0.0185	0.1714	0.2252	3.3000e-004		9.1900e-003	9.1900e-003		8.6500e-003	8.6500e-003	0.0000	28.8627	28.8627	6.5900e-003	0.0000	29.0274
Waste						0.0000	0.0000		0.0000	0.0000	0.0751	0.0000	0.0751	4.4400e-003	0.0000	0.1861
Water						0.0000	0.0000		0.0000	0.0000	0.0226	1.6984	1.7210	2.3900e-003	7.0000e-005	1.8018
Total	**0.3490**	**0.3163**	**0.3813**	**1.3500e-003**	**1.3380**	**9.7700e-003**	**1.3478**	**0.1443**	**9.1900e-003**	**0.1535**	**0.0977**	**126.2585**	**126.3561**	**0.0167**	**8.0000e-005**	**126.7959**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.3210	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116
Energy	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515
Mobile	9.4400e-003	0.1446	0.1503	1.0200e-003	1.3380	5.4000e-004	1.3385	0.1443	5.0000e-004	0.1448	0.0000	95.3370	95.3370	3.2200e-003	0.0000	95.4175
Offroad	0.0185	0.1714	0.2252	3.3000e-004		9.1900e-003	9.1900e-003		8.6500e-003	8.6500e-003	0.0000	28.8627	28.8627	6.5900e-003	0.0000	29.0274
Waste						0.0000	0.0000		0.0000	0.0000	0.0751	0.0000	0.0751	4.4400e-003	0.0000	0.1861
Water						0.0000	0.0000		0.0000	0.0000	0.0226	1.6984	1.7210	2.3900e-003	7.0000e-005	1.8018
Total	**0.3490**	**0.3163**	**0.3813**	**1.3500e-003**	**1.3380**	**9.7700e-003**	**1.3478**	**0.1443**	**9.1900e-003**	**0.1535**	**0.0977**	**126.2585**	**126.3561**	**0.0167**	**8.0000e-005**	**126.7959**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2022	2/11/2022	5	30	
2	General Construction Operations	Grading	1/8/2022	9/9/2022	5	175	
3	Photovoltaic Installation	Grading	2/12/2022	9/9/2022	5	150	
4	Electrical and Gen-Tie Installation	Grading	5/28/2022	9/9/2022	5	75	
5	Architectural Coating	Architectural Coating	7/17/2022	9/9/2022	5	40	

Acres of Grading (Site Preparation Phase): 249.38

Acres of Grading (Grading Phase): 0

Acres of Paving: 537.34

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 108,600; Non-Residential Outdoor: 36,200; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	10	7.00	212	0.43
Site Preparation	Graders	9	7.00	187	0.41
Site Preparation	Rollers	5	7.00	80	0.38
Site Preparation	Rough Terrain Forklifts	10	7.00	100	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Loaders	1	7.00	203	0.36
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
General Construction Operations	Excavators	0	8.00	158	0.38
General Construction Operations	Graders	0	8.00	187	0.41
General Construction Operations	Pumps	1	7.00	84	0.74
General Construction Operations	Rough Terrain Forklifts	5	7.00	100	0.40

General Construction Operations	Rubber Tired Dozers	0	8.00	247	0.40
General Construction Operations	Rubber Tired Loaders	1	7.00	203	0.36
General Construction Operations	Scrapers	0	8.00	367	0.48
General Construction Operations	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Photovoltaic Installation	Aerial Lifts	1	4.00	63	0.31
Photovoltaic Installation	Bore/Drill Rigs	2	7.00	221	0.50
Photovoltaic Installation	Cranes	1	2.00	231	0.29
Photovoltaic Installation	Crawler Tractors	5	7.00	212	0.43
Photovoltaic Installation	Excavators	0	8.00	158	0.38
Photovoltaic Installation	Graders	3	7.00	187	0.41
Photovoltaic Installation	Rollers	1	7.00	80	0.38
Photovoltaic Installation	Rough Terrain Forklifts	20	7.00	100	0.40
Photovoltaic Installation	Rubber Tired Dozers	0	8.00	247	0.40
Photovoltaic Installation	Scrapers	0	8.00	367	0.48
Photovoltaic Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Photovoltaic Installation	Trenchers	3	7.00	78	0.50
Photovoltaic Installation	Welders	6	4.00	46	0.45
Electrical and Gen-Tie Installation	Aerial Lifts	1	4.00	63	0.31
Electrical and Gen-Tie Installation	Bore/Drill Rigs	2	7.00	221	0.50
Electrical and Gen-Tie Installation	Cranes	1	2.00	231	0.29
Electrical and Gen-Tie Installation	Crawler Tractors	5	7.00	212	0.43
Electrical and Gen-Tie Installation	Excavators	0	8.00	158	0.38
Electrical and Gen-Tie Installation	Graders	3	7.00	187	0.41
Electrical and Gen-Tie Installation	Rollers	2	7.00	80	0.38
Electrical and Gen-Tie Installation	Rough Terrain Forklifts	15	7.00	100	0.40
Electrical and Gen-Tie Installation	Rubber Tired Dozers	0	8.00	247	0.40
Electrical and Gen-Tie Installation	Scrapers	0	8.00	367	0.48

Electrical and Gen-Tie Installation	Skid Steer Loaders	2	7.00	65	0.37
Electrical and Gen-Tie Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Electrical and Gen-Tie Installation	Trenchers	7	7.00	78	0.50
Electrical and Gen-Tie Installation	Welders	4	4.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	35	400.00	0.00	46.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
General Construction Operations	8	0.00	0.00	89.00	10.80	6.60	24.16	LD_Mix	HDT_Mix	HHDT
Photovoltaic Installation	42	1,000.00	0.00	52.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Electrical and Gen-Tie Installation	42	500.00	0.00	10.00	16.71	6.60	34.10	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	0.00	0.00	0.00	10.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1322	0.0000	0.1322	0.0143	0.0000	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1430	1.7568	0.9497	2.5200e-003		0.0641	0.0641		0.0590	0.0590	0.0000	221.1755	221.1755	0.0715	0.0000	222.9638
Total	**0.1430**	**1.7568**	**0.9497**	**2.5200e-003**	**0.1322**	**0.0641**	**0.1964**	**0.0143**	**0.0590**	**0.0733**	**0.0000**	**221.1755**	**221.1755**	**0.0715**	**0.0000**	**222.9638**

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	2.7000e-004	8.2600e-003	1.7500e-003	3.0000e-005	0.0150	3.0000e-005	0.0150	1.6100e-003	3.0000e-005	1.6400e-003	0.0000	2.7592	2.7592	1.1000e-004	0.0000	2.7620
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0248	0.0180	0.1885	6.6000e-004	0.0734	4.6000e-004	0.0738	0.0195	4.2000e-004	0.0199	0.0000	60.0564	60.0564	1.2800e-003	0.0000	60.0885
Total	**0.0251**	**0.0263**	**0.1903**	**6.9000e-004**	**0.0884**	**4.9000e-004**	**0.0888**	**0.0211**	**4.5000e-004**	**0.0216**	**0.0000**	**62.8155**	**62.8155**	**1.3900e-003**	**0.0000**	**62.8504**

3.2 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0595	0.0000	0.0595	6.4300e-003	0.0000	6.4300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0309	0.1340	1.3257	2.5200e-003		4.1200e-003	4.1200e-003		4.1200e-003	4.1200e-003	0.0000	221.1752	221.1752	0.0715	0.0000	222.9636
Total	**0.0309**	**0.1340**	**1.3257**	**2.5200e-003**	**0.0595**	**4.1200e-003**	**0.0636**	**6.4300e-003**	**4.1200e-003**	**0.0106**	**0.0000**	**221.1752**	**221.1752**	**0.0715**	**0.0000**	**222.9636**

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	2.7000e-004	8.2600e-003	1.7500e-003	3.0000e-005	5.3000e-003	3.0000e-005	5.3300e-003	6.4000e-004	3.0000e-005	6.7000e-004	0.0000	2.7592	2.7592	1.1000e-004	0.0000	2.7620
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0248	0.0180	0.1885	6.6000e-004	0.0734	4.6000e-004	0.0738	0.0195	4.2000e-004	0.0199	0.0000	60.0564	60.0564	1.2800e-003	0.0000	60.0885
Total	**0.0251**	**0.0263**	**0.1903**	**6.9000e-004**	**0.0787**	**4.9000e-004**	**0.0792**	**0.0202**	**4.5000e-004**	**0.0206**	**0.0000**	**62.8155**	**62.8155**	**1.3900e-003**	**0.0000**	**62.8504**

3.3 General Construction Operations - 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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1047	1.1539	1.4503	2.5400e-003		0.0464	0.0464		0.0436	0.0436	0.0000	222.1707	222.1707	0.0601	0.0000	223.6724
Total	**0.1047**	**1.1539**	**1.4503**	**2.5400e-003**	**0.0000**	**0.0464**	**0.0464**	**0.0000**	**0.0436**	**0.0436**	**0.0000**	**222.1707**	**222.1707**	**0.0601**	**0.0000**	**223.6724**

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	3.9000e-004	0.0125	2.5300e-003	4.0000e-005	0.0271	4.0000e-005	0.0271	2.8600e-003	4.0000e-005	2.9000e-003	0.0000	3.9155	3.9155	1.8000e-004	0.0000	3.9199
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.9000e-004**	**0.0125**	**2.5300e-003**	**4.0000e-005**	**0.0271**	**4.0000e-005**	**0.0271**	**2.8600e-003**	**4.0000e-005**	**2.9000e-003**	**0.0000**	**3.9155**	**3.9155**	**1.8000e-004**	**0.0000**	**3.9199**

3.3 General Construction Operations - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0301	0.1303	1.7062	2.5400e-003		4.0100e-003	4.0100e-003		4.0100e-003	4.0100e-003	0.0000	222.1704	222.1704	0.0601	0.0000	223.6721
Total	**0.0301**	**0.1303**	**1.7062**	**2.5400e-003**	**0.0000**	**4.0100e-003**	**4.0100e-003**	**0.0000**	**4.0100e-003**	**4.0100e-003**	**0.0000**	**222.1704**	**222.1704**	**0.0601**	**0.0000**	**223.6721**

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	3.9000e-004	0.0125	2.5300e-003	4.0000e-005	9.3800e-003	4.0000e-005	9.4200e-003	1.0900e-003	4.0000e-005	1.1300e-003	0.0000	3.9155	3.9155	1.8000e-004	0.0000	3.9199
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.9000e-004**	**0.0125**	**2.5300e-003**	**4.0000e-005**	**9.3800e-003**	**4.0000e-005**	**9.4200e-003**	**1.0900e-003**	**4.0000e-005**	**1.1300e-003**	**0.0000**	**3.9155**	**3.9155**	**1.8000e-004**	**0.0000**	**3.9199**

3.4 Photovoltaic 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					
Fugitive Dust					0.2784	0.0000	0.2784	0.0301	0.0000	0.0301	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.5725	6.4540	5.4618	0.0112		0.2563	0.2563		0.2370	0.2370	0.0000	977.5545	977.5545	0.3075	0.0000	985.2428
Total	**0.5725**	**6.4540**	**5.4618**	**0.0112**	**0.2784**	**0.2563**	**0.5347**	**0.0301**	**0.2370**	**0.2670**	**0.0000**	**977.5545**	**977.5545**	**0.3075**	**0.0000**	**985.2428**

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	3.1000e-004	9.3400e-003	1.9700e-003	3.0000e-005	0.0169	3.0000e-005	0.0170	1.8200e-003	3.0000e-005	1.8500e-003	0.0000	3.1191	3.1191	1.3000e-004	0.0000	3.1222
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.3103	0.2251	2.3567	8.3000e-003	0.9171	5.7600e-003	0.9229	0.2439	5.3100e-003	0.2492	0.0000	750.7043	750.7043	0.0161	0.0000	751.1058
Total	**0.3106**	**0.2345**	**2.3587**	**8.3300e-003**	**0.9340**	**5.7900e-003**	**0.9398**	**0.2457**	**5.3400e-003**	**0.2511**	**0.0000**	**753.8234**	**753.8234**	**0.0162**	**0.0000**	**754.2280**

3.4 Photovoltaic Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1253	0.0000	0.1253	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1939	0.9283	6.8444	0.0112		0.0318	0.0318		0.0318	0.0318	0.0000	977.5534	977.5534	0.3075	0.0000	985.2417
Total	**0.1939**	**0.9283**	**6.8444**	**0.0112**	**0.1253**	**0.0318**	**0.1571**	**0.0135**	**0.0318**	**0.0454**	**0.0000**	**977.5534**	**977.5534**	**0.3075**	**0.0000**	**985.2417**

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	3.1000e-004	9.3400e-003	1.9700e-003	3.0000e-005	5.9900e-003	3.0000e-005	6.0200e-003	7.3000e-004	3.0000e-005	7.6000e-004	0.0000	3.1191	3.1191	1.3000e-004	0.0000	3.1222
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.3103	0.2251	2.3567	8.3000e-003	0.9171	5.7600e-003	0.9229	0.2439	5.3100e-003	0.2492	0.0000	750.7043	750.7043	0.0161	0.0000	751.1058
Total	**0.3106**	**0.2345**	**2.3587**	**8.3300e-003**	**0.9231**	**5.7900e-003**	**0.9289**	**0.2446**	**5.3400e-003**	**0.2500**	**0.0000**	**753.8234**	**753.8234**	**0.0162**	**0.0000**	**754.2280**

3.5 Electrical and Gen-Tie 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					
Fugitive Dust					0.1392	0.0000	0.1392	0.0150	0.0000	0.0150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3153	3.4905	2.7850	5.6100e-003		0.1543	0.1543		0.1423	0.1423	0.0000	490.4679	490.4679	0.1558	0.0000	494.3616
Total	**0.3153**	**3.4905**	**2.7850**	**5.6100e-003**	**0.1392**	**0.1543**	**0.2934**	**0.0150**	**0.1423**	**0.1573**	**0.0000**	**490.4679**	**490.4679**	**0.1558**	**0.0000**	**494.3616**

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	6.0000e-005	1.8000e-003	3.8000e-004	1.0000e-005	3.2600e-003	1.0000e-005	3.2600e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	0.5998	0.5998	2.0000e-005	0.0000	0.6004
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0776	0.0563	0.5892	2.0700e-003	0.2293	1.4400e-003	0.2307	0.0610	1.3300e-003	0.0623	0.0000	187.6761	187.6761	4.0100e-003	0.0000	187.7765
Total	**0.0776**	**0.0581**	**0.5896**	**2.0800e-003**	**0.2325**	**1.4500e-003**	**0.2340**	**0.0613**	**1.3400e-003**	**0.0627**	**0.0000**	**188.2759**	**188.2759**	**4.0300e-003**	**0.0000**	**188.3769**

3.5 Electrical and Gen-Tie Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0626	0.0000	0.0626	6.7600e-003	0.0000	6.7600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0895	0.4835	3.4325	5.6100e-003		0.0137	0.0137		0.0137	0.0137	0.0000	490.4673	490.4673	0.1558	0.0000	494.3611
Total	**0.0895**	**0.4835**	**3.4325**	**5.6100e-003**	**0.0626**	**0.0137**	**0.0763**	**6.7600e-003**	**0.0137**	**0.0204**	**0.0000**	**490.4673**	**490.4673**	**0.1558**	**0.0000**	**494.3611**

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	6.0000e-005	1.8000e-003	3.8000e-004	1.0000e-005	1.1500e-003	1.0000e-005	1.1600e-003	1.4000e-004	1.0000e-005	1.5000e-004	0.0000	0.5998	0.5998	2.0000e-005	0.0000	0.6004
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0776	0.0563	0.5892	2.0700e-003	0.2293	1.4400e-003	0.2307	0.0610	1.3300e-003	0.0623	0.0000	187.6761	187.6761	4.0100e-003	0.0000	187.7765
Total	**0.0776**	**0.0581**	**0.5896**	**2.0800e-003**	**0.2304**	**1.4500e-003**	**0.2319**	**0.0611**	**1.3400e-003**	**0.0625**	**0.0000**	**188.2759**	**188.2759**	**4.0300e-003**	**0.0000**	**188.3769**

3.6 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3775					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0900e-003	0.0282	0.0363	6.0000e-005		1.6300e-003	1.6300e-003		1.6300e-003	1.6300e-003	0.0000	5.1065	5.1065	3.3000e-004	0.0000	5.1148
Total	**0.3816**	**0.0282**	**0.0363**	**6.0000e-005**		**1.6300e-003**	**1.6300e-003**		**1.6300e-003**	**1.6300e-003**	**0.0000**	**5.1065**	**5.1065**	**3.3000e-004**	**0.0000**	**5.1148**

Unmitigated Construction Off-Site

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

3.6 Architectural Coating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3775					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.9000e-004	2.5800e-003	0.0367	6.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	5.1065	5.1065	3.3000e-004	0.0000	5.1148
Total	**0.3781**	**2.5800e-003**	**0.0367**	**6.0000e-005**		**8.0000e-005**	**8.0000e-005**		**8.0000e-005**	**8.0000e-005**	**0.0000**	**5.1065**	**5.1065**	**3.3000e-004**	**0.0000**	**5.1148**

Mitigated Construction Off-Site

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

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	9.4400e-003	0.1446	0.1503	1.0200e-003	1.3380	5.4000e-004	1.3385	0.1443	5.0000e-004	0.1448	0.0000	95.3370	95.3370	3.2200e-003	0.0000	95.4175
Unmitigated	9.4400e-003	0.1446	0.1503	1.0200e-003	1.3380	5.4000e-004	1.3385	0.1443	5.0000e-004	0.1448	0.0000	95.3370	95.3370	3.2200e-003	0.0000	95.4175

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	48.00	0.00	0.00	185,871	185,871
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Unrefrigerated Warehouse-No Rail	0.00	0.00	0.00		
Total	48.00	0.00	0.00	185,871	185,871

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
General Office Building	16.71	6.60	4.60	85.00	0.00	15.00	100	0	0
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0
Unrefrigerated Warehouse-No	14.70	6.60	6.60	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.600000	0.050000	0.200000	0.000000	0.000000	0.000000	0.000000	0.150000	0.000000	0.000000	0.000000	0.000000	0.000000
Other Non-Asphalt Surfaces	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704
Unrefrigerated Warehouse-No Rail	0.561348	0.038614	0.190285	0.107199	0.015389	0.005180	0.024554	0.046236	0.002209	0.002456	0.005491	0.000334	0.000704

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515
NaturalGas Unmitigated	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515

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					
General Office Building	6548	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**4.0000e-005**	**3.2000e-004**	**2.7000e-004**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.3494**	**0.3494**	**1.0000e-005**	**1.0000e-005**	**0.3515**

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					
General Office Building	6548	4.0000e-005	3.2000e-004	2.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.3494	0.3494	1.0000e-005	1.0000e-005	0.3515
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	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		**4.0000e-005**	**3.2000e-004**	**2.7000e-004**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.3494**	**0.3494**	**1.0000e-005**	**1.0000e-005**	**0.3515**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3210	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116
Unmitigated	0.3210	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116

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	0.0378					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.2828					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	5.2000e-004	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116
Total	**0.3210**	**5.0000e-005**	**5.6000e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0109**	**0.0109**	**3.0000e-005**	**0.0000**	**0.0116**

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	0.0378					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.2828					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	5.2000e-004	5.0000e-005	5.6000e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.0109	0.0109	3.0000e-005	0.0000	0.0116
Total	**0.3210**	**5.0000e-005**	**5.6000e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0109**	**0.0109**	**3.0000e-005**	**0.0000**	**0.0116**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.7210	2.3900e-003	7.0000e-005	1.8018
Unmitigated	1.7210	2.3900e-003	7.0000e-005	1.8018

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.0710935 / 1.55816	1.7210	2.3900e-003	7.0000e-005	1.8018
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**1.7210**	**2.3900e-003**	**7.0000e-005**	**1.8018**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.0710935 / 1.55816	1.7210	2.3900e-003	7.0000e-005	1.8018
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**1.7210**	**2.3900e-003**	**7.0000e-005**	**1.8018**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0751	4.4400e-003	0.0000	0.1861
Unmitigated	0.0751	4.4400e-003	0.0000	0.1861

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	0.37	0.0751	4.4400e-003	0.0000	0.1861
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0751**	**4.4400e-003**	**0.0000**	**0.1861**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	0.37	0.0751	4.4400e-003	0.0000	0.1861
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Unrefrigerated Warehouse-No Rail	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0751**	**4.4400e-003**	**0.0000**	**0.1861**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Generator Sets	1	2.00	20	84	0.74	Diesel
Other General Industrial Equipment	2	4.00	120	88	0.34	Diesel
Pumps	2	10.00	12	84	0.74	Diesel
Tractors/Loaders/Backhoes	2	8.00	20	97	0.37	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	tons/yr										MT/yr					
Generator Sets	7.6000e-004	6.7900e-003	9.1700e-003	2.0000e-005		3.2000e-004	3.2000e-004		3.2000e-004	3.2000e-004	0.0000	1.4130	1.4130	6.0000e-005	0.0000	1.4146
Other General Industrial Equipment	9.7400e-003	0.0926	0.1155	1.5000e-004		5.3300e-003	5.3300e-003		4.9100e-003	4.9100e-003	0.0000	13.4999	13.4999	4.3700e-003	0.0000	13.6091
Pumps	4.9200e-003	0.0413	0.0559	1.0000e-004		2.0200e-003	2.0200e-003		2.0200e-003	2.0200e-003	0.0000	8.4781	8.4781	3.9000e-004	0.0000	8.4878
Tractors/Loaders/Backhoes	3.0300e-003	0.0307	0.0446	6.0000e-005		1.5200e-003	1.5200e-003		1.3900e-003	1.3900e-003	0.0000	5.4717	5.4717	1.7700e-003	0.0000	5.5160
Total	**0.0185**	**0.1714**	**0.2252**	**3.3000e-004**		**9.1900e-003**	**9.1900e-003**		**8.6400e-003**	**8.6400e-003**	**0.0000**	**28.8627**	**28.8627**	**6.5900e-003**	**0.0000**	**29.0274**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix B

Energy Calculation Sheets

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Construction Energy Use

Off-Road Construction Equipment Energy Use												
Phase	Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total MBtu
Site Preparation	Crawler Tractors	Diesel	212	0.43	10	7.0	30	0.0221600	2.02011	141.408	4,242.2	590
	Graders	Diesel	187	0.41	9	7.0	30	0.0211437	1.62109	102.129	3,063.9	426
	Rollers	Diesel	80	0.38	5	7.0	30	0.0194042	0.58989	20.646	619.4	86
	Rough Terrain Forklifts	Diesel	100	0.4	10	7.0	30	0.0208047	0.83219	58.253	1,747.6	243
	Rubber Tired Loaders	Diesel	203	0.38	1	7.0	30	0.0186583	1.43930	10.075	302.3	42
										Site Preparation Subtotal	**9,975.3**	**1,387**
General Construction Operations	Pumps	Diesel	84	0.74	1	7.0	175	0.0154785	0.96214	6.735	1,178.6	164
	Rough Terrain Forklifts	Diesel	100	0.4	5	7.0	175	0.0208047	0.83219	29.127	5,097.2	709
	Rubber Tired Loaders	Diesel	203	0.38	1	7.0	175	0.0186583	1.43930	10.075	1,763.1	245
	Tractors/Loaders/Backhoes	Diesel	97	0.37	1	7.0	175	0.0191274	0.68648	4.805	840.9	117
										General Construction Operations Subtotal	**8,879.9**	**1,234**
Photovoltaic Installation	Aerial Lifts	Diesel	63	0.31	1	4.0	150	0.0159418	0.31134	1.245	186.8	26
	Bore/Drill Rigs	Diesel	221	0.5	2	7.0	150	0.0255415	2.82233	39.513	5,926.9	824
	Cranes	Diesel	231	0.29	1	2.0	150	0.0148849	0.99714	1.994	299.1	42
	Crawler Tractors	Diesel	212	0.43	5	7.0	150	0.0221600	2.02011	70.704	10,605.6	1,474
	Graders	Diesel	187	0.41	3	7.0	150	0.0211437	1.62109	34.043	5,106.4	710
	Rollers	Diesel	80	0.38	1	7.0	150	0.0194042	0.58989	4.129	619.4	86
	Rough Terrain Forklifts	Diesel	100	0.4	20	7.0	150	0.0208047	0.83219	116.506	17,476.0	2,429
	Trenchers	Diesel	78	0.5	3	7.0	150	0.0260228	1.01489	21.313	3,196.9	444
	Welders	Diesel	46	0.45	6	4.0	150	0.0258384	0.53485	12.836	1,925.5	268
										Photovoltaic Installation Subtotal	**45,342.6**	**6,303**
Electrical and Gen-Tie Installation	Air Compressors	Diesel	78	0.48	1	6.0	30	0.0154785	0.57951	3.477	104.3	14
	Aerial Lifts	Diesel	63	0.31	1	4.0	75	0.0159418	0.31134	1.245	93.4	13
	Bore/Drill Rigs	Diesel	221	0.5	2	7.0	75	0.0255415	2.82233	39.513	2,963.5	412
	Cranes	Diesel	231	0.29	1	2.0	75	0.0148849	0.99714	1.994	149.6	21
	Graders	Diesel	187	0.41	3	7.0	75	0.0211437	1.62109	34.043	2,553.2	355
	Rollers	Diesel	80	0.38	2	7.0	75	0.0194042	0.58989	8.258	619.4	86
	Rough Terrain Forklifts	Diesel	100	0.4	15	7.0	75	0.0208047	0.83219	87.380	6,553.5	911
	Skid Steer Loaders	Diesel	65	0.37	2	7.0	75	0.0190609	0.45841	6.418	481.3	67
	Trenchers	Diesel	78	0.5	7	7.0	75	0.0260228	1.01489	49.729	3,729.7	518
	Welders	Diesel	46	0.45	4	4.0	75	0.0258384	0.53485	8.558	641.8	89
										Electrical and Gen-Tie Installation Subtotal	**5,864.0**	**815**
										Project Construction Off-Road Total	**70,061.7**	**9,739**

On-Road Construction Energy Use											
Phase	Trip Type (Fleet Mix)	Trips (1-way)	Distance (miles)		Work Days	Total VMT	gallons diesel/VMT		Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total MBtu
Site Preparation	Worker (LDA, LDT1, LDT2)	400	16.71		30	200,520	0.0002138		42.87	0.033268172	6,670.9	833
	Hauling (HHDT)	46	34.1		30	47,058	0.1549861		7,293.3	-	-	1,014
General Construction Operations	Hauling (HHDT)	89	24.16		175	376,292	0.1549861		58,320.0	0.033268172	12,518.5	9,659
Photovoltaic Installation	Worker (LDA, LDT1, LDT2)	1000	16.71		150	2,506,500	0.0002138		535.9	0.033268172	83,386.7	10,414
	Hauling (HHDT)	52	34.1		150	265,980	0.1549861		41,223.2	-	-	5,730
Electrical and Gen-Tie Installation	Worker (LDA, LDT1, LDT2)	500	16.71		75	626,625	0.0002138		134.0	0.033268172	20,846.7	2,604
	Hauling (HHDT)	10	34.1		75	25,575	0.1549861		3,963.8	-	-	551
				Project Construction On-Road Total		**4,048,550**			**111,513.1**		**123,422.8**	**30,805**

Project Construction Energy By Phase				
Phase	Days	Gallons Diesel	Gallons Gas	MBtu
Site Preparation	30	7,336	6,671	1,847
General Construction Operations	175	58,320	12,519	9,659
Photovoltaic Installation	150	41,759	83,387	16,144
Electrical and Gen-Tie Installation	75	4,098	20,847	3,155
Project Construction Total		**111,513**	**123,423**	**30,805**

Project Construction Energy By Source			
Source	Gallons Diesel	Gallons Gas	MBtu
Off-Road Construction Equipment	70,062	-	9,739
On-Road Construction Traffic	111,513	123,423	30,805
Project Construction Total	**181,575**	**123,423**	**40,543**

Notes:
1. Off-road equipment types, horsepower, count and hours from CalEEMod Version 2016.3.2. http://www.caleemod.com/.
2. Off-road fuel consumption factors from CARB OFFROAD2017- ORION Web Database. https://www.arb.ca.gov/orion/.
3. On-road fuel consumption factors from CARB EMFAC2107 Web Database. https://www.arb.ca.gov/emfac/2017/.
4. 1 Gallon of diesel = 0.139 MBtu; 1 gallon of gasoline = 0.124 MBtu.

Operational Energy Use and Generation

On-Road Operation (Mobile) Energy Use										
Category	%	Trips (1-way)	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	gasoline gallons	Total MBtu
LDA	60%	48	16.71	260	125,124	0.0205372	2,569.70	0.03133254	3,920.5	843.3
LDT1	5%	48	16.71	260	10,427	0.0416293	434.1	0.03648388	380.4	107.5
LDT2	20%	48	16.71	260	41,708	0.0279412	1,165.4	0.03948049	1,646.7	366.2
HDT	15%	48	4.6	260	8,611	0.1549861	1,334.6		-	185.5
Project Construction On-Road Total					**185,871**		**5,503.8**		**5,947.5**	**1,502.5**

Off-Road Equipment Energy Use											
Equipment	Fuel	HP	Load Factor	Equipment Count	Hours/Day	Work Days	Gallons Diesel /HP-Hr	Gallons Diesel /Hour	Gallons Diesel /Day	Total Gallons Diesel	Total MBtu
All-Terrain Vehicles	Diesel	88	0.34	2	7.0	120	0.0214653	0.64224	8.991	1,079.0	150.0
Small Tractors	Diesel	97	0.37	2	7.0	20	0.0191274	0.68648	9.611	192.2	26.7
Portable Generators	Diesel	84	0.74	1	7.0	20	0.0154785	0.96214	6.735	134.7	18.7
Portable Water Trailers with Pump	Diesel	84	0.74	2	7.0	12	0.0154785	0.96214	13.470	161.6	22.5
									Total	**1,567.5**	**217.9**

Natural Gas Use	
Source	Total MBtu
O&M Building	**6.5**

Water Use Energy								
Water Use (Mgal)			Electricity Intensity Factors (kWh/Mgal)					
Total	Indoor	Outdoor	Source Water	Treat Water	Distribute Water	Wastewater Treatment	kWh Total	Total MBtu
1.629	0.071	1.558	2117	111	1272	1911	8678.8	**29.6**

Project Electricity Generation				
Capacity Factor Calculations				
County	Capacity (MW AC)	Net Production (MW AC)	Capacity Factor	
Alameda	18	29,133	**18.7%**	
Contra Costa	45	83,057	**21.3%**	
Santa Clara	26	47,934	**21.1%**	
Solano	26	41,577	**18.5%**	
Total	**114**	**201,701**	**20.2%**	
Energy Generation				
Capacity (MW AC)	hours/year	Capacity Factor	Energy Generated (MWhr/year)	Total MBtu
100	8,766	20.2%	**177,207**	**604,656.6**

Project Net Operatiopnal Energy Use	
Source	Total MBtu
Mobile	1,502.5
Off-Road	217.9
Natural Gas	6.5
Water/Wastewater	29.6
Electricity Generation	(604,656.6)
Net Energy Use	**(602,900.0)**

Offset GHG Calculation			
Gas	Intensity Factor (lb/MWhr)	GWP	CO2e (MT/year)
CO2	6.41E+02	1	51,523.5
CH4	2.90E-02	25	58.3
N2O	6.17E-03	298	147.8
		Total	**51,729.6**

Notes:
1. Off-road equipment types, horsepower, count and hours from CalEEMod Version 2016.3.2. http://www.caleemod.com/.
2. Off-road fuel consumption factors from CARB OFFROAD2017- ORION Web Database. https://www.arb.ca.gov/orion/.
3. On-road fuel consumption factors from CARB EMFAC2107 Web Database. https://www.arb.ca.gov/emfac/2017/.
4. 1 Gallon of diesel = 0.139 MBtu; 1 gallon of gasoline = 0.124 M Btu.
5. Solar electricity generation capacity factor calculated from CEC data for Solar generation facilities in the eastern and southern San Francisco Bay Area.
6. GHG intensity factors from CalEEMod Version 2106.3.2

OFFROAD2017 (v1.0.1) Emissions Inventory
Region Type: Air Basin
Region: San Francisco Bay Area
Calendar Year: 2022
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2017 Equipment Types
Units: Emissions: tons/day, Fuel Consumption: gallons/year, Activity: hours/year, HP-Hours: HP-hours/year

Region	CalYr	VehClass	MdlYr	HP_Bin	Fuel	Fuel_gpy	Total_Activity_hpy	Total_Population	Horsepower_Hours_hhpy	Gallons/hp-hour
San Francisc	2022	ConstMin - Bore/Drill Rigs	Aggregated	75	Diesel	8740.9033	4793.915797	10.5842572	342223.7168	0.02554149
San Francisc	2022	ConstMin - Cranes	Aggregated	300	Diesel	209417.64	63777.76967	135.2967655	14069174.34	0.01488486
San Francisc	2022	ConstMin - Crawler Tractors	Aggregated	300	Diesel	287351.18	63106.56853	141.4126564	12967089.72	0.02216004
San Francisc	2022	ConstMin - Graders	Aggregated	300	Diesel	802029.11	175216.3924	230.7533916	37932274.9	0.02114371
San Francisc	2022	ConstMin - Other Construction Equipment	Aggregated	100	Diesel	152976.83	86788.69257	192.2176828	7126688.203	0.02146535
San Francisc	2022	ConstMin - Rollers	Aggregated	100	Diesel	198634.77	117266.662	353.3959813	10236683.15	0.01940421
San Francisc	2022	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	509197.02	254184.8535	899.695678	24475070.54	0.02080472
San Francisc	2022	ConstMin - Rubber Tired Loaders	Aggregated	300	Diesel	1488248.8	382202.4152	358.5060573	79763414	0.01865829
San Francisc	2022	ConstMin - Skid Steer Loaders	Aggregated	75	Diesel	506829.28	376834.5261	1055.152456	26590054.59	0.01906086
San Francisc	2022	ConstMin - Tractors/Loaders/Backhoes	Aggregated	100	Diesel	3052088.4	1918653.407	3064.253302	159566319.8	0.01912740
San Francisc	2022	ConstMin - Trenchers	Aggregated	100	Diesel	44665.825	20508.70128	62.14064724	1716414.159	0.02602275
San Francisc	2022	Industrial - Aerial Lifts	Aggregated	75	Diesel	287697.89	249567.5957	826.7917243	18046711.9	0.01594185
San Francisc	2022	OFF - Light Commercial - Welders	Aggregated	50	Diesel	1053503.2	886366	1380.12	40772836	0.02583836
San Francisc	2022	Portable Equipment - Non-Rental Compressor	Aggregated	100	Diesel	121056.32	92008.17176	228.6682714	7820937.676	0.01547849
San Francisc	2022	Portable Equipment - Non-Rental Generator	Aggregated	100	Diesel	279996.17	191657.1516	142.7725755	18089369.84	0.01547849
San Francisc	2022	Portable Equipment - Non-Rental Pump	Aggregated	100	Diesel	56497.606	40834.00385	130.0042964	3650071.7	0.01547849

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: Air Basin
Region: SAN FRANCISCO BAY AREA
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation d

2020 Construction Fleet Fuel Consumption								
Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	Fuel Consumption (1000 Gal.)	Gallons/VMT
Worker (LDA, LDT1, LDT2)								
SAN FRANCISCO BAY AREA	2022	LDA	Aggregated	Aggregated	DSL	1098265.5	22.55524516	0.020537151
SAN FRANCISCO BAY AREA	2022	LDT1	Aggregated	Aggregated	DSL	2983.8991	0.124217665	0.041629312
SAN FRANCISCO BAY AREA	2022	LDT2	Aggregated	Aggregated	DSL	256077.98	7.155116736	0.027941163
					Diesel Total	**1357327.4**	**29.83457956**	**0.000213798**
SAN FRANCISCO BAY AREA	2022	LDA	Aggregated	Aggregated	GAS	96209643	3014.492163	0.031332537
SAN FRANCISCO BAY AREA	2022	LDT1	Aggregated	Aggregated	GAS	9811542.1	357.9631207	0.03648388
SAN FRANCISCO BAY AREA	2022	LDT2	Aggregated	Aggregated	GAS	32166990	1269.96855	0.03948049
					Gas Total	**138188176**	**4642.423834**	**0.033268172**
					Total VMT	**139545503**		
Hauling (HHDT)								
SAN FRANCISCO BAY AREA	2022	HHDT	Aggregated	Aggregated	DSL	4387800.8	680.0482745	**0.154986131**

Appendix E

Biological Resources Technical Report

HELIX Environmental Planning

Aramis Solar Energy Generation and Storage Project

Biological Resources Technical Report

September 2020 | IPO-01.03



Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 150
Folsom, CA 95630

Aramis Solar Energy Generation and Storage Project

Biological Resources Technical Report

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September 2020 | IPO-01.03

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1.0 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) has prepared this Biological Resources Technical Report (BTR) on behalf of the Aramis Solar Energy Generation and Storage Project (project) proposed by IP Aramis, LLC (a subsidiary of Intersect Power, LLC) (Proponent). The purpose of this report is to provide Alameda County (County), trustee agencies, and the public with current data on biological resources necessary for processing the project under the California Environmental Quality Act (CEQA). This report includes information on the current biological resources in and adjacent to the project site, including vegetation and land cover, aquatic resources, general flora and fauna, and natural communities. It also includes an analysis of the potential for regionally occurring special-status species to occur in the project site, potential project impacts to biological resources, and proposed measures to avoid, minimize, and offset impacts to biological resources.

1.1 PROJECT LOCATION

The 410-acre project site is located in unincorporated Alameda County, approximately 2.5 miles north of Livermore (Appendix A: Figure 1). The project site is located within Section 17 of Township 02 South, Range 02 East and un-surveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" USGS 7.5-minute quadrangles (Appendix A: Figure 2). The project site is located on portions of four privately-owned parcels – Assessor's Parcel Numbers (APNs) 903-0006-001-02 (eastern 269 acres of a 523-acre parcel), 903-0007-002-01 (52 acres), 903-0006-003-07 (38 acres), and 902-0001-005-00 (51 acres). The project site is made up of a 103-acre northern section (APNs 903-0007-002-01 [52 acres] and 902-0001-005-00 [51 acres]), a 269-acre central section (eastern portion of APN 903-0006-001-02), and a 38-acre southern section (APN 903-0006-003-07) (Appendix A: Figure 3). The northern section is north of Manning Avenue and the central and southern sections are south of Manning Avenue. The project site lies at an elevation of roughly 500 to 700 feet above mean sea level (amsl).

1.2 DESCRIPTION OF THE PROPOSED PROJECT

IP Aramis, LLC (a subsidiary of Intersect Power, LLC) is the project applicant and is seeking a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) facility for at least 50 years. The project would generate 100 megawatts (MW) of PV power on the 410-acre site. The project would provide solar power to utility customers by interconnecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E's) existing Cayetano 230 kilovolt (kV) substation located adjacent and interior to the project site. The project would serve East Bay Community Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract. A site plan is included as Appendix A: Figure 4.

The proposed project includes a utility-scale solar energy generation and battery energy storage system and a parcel subdivision. The solar facility would be comprised of the PV modules and associated energy collection system; substation; battery energy storage system; and a generation intertie line to connect to the existing PG&E Cayetano substation.

The project applicant has designed the facility so that all structures would be located outside of the 100-year floodplain of Cayetano Creek as determined through hydrologic modeling and a minimum of 50 feet from the banks of Cayetano Creek or its tributaries. The dedication of an easement to Alameda

County (or the Livermore Parks & Recreation District, which manages open space and trail development in conjunction with the East Bay Regional Parks District) is proposed along Cayetano Creek in the project area, outside of the development footprint of the solar facility, for their use to construct a public hiking trail in the future, if desired. The construction of a public hiking trail along Cayetano Creek is not proposed as part of this project.

Selected elements of the project description pertinent to the discussion of biological resources are included below.

1.2.1 Project Components

1.2.1.1 Parcel Subdivision

APN 903-0006-001-02 is a 536-acre parcel. Approximately 150 acres of the western portion of this parcel are steeply sloped and have high biological resource value; this area is proposed to be subdivided to legally separate it from the real property affiliated with the proposed project development.

1.2.1.2 Solar Photovoltaic System

The proposed project would include PV modules connected in strings mounted onto a single-axis tracker racking system, which would in turn be affixed to steel piles. The module strings would track the sun during the day, from east to west, to optimize power generation of the facility. Modules would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a medium voltage (MV) of 34.5 kV (or lower suitable voltage) to collect the energy generated to a project substation. The substation would step up the MV collected energy to the interconnection voltage via one or more step up transformers. The substation would meter and project the energy pursuant to the Interconnection Agreement and Power Purchase Agreement(s) with the utility and offtaker(s), respectively.

The maximum height of modules would be approximately 8 feet in their stow position. The maximum height of the electrical poles would be 100 feet.

1.2.1.3 Project Substation and Gen-Ties

The project substation would provide the necessary circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure.

The project substation is adjacent to the west of the existing PG&E Cayetano substation, allowing the gen-tie to be short and overhead with a possibility of underground construction as well. Overhead lines would be constructed on either tubular steel poles or wood H-fames and may be constructed to be single-circuit or double-circuit. The heights of the overhead poles could vary from 30 to 100 feet, depending on the entry angle required by the interconnecting utility.

The northern section of the project site (north of Manning Road) would be electrically connected to the central and southern sections via medium-voltage distribution lines. Medium voltage distribution lines would be routed either overhead or underground.

1.2.1.4 Energy Storage

A battery storage system would be located on-site and adjacent to the west of the existing PG&E Cayetano substation. The battery storage system could be designed to accept excess electrical load from the distribution system, and subsequently dispatch stored electricity during times of peak demand. Additionally, the storage system could be designed to charge from the facility during low demand hours and subsequently discharge during high demand hours. Batteries would be contained in several locking metal electrical enclosures. Low-voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer. The system would fit in four 100-foot by 180-foot buildings which would be sited near the Operations and Maintenance (O&M) building.

1.2.1.5 Support Facilities

The renewable energy system components would be enclosed by security fencing. Locked gates would provide two points of ingress/egress. Access pathways within the fence line would provide access for routine maintenance of the system. A meteorological station would collect site-specific weather data. A fiber optic telecommunications line required by the interconnecting utility would be integrated with the gen-tie line. An electrical control enclosure would be included on site for the operations electrician to monitor and manage the system.

Shielded, downward directional security lighting would be located at the control enclosure and O&M building for emergency repairs. Night lighting would not be required except during scheduled maintenance periods and emergency repairs. Signage would be limited to what is required by the interconnecting utility and County and would conform to County guidelines.

1.2.2 Concomitant Agricultural Uses

The project applicant plans to maintain a majority of the site in limited agricultural operation for the duration of the life of the solar facility. Solar facilities have a minimal development footprint, which allows for concomitant sheep grazing. Because the solar panels (modules) are installed on a system of racks, the ground below the modules remains undeveloped. Additional areas within the project site include grassy areas between the rows and undeveloped portions of the site that will remain as open space for the life of the project. The undeveloped areas would be available for sheep grazing and may be intermittently grazed or left fallow. Pollinator-friendly plant species would be used in landscaping and seed mixes to promote honeybee forage.

1.2.3 Construction Activities and Schedule

The duration of project construction would be approximately 9 months. Project construction activities would consist of site preparation, installation of interconnection facilities and battery storage system, cable installation, pile and skid installation, tracker and module installation, and lastly, site cleanup. Project construction would be completed in four phases, including Phase 1 site preparation (30 work days), Phase 2 PV installation (150 work days), Phase 3 electrical, battery storage system, and gen-tie installation (75 work days), and Phase 4 general construction operations, site clean-up and restoration (175 work days). Phase 4 would span the entire construction duration and be overlapped by Phases 1, 2, and 3. It is anticipated that the construction of Phases 2, and 3 would overlap. All construction staging areas would be located within the development footprint of the solar facility.

Limited excavation activities would be associated with trenching or boring for utilities, building structure foundations, and installing footings where required for structural safety. Most excavation activities would be less than 6 feet in depth; however, some excavations, such as those for the installation of electricity collector poles and dead-end structures, may reach depths of approximately 20 feet depending on site-specific soil conditions. All excavated material would be retained and utilized on the project site (no export of excavated material would occur).

Construction of the solar facility would commence as early as October 2021 or as late as February 2022 depending on final construction plans and building permit requirements. Construction would last for approximately 9 months. Construction of the various project components discussed above could occur simultaneously, sequentially, or some combination thereof.

Construction equipment would operate between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, for up to a maximum of eight hours per piece of equipment, daily. Weekend construction work is not expected to be required, but may occur on occasion, depending on schedule considerations. All construction work, including any weekend work, would comply with the policies and requirements established in the Noise Element of the County General Plan.

1.2.4 Vegetation and Agricultural Management

The project operations would promote continued agricultural use of the project site, promote wool production, promote honeybee forage vegetation and the control of invasive weeds, promote pollination services and honey production, maintain soil capability and minimize agricultural water use, and manage onsite fuel load of vegetation.

The vegetative cover would generally be kept low to prevent shading of solar panels, to minimize and manage buildup of combustible fuel loads which could otherwise result in a fire hazard, and to facilitate emergency and maintenance vehicle access. This would be accomplished by using low-growing species on the site and maintaining vegetation with grazing during the growing season and could include mechanical methods such as mowing, trimming, and hoeing. Grazing would occur from January until the end of the growing season in May, at which time the sheep would be removed from the site. During the grazing season, the grazing may be controlled by enclosing the sheep in temporary enclosures within the targeted grazing area and would be moved progressively throughout the site. The proposed program for concomitant agricultural land uses during operation of the solar facility would be outlined in an Agricultural Management Plan (AMP) prepared for the project. The AMP would be implemented to sustain agricultural operations throughout the project site for the duration of the life of the project. The project operator would work with commercial beekeepers and sheep operators to both ensure the project is developed for viable sheep and bee operations and to provide for routine, periodic access to the project site when forage conditions are favorable.

1.2.5 Decommissioning of Solar Facilities

The solar facility is anticipated to have an operating life of at least 50 years. Once the operating life of the facility is over, it would be either repowered or decommissioned. If repowering were to be pursued, it would require the facility owner to obtain all required permit approvals. Project decommissioning would occur in accordance with the termination or expiration of the CUP and would involve the removal of above-grade facilities, buried electrical conduit, and all concrete foundations in accordance with a

Decommissioning Plan. Equipment would be repurposed off-site, recycled, or disposed of in a landfill as appropriate.

After the operating life of the solar facility is complete, the battery storage system would be decommissioned along with the rest of the solar facility. Batteries may be disposed of as hazardous waste, or recycled, depending on available technology. Lithium-ion batteries and their constituent parts would likely be recycled. Lithium-ion batteries contain a variety of valuable metals in addition to lithium, and recycling of these batteries is expected to become increasingly commonplace with the increased use of batteries in consumer goods and electric vehicles. Some batteries may have the capacity at the end of the operating life of the project to be reused. The chemical components of flow batteries may either be disposed of as hazardous waste (i.e., neutralization of the liquid within the battery), or they may comprise valuable elements which would also be recycled or reused.

Decommissioning activities would involve exposure and disturbance of soils; therefore, measures for erosion and sediment control would be implemented in accordance with a separate Stormwater Pollution Prevention Plan (SWPPP) that would be required for decommissioning.

1.2.6 Applicant Proposed Measures

1.2.6.1 Agricultural Management Plan

Project operations will adhere to a County-approved Agricultural Management Plan (AMP) to ensure consistency of the facility with adjacent agricultural land uses. The AMP would fulfill the following project objectives:

- Promote continued agricultural use of the project site
- Promote wool production
- Promote honey-bee forage vegetation and the control of invasive weeds
- Promote pollination services and honey production
- Maintain soil capability and minimize agricultural water use
- Manage onsite fuel load of vegetation

The project owner will work with commercial beekeepers and sheep operators to both ensure the project is developed for viable sheep and bee operations and to provide for routine, periodic access to the project site when forage conditions are favorable.

1.2.6.2 Stormwater Management Plan

Prior to issuance of Building Permits, the project owner will submit to the County pre- and post-construction site drainage calculations prepared by a qualified hydrologist or civil engineer and supported by a 2-dimensional hydrologic model to understand whether the project would generate increased runoff. If an increase in runoff is projected, then sizing and location of appropriate detention basins or other stormwater best management practices will be recommended to mitigate any projected increase in offsite runoff and to protect downstream properties against adverse impacts.

A SWPPP will be prepared by qualified engineer, and the approved stormwater management practices in the SWPPP will be carried out by on-site construction and operations personnel to ensure that off-site stormwater sedimentation would not occur.

2.0 REGULATORY SETTING

Policies, regulations, and plans pertaining to the protection of biological resources on the project site are summarized in the following sections.

2.1 FEDERAL REQUIREMENTS

2.1.1 Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) enforces the provisions stipulated within the Federal Endangered Species Act of 1973 (FESA; 16 United States Code [USC] 1531 et seq.). Species identified as federally threatened or endangered (50 CFR 17.11, and 17.12) are protected from take, defined as direct or indirect harm, unless a Section 10 permit is granted to an entity other than a federal agency or a Biological Opinion with incidental take provisions is rendered to a federal lead agency via a Section 7 consultation. Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally-listed species may be present in the study area and determine whether the proposed project will jeopardize the continued existence of or result in the destruction or adverse modification of critical habitat of such species (16 USC 1536 (a)[3], [4]). Other federal agencies designate species of concern (species that have the potential to become listed), which are evaluated during environmental review under the National Environmental Policy Act (NEPA) or CEQA although they are not otherwise protected under FESA.

2.1.2 Executive Order 13186: Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA; 16 USC, Sec. 703, Supp. I, 1989) regulates and prohibits taking, killing, possession of, or harm to migratory bird species listed in Title 50 CFR §10.13. The MBTA protects whole birds, parts of birds, and bird eggs and nests and prohibits the possession of all nests of protected bird species whether they are active or inactive. An active nest is defined as having eggs or young, as described by the Department of the Interior in April 16, 2003 Migratory Bird Permit Memorandum. Nest starts (nests that are under construction and do not yet contain eggs) are not protected from destruction. This international treaty for the conservation and management of bird species that migrate through more than one country is enforced in the United States by the USFWS. Additionally, as discussed below, §3513 of the California Fish and Game Code states that it is unlawful to take or possess any migratory non-game bird as designated in the MBTA. This provides CDFW with enforcement authority for project-related impacts that would result in the "take" of bird species protected under the MBTA. Hunting of specific migratory game birds is permitted under the regulations listed in Title 50 CFR 20. The MBTA was amended in 1972 to include protection for migratory birds of prey (raptors).

2.1.3 The Bald and Golden Eagle Protection Act

The bald eagle and golden eagle are federally protected under the Bald and Golden Eagle Protection Act (16 USC 668–668c). It is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export, or import at any time or in any manner a bald or golden eagle, alive or dead; or any part, nest, or egg of these eagles unless authorized by the Secretary of the Interior. Violations are subject to fines and/or imprisonment for up to one year. Active nest sites are also protected from disturbance during the breeding season.

2.2 STATE REQUIREMENTS

2.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code Sections 2050 to 2097) is similar to the FESA. The California Fish and Wildlife Commission is responsible for maintaining lists of threatened and endangered species under CESA. CESA prohibits the take of listed and candidate (petitioned to be listed) species. "Take" under California law means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch capture, or kill (California Fish and Game Code, Section 86). The California Department of Fish and Wildlife (CDFW) can authorize take of a state-listed species under Section 2081 of the California Fish and Game Code if the take is incidental to an otherwise lawful activity, the impacts are minimized and fully mitigated, funding is ensured to implement and monitor mitigation measures, and CDFW determines that issuance would not jeopardize the continued existence of the species. A CESA permit must be obtained if a project will result in the "take" of listed species, either during construction or over the life of the project. For species listed under both FESA and CESA requiring a Biological Opinion under Section 7 of the FESA, CDFW may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the Fish and Game Code.

2.2.2 California Code of Regulations Title 14 and California Fish and Game Code

The official listing of endangered and threatened animals and plants is contained in the California Code of Regulations Title 14 §670.5. A state candidate species is one that the California Fish and Game Code has formally noticed as being under review by CDFW to include in the state list pursuant to Sections 2074.2 and 2075.5 of the California Fish and Game Code.

Legal protection is also provided for wildlife species in California that are identified as "fully protected animals." These species are protected under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species at any time. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by these species. CDFW has informed non-federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects. However, Senate Bill 618 (2011) allows the CDFW to issue permits authorizing the incidental take of fully protected species under the CESA, so long as any such take authorization is issued in conjunction with the approval of a Natural Community Conservation Plan that covers the fully protected species (California Fish and Game Code Section 2835).

2.2.3 California Environmental Quality Act

Under the California Environmental Quality Act of 1970 (Public Resources Code Section 21000 et seq.), lead agencies analyze whether projects would have a substantial adverse effect on a candidate, sensitive, or special-status species (Public Resources Code Section 21001(c)). These "special-status" species generally include those listed under FESA and CESA, and species that are not currently protected by statute or regulation, but would be considered rare, threatened, or endangered under the criteria included CEQA Guidelines Section 15380. Therefore, species that are considered rare are addressed under CEQA regardless of whether they are afforded protection through any other statute or regulation. The California Native Plant Society (CNPS) inventories the native flora of California and ranks species according to rarity; plants ranked as 1A, 1B, 2A and 2B are generally considered special-status species

under CEQA.[1] The East Bay Chapter of the CNPS maintains a database of Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties. Plants from the database with a rank of "A" were considered special-status species under CEQA for the purpose of this report.

Although threatened and endangered species are protected by specific federal and state statutes, State CEQA Guidelines Section 15380(d) provides that a species not listed on the federal or state list of protected species may be considered rare if it can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants and animals. Section 15380(d) of the State CEQA Guidelines allows a public agency to undertake a review to determine if a significant effect on species that have not yet been listed by either the USFWS or CDFW (i.e., candidate species) would occur. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agency has an opportunity to designate the species as protected, if warranted.

2.2.4 California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (California Fish and Game Code Sections 1900-1913) requires all state agencies to use their authority to carry out programs to conserve endangered and otherwise rare species of native plants. Provisions of the act prohibit the taking of listed plants from the wild and require notification of CDFW at least 10 days in advance of any change in land use (other than changing from one agricultural use to another), which allows CDFW to salvage listed plants that would otherwise be destroyed.

CNPS is a non-governmental conservation organization that has developed a list of plants of special concern in California. The following explains the designations for each plant species (CNPS 2020).

- Rank 1A – Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
- Rank 1B – Plants Rare, Threatened, or Endangered in California and Elsewhere
- Rank 2A – Plants Presumed Extirpated in California, but Common Elsewhere
- Rank 2B – Plants Rare, Threatened, or Endangered in California, but More Common Elsewhere
- Rank 3 – Plants About Which More Information is Needed- A Review List
- Rank 4 – Plants of Limited Distribution – A Watch List

Although the CNPS is not a regulatory agency and plants on these lists have no formal regulatory protection, plants with a Ranking of 1A through 2B may be considered to meet the definition of endangered, rare, or threatened species under Section 15380(d) of CEQA (see above), and impacts to these species may be considered "significant."

In addition, CDFW recommends, and local governments may require, protection of species which are regionally significant, such as locally rare species, disjunct populations, essential nesting and roosting habitat for more common wildlife species, or plants with a CNPS Ranking of 3 and 4. For example, the East Bay Chapter of the CNPS maintains a database of Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties. The following information is taken from the East Bay Chapter of the CNPS website (https://ebcnps.org/ebrare-plant-database/). The ranking system is first based on how many regions a plant occurs in, then on several other criteria including size of populations, limited or

[1] The California Rare Plant Rank system can be found online at https://www.cnps.org/rare-plants.

threatened habitat, stressed or declining populations, small geographical range, range limits, and other population threats. In addition, ranks are based on how many specific sites a plant occurs in within a region. In most cases, plants occurring in five or fewer regions (A-ranked plants) also have very few specific sites or individual locations within those regions. In a few cases, however, plants occurring in only a few regions have several specific sites within some of those regions, and/or several individual locations within those specific sites. In those cases, a species is sometimes given a lower rank. In addition to the A-ranked species, a two-tiered Watch List of B and C ranked plants tracks local native species that are not currently considered rare or endangered in the East Bay but that could become so if certain conditions persist such as over-development, water diversions, excessive grazing, weed or insect invasions, etc. B ranked species occur in 6 to 9 regions in the two counties or are otherwise subject to threat, and C ranked species currently occur in 10 to 15 regions in the two counties but have potential threats. A-ranked plants from the database were considered special-status species under CEQA for the purpose of this report because they are considered rare or endangered in the East Bay. The ranking system taken from (https://ebcnps.org/ebrare-plant-database/) is defined below:

- *A1x, *A1 or *A2: Species in Alameda and Contra Costa counties listed as rare, threatened or endangered statewide by federal or state agencies or by the state level of CNPS.

- A1: Species currently known from 2 or less regions in Alameda and Contra Costa Counties (but not rare statewide).

- A2: Species currently known from 3 to 5 regions in the two counties (but not rare statewide), or, if more regions, meeting other important criteria such as small populations, stressed or declining populations, small geographical range, limited or threatened habitat, etc.

- A1x: Species previously known from Alameda or Contra Costa Counties, but now believed to have been extirpated, and no longer occurring here.

- A?: Species that have been reported in the two-county area but identification is questionable and the species may not actually occur here.

2.2.5 Nesting Birds

California Fish and Game Code Subsections 3503 and 3800 prohibit the possession, take, or needless destruction of birds, their nests, and eggs, and the salvage of dead nongame birds. California Fish and Game Code Subsection 3503.5 protects all birds in the orders of Falconiformes and Strigiformes (birds of prey). Fish and Game Code Subsection 3511 states that fully protected birds or parts thereof may not be taken or possessed at any time. Fish and Game Code Subsection 3513 states that it is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act. The Attorney General of California has released an opinion that the Fish and Game Code prohibits incidental take.

2.2.6 California Food and Agriculture Code Section 403

This section directs the California Department of Food and Agriculture (CDFA) to prevent the introduction and spread of injurious pests including noxious weeds.

CDFA Code Section 7271 designates the CDFA as the lead department in noxious weed management responsible for implementing state laws concerning noxious weeds. Representing a statewide program, noxious weed management laws and regulations are enforced locally in cooperation with the County Agricultural Commissioner.

Under state law, noxious weeds include any species of plant that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, which the director, by regulation, designates to be a noxious weed (CDFA Code Section 5004).

2.3 LOCAL PLANS AND POLICIES

2.3.1 Alameda County General Plan

The Alameda (East County) County General Plan (Plan) is governed by the East County Area Plan (ECAP) and includes several policies intended to promote conservation of existing high-value biological resources in the county and protect sensitive resources and special-status plants and wildlife. In addition to biological resources, the Plan also identifies policies to preserve and protect other resources such as open space, agricultural lands, and sensitive viewsheds. The Alameda General Plan lists the area of the project site as Large Parcel Agriculture that is outside of the Urban Growth area. The Alameda County General Plan outlines several policies intended for the protection of biological resources, including the following, which apply to the project:

Policy 121: The County shall secure open space lands, through acquisition of easements or fee title, specifically for the preservation and protection of indigenous vegetation and wildlife.

Policy 122: The County shall encourage that wetland mitigation be consolidated in areas that are relatively large and adjacent to or otherwise connected to open space. To the extent possible, these areas should be included in, adjacent to, or linked through open space corridors with lands designated as "Resource Management" that are managed specifically for the preservation and enhancement of biological resources.

Policy 123: Where site-specific impacts on biological resources resulting from a proposed land use outside the Urban Growth Boundary are identified, the County shall encourage that mitigation is complementary to the goals and objectives of the ECAP. To that end, the County shall recommend that mitigation efforts occur in areas designated as "Resource Management" or on lands adjacent to or otherwise contiguous with these lands in order to establish a continuous open space system in East County and to provide for long term protection of biological resources.

Policy 124: The County shall encourage the maintenance of biological diversity in East County by including a variety of plant communities and animal habitats in areas designated for open space.

Policy 125: The County shall encourage preservation of areas known to support special status species.

Policy 126: The County shall encourage no net loss of riparian and seasonal wetlands.

Policy 127: The County shall encourage the preservation of East County’s oak woodland plant communities.

Policy 130: The County shall preserve an open space corridor connecting the Bird's Beak Preserve with lands designated "Resource Management." This open space corridor shall vary in width between 50 and 150 feet.

Policy 132: The County shall designate a zone of approximately 200 yards around the perimeter of the defined Bird's Beak Preserve in North Livermore as a Special Management Area. Within this zone, all proposed land uses and project designs shall be evaluated regarding their potential to affect the viability of the Springtown valley sink scrub habitat, and mitigation shall be incorporated into the approval of detailed development plans within this 200 yard zone to avoid the impact. Mitigation may take the form of clustering development to avoid sensitive areas, management practices, land swap with the Federal Communications Commission (FCC) Monitoring Station, or other appropriate measures.

2.3.2 East Alameda County Conservation Strategy

The East Alameda County Conservation Strategy (EACCS) is a collaborative effort between willing land-owners, local agencies and resources agencies for the preservation of endangered species and their habitat through conservation. The EACCS ensures that environmental review provides for assessment of areas in east Alameda County for their habitat conservation value and to establish guiding principles for conservation. The EACCS is intended to guide these agencies to work with willing landowners for long-term conservation stewardship that would offset and mitigate impacts from local land use, transportation and other infrastructure projects. All conservation on private lands is voluntary.

The EACCS study area encompasses the cities of Dublin, Livermore, and Pleasanton, and unincorporated Alameda County areas surrounding these cities, including the project site. The western boundary of the EACCS study area follows the western edge of the Alameda Creek watershed, and the northern, southern, and eastern boundaries follow the Alameda County line with its adjacent counties. The EACCS study area includes the proposed project site (ICF 2010). Although participation in the EACCS by applicant is voluntary, Alameda County participates in the strategy and considers it to be the best available information when considering the impacts of a proposed project.

2.3.3 East Bay Regional Conservation Investment Strategy

On September 22, 2016, the Governor signed Assembly Bill 2087 which created CDFW's Regional Conservation Investment Strategy (RCIS) pilot program (Program). The Program went into effect on January 1, 2017 and is administered by CDFW's Habitat Conservation Planning Branch in Sacramento. On July 21, 2017 the Governor signed Senate Bill 103 which makes two changes to Assembly Bill 2087: (1) it removes the January 1, 2020 "sunset" provision; and (2) it allows a RCIS to be exempt from the "cap" (i.e., the limit of eight RCISs that may be approved by CDFW) if a state water or transportation infrastructure agency requests approval of the RCIS.

The new Program encourages a voluntary, non-regulatory regional planning process intended to result in higher-quality conservation outcomes and includes an advance mitigation tool. The Program uses a science-based approach to identify conservation and enhancement opportunities that, if implemented, will help California's declining and vulnerable species by protecting, creating, restoring, and reconnecting habitat and may contribute to species recovery and adaptation to climate change and resiliency.

The Program consists of three components: regional conservation assessments (RCAs), RCISs, and mitigation credit agreements (MCAs).

An RCIS is a voluntary, non-regulatory, and non-binding conservation assessment that includes information and analyses relating to the conservation of focal species, their associated habitats, and the conservation status of the RCIS land base. Any public agency may develop an RCIS. An RCIS establishes biological goals and objectives at the species level and describes conservation actions and habitat enhancement actions that, if implemented, will contribute to those goals and objectives. Those actions will benefit the conservation of focal species, habitats, and other natural resources and they may be used as a basis to provide advance mitigation through the development of credits (see MCA section below) or to inform other conservation investments. Examples of potential RCIS conservation and habitat enhancement actions include, but are not limited to:

- Land acquisition and protection
- Habitat creation and restoration
- Restoration of creeks and rivers
- Restoration of habitat on public land
- Installation of wildlife crossings and fish passage barrier removal

The development of RCISs does not create, modify, or impose regulatory requirements or standards, regulate land use, establish land use designations, or affect the land use authority of a public agency. If approved by CDFW, an RCIS may be valid for up to 10 years. CDFW may extend the duration of an approved or amended RCIS for an additional 10 years provided the RCIS is updated to include new scientific information and the RCIS continues to meet the Program's requirements as outlined in Fish and Game Code (Chapter 9, Section 1850, et seq.).

The Coastal Conservancy is the East Bay RCIS project proponent and the East Bay RCIS area comprises all of Contra Costa and Alameda Counties. The East Bay RCIS presents conservation goals and objectives for the RCIS area. Incorporated into those goals and objectives are conservation priorities for land acquisition, restoration, and enhancement. These conservation priorities are intended to be used in multiple ways. First, conservation organizations can use these priorities to inform the work they do, ensuring that their efforts align with the goals in the RCIS. This alignment includes the pursuit of funding for land acquisition, restoration, and enhancement. Second, the conservation priorities presented in this RCIS can also inform project permitting and regulatory processes by providing project proponents, regulatory agencies, and those agencies with local land use authority information to identify priority conservation actions that can be used to meet project mitigation needs.

This East Bay RCIS was developed to complement other key planning efforts that overlap the RCIS area. Primarily, it builds on existing efforts to develop a Regional Advance Mitigation Planning (RAMP) for the Bay Area with a focus on transportation projects, and utilizing the Conservation Lands Network data developed through a Bay Area Open Space Council planning effort. This RCIS was also developed to be consistent and coordinated with the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCC HCP/NCCP), addressing species and geographic locations that are not covered by that plan and including conservation actions that complement the ECCC HCP/NCCP's conservation strategy. Additionally, the RCIS considers species recovery plans, city general plans, the EACCS, and other relevant plans and policies.

While the East Bay RCIS is a voluntary program, where possible, the project will protect and enhance habitat for common and special-status species while achieving the project objectives. In general, the project site was chosen because it provides relatively low quality habitat for wildlife and will sustain wildlife populations throughout the life of the project by maintaining vegetative cover and bee forage as well as wildlife corridors and allow for wildlife movement across the site.

2.4 JURISDICTIONAL WATERS

2.4.1 Federal Requirements

Any person, firm, or agency planning to alter or work in "waters of the U.S.," (WOTUS) including the discharge of dredged or fill material, must first obtain authorization from the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA; 33 USC 1344). Permits, licenses, variances, or similar authorization may also be required by other federal, state, and local statutes. Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from USACE (33 USC 403).

On April 21, 2020, the U.S. Environmental Protection Agency (USEPA) and USACE published the Navigable Waters Protection Rule(NWPR) to define "Waters of the United States" in the Federal Register. On June 22, 2020, the NWPR: Definition of "Waters of the United States" became effective in 49 states, including California, and in all US territories.

The NWPR regulates traditional navigable waters and perennial or intermittent tributary systems, and defines four categories of regulated waters including:

- The territorial seas and traditional navigable waters;
- Perennial and intermittent tributaries to those waters;
- Certain lakes, ponds, and impoundments; and
- Wetlands adjacent to jurisdictional waters.

The NWPR also defines 12 categories of exempted aquatic resources:

1. Waters not listed as WOTUS
2. Groundwater
3. Ephemeral features
4. Diffuse stormwater run-off
5. Ditches not identified as WOTUS
6. Prior converted cropland
7. Artificially irrigated areas
8. Artificial lakes and ponds
9. Water-filled depressions incidental to mining or construction activity
10. Stormwater control features
11. Groundwater recharge, water reuse, and wastewater recycling structures
12. Waste treatment systems

With non-tidal waters, in the absence of adjacent wetlands, the extent of USACE jurisdiction extends to the ordinary high-water mark (OHWM) – the line on the shore established by fluctuations of water and

indicated by a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, or the presence of litter and debris. Wetlands are defined in 33 CFR Part 328 as:

> "*those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.*"

Federal and state regulations pertaining to waters of the U.S., including wetlands, are discussed below.

Clean Water Act (CWA; 33 USC 1251-1376). The CWA provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

Section 401 requires that an applicant for a federal license or permit that allows activities resulting in a discharge to waters of the U.S. must obtain a state certification that the discharge complies with other provisions of CWA. The Regional Water Quality Control Board (RWQCB) administers the certification program in California and may require State Water Quality Certification before other permits are issued.

Section 402 establishes a permitting system for the discharge of any pollutant (except dredged or fill material) into waters of the U.S. This system is the National Pollutant Discharge Elimination System (NPDES) program, administered by the USEPA, that has granted oversight authority in California to the State Water Resources Control Board (SWRCB) through its RWQCBs.

Section 404 establishes a permit program administered by USACE that regulates the discharge of dredged or fill material into waters of the U.S. (including wetlands). Implementing regulations by USACE are found at 33 CFR Parts 320-332. The Section 404 (b)(1) Guidelines were developed by the USEPA in conjunction with USACE (40 CFR Part 230), allowing the discharge of dredged or fill material for non-water dependent uses into special aquatic sites only if there is no practicable alternative that would have less adverse impacts.

2.4.2 State Requirements

2.4.2.1 Waters of the State

Any action requiring a CWA Section 404 permit, or a Rivers and Harbors Act Section 10 permit, must also obtain a CWA Section 401 Water Quality Certification. The State of California Water Quality Certification (WQC) Program was formally initiated by the SWRCB in 1990 under the requirements stipulated by Section 401 of the Federal CWA. Although the Clean Water Act is a Federal law, Section 401 of the CWA recognizes that states have the primary authority and responsibility for setting water quality standards. In California, under Section 401, the State and Regional Water Boards are the authorities that certify that issuance of a federal license or permit does not violate California's water quality standards (i.e., that they do not violate Porter-Cologne and the Water Code). The WQC Program currently issues the WQC for discharges requiring USACE permits for fill and dredge discharges within Waters of the United States, and now also implements the State's wetland protection and hydromodification regulation program under the Porter Cologne Water Quality Control Act.

On April 2, 2019, the SWRCB adopted a State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State (Procedures), for inclusion in the forthcoming Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries and Ocean Waters of California. The Procedures consist of four major elements: (1) a wetland definition; (2) a framework for

determining if a feature that meets the wetland definition is a water of the state; (3) wetland delineation procedures; and (4) procedures for the submittal, review and approval of applications for Water Quality Certifications and Waste Discharge Requirements for dredge or fill activities. The Office of Administrative Law approved the Procedures on August 28, 2019, and the Procedures become effective May 28, 2020. The SWRCB circulated final implementation Guidance on the Procedures in April 2020.

Under the Procedures and the State Water Code (Water Code §13050(e)), "Waters of the State" are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." Unless excluded by the Procedures, any activity that could result in discharge of dredged or fill material to Waters of the State, which includes Waters of the U.S. and non-federal Waters of the State, requires filing of an application under the Procedures.

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act, Water Code Section 13000 et seq.) is California's statutory authority for the protection of water quality in conjunction with the federal CWA. The Porter-Cologne Act requires the SWRCB and RWQCBs under the CWA to adopt and periodically update water quality control plans, or basin plans. Basin plans are plans in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California. The Porter-Cologne Act also requires dischargers of pollutants or dredged or fill material to notify the RWQCBs of such activities by filing Reports of Waste Discharge and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements, NPDES permits, Section 401 water quality certifications, or other approvals. Projects that do not require a federal permit may still require review and approval by the RWQCB. The RWQCB focuses on ensuring that projects do not adversely affect the "beneficial uses" associated with waters of the State. In most cases, the RWQCB requires the integration of water quality control measures into projects that will require discharge into waters of the State. For most construction projects, the RWQCB requires the use of construction and post-construction best management practices.

2.4.2.2 California Fish and Game Code Section 1602 – Lake and Streambed Alteration Program

Diversions or obstructions of the natural flow of, or substantial changes or use of material from the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW, pursuant to Section 1602 of the California Fish and Game Code. The CDFW requires notification prior to commencement of any such activities, and a Streambed Alteration Agreement (SAA) pursuant to Fish and Game Code Sections 1601-1603, if the activity may substantially adversely affect an existing fish and wildlife resource.

3.0 METHODS

Studies conducted in preparation of this BTR included a desktop evaluation and background research to identify sensitive biological communities and/or special-status species with the potential to occur on or near the project site, as well as biological field surveys to document baseline conditions and special-status species and/or their habitats on and adjacent to the site. These included biological reconnaissance surveys, wetland assessments, a habitat assessment and two full seasons of protocol surveys for California red-legged frog (*Rana draytonii*) (CRLF), a habitat assessment for California tiger salamander (*Ambystoma californiense*) (CTS), protocol surveys for burrowing owl (*Athene cunicularia*), and focused botanical surveys. Methods are presented in the following sections.

3.1 DATABASE AND LITERATURE REVIEW

The most current available lists of special-status species known to occur and/or having the potential to occur in the project region were reviewed to determine their potential to occur on the project site or otherwise be affected by project-related activities on the project site.

For the purposes of this analysis, special-status species are defined as those species meeting one or more of the following criteria:

- Listed as Threatened or Endangered under FESA;
- Listed as Threatened or Endangered under CESA;
- Under review for listing under FESA or CESA (Candidate);
- "Fully Protected" under California Fish and Game Code Section 3511, 4700, 5050, or 5515;
- Included on the list of Species of Special Concern (SSC) by the CDFW;
- Included on the Watch List of species that may qualify as SSC by the CDFW;
- Having a California Rare Plant Rank (CRPR) of 1A (presumed extinct in California and rare elsewhere), 1B (rare in California and elsewhere), 2A (presumed extinct in California but more common elsewhere), 2B (rare in California but more common elsewhere), or 3 (more information needed); or
- Included on the East Bay Chapter of the CNPS Database of Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties with a Rank of "A."

The following lists were reviewed and are included in Appendix B:

- The Sacramento Fish and Wildlife Office list of threatened and endangered species that may occur in the project site and/or may be affected by the project (USFWS 2020a).
- The CNPS list of special-status plants documented in the *Tassajara* and *Livermore* 7.5-minute quads (CNPS 2020).
- East Bay Chapter of the CNPS database of Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties occurring within the Morgan Territory (Dmg) area (Lake 2020).
- The California Natural Diversity Database (CNDDB; CDFW 2020 list of special-status species documented in the *Tassajara* and *Livermore* 7.5-minute quads.

Table C-1 in Appendix C presents the general habitat requirements, status, the potential for the species to occur, and rationale for each species evaluated. Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties that are not otherwise included on the CNPS statewide list, USFWS list, or the CNDDB (considered locally rare plants) are not evaluated in detail in Table C-1 in Appendix C due to the high volume of species reported in the database. However, each of these locally rare plant species was evaluated for the potential to occur in the project site based on elevation and habitat requirements and

species with the potential to occur in habitats present on the project site and similar elevations to the project site are documented in Table C-2 in Appendix C. Species determined to have no potential to occur in the project site or be otherwise affected by activities in the site were excluded from further evaluation. Species having the potential to occur in the project site and/or be affected by project activities are evaluated in detail in Section 5 of this BTR.

The USFWS National Wetlands Inventory (USFWS 2020) was reviewed to determine the presence of wetlands and water features in the project area.

3.1.1 Biological Surveys

Numerous biological surveys have been conducted by HELIX and staff from Surf to Snow (previously Californian Environmental Services) over the last 2.5 years. Biological surveys conducted at the project site are summarized in Table 1; Dr. Gretchen Padgett-Flohr and Jennifer Gonterman are with Surf to Snow and the remaining biologists are with HELIX. A list of plant and animal species observed during the general biological surveys (not including protocol surveys) is included in Appendix D. Biological surveys are described briefly below and protocol survey reports are included as appendices to this BTR. Protocol survey reports include lists of species observed during species-specific surveys.

Table 1
BIOLOGICAL SURVEYS CONDUCTED FOR THE PROPOSED PROJECT

Survey Dates	Personnel	Tasks Performed
December 6, 2017	Stephen Stringer, M.S.	Biological reconnaissance survey; CRLF and CTS habitat assessment
January 30, 2018	Gretchen Padgett-Flohr, Ph.D., Stephen Stringer, M.S. and Jennifer Gonterman	CRLF protocol survey (daytime)
January 31, 2018	Stephen Stringer, M.S.	CRLF protocol survey (daytime)
January 31, 2018	Stephen Stringer, M.S. and Jennifer Gonterman	CRLF protocol survey (nighttime)
March 15, 2018	Stephen Stringer, M.S. and Jennifer Gonterman	CRLF protocol survey (nighttime); botanical survey
March 29, 2018	Stephen Stringer, M.S. and Jennifer Gonterman	Botanical survey; CRLF protocol survey (nighttime)
April 23, 2018	Stephen Stringer, M.S. and Jennifer Gonterman	Botanical survey; CRLF protocol survey (nighttime)
May 3, 2018	Stephen Stringer, M.S. and Jennifer Gonterman	Botanical survey; CRLF protocol survey (nighttime)
July 31, 2018	George Aldridge, Ph.D. Patrick Martin	CRLF daytime and nighttime protocol survey; reconnaissance biological survey; wetland assessment; botanical survey
August 1, 2018	George Aldridge, Ph.D. Patrick Martin	Reconnaissance biological survey; wetland assessment; botanical survey
February 6, 2020	George Aldridge, Ph.D. Stephanie McLaughlin, M.S.	Burrowing owl habitat assessment
February 6, 2020	Patrick Martin Haile Goeman	CRLF protocol survey (daytime); wetland assessment
February 25, 2020	Patrick Martin Stephanie McLaughlin, M.S.	Burrowing owl survey
February 26, 2020	Patrick Martin Stephanie McLaughlin, M.S.	Burrowing owl survey
March 9, 2020	Patrick Martin Stephanie McLaughlin, M.S.	CRLF protocol survey (daytime and nighttime)
March 17, 2020	Patrick Martin Haile Goeman	CRLF protocol survey 4 (nighttime)
April 6, 2020	Patrick Martin Haile Goeman	CRLF protocol survey (nighttime)
April 22/23, 2020	Stephanie McLaughlin, M.S. Haile Goeman	Burrowing owl survey
April 28, 2020	Patrick Martin	CRLF protocol survey (nighttime)
May 21/22, 2020	Patrick Martin Stephanie McLaughlin, M.S.	Burrowing owl survey
June 17/18, 2020	Patrick Martin	Burrowing owl survey
June 18, 2020	Stephen Stringer	Botanical survey; general biological reconnaissance survey
July 14, 2020	Patrick Martin	CRLF protocol survey (daytime and nighttime)

3.1.2 General Biological Reconnaissance

Biological reconnaissance surveys were conducted at the project site by HELIX Principal Biologist Stephen Stringer, M.S., HELIX Senior Botanist/Biologist George Aldridge, Ph.D., and HELIX Senior Wildlife Biologist Patrick Martin. Mr. Stringer conducted biological reconnaissance surveys on December 6, 2017 and June 18, 2020. Dr. Aldridge and Patrick Martin conducted biological reconnaissance surveys of the project site on July 31 and August 1, 2018. Biological reconnaissance surveys included habitat mapping and a plant and wildlife inventories. Boundaries of biological habitats were primarily determined based on the composition of dominant plant species. Transects were walked of the entire site to gain 100 percent visual site coverage. Habitat types were documented and animal species (and sign) observed on site were documented. The biological reconnaissance surveys included searching for mammal burrows and dens of fossorial animals. Representative photos of the site are provided in Appendix E.

3.1.3 Botanical Surveys

HELIX Principal Biologist Stephen Stringer, M.S. conducted botanical surveys on the site on March 15, and 29, April 23, and May 3, 2018. HELIX Senior Botanist/Biologist George Aldridge, Ph.D. conducted botanical surveys of the project site on July 31 and August 1, 2018. An additional botanical survey was conducted by Mr. Stringer on June 18, 2020. Botanical inventories were conducted in compliance with the *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities* (CDFW 2000), and CNPS' botanical survey guidelines (CNPS 2001). Transects were walked of the entire site to gain 100 percent visual site coverage and then surveys were focused in areas that provided potential habitat for special-status plants. Habitat types were documented, and plant species observed on site were documented.

3.1.4 California Red-Legged Frog Habitat Assessment and Protocol Surveys

A habitat assessment and two full seasons of protocol surveys for CRLF were conducted (see Table 1). The report detailing these surveys is included as Appendix F. The methods used for this CRLF site assessment and protocol surveys were derived from the USFWS *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS 2005). The site assessment included a review of available resources to provide an overview of the upland and aquatic habitats present within the project site and surrounding vicinity. The CDFW California Natural Diversity Database (CDFW 2020 and the *Recovery Plan for the California Red-legged Frog* (*Rana aurora draytonii*; USFWS 2002) were reviewed for information regarding known existing and historic populations of CRLF in the project region.

The habitat assessment for CRLF was conducted by HELIX Principal Biologist Stephen Stringer, M.S. on December 6, 2017 and focused on aquatic habitats along ephemeral and intermittent streams. Three criteria were used to assess the likelihood of CRLF presence in or within the vicinity of the project site: (1) the location of the project site with respect to the current and historic range of CRLF, (2) the presence/absence of known records of CRLF within a one-mile radius of the project site, and (3) the habitat types occurring within the project site and within a one-mile radius.

All aquatic habitats on the project site were identified and assessed for the potential to support CRLF. Habitats were determined to meet the criteria for suitable CRLF breeding habitat if they met the criteria for aquatic habitat in the literature (USFWS 2002 and 2005). Such habitats include low-gradient

freshwater bodies, including ponds, marshes, sag ponds, dune ponds, stock ponds, lagoons, seeps, springs, and backwaters within streams and creeks with still or slow moving fresh water deeper than 2.3 feet (0.7 meter) with dense, shrubby emergent or overhanging vegetation that provides egg deposition sites and cover for adult frogs and that persists for a minimum of 20 weeks following the breeding season (November through April).

Two full seasons of protocol surveys for CRLF were conducted in all suitable aquatic habitats on the site; once in 2018 and again in 2020. Protocol surveys in 2018 were conducted from January 30 to July 31, 2018 and protocol surveys in 2020 were conducted from February 6, 2020 to July 14, 2020. A total of eight surveys were conducted for CRLF at the project site during winter, spring and summer of 2018 and an additional eight surveys were conducted during the winter, spring and summer of 2020. The CRLF protocol surveys were conducted by HELIX Principal Biologist Stephen Stringer, M.S., HELIX Senior Botanist/Biologist George Aldridge, Ph.D., HELIX Senior Wildlife Biologist Patrick Martin (CRLF permitted biologist TE-778195-14), HELIX Biologist Stephanie McLaughlin, M.S., and HELIX Biologist Halie Goeman in addition to CRLF permitted biologists from Surf to Snow, Gretchen Padgett-Flohr, Ph.D., and Jennifer Gonterman (TE-006112-7), as detailed in Table 1. All suitable aquatic habitat identified during the site assessment as having the potential to support CRLF was surveyed during each survey event.

3.1.5 California Tiger Salamander Habitat Assessment

A habitat assessment for CTS was conducted concurrently with the habitat assessment for CRLF on December 6, 2017 and focused on a search for any potential breeding habitat for CTS on or adjacent to the site. Because there are no wetlands outside of drainages on or adjacent to the site, the habitat assessment focused on aquatic habitats along ephemeral and intermittent streams.

3.1.6 Burrowing Owl Protocol Surveys

A habitat assessment and protocol surveys for burrowing owl were conducted in 2020. A habitat assessment of the site was conducted on February 6, 2020 and the site was determined to provide suitable breeding and foraging habitat for burrowing owl. Breeding season burrowing owl surveys were then conducted according to the guidelines prepared by CDFW in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The Property was surveyed a total of four times during the burrowing owl breeding season (Table 1) by HELIX biologists with extensive experience at burrowing owl surveys. The burrowing owl protocol survey report is included as Appendix G.

3.2 ASSESSMENT OF WETLANDS AND OTHER WATERS

An assessment of potential wetlands and other waters of the U.S. and State on the project site was conducted on July 31 and August 1, 2018 by Dr. Aldridge and Patrick Martin. On February 6, 2020 an additional assessment of potential wetlands and other waters of the U.S. was completed by Mr. Martin and HELIX biologist Halie Goeman. The presence of wetlands and other waters were determined based on the USACE three parameter method described in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0*; USACE 2008). A total of 10 data points were taken in the project site. Aquatic resources in the project site were also evaluated for their potential to qualify as waters of the State subject to RWQCB jurisdiction and/or CDFW jurisdiction. A map of aquatic resources and data point locations in the project site are mapped in Appendix A: Figure 5 and the wetland datasheets are provided in Appendix H.

3.3 INVASIVE SPECIES

Plant species observed in the project site were compared to the list of invasive plants in California maintained by the California Invasive Plant Council (Cal-IPC; 2006) and the list of noxious weeds maintained by the CDFA (2010). Several invasive and noxious weed species listed by Cal-IPC and CDFA occur in the project site, as would be expected due its highly disturbed nature. Invasive and noxious weeds are identified on the plant species observed list in Appendix D and discussed further in Section 4.6.3.

CDFA List "C" species warrant state-endorsed holding action and eradication only when found in a nursery; actions to retard spread outside of nurseries is conducted at the discretion of the commissioner; and warrant rejection only when found in a crop seed for planting or at the discretion of the commissioner. In addition, the Cal-IPC categorizes plants as "high, moderate, or limited," reflecting the level of each species' negative ecological impact in California. Each plant on the list received an overall rating of high, moderate, or limited based on the following evaluation criteria:

- High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

- Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

- Limited – These species are invasive, but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

4.0 RESULTS: ENVIRONMENTAL SETTING

4.1 EXISTING LAND USE

The project site lies in a rural area of northern Alameda County and is surrounded primarily by undeveloped land supporting grazing, agricultural and rural residential uses. Los Vaqueros Reservoir lies 3 miles north and the city limits of Livermore and I-580 lie approximately 2.5 miles south of the project site. Other communities in the area include the community of Tassajara located an estimated 5 miles west of the project site and the City of Dublin, located southwest of the project site.

The project site is currently in use for cattle grazing and production of dryland grain crops. Dryland grain crop occurs in the northern parcel north of Manning Road and in the two southern parcels. The central parcel south of Manning Road is used for cattle grazing and exhibits evidence of prior agricultural use (e.g., disking/furrowing), likely production of feed for cattle such as hay crops. One or more travel trailers occupied by the caretaker(s) are typically present in the northern portion of the central parcel,

accessed from a driveway from Manning Road. A review of aerial photographs (Google Earth 2020) and landowner interviews indicates that the project site has been in use for cattle grazing and production of dryland grain crops for nearly one hundred years.

4.2 CLIMATE

The climate of Alameda County is Mediterranean, characterized by wet, cool winters and dry, hot summers. The nearest weather station is the Livermore Municipal Airport, located approximately 3.8 miles southwest of the project site in Alameda County. Mean daily maximum and minimum temperatures are 88 degrees and 57 degrees Fahrenheit in July, and 58 and 38 degrees Fahrenheit in January (NRCS 2020a). The mean annual precipitation is 14.0 inches, with nearly 100 percent occurring as rain from September through May. The weather station at the Livermore Municipal Airport received 11.3 inches of rainfall in the 2019/2020 rain season from (October to September) or about 81 percent of normal (NRCS 2020a). During the 2018/2019 rain year, the weather station received 13.7 inches of precipitation, which is nearly average. In the 2017/2018 rain year, the nearby weather station received 25.6 inches of precipitation, which is approximately 183 percent of normal (NRCS 2020a).

4.3 TOPOGRAPHY

Alameda County is in central California and spans the Coastal Mountain Range. The County's boundaries are the San Francisco Bay on the west and Contra Costa County on the north, Santa Clara County to the south and San Joaquin County to the east. The eastern part of Alameda County in Livermore Valley is characterized by rolling foothills and annual grasslands. The project site is in a valley and is surrounded by peaks of the Coastal Mountains reaching a height of approximately 2,000 feet.

4.4 SOILS

Soils in the project site are loamy to clay in five soil mapping units (NRCS 2020b) and a soil map is provided in (Appendix A: Figure 6):

Clear Lake clay loam, drained, 0 to 2 percent slopes, MLRA 14 is a poorly drained basin alluvium derived from igneous, metamorphic and sedimentary rock. Clear lake clay loam has a depth of greater than 80 inches to the restrictive layer and a depth of 36 to 72 inches to the water table. This soil is considered prime farmland if it is irrigated. Clear Lake clay loam is rated as a hydric soil (NRCS 2018c).

Diablo clay, very deep, 3 to 15 percent slopes is a well-drained alluvium derived shale and siltstone. Diablo clay has a depth of greater than 80 inches to the water table and the restrictive layer. This soil is considered prime farmland of statewide importance. Diablo clay is rated as a hydric soil because of hydric inclusions (NRCS 2018c).

Linne clay loam, 3 to 15 percent slopes is a well-drained residuum and is derived from shale and sandstone. Linne clay loam has a depth of greater than 80 inches to the water table and is described as having a paralithic bedrock restrictive layer at depths of 20–40 inches. This soil is nonsaline to very slightly saline and is considered farmland of statewide importance. Linne clay loam is rated as a hydric soil because of hydric inclusions (NRCS 2018c).

Linne clay loam, 15 to 30 percent slopes, MRLA 15 is a well-drained residuum and is derived from calcareous shale. Linne clay loam has a depth of greater than 80 inches to the water table and is

described as having a paralithic bedrock restrictive layer at depths of 35 to 50 inches. This soil is not considered prime farmland. Linne clay loam is rated as a hydric soil because of hydric inclusions (NRCS 2018c).

Linne clay loam, 30 to 45 percent slopes, eroded is a somewhat poorly drained alluvium derived from sedimentary rock. Solano loam has a depth of 36 to 48 inches to the water table and a depth of greater than 80 inches to the restrictive layer. This soil is strongly saline and is not considered prime farmland. Linne clay loam is rated as a hydric soil (NRCS 2018c).

4.5 HYDROLOGY

The project site spans the Lower Arroyo Las Positas watershed (HUC12 180500040302) and the Upper Arroyo Las Positas watershed (HUC12 180500040203). Both watersheds are a part of the San Francisco Bay watershed (HUC8 18050004). Cayetano Creek is a natural stream that has been manipulated and impounded upstream and downstream of the project site, which has altered its flow regime. There are three branches of Cayetano Creek that occur adjacent to the project site; both minor branches only flow very infrequently during heavy precipitation events. Cayetano Creek ultimately drains to Alameda Creek and the San Francisco Bay.

The project site is not irrigated and consists almost entirely of annual grassland or dry cropland, which consists mostly of annual grasses. This site has been cultivated to grow hay and/or graze cattle for nearly a century. Water that may collect in depressional upland areas is from precipitation, which ultimately drains to Cayetano Creek adjacent to the site. One unnamed ephemeral stream on the property north of Manning Road transitions to an upland swale, and water terminates in uplands. There are no natural or manmade water conveyance features that direct flows to or from the site; flows entering or leaving the site would be limited to sheet flow or other forms of overland flow.

4.6 GENERAL BIOLOGICAL RESOURCES

4.6.1 Vegetation Communities/Land Cover Types within the Project Site

Five vegetation communities/land cover types are present in the project site: developed, annual grassland, dryland grain crop, upland swale, and ephemeral stream (Appendix A: Figure 5).

4.6.1.1 Developed

Developed areas, which comprise 2.82 acres in the project site, consist of areas that are graveled or supported buildings with associated ornamental vegetation. There are two areas in the project site that are classified as developed. The first developed area, at 1815 Manning Road and about 400 feet from Manning Road, is a former and abandoned homestead that is presently used by the property caretaker using one or more travel trailers, in the northern portion of the central parcel with trees that include black locust (*Robinia pseudoacacia*) and Peruvian pepper trees (*Schinus molle*). The other developed area is in the southeastern corner of the central parcel and is a graveled staging area with equipment being used for a gas line installation through the region. These isolated areas are heavily disturbed and consist mostly of bare ground or landscaped vegetation. Landscaped vegetation may provide habitat for wildlife such as nesting birds.

4.6.1.2 Annual Grassland

Annual grassland, which totals 267.77 acres in the project site, comprises the majority of the land cover in the central parcel and includes primarily grazed fields and field margins. Agricultural operations observed within the annual grassland in the central project consist of cattle grazing with cattle actively grazing the project site during many of the surveys. This annual grassland community appears to have been functioning for agricultural use for nearly a century based on historical aerial imagery (Google Earth 2020). Most of the annual grassland in the project site is dominated by wild oats (*Avena fatua*), soft brome (*Bromus hordeaceus*), yellow star-thistle (*Centaurea solstitialis*) and ripgut brome (*Bromus diandrus*). Other portions of the annual grassland community are dominated by a mix of Italian rye grass (*Festuca perennis*), black mustard (*Brassica nigra*), medusahead (*Elymus caput-medusae*) and soft brome. The annual grassland seems to lack a significant population of fossorial mammal species as evidenced by very few California ground squirrels (*Otospermophilus beecheyi*) observed during the survey. Burrowing mammals were detected in the annual grassland but were very rare compared to areas adjacent to the project site along Cayetano Creek and the dryland grain cropland in the northern parcel north of Manning Road.

4.6.1.3 Dryland Grain Crop

Dryland grain crop, which comprises 138.76 acres in the project site, occupies most of the northern parcel on the project site, north of Manning Road and the two southern parcels. This habitat is dominated by oats and other annual grasses and is harvested for hay production. During the survey on August 1, 2018, the cropland in the northern parcel was harvested, and hay bales were stacked on the project site. On February 6, 25 and 26, 2020 the southern parcels on the project site were tilled and planted with oats or some other dryland grain crop. The dryland grain crop is not irrigated and functions in a similar fashion to annual grasslands in the central parcel and provides habitat for fossorial wildlife such as California ground squirrel, which were abundant during the survey. This cropland appears to have been functioning for agricultural use for nearly a century based on historical aerial imagery (Google Earth 2020). This vegetation community is dominated by oats but also contains weedy non-crop species such as soft brome, Italian rye grass, pineapple weed (*Matricaria discoidea*), and other annual grasses and forbs.

4.6.1.4 Upland Swale

An upland swale is a low area on the landscape that appears to briefly channel water during periods of precipitation. Uplands swales support vegetation that is consistent with upland areas such as annual grassland and dryland grain cropland in the project site (as discussed in Section 4.6.1.2 and 4.6.1.3), although more hydrophytes were observed in this area than the surrounding communities. One upland swale is present on the northern parcel and comprises 0.39 acre in the project site. Vegetation in this community is dominated by wild oat and Italian ryegrass, but also supports burclover (*Medicago polymorpha*), yellow star-thistle and pineapple weed.

4.6.1.5 Ephemeral Stream

An ephemeral stream is characterized as a feature with a bed and a bank that channels water from uplands and typically only flows during periods of precipitation. Ephemeral streams have a brief hydroperiod which is not supported by groundwater, and flow in the streams stops after precipitation events have ceased or shortly thereafter. Ephemeral streams typically do not support wetlands due to

their brief hydroperiods, although they typically have an incised bank. In the project site, there is one ephemeral stream totaling 0.08 acre that crosses the northwest corner of the northern parcel (north of Manning Road), which transitions into an upland swale as it re-enters the site. This ephemeral stream terminates in uplands and is not a tributary to any other streams. The ephemeral stream in the project site supports vegetation consistent with vegetation described in the annual grassland (Section 4.6.1.2) and is dominated by weedy non-crop species such as soft brome, Italian rye grass, yellow star-thistle, dove weed, and other annual grasses and forbs.

4.6.2 Vegetation Communities/Land Cover Types Adjacent to the Project Site

4.6.2.1 Intermittent Stream (Cayetano Creek and its Tributaries)

Cayetano Creek lies on APN 903-0006-001-02 just beyond the western boundary of the project site and generally parallels the western project site boundary. Three ephemeral tributaries to Cayetano Creek also occur on APN 903-0006-001-02 and empty into Cayetano Creek adjacent to the western boundary of the site. The project site was designed to avoid impacts to Cayetano Creek and its tributaries, splitting the central parcel into four disjunct segments. Because these drainages are adjacent to the project site, they are discussed below.

The segment of Cayetano Creek adjacent to the site flows intermittently. Cayetano Creek was observed flowing during the biological surveys conducted during winter and spring. Groundwater supports some of the flow characteristics of Cayetano Creek, with water persisting after rain events. Sections of Cayetano Creek adjacent to the project site support wetlands in the stream channel that consist of broad-leaved cattail (*Typha latifolia*), California bulrush (*Schoenoplectus californicus*), tall flatsedge (*Cyperus eragrostis*), saltgrass (*Distichlis spicata*), and common spikerush (*Eleocharis macrostachya*). Most of Cayetano Creek adjacent to the project site does not support wetland vegetation, with most of the vegetation consistent with vegetation in the annual grassland vegetation community (Section 4.6.1.2). Adjacent to the project site, Cayetano Creek does not appear to be altered, rerouted or otherwise heavily disturbed by agricultural practices. Water impoundments or diversions upstream may decrease the amount of water available in the stream, although impoundments upstream are few and small. Cattle trails are present in the stream and along its banks, and this stream does experience heavy grazing from cattle in most years. The banks of this stream are steeply incised with a narrow stream channel. The tributaries to Cayetano Creek adjacent to the project site are ephemeral and appear to only flow for a short duration during and immediately after significant storm events. These tributaries support vegetation consistent with vegetation described in the annual grassland (Section 4.6.1.2) and are dominated by weedy non-crop species such as soft brome, Italian rye grass, yellow star-thistle, dove weed, and other annual grasses and forbs.

4.6.3 Invasive Species

A total of 16 non-native species included on CDFA's category C list and/or having a rating of "high" or "moderate" on the Cal-IPC list were identified on the project site (Appendix D). There are no species both rated as "high" for invasiveness and listed in category C, on the project site. Several species rated as "high" on the Cal-IPC list are present on the site including fennel (*Foeniculum vulgare*), yellow star-thistle (*Centaurea solstitialis*), perennial pepperweed (*Lepidium latifolium*), and medusa head (*Elymus caput-medusae*). Other more widespread invasive species, such as wild oats, ripgut brome and hare barley (*Hordeum murinum*), are rated "moderate" for invasiveness and not listed in category C. All of

these species would be expected to occur on site as they are fairly common in the area on agricultural parcels and disturbed areas.

4.6.4 Wildlife

The annual grassland and dryland grain crop fields, which comprise the vast majority of the site, provide relatively poor habitat for non-volant terrestrial wildlife due to human presence and agriculture uses including disking of the soil, planting and harvesting in the dryland grain crop fields and trampling and denuding of the vegetation by cattle. In general, resident wildlife on the site are limited to relatively common and disturbance-tolerant species such as California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), coyote (*Canis latrans*), Audubon's cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), western fence lizard (*Sceloporus occidentalis*), and pacific gophersnake (*Pituophis catenifer catenifer*). A variety of resident birds were also observed on the site typical of agricultural habitats including black phoebe (*Sayornis nigricans*), American robin (*Turdus migratorius*), house sparrow (*Passer domesticus*), northern mockingbird (*Mimus polyglottos*), western meadowlark (*Sturnella neglecta*), red-wing blackbird (*Agelaius phoeniceus*), loggerhead shrike (*Lanius ludovicianus*), and savanna sparrow (*Passerculus sandwichensis*).

The banks of Cayetano Creek adjacent to the site support some fossorial (burrowing) mammals such as California ground squirrel and Botta's pocket gopher, which provide forage for other fossorial predators such as long-tailed weasel (*Mustela frenata*) and American badger (*Taxidea taxus*). Most fossorial mammals on the project site were observed in the northern parcel, north of Manning Road. Areas outside of the project boundary on surrounding grazed hillslopes primarily east, west and north of the project site currently support higher numbers of fossorial mammals as observed during numerous biological surveys. Coyotes have also been detected hunting and pursuing California ground squirrel outside of the project boundary and are likely raiding the chicken farm adjacent to the project site as evidenced by depredated chickens along the project boundary. Small patches of seasonal freshwater emergent wetland vegetation in Cayetano Creek adjacent to the site provide habitat for amphibians such as Sierran treefrog (*Pseudacris sierra*) and western toad (*Anaxyrus boreas*). Mule deer (*Odocoileus hemionus*) have also been observed adjacent to the project site moving along Cayetano Creek.

The annual grassland and dryland grain crop habitats in the project site do provide foraging habitat for raptors such as red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), burrowing owl (*Athene cunicularia*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrysaetos*), and barn owl (*Tyto alba*); although in general, higher quality foraging habitat is present in grasslands in the hills north, east and west of the site because the height of the vegetation as observed during biological surveys was generally much shorter in the surrounding grasslands than the grassland on site making prey more accessible. Foraging habitat is also present in the dryland grain crop for special-status non-raptor species such as tri-colored blackbird (*Agelaius tricolor*) and a variety of common bat species that could roost in trees or structures surrounding the site. Trees and shrubs on and adjacent to the project site also provide nesting habitat for raptors and other birds. Tree cavities in valley oak trees along Cayetano Creek adjacent to the site likely support a variety of cavity nesting birds such as American kestrel (*Falco sparverius*) and oak titmouse (*Baeolophus inornatus*). The majority of the raptors and other special-status birds that have potential foraging habitat on the site do not have suitable nesting habitat on the site and would not be expected to take up residence on the site. For these species, the site represents occasional foraging opportunities. Potential habitat on the site for special-status species, including foraging habitat for raptors, other special-status birds, and bats is discussed in detail in Sections 5.2, 5.3, and 5.4.

4.7 SPECIAL-STATUS SPECIES

Based on species ranges and habitat affinities, a total of 15 regionally occurring special-status species (Table 2) are either known to occur or have the potential to occur in the project site (this analysis is described in Section 3.1). Special-status species observed onsite include long-eared owl (*Asio otus*), golden eagle, white-tailed kite, Swainson's hawk, northern harrier, Cooper's hawk (*Accipiter cooperii*), ferruginous hawk (*Buteo regalis*), and loggerhead shrike; however, no nesting locations of special-status species were observed on the project site. Red-tailed hawk was observed building a nest on February 26, 2020 in a valley oak tree west of Cayetano Creek outside the project site and one barn owl (*Tyto alba*) was observed in an oak tree cavity and was also likely nesting along the creek adjacent to the site. No other special-status plant or wildlife species were observed on the project site. Burrowing owl was observed adjacent to the northern parcel north of Manning Road, outside of the project site. Special-status species with the potential to occur on the project site are discussed in detail in Section 5.

Table 2
SPECIAL-STATUS SPECIES WITH THE POTENTIAL TO OCCUR ON THE PROJECT SITE

Scientific Name Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat in the Project Site
Amphibians			
Ambystoma californiense California tiger salamander	FT/ST/--	Habitat present (dispersal and upland refugia)	There is no suitable breeding habitat on the project site. Cayetano Creek and other ephemeral streams do not provide breeding habitat for this species. Suitable ponds near the project site provide habitat and known records of breeding California tiger salamander. California tiger salamander could occur moving through the project site and use Cayetano Creek and other ephemeral streams as aquatic non-breeding habitat during periods of dispersal.
Rana draytonii California red-legged frog	FT/--/SSC	Habitat present (dispersal and upland refugia)	There is no suitable breeding habitat on the project site. Cayetano Creek or other ephemeral streams do not provide breeding habitat for this species. Suitable ponds near the project site provide habitat and known records of breeding CRLF. CRLF could occur moving through the project site and use Cayetano Creek and other ephemeral streams as aquatic non-breeding habitat during periods of dispersal.
Birds			
Accipiter cooperi Cooper's hawk	--/--/WL	Present (foraging)	The project site provides suitable foraging habitat for Cooper's hawk, but nesting habitat is absent from the site. Cooper's hawk was observed foraging over the site during biological surveys. This species is discussed under *Foraging Habitat for Special-Status Birds*.

Table 2 (cont.)
SPECIAL-STATUS SPECIES WITH THE POTENTIAL TO OCCUR ON THE PROJECT SITE

Scientific Name Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat in the Project Site
Agelaius tricolor Tricolored blackbird	--/SC/--	Habitat present (foraging)	The project site and adjacent areas lack suitable breeding habitat for tricolored blackbird, but potential foraging habitat is present. Tricolored blackbird was not observed on the site during numerous biological surveys. This species is discussed under *Foraging Habitat for Special-Status Birds*.
Ammodramus savannarum Grasshopper sparrow	--/--/SSC	Habitat present (nesting and foraging)	The project site consists of open habitat with non-native annual grasses and forbs that could provide nesting habitat for this species.
Asio otus Long-eared owl	--/--/SSC	Present (foraging)	Long-eared owl was detected during night surveys in Cayetano Creek. This species could use trees adjacent to the project site for nesting. There are no CNDDB records for this species in Alameda County. This owl was observed foraging in the creek and perching on annual vegetation on the top of the bank.
Athene cunicularia Burrowing owl	--/--/SSC	Habitat present (nesting and foraging)	The project site provides foraging habitat and potential nesting/wintering habitat for burrowing owl. Mammal burrows are abundant north of Manning Road, and burrowing owl pellets and feathers have been observed along the fence line of the northern project boundary and along Cayetano Creek. On June 17, 2020 two juvenile burrowing owls were observed at a burrow just east of the project site and appear to be recently fledged owls.
Aquila chrysaetos Golden eagle	--/--/FP	Present (foraging)	Golden eagles were routinely observed foraging over the project site during surveys in 2018 and 2020. Annual grassland and dryland grain crop with small mammal prey provide suitable foraging habitat. There are no suitable nest trees on the project site and no potential nests have been observed on the site.
Buteo regalis Ferruginous hawk	--/--/WL	Present (foraging)	The project site provides suitable foraging habitat for ferruginous hawk, but this species does not nest in California. Ferruginous hawk was observed foraging over the site during biological surveys. This species is discussed under *Foraging Habitat for Special-Status Birds*.

Table 2 (cont.)
SPECIAL-STATUS SPECIES WITH THE POTENTIAL TO OCCUR ON THE PROJECT SITE

Scientific Name Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat in the Project Site
Buteo swainsoni Swainson's hawk	--/ST/--	Present (foraging)	The project site is outside of the nesting range of Swainson's hawk but provides some foraging opportunities. Swainson's hawk was observed foraging on the project site. This species is discussed under *Foraging Habitat for Special-Status Birds*.
Circus cyaneus Northern harrier	--/--/SSC	Present (foraging); Habitat present (nesting)	Nesting habitat for northern harrier is present in the project site in annual grasslands and along Cayetano Creek. Fields provide suitable foraging habitat. Both a male and female were observed on site during surveys in February and March 2020.
Elanus leucurus White-tailed kite	--/--/FP	Present (foraging)	Habitat is present for this species since potential nesting trees are adjacent to the project site, which is surrounding by annual grassland. Trees that could provide nesting habitat for this species are abundant near the project site and this species is likely to occur foraging over the project site in annual grasslands. White-tailed kite was observed on site during surveys in 2020. There is one record of this species nesting within a 5-mile radius of the project site.
Lanius ludovicianus Loggerhead shrike	--/--/SSC	Present (nesting and foraging)	Open habitat with perching sites along fences and some shrubs and small trees provides suitable nesting and foraging habitat for this species. This species was observed foraging in the project site during most surveys. On June 17, 2020 a pair of loggerhead shrikes were observed passing through the site and feeding recently fledged young.
Mammals			
Taxidea taxus American badger	--/--/SSC	Habitat present (denning and foraging)	The site has potential habitat since fossorial prey is present in the project site north of Manning Road but scarce south of Manning Road. The surrounding grazed hills provide good habitat since there is a healthy population of California ground squirrel in the area outside of the project boundary. The nearest CNDDB record is located approximately 4.5 miles west from the project site, which documents a mother badger with young (CDFW 2020). Badger burrows or badger excavations were not observed on the project site.

Table 2 (cont.)
SPECIAL-STATUS SPECIES WITH THE POTENTIAL TO OCCUR ON THE PROJECT SITE

Scientific Name Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat in the Project Site
Vulpes macrotis mutica San Joaquin kit fox	FE/ST/--	Habitat present (dispersal and foraging)	Marginal denning habitat is present for this species since friable soils are absent. Fossorial prey is present in dryland grain crop vegetation community. However, potential kit fox burrows or excavations were not observed during surveys. The project site is at the northwestern extent of this species' known range. There are several CNDDB records for this species within a 5-mile radius of the project site, with the nearest located approximately 2.7 miles north of the project site. The record documents a natal den from 1989. Subsequent surveys using scent tracking dogs have not identified kit fox in Alameda County.

[1] Regulatory Status is FESA listing/CESA listing/Other state status. FE=Federal Endangered; FT = Federally Threatened; ST=State Threatened; FP=Fully Protected; SSC=Species of Special Concern; WL = Watch List.

[2] Status in the project site is based on results of studies discussed in Section 3.1.

5.0 RESULTS: EVALUATION OF POTENTIAL BIOLOGICAL RESOURCES IMPACTS

5.1 GUIDELINES FOR DETERMINING IMPACT SIGNIFICANCE

The following threshold criteria from the Alameda County CEQA Environmental Checklist Form were used to evaluate potential effects on biological resources. Based on these criteria, the project would have a significant effect on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFW or USFWS.

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

5.2 POTENTIAL FOR IMPACTS TO SPECIAL-STATUS SPECIES

5.2.1 Special-status Plants

No special-status plants were determined to have the potential to occur on the site due to lack of habitat and the disturbed nature of the site. No special-status plants were observed on the site during focused botanical surveys conducted during the blooming season of target special-status plants. Therefore, special-status plants are presumed absent from the site. No impacts to special-status plants would occur as a result of the proposed project.

5.2.2 Special-status Amphibians

5.2.2.1 California Tiger Salamander

Federal status – Threatened
State status – Threatened

Species Description

The historic range of California tiger salamander (*Ambystoma californiense*) (CTS) was endemic to the San Joaquin-Sacramento River Valleys, bordering foothills and coastal valleys in what was considered a contiguous distribution (USFWS 2017). Currently, the population extends from Petaluma in Sonoma County (Sonoma DPS), east to the Colusa and Yolo County line, with an isolated population near Gray Lodge Wildlife area north of the Sutter Buttes, and south through the Central Valley to Santa Barbara County (Santa Barbara DPS) (Jennings and Hayes 1994). Today the species is known to occur in about 23 counties and is found primarily in low elevation grassland-oak woodland plant communities of Central California (USFWS 2017).

CTS occupies a distinct habitat of both aquatic and terrestrial components that consist of aquatic breeding and non-breeding areas embedded within a matrix of habitats used for dispersal, or refugia. Breeding aquatic habitat consists typically of ephemeral freshwater bodies, such as ponds, vernal pools, constructed ponds and other stock ponds. Permanent bodies of water are occasionally used for breeding, but permanent water bodies must be free of potential predators to eggs and larva, such as fish and American bullfrog (*Lithobates catesbeianus*). Non-breeding habitat is located in uplands away from ponds, typically in mammal burrows, where CTS will spend most of their life (USFWS 2017). A complex of upland habitat with burrowing mammals and breeding ponds are necessary habitat components required for this species to persist (USFWS 2017). During the onset of fall precipitation, CTS will emerge from their burrows and migrate to breeding habitat. Eggs are laid along the margins of ponds individually or in small clusters on vegetation or other debris (Jennings and Hayes 1994). The breeding season typically occurs from November through April (USFWS 2017) and is likely influenced by local precipitation and ambient temperature. Females typically lay eggs between December and early April. Larvae typically metamorphose in three to six months and juveniles begin to move out of the natal

pond in late spring or early summer, and rarely overwinter (USFWS 2017). When juveniles leave their natal ponds, they distribute into uplands in search of suitable underground refugia, which typically consists of mammal burrows excavated by California ground squirrel and Botta's pocket gopher (USFWS 2017). Very little is known of CTS behavior while underground. The project site is not located within federally designated critical habitat.

Survey History

No CTS were observed on or adjacent to the project site during any biological surveys, including two full seasons (16 surveys) of protocol surveys for CRLF, which were conducted by individuals with federal recovery permits for CTS (Stephen Stringer, Jennifer Gonterman, Patrick Martin). None of the streams in or adjacent to the project site, including Cayetano Creek and its tributaries adjacent to the central and southern parcels and the ephemeral drainage adjacent to the northern parcel, meet the habitat requirements for CTS breeding because they are too shallow (if they have water at all) and do not provide water of sufficient depth for a long enough duration to support larval development of CTS. CTS could potentially use these streams for dispersal between other more suitable habitats off-site.

There are 35 CNDDB records that document occurrences of CTS within 3.1 miles of the project site. Most of the CNDDB records are recent and document breeding ponds or vernal pool complexes situated in annual grasslands that also provide upland habitat. The closest reported occurrence (Occurrence No. 238) of CTS to the project site is located adjacent to the southeastern portion of the project site and east of North Livermore Avenue and represents an observation of several adults during protocol surveys which were conducted in 1997 (CDFW 2020). Dublin Ranch Conservation Area east of the project site also has several breeding ponds (CDFW 2020). There are several other records near the project site with potential breeding habitat visible on aerial imagery (Google Earth 2020).

Habitat Suitability

The project site does not provide suitable breeding habitat for CTS and is not being used by CTS for breeding based on the results of 16 protocol surveys for CRLF within aquatic habitats on and adjacent to the site over two wet seasons. The project site provides potential dispersal habitat for CTS since the project site is within the current range of CTS and there are several records documenting their presence within a one-mile radius of the project site. Potential dispersal by CTS could occur on or adjacent to the site, primarily within and adjacent to Cayetano Creek and its tributaries. However, no CTS were observed during protocol surveys for CRLF, several of which were conducted during light rain events to target amphibians moving through uplands. Upland refuge sites are scarce on the central parcel on the project site and are limited to cracks in the clay soil or in California ground squirrel burrows, which are primarily located in the northern parcel north of Manning Road. Ground squirrel burrows are more abundant adjacent to the project site along Cayetano Creek and in the hills north of the northern parcel north of Manning Road.

Potential for Adverse Effects

In the absence of the proposed mitigation measures, potential adverse effects to CTS could include take of individuals using upland areas for dispersal and/or refugia during construction, operations, and decommissioning.

CTS has the potential to use the project site seasonally due to its proximity to known breeding habitat and the known upland migration distance of CTS. However, breeding habitat for CTS is absent and

potentially suitable upland refuge habitat in the form of mammal burrows is mostly limited to the portion of the project site north of Manning Road. Soil cracks in the surface of the soil may provide temporary refuge during migration between breeding ponds and other upland areas. Because habitat is so limited on the project site, there is only a low potential for CTS to occur on the project site either dispersing through the site or using the site for upland refugia at the time of construction and decommissioning and be harmed by construction equipment or personnel.

Conversion of the project site from grassland and dry cropland to a solar generation facility would not permanently eliminate the potential for CTS to use the site for dispersal and upland refugia and would not constitute a significant impact to this species. After construction has stopped and the site has been revegetated, the solar array is not expected to impede any migration route for CTS, as the project will continue to support grassland and fossorial mammals at a level comparable to conditions prior to construction. The project was sited to utilize lower quality grassland and avoid impacts to higher quality grassland habitats and streams that could provide dispersal corridors for this species. The setback of the solar array from Cayetano Creek would maintain an important wildlife corridor and dispersal habitat. Approximately 150 acres of APN 903-0006-001-02 was removed from the development footprint during the planning phase in part because of its biological value. This area is proposed to be subdivided to legally separate it from the real property affiliated with the proposed project development. The project will impact low quality grassland habitat next to heavily travelled roads and other development that is not expected to provide quality habitat for CTS. In addition, the site will be revegetated following construction of the solar arrays and would still be expected to provide dispersal habitat for CTS. No compensatory mitigation for potential impacts to CTS upland habitat is considered necessary because grassland habitat would be preserved on site under the panels and the project once operational would not eliminate the potential for CTS to use the site for dispersal and upland refugia.

In the absence of proposed mitigation measures, the project would have the potential for adverse effects on CTS including potential take of individuals during project construction, operation, and decommissioning. This would be a significant impact. Implementation of the recommended mitigation measures for CTS contained in Section 6 (MM BIO-2) would avoid take of this species and would reduce impacts to CTS to less than significant.

5.2.2.2 California Red-legged Frog

Federal status – Threatened
State status – Species of special concern

Species Description

The historic range of CRLF extends from Baja California, Mexico, north to the vicinity of Redding inland, and at least to Point Reyes, California coastally (Jennings and Hayes 1994). Today the species is known to occur in about 238 streams or drainages in 23 counties and is found primarily in wetlands and streams in the coastal drainages of Central California. Records of the species are known from Riverside County to Mendocino County along the Coast Range, from Calaveras County to Butte County in the Sierra Nevada, and in Baja California, Mexico. CRLF are still locally abundant within portions of the San Francisco Bay area (including Marin County) and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges (USFWS 2010a). In the Sierra Nevada, CRLF historically occupied portions of the lower elevations west of the crest from Shasta County south to Tulare County. Almost all known CRLF

populations have been documented at elevations below 3,500 feet amsl with some historical sightings documented at elevations up to 5,200 feet amsl.

Within its range, CRLF occupies a distinct habitat of both aquatic and terrestrial components that consist of aquatic breeding and non-breeding areas embedded within a matrix of habitats used for dispersal, or refugia. Breeding and non-breeding aquatic habitat consists of low-gradient freshwater bodies, including ponds, marshes, sag ponds, dune ponds, stock ponds, lagoons, seeps, springs, and backwaters within streams and creeks. This species does not inhabit water bodies that exceed 70 degrees Fahrenheit if there are no cool, deep portions (USFWS 2002). Important characteristics of aquatic breeding habitat include still or slow moving fresh water (with salinities of less than 7.0 parts per thousand) deeper than 2.3 feet (0.7 meter) with dense, shrubby emergent or overhanging vegetation that provides egg deposition sites and cover for adult frogs (Jennings and Hayes 1994; USFWS 2002) and that persists for a minimum of 20 weeks following the breeding season to allow tadpoles to mature (USFWS 2010a). The breeding season typically occurs from November through April (USFWS 2002) and is likely influenced by local precipitation and ambient temperature. Females typically lay eggs between December and early April. Tadpoles typically metamorphose in 11 to 20 weeks, from July to September, but may overwinter in some sites. The largest populations of CRLF are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) intermixed with cattails. Adults feed primarily on aquatic and terrestrial invertebrates, but may feed on tadpoles, smaller frogs, small mammals, and fish. Juvenile frogs are active diurnally and nocturnally, and adult frogs are largely nocturnal (USFWS 2002).

CRLF are generally found in or near water but may disperse into uplands during the wet season to migrate to breeding habitat or for foraging, or in response to receding water during the driest time of the year. Well-vegetated terrestrial areas within a riparian corridor may provide important sheltering habitat when temperatures are cold in the winter or when water is unavailable during dry periods. CRLF spend considerable time resting and foraging in riparian vegetation when it is present (USFWS 2002). The use of the adjacent riparian corridor during summer is most often associated with drying of creeks in mid- to late-summer (Rathbun in litt., 1994 in USFWS 1996). During dry periods, CRLF remain close to water and often disperse upstream or downstream from their breeding habitat to forage or seek aestivation sites if water is not available (USFWS 2002). This habitat may include shelter under boulders, rocks, logs, industrial debris, agricultural drains, water troughs, small mammal burrows, incised stream channels, or areas with moist leaf litter (Jennings and Hayes 1994; USFWS 2002). Most CRLF do not disperse farther than the nearest suitable cold-shelter or aestivation habitat. CRLF have been found up to 200 feet from water in adjacent dense riparian vegetation (USFWS 2010a).

During periods of wet weather, individuals may disperse through uplands to migrate between aquatic breeding sites and have been observed making straight-line point to point migrations rather than using stream corridors (USFWS 2002). Movements of up to two miles have been reported (Fellers and Kleeman 2007), but one mile represents a more typical dispersal distance for breeding migration. Most overland movements occur at night (USFWS 2002).

The primary constituent elements of habitat for CRLF are aquatic and upland areas where suitable breeding and non-breeding habitat is interspersed throughout the landscape and is interconnected by unfragmented dispersal habitat. Specifically, to be considered to have the primary constituent elements, an area must include two (or more) suitable breeding locations, a permanent water source, associated uplands surrounding these water bodies up to 300 feet from the water's edge, all within 1.25 miles of one another and connected by barrier-free dispersal habitat that is at least 300 feet in width (USFWS 2002).

Survey History

Two full seasons of protocol surveys for CRLF were conducted on the project site. Surveys were conducted in two locations including Cayetano Creek and its tributaries adjacent to the central and southwest parcels and one ephemeral drainage in the northwest corner of the northern parcel. These were the only features in and adjacent to the site that were determined to provide potential aquatic habitat for CRLF. A total of eight surveys were conducted between January 30 and July 31 of 2018 and an additional eight surveys were conducted from February 6 to July 14 of 2020. For further information on CRLF protocol surveys, see Appendix F.

The segment of Cayetano Creek adjacent to the site is a natural stream with intermittent flow, receiving most of its water from a combination of precipitation and groundwater. The stream channel is mostly vegetated with herbaceous upland species consistent with annual grasses and forbs in annual grassland habitat. Portions of the stream support wetland vegetation, which consists of broad-leaved cattail, California bulrush, tall flatsedge, saltgrass, and common spikerush and other emergent vegetation. The stream channel is an average of 5 to 6 feet in width and has an estimated maximum depth of 3 to 4 feet, although the top of bank width is approximately 20 feet wide. The maximum water depth observed during any of the CRLF surveys was only a few inches in 2018 and approximately 12 inches in 2020 in several small short-lived pools. Pools along the stream are small and shallow and are mostly located at the southern and northern reaches of the stream. There are no pools or deep-water areas within the stream that could support breeding CRLF. Amphibian species observed in the stream during the surveys included Sierran treefrog and western toad. CRLF survey data sheets are included in Appendix F.

No CRLF were observed in the Cayetano Creek or its tributaries during any of the protocol surveys. The stream does not meet the habitat requirements for CRLF breeding because it is too shallow and does not provide water of sufficient depth for a long enough duration to support breeding CRLF. CRLF could potentially use the stream for dispersal between other more suitable habitats offsite since the stream holds moisture and hydrophytes into the summer.

There are 5 documented locations where CRLF have been reported in the CNDDB within a one-mile radius of the project site (CNDDB 2020). There are 9 additional reported occurrences on the Byron Hot Springs quad that show up with a one-mile radius search, but these records are non-specific records that cover the entire quad. The actual location of these reported occurrences appears to be outside of the one-mile radius and these records are not reported here.

The closest reported occurrence (Occurrence No. 297) of CRLF to the project site is located less than 0.5 mile southeast of the project site where juveniles were observed dispersing from Altamont Creek in non-native annual grassland in January of 1997. The next closest record (Occurrence No. 1382) is approximately 0.6 miles west of the western project boundary south of Manning Road and along a branch of Cayetano Creek (CDFW 2020). That record is of two adult CRLF and approximately 50 tadpoles that were observed in May 2013 in a riparian area dominated by willow. The creek was not flowing, but a remnant pool with a depth of between 2-3 feet provided habitat for California red-legged frog (CDFW 2020). The branch of Cayetano Creek where the CRLF have been reported has stretches of dense riparian vegetation and holds water into at least late August in at least some years based on aerial imagery (Google Earth 2020; imagery date 8/31/2017), whereas the segment of Cayetano Creek adjacent to the project site has very sparse riparian vegetation consisting primarily of single trees and rarely holds any water past spring based on survey results and a review of aerial imagery (Google Earth 2020).

Habitat Suitability

The project site is located adjacent to Critical Habitat Unit CCS-2B, Mount Diablo, which is in Alameda County and Contra Costa County, north of Interstate 580. This Critical Habitat was considered occupied at the time of the April 16, 2010 ruling, and is in the San Francisco Bay watershed. The western portion of APN 903-0006-001-02, which is being split off as a separate parcel and is not part of the project site, is within designated Critical Habitat Unit CSS-2B. The project site was chosen in part because it is not located within the designated Critical Habitat and does not support breeding habitat surrounded by high quality upland habitat.

Based on the results of the site assessment for CRLF, the project site lacks suitable breeding habitat for CRLF but provides potential upland dispersal habitat for CRLF since the project site is within the current range of CRLF, federally designated Critical Habitat occurs adjacent to the project site to the north, east, and west, this species is documented breeding within one mile of the project site in the CNDDB, and there are other pools within one mile of the project site that provide potential breeding habitat for CRLF. Potential dispersal by CRLF could occur through the uplands on the site as well as through segments of Cayetano Creek and its tributaries adjacent to the site. However, no CRLF were observed in or adjacent to the site during two seasons of CRLF protocol surveys or any other biological surveys. The project site does not provide suitable breeding habitat and is not being used by CRLF for breeding.

The project site is located within a larger geographic area that provides high quality habitat for CRLF and supports populations of CRLF breeding in constructed and natural ponds within a grassland matrix with dispersal habitat consisting of uplands as well as intermittent and ephemeral drainages. The project site itself does not provide breeding habitat for CRLF and is not a high quality dispersal corridor. Although the project site supports annual grassland and provides potential for upland dispersal, it is peripheral to designated Critical Habitat and these higher quality habitats for CRLF and is on the edge of developed areas that are less suitable. The central and southern parcels in the project site are bordered by North Livermore Ave. on the east and the central parcel is also bordered by Manning Road on the north; these roadways may pose dispersal barriers to CRLF as does the chicken farm that separates the central and southern parcels. Although the potential for CRLF to disperse through the uplands or use the site for upland refugia (particularly in portions of the site adjacent to Cayetano Creek and its tributaries) cannot be ruled out, the site otherwise lacks suitable habitat for CRLF and would not be expected to be highly utilized by this species as evidenced by the lack of sightings.

Potential for Adverse Effects

In the absence of the proposed mitigation measures, potential adverse effects to CRLF could include take of individuals using upland areas for dispersal and/or refugia during construction, operations, and decommissioning.

CRLF has the potential to use the project site seasonally for upland dispersal or refugia due to its proximity to known breeding habitat and the known upland migration distance of CRLF. However, breeding habitat for CRLF is not present on the site. Potentially suitable upland refugia in the form of mammal burrows is mostly limited to the northern parcel north of Manning Road. Soil cracks in the surface of the soil may provide temporary refuge during migration between breeding ponds and other upland areas. Because habitat is so limited on the project site, there is only a low potential for CRLF to occupy the project site prior to commencement of the project or to occur in the project site as migrating individuals dispersing through the site during construction and decommissioning.

Conversion of the project site from grassland and dry cropland to a solar generation facility would not permanently eliminate the potential for CRLF to use the site for dispersal and upland refugia and would not constitute a significant impact to this species. After construction has stopped and the site has been revegetated, the solar array is not expected to impede dispersal or access to upland refugia for CRLF, as the project will continue to support grassland and fossorial mammals at a level comparable to conditions prior to construction. The project was sited to utilize lower quality grassland and avoid impacts to higher quality grassland habitats and streams that could provide dispersal corridors for this species. The setback of the solar array from Cayetano Creek would maintain an important wildlife corridor and dispersal habitat. Approximately 150 acres of APN 903-0006-001-02 was removed from the development footprint during the planning phase in part because of its biological value. This area is proposed to be subdivided to legally separate it from the real property affiliated with the proposed project development. The project will impact low quality grassland habitat next to heavily travelled roads and other development that is not expected to provide quality habitat for CRLF In addition, the site will be revegetated following construction of the solar arrays and would still be expected to provide dispersal habitat and upland refugia for CRLF. No compensatory mitigation for potential impacts to CRLF upland habitat is considered necessary because grassland habitat would be preserved on site under the panels and the project once operational would not eliminate the potential for CRLF to use the site for dispersal and upland refugia.

In the absence of proposed mitigation measures, the project would have a low potential for adverse effects on CRLF including potential take of individuals during project construction, operation, and decommissioning. This would be a significant impact. Implementation of the recommended mitigation measures for CRLF contained in Section 6 (MM BIO-2) would avoid take of this species and would reduce impacts to CRLF to less than significant.

5.2.3 Special-status Birds

Species descriptions in this section are taken from Shuford and Gardali (2008), or from other sources as noted.

5.2.3.1 Grasshopper Sparrow

Federal status – none
State status – species of special concern

Species Description

Grasshopper sparrow are summer residents of the San Joaquin Valley and nest in along the foothills and lowlands up to 5,000 feet amsl. They use dense grasslands, forb, and scattered shrubs of grassland habitats. In addition to natural habitats, grasshopper sparrow can be found in urban habitats such as at the margins of airports and golf courses and in vacant urban lots. Grasshopper sparrow forage in adjacent grasslands and other suitable habitats primarily for invertebrates and seeds. Grasshopper sparrow are reliant on dense vegetation for cover while foraging and nesting. Grasshopper sparrow nest on the ground in tall grasses and commonly perch on fence posts, shrubs or tall vegetation for singing.

Survey History

Grasshopper sparrow was not observed in the project site during any of the biological surveys. The nearest CNDDB reported occurrence (Occurrence No. 21) of grasshopper sparrow is located 1.6 miles

east of the project site. The reported occurrence describes breeding pairs in a grassland preserve with surrounding land uses consisting of rural residential homes, shooting range and cattle grazed land (CDFW 2020).

Habitat Suitability

The entire project site provides marginal potential foraging and nesting habitat for grasshopper sparrow. The project site is dominated by annual grasses and forbs. Fence posts, tall annual weeds and sparse shrubs provide perches for singing. However, the project site is actively grazed by cattle, and areas that are heavily grazed do not provide habitat for this species, since grazing removes foraging and cover sites for nesting. Potential threats to grasshopper sparrow in the project site include harvesting of oats in the northern and southern parcels and cattle grazing in the central parcel. Both existing land practices may diminish the quality of the grassland habitat and or result in mortality of individuals or nests located in the annual grass dominated vegetation communities, rendering the site inhospitable for this species.

Potential for Adverse Effects

In the absence of proposed mitigation measures, potential adverse effects of the proposed project (construction only) on grasshopper sparrow could include harm to individual grasshopper sparrow, nest disturbance/loss of active nests, and loss of potential habitat. Grasshopper sparrow nesting was not observed in the project site and there are no known occupied grasshopper sparrow nesting locations in the project site (reported in the CNDDB or other sources).

No mitigation is proposed or necessary for loss of potential habitat for this species. Higher quality habitat for grasshopper sparrow is abundant in the project region. The recommended mitigation measures for nesting birds and raptors contained in Section 6 (MM BIO-6) would reduce impacts to this species to less than significant.

5.2.3.2 Golden Eagle

Federal status – The Bald and Golden Eagle Protection Act
State status – Fully Protected (nesting and wintering)

Species Description

Golden eagle is an uncommon permanent resident and migrant throughout California. Golden eagle nests on cliffs or in large trees in open habitats. Preferred habitats are in steep mountainous terrain with canyons and ledges for nesting. Golden eagles are year-round residents of California and typically do not migrate but may move to lower or higher elevations depending on the season. Golden eagle nests are usually located on cliffs, but they will also use large trees with a commanding view of the landscape as well as electrical towers for nesting. Golden eagle requires open areas for hunting, such as rolling foothills, grasslands, deserts, shrublands and early successional stages of forest habitats. Golden eagles primarily feed on rodents and lagomorphs; however, they will feed on a variety of prey including other small mammals, birds, reptiles, carrion and on occasion domestic calves and lambs (Zeiner et al. 1990).

Survey History

The project is in the Livermore area, which has been documented to have one of the highest territory densities ever documented for this species at one pair per 19 km^2 (Hunt et al. 1998). Golden eagle was

observed soaring over the project site during most biological surveys conducted in 2018 and 2020. During the surveys, golden eagles were observed flying from west to east during the late morning and then returning in the afternoon (traveling east to west). Golden eagles were observed soaring high over the project site and then foraging low over the surrounding hillslopes (out of the project site) pursuing California ground squirrel. There are several reported occurrences in the CNDDB of golden eagle nests within a 5-mile radius of the project site (CDFW 2020). The nearest CNDDB record (Occurrence No. 70) is located approximately 2 miles north of the project site near Vaquero Reservoir. Another CNDDB record (Occurrence No. 84) is located 4 miles west of the project site along Camino Tassajara Road. Both records document nests in oak trees (CDFW 2020), which are situated similarly to valley oak trees adjacent to the project site along Cayetano Creek. HELIX biologist Patrick Martin is familiar with the golden eagle nest (CNDDB Occurrence No. 84) and observed activity at this nest in 2017 while conducting surveys for the County of Contra Costa. Golden eagle flights over the project site appear to originate from the general direction of this nest along Camino Tassajara Road and may be birds nesting in that location that are travelling to forging grounds north and east of the project site.

Habitat Suitability

There is no suitable nesting habitat for golden eagle on the project site. The site itself is treeless (except for three or four small horticultural trees around the former homestead in the central parcel) and consists entirely of grazed annual grassland and on some portions, dryland grain crop fields. Several large valley oak trees are located along Cayetano Creek adjacent to the site and other potentially suitable nesting habitat surrounding the project site includes other large oak trees and large stands of eucalyptus trees. However, because the large trees are situated around rural residential homes, which typically are not suitable nest locations for golden eagle, golden eagle is not expected to nest adjacent to the project site. No raptor nests that could support a golden eagle were detected in any of the large valley oak trees adjacent to the site during the surveys. One of these large valley oak trees adjacent to the site was found to have a red-tailed hawk nest during surveys in 2018 and 2020. The project site provides potential foraging habitat for golden eagle. Prey is present in the project site, with several occupied California ground squirrel burrows observed on the project site concentrated in the northern parcel. Black-tailed jackrabbit and Audubon's cottontail are also present in the annual grassland community on the central parcel.

Potential for Adverse Effects

Nesting

Although large valley oak trees are present adjacent to the project site, they are not considered likely to be used by golden eagle due to their proximity to the nearby residential uses, including the caretaker's travel trailer. Because there are no potential nest trees on the project site, implementation of the project would not remove golden eagle nesting habitat. Project construction and decommissioning activities within 660 feet of a nest could potentially disturb nesting golden eagles if this species was to use trees adjacent to the project site for nesting. The recommended mitigation measures for nesting raptors and migratory birds contained in Section 6 (MM BIO-6) would reduce impacts to nesting golden eagle to less than significant.

Foraging Habitat

The project site provides suitable foraging habitat for golden eagle, which will be impacted as a result of converting grassland to a solar generation facility, although some habitat may remain around the

perimeter of the site in undeveloped areas. Golden eagles were observed soaring over the project site; however, no attempts at capturing prey were observed on the project site. Golden eagle was observed unsuccessfully pursuing California ground squirrel on hills west and northeast of the site where this species was observed flying low over the ground and attempting to swoop down onto unsuspecting ground squirrels. Other species such as black-tailed jackrabbit and Audubon's cottontail are more abundant than ground squirrels on the project site and could provide forage for golden eagle on the project site. Golden eagles are known to have territories that range from 9 to 74 square miles (Zeiner et al. 1990), which encompasses a vast area for foraging. Impacts to foraging habitat for golden eagle will be less than significant due to the abundance of more suitable foraging habitat in the region. No mitigation is proposed for loss of potential foraging habitat for golden eagle.

5.2.3.3 Long-eared Owl

Federal status – none
State status – species of special concern

Species Description

Long-eared owl nests and roosts in conifer, oak and riparian habitat. Typically, nests are located in open forests, or in dense forests on the edge of grasslands or another open habitat. This species will use old hawk or corvid nests, squirrel nests, woodrat nests or mistletoe brooms. This species forages in open habitat and rarely in wooded areas, and typically perches in dense areas relying on camouflage to remain undetected. This species has long wings and flies buoyantly and low over the ground and feeds almost exclusively on small mammals but will opportunistically take birds and rabbits.

Survey History

Long-eared owl was detected on-site and evidence of other long-eared owl perch locations were also identified. During CRLF nighttime surveys, this species was detected by eye-shine perched on vegetation along Cayetano Creek adjacent to the project site. Small rodent prey was also detected by eye shine and appeared to be abundant in the annual grassland where the long-eared owl was foraging. Additionally, whitewash and large owl pellets were observed at other locations along Cayetano Creek adjacent to the project site that are consistent with long-eared owl pellets and were located similarly along the creek where the long-eared owl was observed to be perched while foraging. Long-eared owl nesting was not observed on the project site and there are no known occupied nest locations in or immediately adjacent to the project site (reported in the CNDDB sources). However, other accounts from eBird document observations of long-eared owl in the Livermore area.

There are no CNDDB reported occurrences for long-eared owl within a 5-mile radius of the project site or within Alameda County.

Habitat Suitability

The entire project site provides potential foraging habitat for long-eared owl, and large trees along Cayetano Creek adjacent to the site provide potential nesting habitat. Annual grassland and dryland grain crop habitat in the project site provide abundant habitat for prey resources. No suitable nest trees for long-eared owl occur in the project site.

Potential for Adverse Effects

In the absence of proposed mitigation measures, potential adverse effects of the proposed project on long-eared owl during construction and decommissioning could include harm to individual long-eared owls, nest disturbance, and loss of foraging habitat.

If dispersing or transient long-eared owls were to occupy nests adjacent to the project site prior to construction of the project or decommissioning, such activities could result in direct impacts to long-eared owl individuals through nest disturbance. Project construction activities would include road construction, trenching for low-voltage collection lines, boring for support posts, and installation of solar panel arrays. These activities would be considered low-intensity impacts because the construction disturbance (noise, presence of equipment and personnel) would be comparable in nature to the agricultural practices in the region but could impact long-eared owl if present through noise, vibration, and the presence of construction equipment and personnel. This would be a significant impact.

Foraging habitat for long-eared owl will largely be lost as a result of converting grassland to a solar generation facility, although some habitat may remain around the perimeter of the site in undeveloped areas and this species may be able to forage between rows of panels or under panels. HELIX biologists have observed other species of owls, such as great horned owls, perching on solar panels and searching for small mammal prey. Impacts to foraging habitat for long-eared owl will be less than significant due to the abundance of foraging habitat in the region and the generally low levels of long-eared owl populations in the region. No mitigation is proposed for loss of potential foraging habitat for long-eared owl. The recommended mitigation measures for nesting raptors and migratory birds contained in Section 6 (MM BIO-6) would reduce potential impacts to nesting individuals to less than significant.

5.2.3.4 Burrowing Owl

Federal status – none
State status – species of special concern

Species Description

Burrowing owls are often found in open, dry grasslands, agricultural and range lands, and desert habitats. They can also inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats. Burrowing owls occur at elevations ranging from 200 feet below mean sea level to over 9,000 feet amsl. In California, the highest elevation where burrowing owls are known to occur is 5,300 feet amsl in Lassen County. In addition to natural habitats, burrowing owls can be found in urban habitats such as at the margins of airports and golf courses and in vacant urban lots. Burrowing owls forage in adjacent grasslands and other suitable habitats primarily for insects and small mammals, and less often for reptiles, amphibians, and other small birds.

Burrowing owls nest in burrows in the ground and commonly perch on fence posts or mounds near the burrow. The owls often use ground squirrel burrows or badger dens or artificial burrows such as abandoned pipes or culverts. Although the more northern burrowing owl populations migrate seasonally, burrowing owls are year-round residents of the San Joaquin Valley. In the San Joaquin Valley, the nesting season for burrowing owl can begin as early as February 1 and continues through August 31.

Survey History

Burrowing owls or sign was not observed in the project site during biological surveys conducted in 2018. However, several burrowing owl pellets and feathers were observed along the northern boundary of the project site and throughout Cayetano Creek adjacent to the project site during burrowing owl protocol surveys in 2020. However, burrowing owl pellets were not observed in association with any burrows or owls and were likely a result of transient owls passing through the site or the creek represents an area used by burrowing owls to forage. On June 17 and 18, 2020, two juvenile burrowing owls were observed at a burrow east of the northern parcel approximately 200 feet from the project boundary (see Appendix A: Figure 5). Both owls were observed making short flights during daylight hours and returning to the burrow over two days. A follow up survey conducted on July 14, 2020 confirmed that four juvenile burrowing owls were at this burrow. Mature burrowing owls were not observed at this burrow. These owls likely originated from a nest nearby and are dispersing away from the nest. Burrowing owl pellets and feathers detected earlier in the 2020 survey season indicate that burrowing owls forage in the project site although no burrowing owls were observed while conducting nighttime surveys for CRLF.

No other indication of burrowing owl was detected. Burrowing owls were not observed at any of the California ground squirrel burrows or at any of the culverts or abandoned pipes located in the project site. Additionally, very little burrow habitat was observed in the project site in the central and southern parcels south of Manning Road. A few burrows located south of Manning Road were limited to Cayetano Creek and its banks outside of the project site. Most burrow habitat for this species was detected on the northern parcel north of Manning Road with several California ground squirrel burrows located throughout the project site.

There are eight CNDDB reported occurrences of burrowing owl within a 2-mile radius of the project site with the nearest reported occurrence (Occurrence No. 257) located approximately 0.55 mi southeast where burrowing owls were documented nesting in grazed grassland with ground squirrel burrows in spring/summer of 1997. The next closest record (Occurrence No. 46) is located approximately 1.2 miles southeast of the project site. This observation documents two burrowing owls during the winter along the road. Another CNDDB record (Occurrence No. 642) documents a pair of burrowing owl nesting in a preserve approximately 1.25 miles east of the project site in 2016 (CDFW 2020).

Habitat Suitability

The project site provides potential foraging habitat for burrowing owl primarily in the dryland grain crop in the northern and southern parcels; much of the central parcel is comprised of tall grass, which is typically avoided by burrowing owl. Mammal burrows are present adjacent to the project site along Cayetano Creek, along the fence line of the northern parcel north of Manning Road, and in the dryland grain crop north of Manning Road providing potential nesting habitat for burrowing owl. Annual grassland habitat in the central parcel south of Manning Road is nearly devoid of burrowing mammals and the grassland consists of tall grass which is typically avoided by burrowing owl. No burrows showing sign of occupancy by burrowing owl were detected anywhere inside the project site boundaries, although suitable burrows are present.

Potential for Adverse Effects

In the absence of proposed mitigation measures, potential adverse effects of the proposed project on burrowing owl during project construction and decommissioning could include harm to individual

burrowing owls, nest disturbance/loss of occupied burrows, and loss of foraging habitat. Burrowing owl nesting was not observed in the project site and there are no known occupied burrowing owl nesting locations in the project site (reported in the CNDDB or other sources). However, burrowing owls were observed approximately 200 feet east of the eastern boundary of the northern parcel.

If dispersing or transient burrowing owls were to occupy mammal burrow(s) in or adjacent to the project site prior to construction of the project or decommissioning, such activities could result in direct impacts to burrowing owl individuals through harm because of contact with construction equipment or personnel and/or indirect impacts because of habitat destruction or loss of burrows. Project construction activities would include road construction, trenching for low-voltage collection lines, boring for support posts, and installation of solar panel arrays. These activities would be considered low-intensity impacts because the construction disturbance (noise, presence of equipment and personnel) would be comparable in nature to the agricultural practices in the region but could impact burrowing owl if present through noise, vibration, and the presence of construction equipment and personnel. This would be a significant impact.

Foraging habitat will be impacted as a result of converting grassland to a solar generation facility, however, foraging habitat for burrowing owl will be available among the panels and in open undeveloped areas on the facility. Impacts to foraging habitat for burrowing owl will be less than significant due to the abundance of more suitable and higher quality foraging habitat in the region and the continued presence of foraging habitat within the project site. No mitigation is proposed for loss of potential foraging habitat. The recommended mitigation measures for burrowing owl contained in Section 6 (MM BIO-3) would reduce impacts to nesting burrowing owl to less than significant.

5.2.3.5 Northern Harrier

Federal status – none
State status – species of special concern

Species Description

Northern harrier is widespread throughout North America from southern Canada to northern Mexico and is a year-round resident in California. Population sizes increase during the non-breeding season due to over-wintering migrants. Northern harrier is also considered to be somewhat nomadic and will range widely even during nesting season. Northern harriers breed in a variety of open habitats including marshes, wet meadows, weedy shorelines, grasslands, weed fields, pastures, sagebrush flats, desert sinks, and croplands. Northern harriers nest on the ground in patches of dense, tall vegetation in undisturbed areas. Breeding occurs from March to August. Northern harriers feed on a wide variety of vertebrate prey, including rodents, songbirds, waterfowl, and lizards.

Survey History

Northern harrier was observed on the project site during several biological surveys in 2020. Both a male and female pair were observed foraging regularly over the central parcel on the project site. Annual grassland habitat in the project site provides habitat for nesting and foraging. Small mammal prey is abundant on portions of the project site and adjacent areas and could support this species. No northern harrier nests or breeding behaviors were observed during surveys in 2020. The nearest CNDDB reported occurrence of northern harrier documents a nesting pair located approximately 4 miles west of the project site in the foothills (CDFW 2020).

Habitat Suitability

Grazed annual grassland and dryland grain crop vegetation communities in the project site provide suitable foraging habitat for northern harrier. The project site provides suitable nesting habitat throughout the grassland where tall vegetation is present and suitable nesting habitat is adjacent to the project site along Cayetano Creek.

Potential for Adverse Effects

In the absence of proposed mitigation measures, project construction and decommissioning activities have the potential to affect northern harrier. Construction and/or decommissioning would not affect foraging northern harrier as it is a highly mobile bird species and individual birds foraging or otherwise occurring in the site could readily avoid construction areas or contact with construction equipment or personnel. Therefore, no impacts to individual harriers is anticipated unless this species nests on the site. If northern harrier were to nest on the site, impacts to nesting could occur through noise, vibration, and the presence of construction equipment and personnel. Potential impacts to nesting harriers would be a significant impact.

The recommended mitigation measures for nesting raptors and migratory birds contained in Section 6 (MM BIO-6) would reduce impacts to northern harrier to less than significant.

5.2.3.6 White-tailed Kite

Federal status – none
State status – fully protected

Species Description

White-tailed kite is a year-round resident in California in coastal areas and lowlands in the Central Valley. Population sizes increase during the non-breeding season due to over-wintering migrants. White-tailed kite prefers open stages of habitats dominated by herbaceous species (Zeiner et al. 1990). White-tailed kite will nest in tall trees adjacent to foraging habitat (Zeiner et al. 1990). White-tailed kites feed mainly on small mammals such as voles (*Microtus* spp.) but will take other small vertebrate and invertebrate prey.

Survey History

White-tailed kite was observed in the project site during biological surveys in 2020. Two white-tailed kites were observed foraging in the annual grassland habitat on the site and perching in the large valley oak trees west of the site along Cayetano Creek. There are no suitable nest trees for white-tailed kite on the project site. However, suitable large valley oaks trees that provide potential nesting habitat for white-tailed kite are present adjacent to the site along Cayetano Creek although no white-tailed kite nests were observed in any of these trees. Only one raptor nest was observed in the large valley oak trees adjacent to the project site, which was being used by a red-tailed hawk on February 26, 2020.

There are no reported occurrences of white-tailed kite nesting in or adjacent to the site. The nearest CNDDB reported occurrence (Occurrence No. 81) of white-tailed kite documents a nesting pair located approximately 4.5 miles west of the project site (CDFW 2020). The record documents a nesting pair from 1992 using an oak tree.

Habitat Suitability

Annual grassland that is currently managed for cattle grazing and dryland grain crop fields in the project site provides suitable foraging habitat for white-tailed kite. Suitable nesting habitat is adjacent to the project site along Cayetano Creek where there several large valley oak trees rooted in the bank of the stream. The lands surrounding the project site consists primarily of a mix of active cattle grazed land, annual grassland and dryland grain crop fields that have been historically cultivated for agriculture and is subject to routine disturbance. These lands provide abundant suitable foraging habitat for white-tailed kite.

Potential for Adverse Effects

In the absence of mitigation measures, project construction and decommissioning activities have the potential to affect white-tailed kite. Construction and/or decommissioning would not affect foraging white-tailed kite as it is a highly mobile bird species and individual birds foraging or otherwise occurring in the site could readily avoid construction areas or contact with construction equipment or personnel. Therefore, no impacts to individual white-tailed kite is anticipated unless this species nests adjacent to the site. If white-tailed kite were to nest adjacent to the site, impacts to nesting could occur through noise, vibration, and the presence of construction equipment and personnel. Potential impacts to nesting white-tailed kite would be a significant impact.

Foraging habitat will be impacted as a result of converting grassland to a solar generation facility, however, foraging habitat for white-tailed kite will be available among the panels and in open undeveloped areas on the facility. Impacts to foraging habitat for white-tailed kite will be less than significant due to the abundance of more suitable and higher quality foraging habitat in the region, the low populations levels of this species in the region, and continued availability of foraging habitat at the site. The recommended mitigation measures for nesting raptors and migratory birds contained in Section 6 (MM BIO-6) would reduce impacts to white-tailed kite to less than significant.

5.2.3.7 Loggerhead Shrike

Federal status – none
State status – species of special concern

Species Description

The range of the loggerhead shrike extends throughout the United States and southern Canada, and it is a year-round resident throughout most of its California range. This species prefers open habitats with scattered shrubs, trees, posts, or other perches. It can be found in shrublands or open woodlands with bare ground, or sparse herbaceous cover and is often found in open cropland. Loggerhead shrikes hunt in open areas of short grasses, forbs, or bare ground, and impale prey on thorns or barbed wire. Prey includes large insects, as well as various small reptiles, amphibians, rodents, and birds.

Suitable breeding habitat includes shrublands or open woodlands with grass cover or bare ground. Loggerhead shrikes in the Central Valley typically use riparian edges where they generally place their nests 1 to 2 meters (3.3 to 6.6 feet) above ground in shrubs or trees. Loggerhead shrike habitat includes alfalfa fields, grasslands, non-rice crops, oak groves, orchards, pastures, ponds and seasonally wet areas, riparian areas, disturbed areas, rural residential development, tree groves, and canals.

Survey History

Several loggerhead shrikes were observed foraging in the project site during surveys in 2018 and 2020. These individuals were typically perched on fences or vegetation; no active nests of this species were observed. Several inactive stick nests were observed in small shrubs and trees adjacent to the project site along Cayetano Creek that could belong to loggerhead shrike. On June 17, 2020, a pair of loggerhead shrikes were observed feeding recently fledged offspring in a valley oak tree along Cayetano Creek adjacent to the site. The loggerhead shrikes were also very defensive around their fledglings. No active nest was observed at this location. The loggerhead shrikes and young were not present the following day on June 18, 2020.

There are no CNDDB reported occurrences of loggerhead shrike nesting in a 5-mile radius of the project site.

Habitat Suitability

The project site provides suitable nesting, perching and hunting habitat for loggerhead shrike. Grazed grasslands and barbed wire fences provide foraging habitat. Perennial shrubs are present in the project site, although they are sparse and scattered along the perimeter of the project site and along Cayetano Creek. Loggerhead shrike could occur nesting and several individuals have been detected foraging during surveys in 2018 and fledglings were observed in June of 2020.

Potential for Adverse Effects

In the absence of mitigation measures, project construction and decommissioning activities have the potential to affect loggerhead shrike. Construction and/or decommissioning would not affect foraging loggerhead shrike as it is a highly mobile bird species and individual birds foraging or otherwise occurring in the site could readily avoid construction areas or contact with construction equipment or personnel. Therefore, no impacts to individual loggerhead shrike is anticipated unless this species nests on the site. If loggerhead shrike were to nest on the site, impacts to nesting could occur through noise, vibration, and the presence of construction equipment and personnel. Potential impacts to nesting loggerhead shrike would be a significant impact.

Foraging habitat will be impacted as a result of converting grassland to a solar generation facility, however, foraging habitat for loggerhead shrike will be available among the panels and in open undeveloped areas on the facility. Impacts to foraging habitat for loggerhead shrike will be less than significant due to the abundance of more suitable and higher quality foraging habitat in the region, the low populations levels of this species in the region, and continued availability of foraging habitat on-site. The recommended mitigation measures for nesting raptors and migratory birds contained in Section 6 (MM BIO-6) would reduce impacts to loggerhead shrike to less than significant.

5.2.4 Special-status Mammals

5.2.4.1 American Badger

Federal status – none
State status – species of special concern

Species Description

American badger occurs throughout most of California in a wide range of habitats but prefers open stages of forest and scrub habitats with friable soils. American badger dens are typically located in open areas with sparse vegetation. American badger will use many dens in a season, reusing the same den or excavating new dens each night. Common signs of use include a dirt ramp leading to the entrance, flattened grass around the entrance, scat, and tracks. The home range of a badger typically ranges from 400 to 600 acres but may range to as high as 1,549 acres (Zeiner et al. 1990).

Survey History

American badger or their burrows were not observed in the project site during any of the numerous biological surveys, including protocol surveys for burrowing owl which included searching for mammal burrows. The project site contains no known dens. A staple diet of the American badger, the California ground squirrel, and their burrows are abundant in the northern parcel north of Manning Road although they are relatively scarce in the central and southern parcels located south of Manning Road. Surrounding hillslopes outside of the project boundary support a heavy population of California ground squirrels in cattle grazed annual grasslands. Both coyote and golden eagle were observed foraging in these areas. There are several CNDDB reported occurrences of American badger near the project site, with the nearest CNDDB reported occurrence (Occurrence No. 64) located approximately 2 miles northeast of the project site along North Vasco Road. This record is of a badger observed dead on the road in 1995.

Habitat Suitability

Although this species does not currently occupy the site and no evidence of this species was detected, the entire project site is potentially suitable foraging and dispersal habitat for American badger, and marginal denning habitat is present on the site where California ground squirrel burrows are present. Since the annual grassland in the central and southern parcels south of Manning Road was virtually devoid of California ground squirrel burrows, foraging habitat for badger is likely poor in those parcels. However, fossorial prey that could support American badger such as California ground squirrel, Botta's pocket gopher and other rodents are abundant in the northern parcel north of Manning Road and in the surrounding area. American badger likely occupies the landscape in the vicinity of the project site since they have been documented in the CNDDB, and the surrounding annual grasslands and dry farmed lands are contiguous with annual grassland and dryland grain crops on the project site.

Potential for Adverse Effects

American badger has the potential to use the project site since habitat with fossorial prey species is present and there are documented accounts of this species in the area. However, no occupied dens or direct observations of American badger or sign, such as tracks, or badger excavations were observed in the project site. There is a potential for American badger to occupy the project site prior to commencement of the project or to occur in the project site as transient individuals either foraging or dispersing through the site during construction and decommissioning. Wildlife friendly fencing has been incorporated into the proposed project to allow for dispersal of small to medium sized species such as American badger. Therefore, this species would not be precluded from foraging on the site. Because American badger is a highly mobile animal, other than potential denning, it would be able to avoid contact with construction equipment and personnel and any operational staff or maintenance

operations. In the absence of proposed mitigation measures, the project would have a low potential for adverse effects on American badger if it were to den on the project site. This would be a significant impact.

Implementation of the recommended mitigation measures for American badger contained in Section 6 (MM BIO-4) would avoid take of this species and would reduce impacts to American badger to less than significant.

5.2.4.2 San Joaquin Kit Fox

Federal status – endangered
State status – threatened

Species Description

San Joaquin kit fox was listed as "threatened with extinction" under the Endangered Species Preservation Act of October 15, 1966 (16 U.S.C. 668aa(c); 32 FR 4001) and is currently listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544).

San Joaquin kit fox inhabits a wide range of open and shrubby habitats, including grassland, scrublands, agricultural areas where dens are available (e.g., unplowed fields, row crops, vineyards, or orchards), non-irrigated pastures, vernal pool grasslands, playas, and alkali meadows. San Joaquin kit fox dens are typically located on slopes less than 40 degrees, and pupping dens are usually on level ground; den entrances are typically 8 to 10 inches in diameter. San Joaquin kit foxes use many dens in a season, and occupied dens often show no signs of use. Common signs of use include a dirt ramp leading to the entrance, flattened grass around the entrance, scat, tracks, and prey remains.

The largest extant populations of San Joaquin kit fox are at the western margins of the Central Valley and the eastern Coast Ranges. Population centers occur in western Kern County (Elk Hills and Pixley National Wildlife Refuge), eastern San Luis Obispo County (Carrizo Plain), western Fresno County and eastern San Benito County (Ciervo-Panoche Natural Area), Southern Monterey County (Fort Hunter-Liggett and Camp Roberts), western Merced County, and eastern Contra Costa County. These population centers generally form a meta-population lying west of Interstate 5 and/or south of Allensworth, with only isolated occurrences in the remainder of the valley. By 2006, San Joaquin kit fox was determined to be largely eliminated from the central San Joaquin Valley (USFWS 2010b).

Survey History

No San Joaquin kit fox, potential dens, or their sign, was observed in the project site during any of the biological surveys, including transects of the site to search for dens of fossorial animals during protocol burrowing owl surveys as well as general biological reconnaissance surveys. The project site supports several ground squirrel burrows but contains no suitable San Joaquin kit fox dens. All burrows observed in the project site were either occupied by California ground squirrel, collapsed and inactive or had recent sign of use by California ground squirrel. Scat that likely belonged to coyote was observed along a cattle trail in Cayetano Creek adjacent to the site and consisted of red fur (cattle) and vegetation. Coyotes, a potential predator and competitor of kit fox were abundant with six individuals observed during the day north of the northern parcel outside of the project site. Another potential fox predator, golden eagle, was also observed foraging over the project site routinely.

There are several CNDDB reported occurrences of San Joaquin kit fox within a 5-mile radius of the project site. The nearest CNDDB reported occurrence (Occurrence No. 571) is located approximately 2.7 miles north of the project site. This record from 1989 documents a natal den near North Vasco Road (CDFW 2020). The most recent account of this species in Alameda County is an observation documented in the CNDDB (Occurrence No. 58) from 2002 of one individual moving through an area dominated by annual grassland and rocky outcrops near Brushy Peak (CDFW 2020), approximately 4.5 miles northeast of the project site. This CNDDB record did not document a den or breeding foxes.

The project site is in an area described as a satellite population at the northern and western extent of the San Joaquin kit fox range, which is in decline with no known breeding (USFWS 2010b). The project site is not in a core area or a linkage area between known occupied populations of San Joaquin kit fox (USFWS 2010b). There are very few studies documenting the status of this species in the northern portions of this species range, with very few recent accounts of this species persisting at detectable levels (USFWS 2010b).

A study conducted in 2003 using detection dogs surveyed public and private lands to detect the presence of this species in the northern extent of their range. Previous studies in the southern parts of the San Joaquin kit fox range using dog detection and DNA analysis were successful at identifying San Joaquin kit fox populations (Smith et al. 2006). The use of dog detection to identify fox scat, can identify old scat and recent scat and identify whether fox has occupied an area briefly or for a longer duration. The study collected all potential fox scat and used DNA analysis to identify scat to species. The study only identified San Joaquin kit fox in Merced County, and did not detect kit fox scat in Alameda County or any other northern counties examined. The only fox scat detected during the study in Alameda County was red fox scat, which is potentially detrimental for San Joaquin kit fox. Red fox, in addition to coyotes, are potential competitors and predators of San Joaquin kit fox. Additionally, red fox has been known to kill kit fox and may also spread disease to kit fox. In some areas, red fox has been known to replace the ecological niche of the kit fox. Although the dog detection study did not detect kit fox in most of their historical range in the north, that does not mean they still do not persist. San Joaquin kit fox may persist at very low levels that are difficult to detect, or the population may consist of transient individuals that are dispersing from other isolated populations.

Habitat Suitability

The entire project site is suitable foraging and dispersal habitat for San Joaquin kit fox. Potential prey species consisted primarily of California ground squirrel, which were abundant in the northern parcel north of Manning Road and in areas surrounding the project site. California ground squirrels established large burrow complexes irregularly throughout the project site, with most burrows north of Manning Road. Stream banks adjacent to the project site along Cayetano Creek and field margins in the northern parcel north of Manning Road support ground squirrel burrows, which could provide marginal denning habitat for kit fox. The project site is generally poor quality denning habitat for San Joaquin kit fox. Soils in the project site consist primarily of clay or loam and were relatively hard and cracked and not the best habitat for kit fox (Clark et al. 2007). Dense vegetation in grasslands also makes kit fox more susceptible to ambush predation from species such as bobcat (*Lynx rufus*) (Clark et al. 2007). No potential San Joaquin kit fox dens were observed on the site. All burrows belonged to California ground squirrels and were either occupied or collapsed.

A pack of six coyotes was observed foraging on the outskirts of the northern edge of the project site and coyote scat was abundant throughout the project site. Coyote was also observed excavating ground

squirrel burrows and chasing ground squirrels west of the project boundary. The project site is also within the range of gray fox, but gray fox typically does not occupy the same habitat as kit fox. The presence of several coyotes, golden eagle, the potential presence of red fox and the presence of hard clay to clay loam soils that cover most of the project site would make the project site less favorable for San Joaquin kit fox. Hard clay soils on the project site also reduce the kit fox's ability to dig refuge sites from potential canid and avian predators. Because the project site largely lacks suitable soils for San Joaquin kit fox, supports numerous predators of this fox, is in an area where populations of this fox species are in very low levels (if this species persists at all in the area), and no dens were observed on the site, San Joaquin kit fox is generally considered to be absent from the project site. At best, San Joaquin kit fox would be expected to occasionally use the site for dispersal or foraging if there are populations in the region but would not be expected to linger on the site for any extended period of time.

Potential for Adverse Effects

Conversion of the project site from suitable foraging and dispersal habitat to a solar generation facility would not eliminate the potential for San Joaquin kit fox to use the site for foraging and dispersal and would not constitute a significant impact to this species. Wildlife friendly fencing has been incorporated into the proposed project to allow for dispersal of small to medium sized species such as San Joaquin kit fox. Because San Joaquin kit fox is a highly mobile animal and the site does provide suitable foraging and dispersal habitat, there is a low potential for San Joaquin kit fox to occupy the project site prior to commencement of the project or to occur in the project site as transient individuals either foraging or dispersing through the site during construction, operation, and decommissioning. In the absence of proposed mitigation measures, the project would have a low potential for adverse effects on San Joaquin kit fox. This would be a significant impact.

Implementation of the recommended mitigation measures for San Joaquin kit fox contained in Section 6 (MM BIO-5) would avoid take of this species and would reduce impacts to San Joaquin kit fox to less than significant.

5.2.5 Foraging Habitat for Special Status Birds

5.2.5.1 Tricolored Blackbird

Federal status – none
State status – Candidate Threatened

Tricolored blackbird forages on the ground in croplands, grassy fields, flooded land, and edges of ponds for insects (Shuford and Gardali 2008). With the loss of natural flooding cycles of foraging habitat in the Central Valley, breeding tricolored blackbirds forage primarily in managed habitats (Tricolored Blackbird Working Group 2007). Preferred foraging habitat is typically in vegetation that is less than 15 centimeters tall (Shuford and Gardali 2008) and within 3-4 miles of their breeding colony sites (Tricolored Blackbird Working Group 2007).

The project site and surrounding areas provide suitable foraging habitat for tricolored blackbird. Tricolored blackbirds have not been observed in the project site during the numerous biological surveys and there is no breeding habitat within the site. However, the site is dominated by dryland grain cropland and annual grassland, which may provide foraging habitat for colonies that may be breeding near the project site. The nearest CNDDB record (CNDDB Occurrence No. 840) for tricolored blackbird is

located approximately 1.3 miles east of the project site. The CNDDB record documents several years of tricolored blackbirds foraging and breeding in stock ponds and seasonal wetlands set in annual grassland habitat, which was last documented in 2014 (CDFW 2020).

On the project site, foraging habitat for tricolored blackbird is likely limited to the areas that consist of dryland grain crops after they have been harvested, since the rest of the site consists of herbaceous annual vegetation that is much taller than 15 centimeters. Most vegetation in the annual grassland habitat is approximately 60 to 90 centimeters. The closely related red-winged blackbird (*Agelaius phoeniceus*) was observed foraging and nesting in annual grassland along Cayetano Creek and its tributaries, however no tricolored blackbirds were observed in association with the red-winged blackbirds.

Impacts to potential foraging habitat for tricolored blackbird that could occur as a result of the proposed project are considered less than significant because suitable foraging habitat for tri-colored blackbird is limited on the site, this species has never been observed foraging on the site during numerous biological surveys conducted over a period of approximately 2.5 years, foraging habitat is abundant in the region and the herbaceous understory will be maintained after the installation of the solar array will continue to function as potential foraging habitat for tricolored blackbirds.

5.2.5.2 Swainson's Hawk

Federal status – none
State status – Threatened

Swainson's hawk is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. Swainson's hawk breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley and forages in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. Swainson's hawks breed in California and winter in Argentina, Mexico, and South America. Swainson's hawks usually arrive in the Central Valley between March 1 and April 1 and migrate south between September and October. Swainson's hawks usually nest in trees adjacent to suitable foraging habitat. Swainson's hawk nests are usually located in trees near the edges of riparian stands, in lone trees or groves of trees in agricultural fields, and in mature roadside trees. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet, and ranging from 41 to 82 feet, are the most commonly used nest trees in the Central Valley. Suitable foraging areas for Swainson's hawk include native grasslands or lightly grazed pastures, alfalfa and other hay crops, idle land, certain grain and row croplands, and ruderal lands. Swainson's hawks primarily feed on voles; however, they will feed on a variety of prey including small mammals, birds, and insects.

The project site and surrounding areas provide suitable foraging habitat for Swainson's hawk, which was observed soaring over the project site on April 6, 2020. The project is not within the current nesting range for Swainson's hawk per the California Wildlife Habitat Relationship (CWHR) program (Zeiner et al. 2011). Although Swainson's hawk have recently been identified breeding outside of their current known range in Santa Clara County (Philips et al. 2014), no detections of nesting Swainson's hawk have been reported in the CNDDB or on other public databases in or near the Livermore Valley. There is a total of seven CNDDB records within a 10-mile radius of the project site, which is the standard accepted travel distance foraging Swainson's hawk will make from a nest (CDFW 1994). The nearest documented record for Swainson's hawk is approximately 3.9 miles southwest of the project site in the City of Livermore.

The CNDDB record states that a pair was observed at a nest from April through May in 2017 but does not specify the success of the nest or whether nestlings were observed in the nest or whether Swainson's hawk constructed the nest (CDFW 2020). Additionally, this is the only record of a Swainson's hawk at a nest in the Livermore Valley. In the region of the project site, Swainson's hawk typically nest in the Central Valley per their known range (Zeiner et al. 2011). There are no other nest sites in the Livermore Valley and all other accounts of nesting Swainson's hawk within a 10-mile radius are in the Central Valley or in the Sacramento-San Joaquin Delta (CDFW 2020).

Although the project site is within the foraging range of reported Swainson's hawk occurrences, Swainson's hawks are not expected to regularly use the project site for foraging. Over numerous biological surveys conducted over an approximately 2.5-year period, Swainson's hawk were only observed twice at the project site. Each time consisted of a single adult soaring over the site, presumably foraging in the annual grassland and dryland grain crops. Swainson's hawk was not observed capturing prey in or adjacent to the project site on either occasion. Since Swainson's hawk have not been documented successfully nesting in the area of the project, and the project site is outside of this species recognized breeding range per CWHR, this species is not expected to nest in close proximity to the project site.

Impacts to potential foraging habitat for Swainson's hawk that could occur as a result of the proposed project are considered less than significant because the site is at the edge of the known range of this species and therefore this species would not be expected to nest in close proximity to the site or use the site substantially for forage, as evidenced by the low level of observed site use by the species over numerous biological surveys. In addition, as discussed in Section 5.3, the site is expected to continue to provide suitable foraging habitat for Swainson's hawk upon installation of the solar generating facility and revegetation of the site. The recommended raptor foraging measures (MM BIO-7) would reduce impacts to foraging habitat to less than significant.

5.2.5.3 Cooper's Hawk and Ferruginous Hawk

Cooper's hawk and ferruginous hawk are two CDFW watch list bird species that were observed foraging over the project site on February 26, 2020. Ferruginous hawks only winter in California and will not nest in the project boundary and Cooper's hawks typically nest in riparian habitat, which is not present. Impacts to potential foraging habitat for Cooper's hawk and ferruginous hawk that could occur as a result of the proposed project are considered less than significant because of the abundance of suitable foraging habitat for these species in the project region. In addition, as discussed in Section 5.3, the site is expected to continue to provide suitable foraging habitat for raptors upon installation of the solar generating facility and revegetation of the site. The recommended raptor foraging measures (MM BIO-7) would reduce impacts to foraging habitat to less than significant.

5.2.6 Migratory Birds and Raptors

5.2.6.1 Nesting Impacts

The project site and adjacent areas provide nesting habitat for a variety of native birds common to the region and a total of 45 bird species were observed on and adjacent to the site (see Appendix D). The structures and associated trees along Manning Road adjacent to the site provide potential nesting habitat for species that nest or roost in buildings and trees. Large trees adjacent to the project site along Cayetano Creek also provide nesting habitat for red-tailed hawk and other raptors, which have been

observed in the project site. Active nests were not observed during surveys, although fledgling red-tailed hawks were observed perching in the trees outside the site along Cayetano Creek and in the surrounding area. Grassland habitat also provides habitat for ground nesting birds such as western meadowlark, red-wing blackbird, and a variety of sparrows.

Project activities during construction and decommissioning would not directly disturb trees or shrubs but could result in noise and other indirect disturbance that has potential to cause nest failure and project activities will affect herbaceous vegetation, which could contain nests. In the absence of proposed mitigation, destruction of nests, eggs, or nestlings by vegetation clearing or ground-disturbing activities or indirect impacts to birds nesting offsite that resulted in forced fledging or nest abandonment could occur if construction commenced during the avian breeding season (February through August). There is also the potential for small birds to enter hollow vertical piles in the solar arrays and in fence posts. Birds could become entrapped and unable to extricate themselves, potentially resulting in mortality. This could occur with both common and special-status bird species. Such impacts would be considered a violation of the California Fish and Game Code and would be a significant impact.

The recommended mitigation measures for nesting birds (MM BIO-6) would reduce impacts to nesting migratory birds and raptors during construction and decommissioning activities to less than significant.

5.2.6.2 Potential Avian Impacts Resulting from Photovoltaic Solar Generating Facilities

It is acknowledged that solar generating facilities have been documented to result in bird mortality, however these studies are primarily conducted in the deserts of the southwest and include other types of solar facilities, such as solar thermal (power towers) facilities that injure birds due to collisions with the high towers and concentrated rays injuring the birds, and not just solar PV facilities. A publication by the U.S. Department of Energy reviewed the state of knowledge concerning avian mortality at utility-scale solar facilities (Walston et al. 2015). The report included discussion of the potential for solar PV generating facilities to cause death and injury to waterfowl that mistake fields of PV panels for waterbodies – a phenomenon called the "lake effect." The report concluded that few empirical data are available on the number of birds killed or injured at solar generating facilities generally, and by the lake effect specifically. In addition, the authors state that no scientific studies testing the reality of the lake effect had been conducted up to the time of publication.

Waterfowl were not observed in or near the project site since the site is dry and does not provide habitat for waterfowl. Waterfowl are not expected to be common in the project site or pass over since there are no bodies of water in the project site and only seasonally flooded cattle ponds near the project site. The surrounding landscape consists of cattle grazed land in rolling hills. The segment of Cayetano Creek adjacent to the site supports a few small intermittent seasonal wetlands and does not support riparian vegetation. Most of Cayetano Creek supports annual grasses that are consistent with the surrounding grassland, which is dominated by non-native annual grasses. The segment of Cayetano Creek adjacent to the site generally does not provide habitat for avian species associated with aquatic habitats. Waterfowl may be attracted to nearby reservoirs or seasonal wetlands such as Los Vaqueros Reservoir located three miles north of the project site and Valley sink scrub habitat, which consists of seasonal wetlands, located approximately 1.3 miles southeast of the project site. However, as stated previously, no waterfowl were observed on the project site during numerous biological surveys.

HELIX biologists have conducted studies of utility scale solar PV generation facilities related to bird use and potential mortality in the Central Valley. The purpose of the studies was to provide quantitative

data on overall bird use and large-bird mortality, if any, as well as the effectiveness of an avian deterrent measures implemented to reduce avian collisions with solar panels in utility scale solar PV generation sites of 1,000 acres and larger. To date, these studies have shown that resident and migratory birds use the PV array for foraging and that the solar sites are not a significant source of avian mortality (HELIX 2018, unpublished data).

Although impacts to birds due to collisions with solar panels or objects such as electrical lines or towers is not anticipated to be a significant source of mortality or result in a significant impact as discussed above, mitigation measures are being incorporated to reduce any such impacts and also study whether the solar facility is causing avian mortality once constructed and operational. The recommended avian protection measures (MM BIO-7) would reduce avian impacts during operation of the facility to less than significant.

5.3 RAPTOR FORAGING HABITAT

This section discusses how conversion of the annual grassland and dryland grain crops on the site to a solar generating facility could affect the suitability of the site for use by foraging raptors. It has been previously thought that lands supporting linear rows lined with tall vegetation (e.g., vineyards) are considered unsuitable foraging habitat for raptors because the extent to which raptors would attempt to capture prey between rows of tall vegetation was considered negligible. Similarly, solar generation facilities–which are generally similar to vineyards in overall structure–are typically considered unsuitable foraging habitat. However, studies indicate that both vineyards and solar generation facilities that are appropriately managed can provide foraging habitat value for Swainson's hawk, which is a wide-ranging species that forages in open areas (Estep 2013; Swolgaard et al*.* 2008).

Although this section focuses on studies that were done to evaluate Swainson's hawk use of solar generating facilities for foraging specifically, this analysis can be applied to foraging raptors in general. Swainson's hawk is a far-ranging species that forages on the wing and typically requires large open tracts of land for foraging, although it will also capture prey along the ground (e.g., insects). Many other raptors are site and wait style predators that require much smaller areas to forage and will perch on trees, utility poles or structures and capture unsuspecting prey. For these reasons, Swainson's hawk is a good species to use as a surrogate for general raptor foraging requirements, because if Swainson's hawks can use a solar generating facility for foraging, most other raptor species could as well. In fact, it may be somewhat conservative to use Swainson's hawk for a discussion of overall raptor foraging as other species would be even better suited to forage in a solar generating facility based on their life history requirements. Due to the amount of studies that have been conducted on the use of solar facilities by Swainson's hawks for foraging and the reasons mentioned above, this analysis of potential impacts to raptor foraging considers studies done on the ability for Swainson's hawk to forage in a solar generating facility to generally discuss impacts to foraging raptors as a whole.

Because much of the typical solar generation facility is composed of open areas, there is potential for use of solar projects by Swainson's hawks and other raptors for foraging, particularly if the facility is managed to optimize habitat for prey and the area between the panels is managed as perennial grassland vegetation of a suitable height. For example, considering the proposed project at the most horizontal position the panels would cover approximately 50 percent of the ground surface within the portions of the project site covered by panels. As previously mentioned, other land uses with a similar structure, such as vineyards, have also been demonstrated to be used by foraging raptors, so this concept is not completely new. To test the hypothesis that solar arrays provide foraging habitat for

Swainson's hawks, Estep (2013) conducted a pilot study in Sacramento County in 2012 to evaluate the foraging use of solar arrays by Swainson's hawks and other raptor species relative to the surrounding agricultural landscape.

In that study, three PV solar generation facilities in Sacramento County, ranging from 105 to 200 acres in size, were evaluated for foraging use by Swainson's hawks and other raptors. All three of the solar generation facilities evaluated in the foraging study are located within a diverse agricultural landscape of similarly sized parcels to the solar facilities. The study was conducted after the three facilities had been constructed, operation had commenced, and grass cover had been established. The three facilities were being managed to allow establishment of grasses beneath and between the solar panels. The grass cover at these sites is maintained between 4 and 12 inches in height through a sheep grazing program. The grass ground cover is managed to promote the establishment of rodent populations to provide foraging habitat for raptors as well as refugia for rodents to assist with re-establishment of rodent populations on adjacent farmlands following cultivation.

Results of the study indicated that the solar array fields were used for foraging by Swainson's hawks similar to other moderate to high value agricultural cover types and the presence of the solar facilities did not appear to affect the overall use of the landscape by Swainson's hawks or other raptors. As one element of an otherwise diverse agricultural matrix, the solar array fields provided a consistent and an apparently reasonably accessible source of prey, particularly for Swainson's hawks and American kestrels. Surprisingly, the study also indicated that the solar arrays were used at a higher rate than would be expected based on their availability in the landscape, meaning that Swainson's hawks appeared to be selectively foraging within solar arrays over other crop types. The key to this was the fact that the solar sites were managed to provide a continual source of prey that was accessible to the hawks consistently throughout the spring and summer breeding season versus the seasonal availability of prey in agricultural crops due to the planting, growth, and harvesting regime.

Although this was a relatively simple short-term study (i.e., a 5-month study) designed to determine foraging use by Swainson's hawk in 100-200-acre solar arrays within a diverse agricultural matrix, it demonstrated that solar arrays do provide available foraging habitat for Swainson's hawk and are used by this species for foraging. The study also suggests that conversion of otherwise suitable foraging habitat to solar arrays does not necessarily constitute a complete loss of foraging habitat for Swainson's hawk and that properly managed solar arrays could provide important foraging habitat for Swainson's hawk during periods when surrounding agricultural crops are not suitable.

In 2017, HELIX biologists conducted a study of Swainson's hawk foraging at a large-scale solar generation facility in Kings County (HELIX 2018). The study showed that Swainson's hawk will forage in a large-scale solar generation facility (>1,000 acres). The study compared Swainson's hawk foraging use of the 1,100-acre solar facility to an approximately 4,800-acre off-site area that included active and fallow agricultural lands. HELIX found that Swainson's hawk foraged in the operational solar generation facility at a higher intensity (determined by the minutes of forage per unit area) than in surrounding lands. This result is consistent with the findings of Estep (2013), suggesting that solar generation facilities managed to promote raptor foraging may provide higher-value foraging habitat than active and idle agricultural lands.

The results of these studies indicate that solar generation facilities can be used for foraging by Swainson's hawks and other raptors similar to other moderate to high value agricultural cover types. As one element of an otherwise diverse agricultural matrix, the solar generation facilities provided a

consistent and an attractive source of prey. The key to this was the fact that the solar generation facilities were managed to provide a continual source of prey that was accessible to the hawks consistently throughout the spring and summer breeding season versus the seasonal availability of prey in agricultural crops due to the planting, growth, and harvesting regime (Estep 2013).

Estep (2013) notes that to encourage raptor foraging use of solar arrays, the management of a grassland substrate to promote rodent populations, including maintaining vegetation at a height that promotes visibility and access to prey, is of key importance. Most crop types are available for a short period of time during the breeding season due to the planting, growing and harvesting regime, whereas a managed grassland can provide a consistent and available source of prey throughout the spring and summer breeding season.

During operation of the proposed project, the applicant plans to maintain the project site with vegetation and seasonally graze livestock (sheep) between and under the solar panels for the duration of operation of the solar facility, pursuant to an AMP. The mixture of grassland and forbs managed by targeted sheep grazing is expected to provide high value and consistently available habitat conditions for small mammal prey species (ground squirrels, rabbits, voles, pocket gophers, deer mice and house mice). The AMP would include vegetation management methods to ensure that the vegetation composition and structure provides a combination of areas with lower vegetation heights and density to provide accessibility to foraging raptors, and areas with denser, taller vegetation to attract and maintain prey on the site, thus enhancing the site for raptor foraging use.

Management conditions would include ensuring that the vegetation cover is not reduced to the extent that vegetation would not naturally regenerate; there are openings in the vegetation to allow foraging access for raptors; and there are areas where the vegetation would be allowed to grow taller. In general, vegetation heights below the panels should be allowed to be higher to provide cover for prey species, and the vegetation heights between the panels should be maintained at a suitable height to provide foraging accessibility. Suitable grass height to promote foraging for Swainson's hawk and other raptors is generally less than 12 inches, and optimally 4 to 8 inches.

With the proposed site management, many raptor species are expected to continue using the site for foraging and for some species the foraging quality of the site may improve due to more regular availability of prey. HELIX biologists have observed several raptor species foraging in utility scale solar generation facilities including northern harrier, American kestrel, great horned owl, and red-tailed hawk (HELIX 2018). The recommended raptor foraging measures (MM BIO-7) would reduce impacts to foraging habitat to less than significant.

5.4 REGIONALLY OCCURRING BATS

The project site does not provide habitat for special-status bats that may occur in the region, such as pallid bat (*Antrozous pallidus*) or Townsend's big-eared bat (*Corynorhinus townsendii*), and roosting habitat for bat species is absent from the project site. Water resources for bats are also very limited in the region of the project and are likely only limited to artificial water impoundments along drainages or in seasonal wetland complexes. Over the course of numerous biological surveys conducted for the project, including a total of 10 nighttime surveys for CRLF and four evening surveys for burrowing owl, no bat roosts were detected and no bats were observed emerging from trees or structures in or adjacent to the project site. However, the project site may provide foraging habitat for a variety of common bat species such as Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus*

fuscus), or California myotis (*Myotis californicus*). Brazilian free-tailed bat specifically is a wide-ranging bat species that prefers open habitats and may actively forage over the project site if it is present in the project region. Structures adjacent to the project site such as barns, abandoned houses or other outbuildings as well as large trees adjacent to the site along Cayetano Creek could provide roosting habitat for common bat species adjacent to the site that could forage on the site.

Based on the design of the project with buried utilities and the low profile of the solar arrays and the retention of the grassland habitat under the PV arrays, impacts to bats that may occur in the region are expected to be less than significant. PV solar projects pose little risk to bats, particularly among PV arrays. Based on the data presented in the Sunshine Valley Bird and Bat Conservation Strategy (WEST 2017), no bat fatalities were reported during the early implementation of three PV solar projects in California (WEST 2017). Bats detected in the PV arrays were either using the structures or fences for roosting (WEST 2017). Since habitat for roosting bats is absent from the project site, bats have not been observed on the project site during numerous surveys conducted at the ideal time to observe emerging and foraging bats, and the abundance of other suitable foraging habitat in the region, impacts to regionally occurring bat species resulting from the proposed project would be less than significant.

5.5 SENSITIVE NATURAL COMMUNITIES

There is one 0.08-acre ephemeral drainage in the northwest corner of the northern parcel on the project site that is a potential waters of the State and could be considered a sensitive natural community (Appendix A: Figure 5). The proposed project as designed could result in fill of this feature. Potential impacts to the ephemeral drainage are discussed in Section 5.6 and mitigation is proposed to reduce impacts to the feature to less than significant. There are no other sensitive natural communities on the project site. The site consists almost entirely of annual grassland and other agricultural land that supports a mixture of non-native and native species and lacks native or naturalized vegetation communities. Cayetano Creek and its tributaries adjacent to the site are sensitive natural communities. However, the project has been designed to avoid impacts to these features.

5.6 JURISDICTIONAL WATERS AND WETLANDS

HELIX conducted a routine assessment of wetlands and "other waters" of the U.S. and State on July 31, 2018, August 1, 2018 and February 6, 2020, in accordance with the USACE *Wetlands Delineation Manual*, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0), *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States*, and SWRCB policies and regulations. HELIX collected 10 data points which documented upland areas in streams and swales. HELIX delineated five aquatic features: one ephemeral stream, one intermittent stream (Cayetano Creek), and three ephemeral tributaries to Cayetano Creek totaling 5.13 acres. With the exception of one ephemeral stream in the northwest corner of the northern parcel (north of Manning Road) that totals approximately 0.08 acre in size, the project boundaries have been modified to exclude aquatic features from within the project site. Ephemeral drainages are not considered waters of the U.S. but may be waters of the State subject to RWQCB jurisdiction and also subject to CDFW jurisdiction under Section 1600 of the Fish and Game Code. The project as designed could impact the ephemeral drainage. Therefore, the project could result in impacts to waters of the State and waters under CDFW jurisdiction. However, no impacts to potentially jurisdictional waters of the U.S. are anticipated from the project. If the project were to result in impacts to waters of the State, that would be a significant impact.

With the implementation of the recommended mitigation measures for potential impacts to waters of the State (MM BIO-8), impacts to jurisdictional waters would be less than significant.

5.7 WILDLIFE NURSERIES AND MOVEMENT CORRIDORS

A wildlife corridor is a link of wildlife habitat, generally native vegetation, which joins two or more larger areas of similar wildlife habitat. Corridors are critical for the maintenance of ecological processes including facilitating the movement of animals and the continuation of viable populations. Historically, the grasslands in eastern Alameda County were connected through the lowland valleys and stream systems through the Livermore Valley. The majority of this area has been converted to urban and agricultural uses, fragmenting and separating grassland habitat. In addition, I-580 serves as a barrier between the northern and southern parts of the county, with only a few linkages (under crossings) under the freeway between Livermore and the Alameda/Contra Costa County line.

The project site is not included in any corridors mapped by the California Essential Habitat Connectivity project and does not provide any unique movement or dispersal habitat relative to surrounding lands for several miles in all directions. The project site and surrounding lands, which consist predominately of annual grassland and dryland grain crop, currently provide extensive open, dispersal habitat for wildlife movement in the region. No significant impacts to wildlife corridors would occur as a result of the proposed project. In addition, a gap will be maintained between the perimeter fence and the ground to allow passage of small to mid-sized mammals as included in the recommended mitigation under fencing guidelines for San Joaquin kit fox (MM BIO-5). Impacts to wildlife corridors resulting from the proposed project would be less than significant.

5.8 LOCAL POLICIES

The Alameda (East County) County General Plan includes several policies intended to promote conservation of existing high-value biological resources in the county and protect sensitive resources and special-status species. The project site has been subject to a long history of agricultural land use that has severely reduced its biological value compared to undisturbed natural habitats. The Alameda General Plan lists the area of the project site as Large Parcel Agricultural that is outside of the Urban Growth area. The East Alameda County Conservation Strategy and East Bay Regional Conservation Investment Strategy are voluntary plans to promote conservation of natural resources. The project has potential for impacts to special-status species, and includes avoidance, minimization, and mitigation measures that will reduce impacts to special-status species (Section 6). Therefore, the project would not conflict with local policies and ordinances protecting biological resources. No impacts to local policies or plans were identified and no additional mitigation is required.

5.9 HABITAT CONSERVATION PLANS/NATURAL COMMUNITY CONSERVATION PLANS

The project does not fall under the purview of any Habitat Conservation Plans (HCPs) or Natural Community Conservation Plans (NCCPs). The project site is in the Pacific Gas and Electric Bay Area HCP coverage area, although this HCP is for the maintenance and operation of PG&E facilities and not for the installation of large utility scale solar projects. Therefore, the project would not conflict with any provisions of an adopted HCP/NCCP and no mitigation is required.

The project is located within the EACCS area and the project has been designed to be incorporated into previously disturbed agricultural land. The project site will be managed and operated in a similar capacity for grazing of livestock and honey production from bees with the inclusion of PV solar arrays for the next 50 years. Through the implementation of project design and mitigation measures, the project site will continue to provide habitat for wildlife that already occur in the project site, which falls in line with the goals and purpose of the EACCS.

5.10 POTENTIAL FOR SPREAD OF INVASIVE SPECIES

Ongoing agricultural activities on a project site likely reduce the spread of invasive species compared to leaving the land fallow because active agriculture regularly removes established vegetation and replaces it with a crop monoculture. Abandoned fields typically become overgrown with invasive species, including host plants for agricultural pests. Converting active agricultural land to solar PV generation has the potential to result in increased establishment of weedy species by reducing the frequency of disturbance. The project is expected to comply with all weed abatement policies and orders of the Alameda County Department of Agriculture and Weights and Measures. This would reduce potential impacts from the spread of invasive species to less than significant. No mitigation for invasive species is required.

6.0 PROPOSED MITIGATION MEASURES

6.1 GENERAL MITIGATION MEASURES

The following general mitigation measures should be implemented to reduce impacts to biological resources. Specific mitigation measures are included in following sections and some measures may be repeated in the specific measures.

MM BIO-1a Prior to the issuance of grading or building permits, and for the duration of construction activities, the project proponent/operator shall demonstrate that it has in place a Construction Worker Environmental Awareness Training and Education Program for all new construction workers at the project site. All construction workers shall attend the Program prior to participating in construction activities. Any employee responsible for the operations and maintenance or decommissioning of the proposed project facilities shall also attend the Environmental Awareness Training and Education Program prior to starting work on the project.

The Program will be developed and presented by a biologist meeting the qualifications of an authorized biologist as defined by USFWS or designee. The training may be presented in video form. The Program shall include:

- Information on the life history of the American badger, burrowing owl, grasshopper sparrow, loggerhead shrike, golden eagle and other raptors, as well as other wildlife and plant species that may be encountered during construction activities, and the legal protection status of each species (including all nesting birds);

- A description of CRLF, CTS and its habitat, the avoidance and minimization measures that are being implemented to conserve the CRLF and CTS as they relate to the project, and the boundaries within which work may occur;

- A description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information shall be prepared for distribution to the previously referenced people and anyone else who may enter the project site;

- The definition of "take" under the Federal Endangered Species Act and the California Endangered Species Act;

- Measures the project proponent/operator is implementing to protect the species; and

- Specific measures that each worker shall employ to avoid take of wildlife species, and penalties for violation of the Federal Endangered Species Act or California Endangered Species Act.

The worker environmental awareness training material will be kept on-site for the duration of operations and all personnel will be instructed on the importance of CRLF and CTS, how to identify these amphibians, and what to do if CRLF or CTS is found on the facility.

MM BIO-1b Environmental tailboard trainings shall take place on an as-needed basis in the field. The environmental tailboard trainings will include a brief review of the biology of the covered species and guidelines that must be followed by all personnel to reduce or avoid negative effects to these species during construction activities. Directors, Managers, Superintendents, and the crew foremen and forewomen will be responsible for ensuring that crewmembers comply with the guidelines.

MM BIO-1c Contracts with contractors, construction management firms, and subcontractors shall obligate all contractors to comply with these mitigation measures.

MM BIO-1d The following shall not be allowed at or near work sites: trash dumping, firearms, open fires (such as barbecues) not required by the activity, hunting, and pets.

MM BIO-1e Vehicles and equipment shall be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.

MM BIO-1f Off-road vehicle travel shall be prohibited outside of designated project areas.

MM BIO-1g Vehicles shall not exceed a speed limit of 15 mph on unpaved roads within natural land cover types, or during off-road travel.

MM BIO-1h Vehicles or equipment shall not be refueled within 100 feet of a wetland, stream, or other waterway unless a bermed and lined refueling area is constructed.

MM BIO-1i Vehicles shall be washed only at approved areas. No washing of vehicles shall occur at job sites.

MM BIO-1j To discourage the introduction and establishment of invasive plant species, seed mixtures/straw used within natural vegetation shall be either rice straw or weed-free straw.

MM BIO-1k Pipes, culverts, and similar materials greater than four inches in diameter, shall be stored so as to prevent covered wildlife species from using these as temporary refuges, and these materials shall be inspected each morning for the presence of animals prior to being moved.

MM BIO-1l Erosion control measures shall be implemented to reduce sedimentation in wetlands and drainages adjacent to the site that could be occupied by special-status animal and plant species when activities are the source of potential erosion problems. Plastic mono-filament netting (erosion control matting) or similar material containing netting shall not be used at the project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

MM BIO-1m Stockpiling of material shall occur such that direct effects to special-status species are avoided.

MM BIO-1n Grading shall be restricted to the minimum area necessary.

MM BIO-1o Prior to ground disturbing activities adjacent to sensitive habitats, project construction boundaries and access areas shall be flagged and temporarily fenced during construction to reduce the potential for vehicles and equipment to stray into adjacent habitats.

6.2 MITIGATION FOR POTENTIAL EFFECTS ON CALIFORNIA RED-LEGGED FROG AND CALIFORNIA TIGER SALAMANDER

In the absence of the proposed mitigation measures, potential adverse effects to CTS and CRLF could include take of individuals using upland areas for dispersal and/or refugia during construction, operations, and decommissioning. No impacts to potential breeding habitat would occur. For further analysis see *Potential for Adverse Effects* under the California Tiger Salamander and California Red-legged Frog discussions in Sections 5.2.2.1 and 5.2.2.2.

MM BIO-2a If construction commences during the wet season and active dispersal period for these species (between approximately October 16 and May 14, depending on the precipitation year), preconstruction surveys for CRLF and CTS would be conducted in the project site approximately two weeks prior to the initiation of construction and decommissioning activities to ensure that CRLF and CTS are not actively using the project site or adjacent areas as a dispersal corridor. Preconstruction surveys would be conducted by a qualified biologist familiar with all life stages of the amphibians and

would cover all aquatic habitats on and immediately adjacent to the project site (Cayetano Creek and its tributaries) that are suitable for CRLF and CTS dispersal.

MM BIO-2b If any life stage of CRLF and/or CTS (e.g., egg, egg mass, larvae, tadpole, juvenile, or adult) is detected within the project site during any surveys or monitoring for the project during construction or decommissioning, USFWS and CDFW shall be notified within 48 hours. The biologist shall monitor the CRLF or CTS to make sure the amphibian is not harmed and that it leaves the site on its own. Construction activities will not be allowed within 100 feet of the animal. Handling of listed species without a take permit pursuant to the FESA is not allowed.

MM BIO-2c Activities associated with construction and decommissioning conducted within 200 feet of on-site drainages shall be limited to a period outside of the active season for CRLF and CTS (approximately May 15 to October 15, depending on the precipitation year). This construction window is during the dry season in which creek levels are lower to dry, providing limited aquatic dispersal habitat for CRLF. The dry season is defined generally as that time between April 15 and the first qualifying rain event on or after October 15 defined as precipitation of more than one half of an inch for 24 hours. Any extension of the work window outside of the May 15 to October 15 timeframe due to abnormally dry conditions would require coordination with the USFWS.

MM BIO-2d Construction and decommissioning activities within 200 feet of on-site drainages shall be restricted to daylight hours to avoid CRLF and CTS that may be present in the project site during the time they are most active–between dusk and dawn. Construction and decommissioning activities shall cease one half hour before sunset and shall not begin prior to one half hour before sunrise.

MM BIO-2e Construction and decommissioning activities and clearing within the project site shall be confined to the minimal area necessary to facilitate construction activities. To ensure that construction equipment and personnel do not affect sensitive habitat outside of designated work areas, orange barrier fencing shall be erected to clearly define the habitat to be avoided. This will delineate the ESA on the project. The integrity and effectiveness of ESA fencing and erosion control measures shall be inspected daily. Corrective actions and repairs shall be carried out immediately for fence breaches and ineffective erosion control BMPs.

MM BIO-2f To prevent CRLF and CTS from moving through the project site during construction and decommissioning, temporary exclusion fencing shall be placed along the boundary of the project site by October 15th of the year prior to commencement of construction and decommissioning. This will allow any CRLF or CTS potentially using the project site for upland refugia to leave the project site to access breeding habitat, but not return. The fence shall be made of a material that does not allow amphibians to pass through, with one-way exit holes, and the bottom will be buried to a depth of two inches so that frogs cannot crawl under the fence. To avoid entanglement of amphibians and other wildlife, the use of plastic monofilament netting is prohibited. Exclusion fencing shall be removed within 72 hours of the completion of work.

MM BIO-2g A biologist meeting the qualifications of an authorized biologist as defined by USFWS or designee shall survey the project site immediately prior to installation of temporary exclusion fencing to ensure that this species is not present within the site. Once the temporary exclusion fencing is installed, the work area within the exclusion fence shall be surveyed again immediately prior to the onset of construction activities. If listed species are found in the project site during preconstruction surveys, construction activities shall not start within a 100-foot radius until the species has left the area of its own volition. Handling of CRLF or CTS without a take permit pursuant to the FESA is not allowed.

MM BIO-2h A qualified biological monitor shall be present daily during initial construction and decommissioning activities including but not limited to equipment mobilization, site clearing, vegetation removal, and grading/ground disturbance to verify that no CRLF or CTS enter the project site during construction or are harmed. Daily monitoring can be reduced to weekly inspections at the discretion of the biological monitor once site grading has been completed and no habitat/refugia is present for CRLF or CTS on the site.

- Any mammal burrows providing potential refugia for CRLF or CTS shall be scoped to search for these animals. If CRLF or CTS are found, the burrow shall be flagged and avoided by a suitable buffer as determined by the biological monitor.

- If CRLF or CTS are found during construction or decommissioning, work shall immediately stop within 100 feet and the listed amphibian shall be allowed to move out of harm's way on its own accord. The biological monitor shall monitor the CRLF or CTS to make sure the amphibian is not harmed and that it leaves the site on its own. Handling of listed species without a take permit pursuant to the FESA is not allowed. Sightings of special-status species shall be reported to CNDDB.

- Prior to the start of daily construction and decommissioning activities during initial ground disturbance, the biological monitor shall inspect the perimeter fence to ensure that it is neither ripped nor has holes and that the base is still buried. The fenced area shall also be inspected to ensure no amphibians are trapped. If listed amphibians are found inside or outside of the fence, work shall immediately stop, and the animal shall be allowed to leave the project site on its own accord. Any listed species shall be closely monitored until they move away from the construction area.

- A permitted biologist shall be contracted to trap and move CRLF and CTS to nearby suitable habitat if they are found inside the project area and do not leave the project site of their own accord.

MM BIO-2i To ensure that amphibian diseases are not conveyed between work sites by the USFWS-approved biologist or biological monitor, the fieldwork code of practice developed by the Declining Amphibian Population Task Force shall be followed at all times.

MM BIO-2j Standard construction BMPs shall be implemented throughout construction and decommissioning, in order to avoid and minimize adverse effects to the water quality

within the project site. Appropriate erosion control measures shall be used (e.g., hay bales, filter fences, vegetative buffer strips or other accepted equivalents) to reduce siltation and contaminated runoff from the project site. The integrity and effectiveness of the BMPs shall be inspected on a daily basis by the resident engineer or site foreman. Corrective actions and repairs shall be carried out immediately.

MM BIO-2k Construction by-products and pollutants such as petroleum products, chemicals, or other deleterious materials should not be allowed to enter into streams or other waters. A plan for the emergency clean-up of any spills of fuel or other materials should be available when construction equipment is in use.

MM BIO-2l Equipment shall be re-fueled and serviced at designated construction staging areas. All construction material and fill shall be stored and contained in a designated area that is located away from channel areas to prevent transport of materials into adjacent streams. The preferred distance is 100 feet from the wetted width of a stream. In addition, a silt fence shall be installed to collect any discharge, and adequate materials should be available for spill clean-up and during storm events.

MM BIO-2m Construction vehicles and equipment shall be monitored and maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Leaking vehicles and equipment shall be removed from the site.

MM BIO-2n Building materials storage areas containing hazardous or potentially toxic materials such as herbicides and petroleum products shall be located outside of the 100-year flood zone, have an impermeable membrane between the ground and the hazardous material, and shall be bermed to prevent the discharge of pollutants to ground water and runoff water. The bermed area shall at a minimum have the capacity to store the volume of material placed in it.

MM BIO-2o All disturbed soils shall undergo erosion control treatment prior to October 15 and/or immediately after construction is terminated. Appropriate erosion control measures shall be used (e.g., hay bales, filter fences, vegetative buffer strips or other accepted equivalents) to reduce siltation and contaminated runoff from project sites. Erosion control blankets shall be installed on any disturbed soils steeper than a 2:1 slope or steeper.

MM BIO-2p During project activities, all trash that may attract predators shall be properly contained, removed from the work site, and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas.

MM BIO-2q To prevent inadvertent entrapment of animals during construction, all excavated, steep walled holes or trenches more than one foot deep shall be covered at the close of each working day with plywood or other suitable material or provided with one or more escape ramps constructed of earth fill or wooden planks. At the beginning of each working day and before such holes or trenches are filled, they shall be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist, or an on-site designee identified by the USFWS-approved biologist, shall immediately place escape ramps or other appropriate structures to allow the

animal to escape, or USFWS shall be contacted for guidance and notified of the incident. All holes and trenches more than one foot deep shall be filled or securely covered prior to October 15.

MM BIO-2r No monofilament plastic shall be used for erosion control.

6.3 MITIGATION FOR POTENTIAL EFFECTS ON BURROWING OWL

In the absence of proposed mitigation measures, potential adverse effects of the proposed project on burrowing owl during project construction and decommissioning could include harm to individual burrowing owls, nest disturbance/loss of occupied burrows, and loss of foraging habitat. For further analysis see *Potential for Adverse Effects* under the Burrowing Owl discussion in Section 5.2.3.4.

MM BIO-3a If feasible, construction-related ground disturbance activities shall begin outside of the burrowing owl nesting season (February 1 through August 31) and during construction the site shall be maintained in a manner that is inhospitable to burrowing owl such as keeping the site free of vegetation, ground squirrel control (the use of poison baits or other substances that could be potentially harmful to San Joaquin kit fox shall not be allowed), and maintaining regular site disturbance by construction equipment and personnel. This will discourage burrowing owl from occupying the project site. If feasible, decommissioning-related ground disturbing activities shall begin outside of the burrowing owl nesting season (February 1 through August 31).

MM BIO-3b No more than 14 days prior to initiation of ground disturbing activities associated with project construction or decommissioning, a qualified biologist shall conduct a pre-construction survey of the project site and surrounding areas to a distance of 150 meters in accordance with the methods outlined in the CDFW Staff Report on Burrowing Owl Mitigation (2012) or most recently adopted guidance. The first pre-construction survey will cover all areas within 150 meters of the portion of the site in which construction/decommissioning is scheduled to start. Surveys will be phased based on the construction/decommissioning schedule such that the surveys are conducted no more than 14 days ahead of the start of ground disturbance in new areas. If construction/decommissioning activities in portions of the site cease for a period of 14 days, those portions of the site shall be resurveyed for burrowing owls prior to the resumption of construction/decommissioning activities. If no occupied breeding or wintering owl burrows are identified, no further mitigation shall be required. If occupied burrows are identified on the site or within 150 meters, one of the following actions shall be taken: (1) permanent avoidance of the burrow or (2) establishment of a temporary avoidance buffer followed by passive relocation and compensatory mitigation for loss of habitat in conjunction with the measures below:

- If an occupied wintering burrow is discovered during pre-construction surveys, a 50-meter buffer area shall be established around the burrow until the owl leaves on its own (if the burrow is more than 50 meters offsite and/or more than 50 meters from the work area, no buffer is necessary). Ground-disturbing work conducted during the nonbreeding (winter) season (September 1 to January 31) can proceed near the occupied burrow so long as the work occurs no closer than 50 meters to the burrow, and the burrow is not directly affected by the project activity. A smaller

buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist. If the 50-meter buffer cannot be maintained for the duration of occupancy by the owl, owls may be excluded from an occupied wintering burrow in accordance with the conditions of the project's *Burrowing Owl Exclusion Plan*, which shall be submitted for approval by CDFW prior to passive relocation of any burrowing owls.

- If an occupied nesting burrow is discovered during pre-construction surveys, an avoidance buffer of 200 meters shall be established around the burrow location and maintained until a qualified biologist has determined that the nest has fledged or is no longer active (a 200-meter avoidance buffer is appropriate for low-intensity impacts near nesting burrows during breeding season [CDFW 2012]). No project activities shall take place within the 200-meter buffer during the time in which it is in place. A smaller buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist.

- If an occupied burrow cannot be avoided, and the burrow is not actively in use as a nest, a 200-meter buffer shall be established until the burrowing owls can be excluded from burrows in accordance with the project's *Burrowing Owl Exclusion Plan*, which shall be submitted for approval by CDFW prior to passive relocation of any burrowing owls. The Burrowing Owl Exclusion Plan is based on the recommendations made in the Staff Report on Burrowing Owl Mitigation (CDFW 2012) or most recently adopted guidance and shall include the following information for each proposed passive relocation:

    - Confirmation by site surveillance that the burrow(s) is empty of burrowing owls and other species;
    - Type of scope to be used and appropriate timing of scoping;
    - Occupancy factors to look for and what shall guide determination of vacancy and excavation timing;
    - Methods for burrow excavation;
    - Removal of other potential owl burrow surrogates or refugia on-site;
    - Methods for photographic documentation of the excavation and closure of the burrow; and
    - Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take. Methods for assuring the impacted site shall continually be made inhospitable to burrowing owls and fossorial mammals.

MM BIO-3c If an occupied burrow is identified off-site within 150 meters and passive exclusion is deemed necessary to protect the owls, burrowing owls may be excluded from burrows in accordance with the project's *Burrowing Owl Exclusion Plan*, which shall be submitted for approval by CDFW prior to passive relocation of any burrowing owls. If burrowing owls cannot be excluded from an off-site burrow and it is not feasible to maintain an avoidance buffer as stated above, coordination shall be conducted with CDFW to determine appropriate measures to minimize impacts to off-site burrowing owls. Such

measures could include, but are not limited to: (1) installation of barriers between the construction or decommissioning area and the occupied burrows to block noise and views of construction or decommissioning equipment and personnel, and (2) regular monitoring by a qualified biologist to determine if construction or decommissioning activities are resulting in disturbance of the owls that could lead to nest abandonment or harm to adult owls or their young. If such disturbance was occurring, the biological monitor would have the authority to halt construction or decommissioning activities until further modifications could be made to avoid disturbance of the owls.

MM BIO-3d If burrowing owl pairs are passively relocated, compensatory mitigation for lost wintering/breeding habitat shall be provided either through dedication of 6 acres of suitable habitat (per pair of relocated owls) at an off-site location in accordance with the conditions of the project's *Burrowing Owl Exclusion Plan* or through purchase of credits at a CDFW-approved mitigation bank in the region. No compensatory mitigation is required for passive relocation or eviction of transient, unpaired owls.

MM BIO-3e If permanent avoidance buffers are established, such areas shall be managed for the duration of the project to preserve current values as foraging habitat for burrowing owl. Management shall include: (1) exclusion of all project activities throughout the construction, operation, and decommissioning phases, including staging, parking, driving, or dumping; (2) vegetation management by grazing or mowing to preserve open, low-growing vegetation; (3) fencing to discourage human incursion; (4) signage identifying the area as a biologically sensitive area managed for burrowing owl, and; (5) a worker education and awareness program for all personnel working on the site including contractors and sub-contractors.

6.4 MITIGATION FOR POTENTIAL EFFECTS ON AMERICAN BADGER

In the absence of proposed mitigation measures, potential adverse effects of the proposed project on American badger could occur if this species were to den on the project site prior to project construction or decommissioning. For further analysis see *Potential for Adverse Effects* under the American badger discussion in Section 5.2.4.1.

MM BIO-4a A qualified biologist shall conduct a preconstruction survey for American badger no more than 14 days prior to the beginning of ground disturbance related to construction and decommissioning activities, or any other project activity likely to impact American Badger (such as staging, mowing, vegetation clearing), to determine if there are any American badger dens on the project site. If there are no American badger dens on the project site, no further mitigation is necessary. If American badger dens are located within the work area and cannot be avoided, a qualified biologist shall determine if the dens are occupied. If unoccupied, the dens shall be collapsed under the supervision of the biologist. If occupied, the biologist shall determine if it is a natal/pupping den or a solitary badger den. Dens of solitary badger may be collapsed under the supervision of the biologist once the animal has vacated the den. Natal/pupping dens shall be avoided by establishment of an exclusion zone around the den determined by the qualified biologist until the young are old enough to leave the den and survive on their own.

6.5 MITIGATION FOR POTENTIAL EFFECTS ON SAN JOAQUIN KIT FOX

Conversion of the project site from suitable foraging and dispersal habitat to a solar generation facility would not eliminate the potential for San Joaquin kit fox to use the site for dispersal and would not constitute a significant impact to this species. Wildlife friendly fencing has been incorporated into the proposed project to allow for dispersal of small to medium sized species such as San Joaquin kit fox. Because San Joaquin kit fox is a highly mobile animal and the site does provide suitable foraging and dispersal habitat, there is a low potential for San Joaquin kit fox to occupy the project site prior to commencement of the project or to occur in the project site as transient individuals either foraging or dispersing through the site during construction and decommissioning. In the absence of proposed mitigation measures, the project would have a low potential for adverse effects on San Joaquin kit fox.

MM BIO-5a A qualified biologist shall conduct a preconstruction survey no more than 14 days prior to the beginning of ground disturbance and/or construction/decommissioning activities, or any other project activity likely to impact San Joaquin kit fox, to determine if potential San Joaquin kit fox dens are present in or within 500 feet of the project site (inaccessible areas outside of the project site can be surveyed using binoculars or spotting scopes from public roads). The surveys shall be conducted in all areas of suitable habitat for San Joaquin kit fox. Surveys need not be conducted for all areas of suitable habitat at one time; they may be phased so that surveys occur within 14 days prior to disturbance of any particular portion of the site. If potential dens are observed and avoidance of the dens is determined to be feasible, the following minimum buffer distances shall be established prior to construction/decommissioning activities (consistent with USFWS 2011):

  - Potential den: 50 feet
  - Atypical den: 50 feet
  - Known den: 100 feet
  - Natal/pupping den: at least 500 feet – **USFWS must be contacted**.

- Buffer establishment shall follow the *USFWS Standardized Recommendations for* Protection *of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011) under "Exclusion Zones."

- If San Joaquin kit fox or occupied San Joaquin kit fox dens are observed on the site, USFWS must be contacted.

MM BIO-5b If avoidance of the potential dens is not feasible, the following measures are required to avoid potential adverse effects to the San Joaquin kit fox:

- If the qualified biologist determines that potential dens are inactive, the biologist shall excavate these dens by hand with a shovel to prevent foxes from re-using them during construction.

- If the qualified biologist determines that a potential non-natal den may be active, an on-site passive relocation program may be implemented with prior concurrence from the USFWS. This program shall consist of excluding San Joaquin kit foxes from

occupied burrows by installation of one-way doors at burrow entrances, monitoring of the burrow for one week to confirm usage has been discontinued, and excavation and collapse of the burrow to prevent reoccupation. After the qualified biologist determines that the San Joaquin kit foxes have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction with prior concurrence from USFWS.

MM BIO-5c In addition, the following avoidance and minimization measures for San Joaquin kit fox shall be implemented during construction/decommissioning of the project (USFWS 2011):

a. Project-related vehicles shall observe a daytime speed limit of 20 mph and a nighttime speed limit of 10 mph throughout the project site, except on County roads and state and federal highways. Additionally, vehicles shall not exceed a speed limit of 15 mph on unpaved roads within natural land cover types or during off-road travel. Off-road traffic shall be prohibited outside of designated project areas.

b. To prevent inadvertent entrapment of kit foxes or other animals during the construction or decommissioning phases of the project, all excavated, steep-walled holes or trenches more than 2-feet deep should be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks should be installed. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the USFWS and the CDFW should be contacted as noted under Measure l referenced below.

c. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped.

d. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in securely closed containers and removed at least once a week from a construction or project site.

e. No firearms shall be allowed on the project site.

f. No pets, such as dogs or cats, shall be permitted on the project site to prevent harassment, mortality of kit foxes, or destruction of dens.

g. Use of rodenticides, herbicides, poison baits, or other substances potentially harmful to San Joaquin kit fox shall be restricted. This is necessary to prevent

primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. Use of such compounds should observe label and other restrictions mandated by the USEPA, CDFA, and other State and Federal legislation, as well as additional project-related restrictions deemed necessary by the USFWS. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.

h. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped kit fox. The representative will be identified during the employee education program and their name and telephone number shall be provided to the Service.

i. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. shall be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but after project completion, will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas shall be determined on a site-specific basis in consultation with the USFWS, CDFW, and revegetation experts.

j. Any contractor, employee, or military or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox should immediately report the incident to their representative. This representative should contact the CDFW immediately in the case of a dead, injured or entrapped kit fox. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. They shall contact the local warden or the wildlife biologist at (530) 934-9309. The USFWS should be contacted at Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, CA 95825, (916) 414-6620 or (916) 414-6600.

k. The Sacramento Fish and Wildlife Office and CDFW shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information.

l. New sightings of kit fox shall be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed should also be provided to the USFWS at the address listed under measure l.

m. Fencing of the project site, with the exception of the project substation and energy storage areas, shall incorporate wildlife-friendly fencing design. Fencing plans may use one of several potential designs that would allow kit foxes to pass through the fence while still providing for project security and exclusion of other unwanted species (i.e., domestic dogs and coyotes). Raised fences or fences with entry/exit points of at least 6 inches in diameter spaced along the bottom of the fence to allow

species such as San Joaquin kit fox access into and through the project site would be appropriate designs.

6.6 MITIGATION FOR POTENTIAL EFFECTS ON NESTING BIRDS AND RAPTORS

The project site and adjacent areas provide suitable nesting habitat for special-status bird species including grasshopper sparrow, golden eagle, long-eared owl, northern harrier, and white-tailed kite. For further analysis see *Potential for Adverse Effects* under the discussions of these species.

In addition, the project site provides nesting and foraging habitat for a variety of native birds common to the Coast Range, such as western meadowlark, western kingbird, oak titmouse, and American kestrel. The structures and associated trees along Manning Road provide potential nesting habitat for species that nest or roost in buildings. Large trees in the project site along Cayetano Creek and the perimeter of the project site provide nesting habitat for red-tailed hawk and other raptors, which have been observed in the project site. Active nests were not observed during surveys, although fledgling red-tailed hawks were observed perching in the trees and in the surrounding area. Grassland habitat also provides habitat for ground nesting birds such as western meadowlark and a variety of sparrows.

Project activities would not directly disturb trees or shrubs but could result in noise and other indirect disturbance that has potential to cause nest failure. In the absence of proposed mitigation measures, destruction of nests, eggs, or nestlings by vegetation clearing or ground-disturbing activities during the avian breeding season (February through August) could occur and would be considered a violation of the Bald and Golden Eagle Protection Act (golden eagle only) and California Fish and Game Code.

MM BIO-6a If project (construction/decommissioning) ground-disturbing or vegetation clearing, and grubbing activities commence during the avian breeding season (February 1 through August 31), a qualified biologist shall conduct a pre-construction nesting bird survey no more than 7 days prior to initiation of project activities. The survey area shall include suitable raptor nesting habitat within 300 feet of the project boundary (inaccessible areas outside of the project site can be surveyed from the site or from public roads using binoculars or spotting scopes). Pre-construction surveys are not required in areas where project activities have been continuous since prior to February 1, as determined by a qualified biologist. Areas that have been inactive for more than 14 days during the avian breeding season must be re-surveyed prior to resumption of project activities. If no active nests are identified, no further mitigation is required. If active nests are identified, the following measure is required:

- A suitable buffer (e.g., 660 feet for golden eagle, 300 feet for common raptors; 100 feet for passerines) shall be established by a qualified biologist around active nests and no construction/decommissioning activities within the buffer shall be allowed until a qualified biologist has determined that the nest is no longer active (i.e., the nestlings have fledged and are no longer reliant on the nest, or the nest has failed). Encroachment into the buffer may occur at the discretion of a qualified biologist. Any encroachment into the buffer shall be monitored by a qualified biologist to determine whether nesting birds are being impacted.

MM BIO-6: Should any vertical tubes, such as solar mount poles, chain link fencing poles, or any other hollow tubes or poles be used on the project site, the poles shall be capped immediately after installation to avoid entrapment of birds.

6.7 MITIGATION FOR POTENTIAL AVIAN EFFECTS DURING OPERATION OF THE SOLAR FACILITY

6.7.1 General Avian Protection Measures

The following general avian protection measures shall be implemented.

MM BIO-7a Project facility lighting shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All lighting shall be directed downward and shielded to focus illumination on the desired areas only and avoid light trespass into adjacent areas. Lenses and bulbs shall not extend below the shields. This will prevent impacts to bird species nesting and foraging in riparian areas in Cayetano Creek and other sensitive habitats adjacent to the site.

MM BIO-7b Rodenticides shall not be used at the project site. Rodents will be controlled by encouraging raptor foraging. If additional rodent control is required to minimize impacts on adjacent agricultural operations, non-chemical methods will be employed.

MM BIO-7c During operations, trash–including microtrash that can be harmful to birds and other wildlife–shall be regularly removed from the project site to avoid impacts to birds using the project site. The area of trash cleanup will include both the project site within the fence lines, in addition to focused trash pickup along the fence on the interior and exterior sides of the fence.

6.7.2 Avian Collision Deterrent Measures

The follow measures shall be implemented to reduce avian impacts due to collisions with solar panels or other structures during operation of the solar facility.

MM BIO-7d The project shall be designed to underground electrical wiring to the maximum extent feasible. In particular, guy wires shall be avoided to the maximum extent feasible without compromising public safety.

MM BIO-7e In compliance with the Avian Power Line Interaction Committee's (APLIC) guidance, Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC 2012), transmission lines and all electrical components shall be designed, installed, and maintained in accordance with APLIC (2012) guidance to reduce the likelihood of large bird electrocutions and collisions.

MM BIO-7f The Applicant shall implement the following measures to reduce the risk of bird collisions with PV panels.

- A qualified biologist shall prepare an Avian Monitoring Plan to assess and monitor the potential for avian collisions with solar panels on the site. The Plan will include

monitoring for levels of avian activity as well as avian mortality in treated and untreated (control) portions of the solar facility to determine if avian mortality is occurring and if there is any apparent difference in avian mortality between treated and untreated panels. The Plan will also include methods to install visual deterrents or cues to encourage bird avoidance of the Project site. Implementation of the Plan will provide quantitative data on the effectiveness of the avian deterrent in terms of overall bird use and large-bird mortality in treated portions of the project versus an untreated control.

- Within 30 days after project commissioning, avian deterrent materials shall be installed in a total of four 50-acre blocks to achieve coverage of a total of 200 acres within the Solar Facility on a 3-month trial basis to evaluate potential avian collision issues. These deterrents will be made of a material that is both reflective and highly visible, such that the material reflects ambient light and is stimulated by air movement. The effect of installation will create the visual impression of continuous and varied movement, which has been shown as an avian deterrent in agricultural applications. Examples of the types of material that could be used include plastic compact discs and reflective tape.

- Upon installation of deterrent measures, avian monitoring shall occur once per week for a total of 12 consecutive weeks; this shall be repeated for the first three consecutive years of operation. During each monitoring event, bird abundance in each block (4 treatment blocks and one untreated control block) will be quantified using a point count method and the number, species, and behavior of birds observed within each block will be recorded. Behaviors will be recorded for each species and will reflect the modal (or typical) behavior observed for all individuals of the species, not for each individual bird. The observer will also record temperature, average wind speed, and percent cloud cover at the start of each observation period.

- Mortality of large birds in each block shall be assessed by surveying the block for carcasses of large birds (crow-sized and larger). Carcass surveys will be performed. During the surveys, the location and species of each carcass will be recorded using a handheld GPS receiver, a photograph will be taken of the carcass, and the cause of mortality will be noted if apparent. Carcasses will not be collected or preserved.

- Overall bird abundance, species diversity, and large-bird mortality shall be compared among all blocks, and between the control block and the treatment blocks combined. Analysis may include t-Test comparisons of means for overall abundance and large-bird mortality; however, statistical power may be low depending on the overall level of bird activity at the site.

- Facility operator or agent shall provide a brief analysis of the effects of the deterrent measures on panel performance and the feasibility of maintaining avian deterrents for inclusion in the analysis.

- Following the initial 3-month period and based on the results of the Plan, visual deterrents shall either be discontinued if there is no significant difference between

avian mortality between the treatment and control blocks, adjusted to reduce performance issues and reexamined on a continuing three-month basis, or if adjustments are not deemed necessary to improve panel performance, deployed on the remainder of the site and maintained for the life of the project or until determined infeasible (based on the definition of "feasible" in CEQA Guidelines §15364) or ineffective by the Project owner in consultation with CDFW and the County.

MM BIO-7g Panels shall include, if feasible, a light-colored, UV-reflective, or otherwise non-polarizing outline, frame, grid, or border, which has been shown to substantially reduce panel attractiveness to aquatic insects (Horvath, 2010) and may reduce avian mortality by avoiding collisions with panel faces (NFL, 2014).

6.7.3 Raptor Foraging Measures

The follow measures shall be implemented to reduce impacts to raptor foraging during operation of the solar facility.

MM BIO-7h Dryland pasture shall be established on the site and used for grazing livestock (sheep) between and under the solar panels throughout the year, pursuant to an AMP. Portions of the site in and around the solar panels would be maintained as dryland pasture containing a combination of grassland species and non-invasive forbs and would be maintained for grazing for the duration of the life of the solar facility. The mixture of grassland and native forbs, managed by targeted sheep grazing, is expected to provide high value and consistently available habitat conditions for small mammal prey species (voles, pocket gophers, deer mice and house mice) preferred by raptors in the region.

MM BIO-7i The AMP shall include grazing management methods to ensure that the vegetation composition and structure provides a combination of areas with lower vegetation heights and density to provide accessibility to raptors, and areas with denser, taller vegetation to attract and maintain prey on the site. Management conditions shall include ensuring that the vegetation cover is not reduced to the extent that vegetation would not naturally regenerate; there are openings in the vegetation to allow foraging access for raptors; and there are areas where the vegetation would be allowed to grow taller. In general, vegetation heights below the panels should be allowed to be higher to provide cover for prey species (12 to 18 inches), and the vegetation heights between the panels should be maintained at a suitable height to provide foraging accessibility (<12 inches).

6.8 MITIGATION FOR POTENTIAL EFFECTS ON JURISDICTIONAL WATERS

The proposed project could result in impacts to an ephemeral drainage in the northwest corner of the northern parcel north of Manning Road that is a potential waters of the State and is also potentially subject to CDFW jurisdiction under Section 1600 of the Fish and Game Code. In the absence of proposed mitigation measures, the project could have the potential to result in a net loss of jurisdictional waters.

Mitigation for potential impacts to jurisdictional waters shall consist of avoidance of preserved jurisdictional waters on or adjacent to the site. In the event such waters cannot be avoided, the project applicant shall obtain the appropriate permits and provide compensatory mitigation at a minimum of a 1:1 ratio .

MM BIO-8a The project shall be designed to avoid impacts to jurisdictional waters on and adjacent to the site. If jurisdictional waters cannot be avoided, prior to the start of construction, the project applicant shall secure any required aquatic resources permits for impacts to jurisdictional waters of the State from the San Francisco Bay RWQCB and CDFW, and shall comply with all conditions of such permits including providing compensatory mitigation as required to achieve no net loss of wetlands or other waters.

MM BIO-8b For those waters of the State and CDFW jurisdictional areas that are not avoided by project construction, compensatory mitigation shall be provided. As approved by the San Francisco Bay RWQCB and CDFW, the project applicant may purchase mitigation credits from an approved mitigation bank at a minimum 1:1 ratio or implement another method of mitigation satisfactory to the San Francisco Bay RWQCB and CDFW.

MM BIO-8c Impacts shall also be minimized by the use of Best Management Practices (BMPs) to protect preserved waters of the U.S./State adjacent to the site and to ensure that water quality standards are not compromised in preserved wetlands and other waters within the watershed. These practices can include installing orange construction fencing buffers, straw waddles to keep fill from entering preserved/avoided wetlands and other waters, and other protective measures.

7.0 CUMULATIVE IMPACTS

Cumulative impacts would occur when a series of actions leads to the loss of biological resources in the vicinity of the project (the North Livermore Valley). The analysis of cumulative impacts to biological resources is based on impacts of the proposed project that could occur in combination with other developments in the vicinity of the subject property, including the nearby proposed Livermore Community Solar Farm and Oasis Fund projects. In the absence of design measures, other applicant proposed measures and proposed mitigation measures, the project would have the potential to result in a cumulative impact to biological resources in the region.

In the absence of the proposed mitigation measures, as well as measures taken by the applicant to site the project in an area that generally lacks high quality habitat for the majority of the special-status plant and wildlife species that occur in the region and the applicant proposed measures to revegetate the site to maintain wildlife habitat, the project would have the potential to result in a potentially significant cumulative impact on special-status species and other biological resources in concert with the impacts from other projects in the region.

Potential cumulative impacts could include (1) loss of high quality breeding and upland habitat for special-status amphibians (CRLF and CTS) or take of individuals leading to an incremental decline in the regional population of these species; (2) reduced nest success, nest failure, or other direct or indirect impacts to nesting birds as well as a complete loss of foraging habitat for special-status and common raptors and other resident and migratory birds that would have an incremental effect potentially leading to reduced populations of these birds in the region or lack of population expansion potential; (3) direct

impacts to American badger and/or San Joaquin kit fox or loss of dispersal and foraging habitat for these species that could lead to an incremental reduction in populations of these species; (4) a net loss of jurisdiction waters in the watershed; and (5) loss of potential movement corridors for special-status and common wildlife species leading to a cumulative potential for impacts to gene flow or genetic diversity among these species.

The project was sited to avoid impacts to high quality grassland habitats and streams that provide breeding habitat and high quality upland habitat for regionally-occurring special-status amphibians (CRLF and CTS). Approximately 150 acres of APN 903-0006-001-02 was removed from the development footprint during the planning phase in part because of its biological value. This area is proposed to be subdivided to legally separate it from the real property affiliated with the proposed project development. The project will impact low quality grassland habitat next to heavily travelled roads and other development that is not expected to provide quality habitat for CRLF and CTS. With the implementation of applicant proposed measures to revegetate the site and maintain herbaceous ground cover under the panels, upon construction of the solar generation facility and revegetation the site will provide grassland habitat for CRLF and CTS suitable for dispersal and refugia. Mitigation measures will also avoid take of individuals if present on the site by allowing them to leave but not return and by conducting pre-construction surveys to see if the site is being actively used as a dispersal corridor, avoiding construction within 200 feet of dispersal habitat during the active season of these species, biological monitoring and numerous other measures outlined in Section 6.2.

As opposed to completely eliminating the value of the site for foraging by developing an industrial type solar generating facility with no vegetation or wildlife habitat, the applicant has committed to maintaining foraging habitat for raptors and other birds on the site by maintaining vegetation under the solar panels that promotes a consistent source of prey and is a suitable height for raptor foraging. During operation of the proposed project, the applicant plans to maintain the project site with vegetation and seasonally graze livestock (sheep) between and under the solar panels for the duration of operation of the solar facility, pursuant to an AMP. The mixture of grassland and forbs managed by targeted sheep grazing is expected to provide high value and consistently available habitat conditions for small mammal prey species (ground squirrels, rabbits, voles, pocket gophers, deer mice and house mice). The AMP would include vegetation management methods to ensure that the vegetation composition and structure provides a combination of areas with lower vegetation heights and density to provide accessibility to foraging raptors, and areas with denser, taller vegetation to attract and maintain prey on the site, thus enhancing the site for raptor foraging use. Impacts to nesting raptors and other birds will be avoided by implementation of the measures in Section 6.6.

Direct impacts to American badger and San Joaquin kit fox will be avoided by implementation of the measures included in Section 6.4 and 6.5 and wildlife friendly fencing will be implemented by maintaining a gap under the fence to allow passage of small to mid-sized mammals. No direct impacts or loss of habitat for these species is anticipated.

No net loss of jurisdictional waters will occur with implementation of proposed measures in Section 6.8 and potential impacts to jurisdictional waters adjacent to the site will be avoided by implementation of BMPs as described in Sections 6.1 and 6.8. The project will not contribute to a cumulative loss of jurisdictional waters in the watershed.

The project was sited to avoid impacts to high quality grassland habitats and streams that could provide dispersal corridors or temporary refugia for wildlife. With the implementation of proposed measures to

revegetate the site upon completion of construction and incorporate wildlife friendly fencing, conversion of the project site from annual grassland and dryland grain cropland to a solar generation facility would not eliminate the potential for special-status amphibians or other wildlife to occupy, use or disperse through the site and would not constitute a cumulatively significant impact to wildlife movement corridors in the region. After construction has stopped and the site has been revegetated, the solar array is not expected to impede any migration route for wildlife, as the project site will support grassland vegetation as it did prior to construction.

Based on the above discussion, the proposed project as designed including the applicant proposed measures and proposed mitigation measures would result in a less than significant cumulative impact to special-status species and biological resources.

8.0 REFERENCES

8.1 LITERATURE CITED

California Department of Fish and Wildlife (CDFW). 2020. California Department of Fish and Wildlife, Natural Diversity Database Biogeographic Data Branch. Sacramento, California. Last accessed online July 13, 2020.

2012. Staff Report on Burrowing Owl Mitigation. March 7.

2000. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities. Revised May 8.

1994. Staff Report regarding Mitigation for Impacts to Swainson's Hawks (*Buteo swainsoni*) in the Central Valley of California. November 8.

California Department of Food and Agriculture (CDFA). 2020. Pest ratings of noxious weed species and noxious weed seed. State of California Department of Food and Agriculture Division of Plant Health and Pest Prevention Services.

California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. Available at: http://www.cal-ipc.org/ip/inventory/index.php#inventory.

California Native Plant Society, Rare Plant Program (CNPS). 2020. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Available at: http://www.rareplants.cnps.org. Accessed July 13, 2020.

2001. Botanical Survey Guidelines. Revised June 2, 2001. Available at: https://cnps.org/wp-content/uploads/2018/03/cnps_survey_guidelines.pdf.

Clark, H.O., R.R. Duke, M.C. Orland, R.T. Golightly and S. I. Hagen. 2007. The San Joaquin Kit Fox in North-Central California: A Review. Transactions of the Western Section of the Wildlife Society 43: 27-36; 2007.

Estep, J. 2013. Swainson's hawk and other foraging raptor use of solar array fields within an agricultural landscape in Sacramento County. Prepared for Recurrent Energy, San Francisco, CA. October.

Fellers, G.M., and Kleeman, P.M. 2007. California Red-Legged Frog (*Rana draytonii*) Movement and Habitat Use: Implications for Conservation. Journal of Herpetology. Volume 1, pp. 279-286. Society for the Study of Amphibians and Reptiles. Western Ecological Research Center.

Google Earth. 2020. Aerial Imagery 1939-2020. Accessed January 2020.

HELIX Environmental Planning, Inc. (HELIX). 2018. Swainson's Hawk Foraging Use of a Large-scale Solar Generating Facility in an Agricultural Landscape. February. Prepared for Recurrent Energy, San Francisco, CA.

Hunt, W.G., R.E. Jackman, T.L. Hunt, .D.E. Driscoll and L. Culp. 1998. A population study of golden eagles in the Altamont Pass Wind Resource Area: population trend analysis 1997. Report to National Renewable Energy laboratory, Subcontract XAT-6-16459-01. Predatory Bird Research Group, University of California, Santa Cruz.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report submitted to the California Department of Fish and [Wildlife], Inland Fisheries Division.

Lake, Dianne 2020. Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties (web application). Berkeley, California: East Bay Chapter of the California Native Plant Society (a non-profit organization). Available at: https://ruspdb.ebcnps.org/cgi-bin/ebrare/ebrare.cgi. Accessed July 2, 2020.

Natural Resources Conservation Service (NRCS). 2020a. Climate Data and Summary Reports from AgACIS. Available at: http://agacis.rcc-acis.org/?fips=06001. Accessed July 7, 2020

2020b. Web Soil Survey. Available at: http://websoilsurvey.nrcs.usda.gov. Accessed January 30, 2020.

2018c. National List of Hydric Soils. Available at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1316620.html. Accessed July 26, 2018.

Phillips, R.A, W.G. Bousman, M. Rogers, R. Bourbour, B. Martinico, and M. Mammoser. 2014. First Successful Nesting of Swainson's Hawk in Santa Clara County, California, since the 1800s. Western Field Ornithologists: Volume 43, No. 3 (176–182). September 2014.

Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Smith, D. A., K. Ralls, B. L. Cypher, H. O. Clark, Jr., P. A. Kelly, D. F. Williams, and J. E. Maldonado. 2006. Relative abundance of endangered San Joaquin kit foxes (*Vulpes macrotis mutica*) based on scat-detection dog surveys. Southwestern Naturalist 51:210-219.

Swolgaard, C.A., K.A. Reeves, and D.A. Bell. 2008. Foraging by Swainson's hawks in a vineyard-dominated landscape. Journal of Raptor Research, 42(3): 188-196.

Tricolored Blackbird Working Group. 2007. Conservation Plan for the Tricolored Blackbird (Agelaius tricolor). Susan Kester (ed.). Sustainable Conservation. San Francisco, CA.

U.S. Army Corps of Engineers (USACE) Environmental Laboratory. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). Vicksburg, MS. September 2008.

1987. Corps of Engineers Wetlands Delineation Manual. Vicksburg, MS. January 1987.

U.S. Fish and Wildlife Service (USFWS). 2020. National Wetlands Inventory Mapper. Available at: https://www.fws.gov/wetlands/Data/Mapper.html. Accessed February 3, 2020.

2020a. List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. July 13.

2017. Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. v + 69pp.

2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance. Available at: https://www.fws.gov/sacramento/es/Survey-Protocols-guidelines/Documents/kitfox_standard_rec_2011.pdf.

2010a. Final Rule – Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red-Legged Frog. March 17, 2010. 75(51); 12816-12959. Available at: http://edocket.access.gpo.gov/2010/pdf/2010-4656.pdf. Accessed March 26, 2010.

2010b. San Joaquin Kit Fox (*Vulpes macrotus mutica*) 5-Year Review: Summary and Evaluation. Prepared by the Sacramento Fish and Wildlife Office.

2005. Revised Guidance on Site Assessments and Field Surveys for the California red-legged frog. Available at: http://www.fws.gov/sacramento/es/documents/crf_survey_guidance_aug2005.pdf.

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

1996. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Red-legged Frog. Final Rule. May 23, 1996. 61(101); 25813-25833.

Walston, L.J., K.E. Rollins, K.P. Smith, K.E. LaGory, K. Sinclair, C. Turchi, T. Wendelin, and H. Souder. 2015. A Review of Avian Monitoring and Mitigation Information at Existing Utility-Scale Solar Facilities. prepared for: U.S. Department of Energy, SunShot Initiative and Office of Energy Efficiency & Renewable Energy. April.

Western Ecosystems Technology, Inc (WEST). 2017. Sunshine Valley Solar Project: Bird and Bat Conservation Strategy. Prepared for Desert Sunlight 250, LLC and Desert Sunlight 300, LLC, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne Wyoming.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 2011. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California. Updates are noted in maps that have been added or edited since original publication. Updated 2011 by CWHR.

1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

Appendix A

Figures

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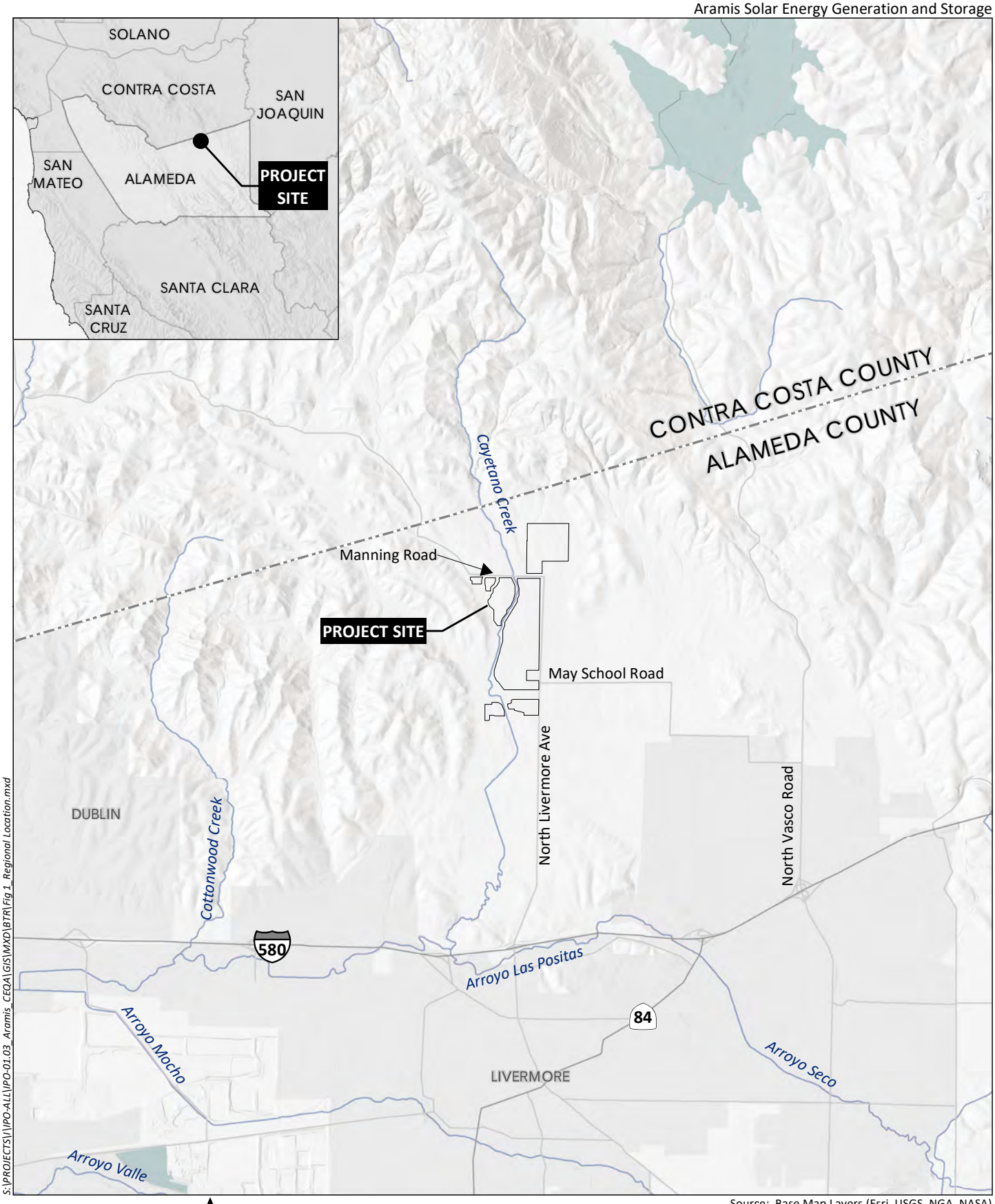


S:\PROJECTS\\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig 1_Regional Location.mxd

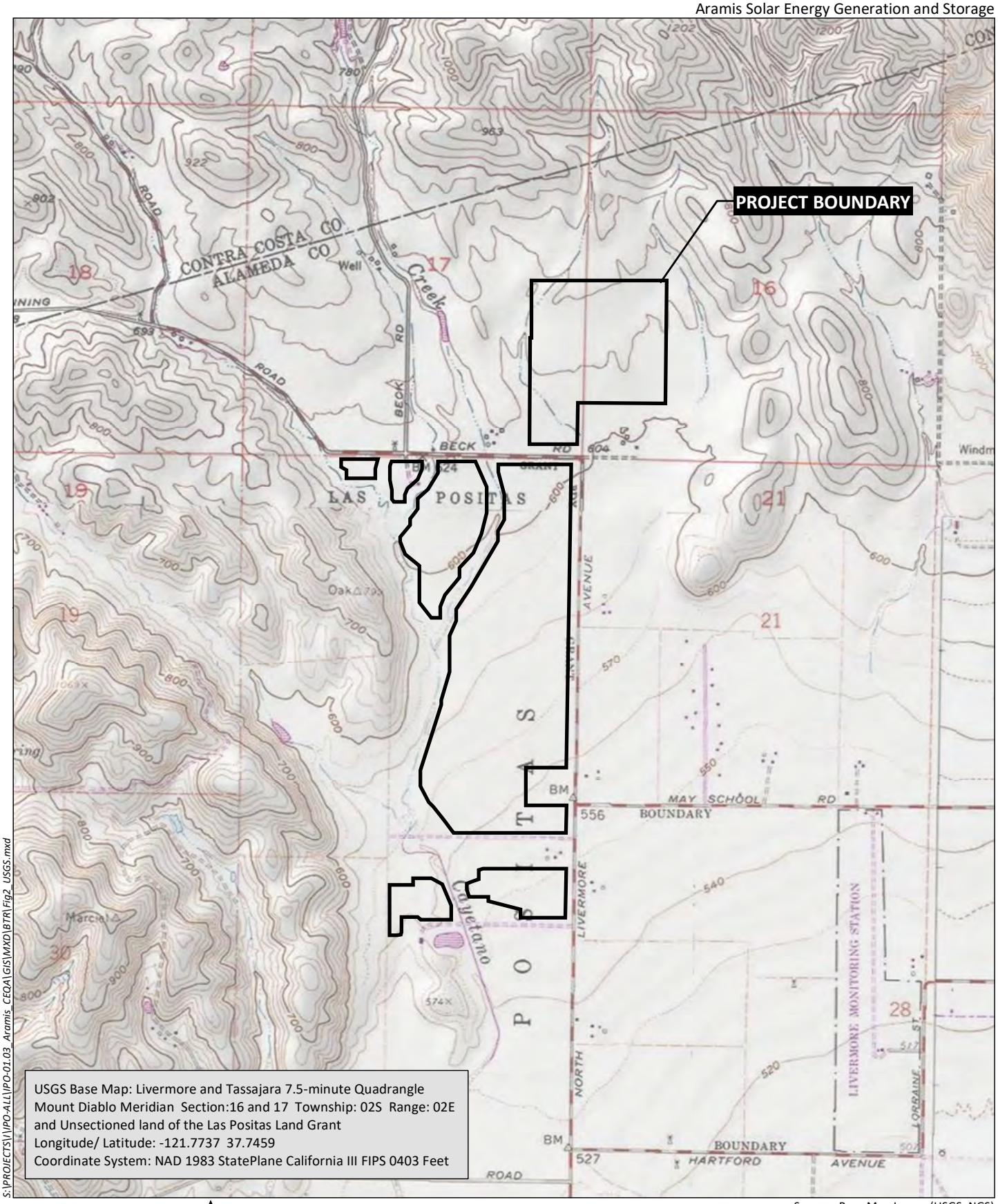
0 1.25 Miles

Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX Environmental Planning

Regional Location

Figure 1



USGS Base Map: Livermore and Tassajara 7.5-minute Quadrangle
Mount Diablo Meridian Section:16 and 17 Township: 02S Range: 02E
and Unsectioned land of the Las Positas Land Grant
Longitude/ Latitude: -121.7737 37.7459
Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

0 2,000 Feet

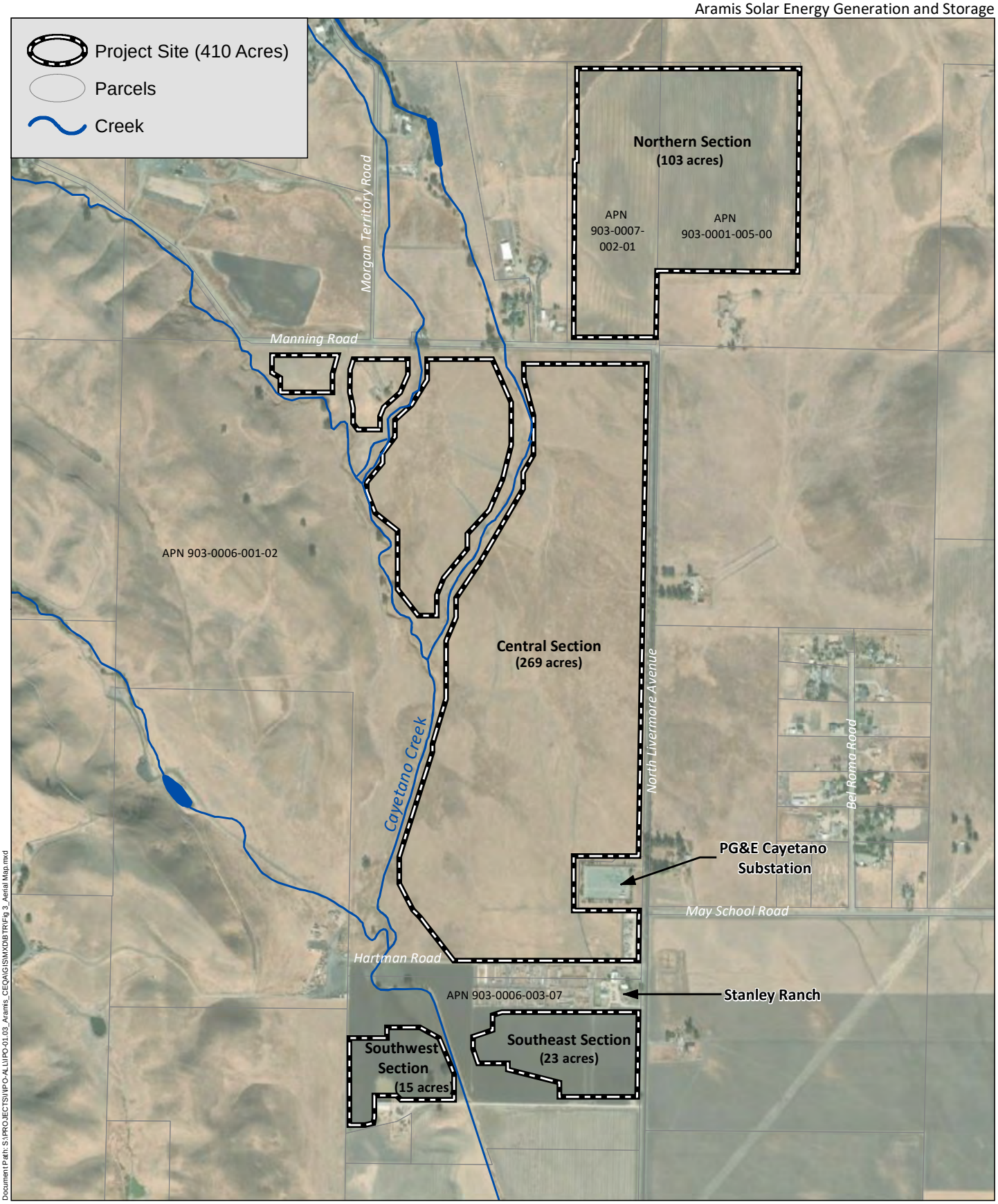
Source: Base Map Layers (USGS, NGS)

S:\PROJECTS\\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig2_USGS.mxd

HELIX Environmental Planning

USGS 7.5-minute Quadrangle Map

Figure 2



Document Path: S:\PROJECTS\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig 3_Aerial Map.mxd

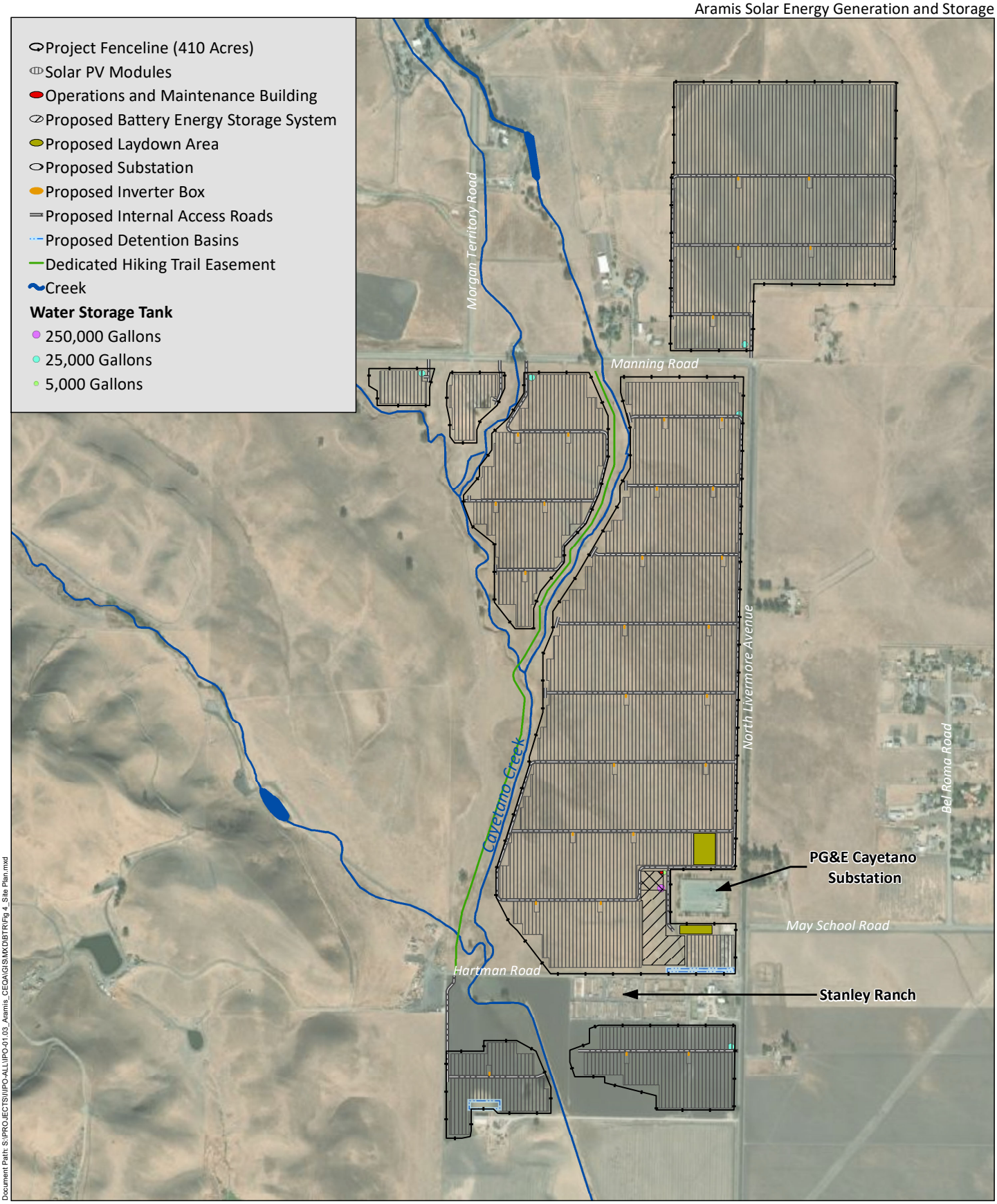
0 1,250 Feet

Source: Base Map Layers (DigitalGlobe 2018); Data (Alameda County 2017)

HELIX Environmental Planning

Aerial Map

Figure 3



Source: Base Map Layers (DigitalGlobe 2018)

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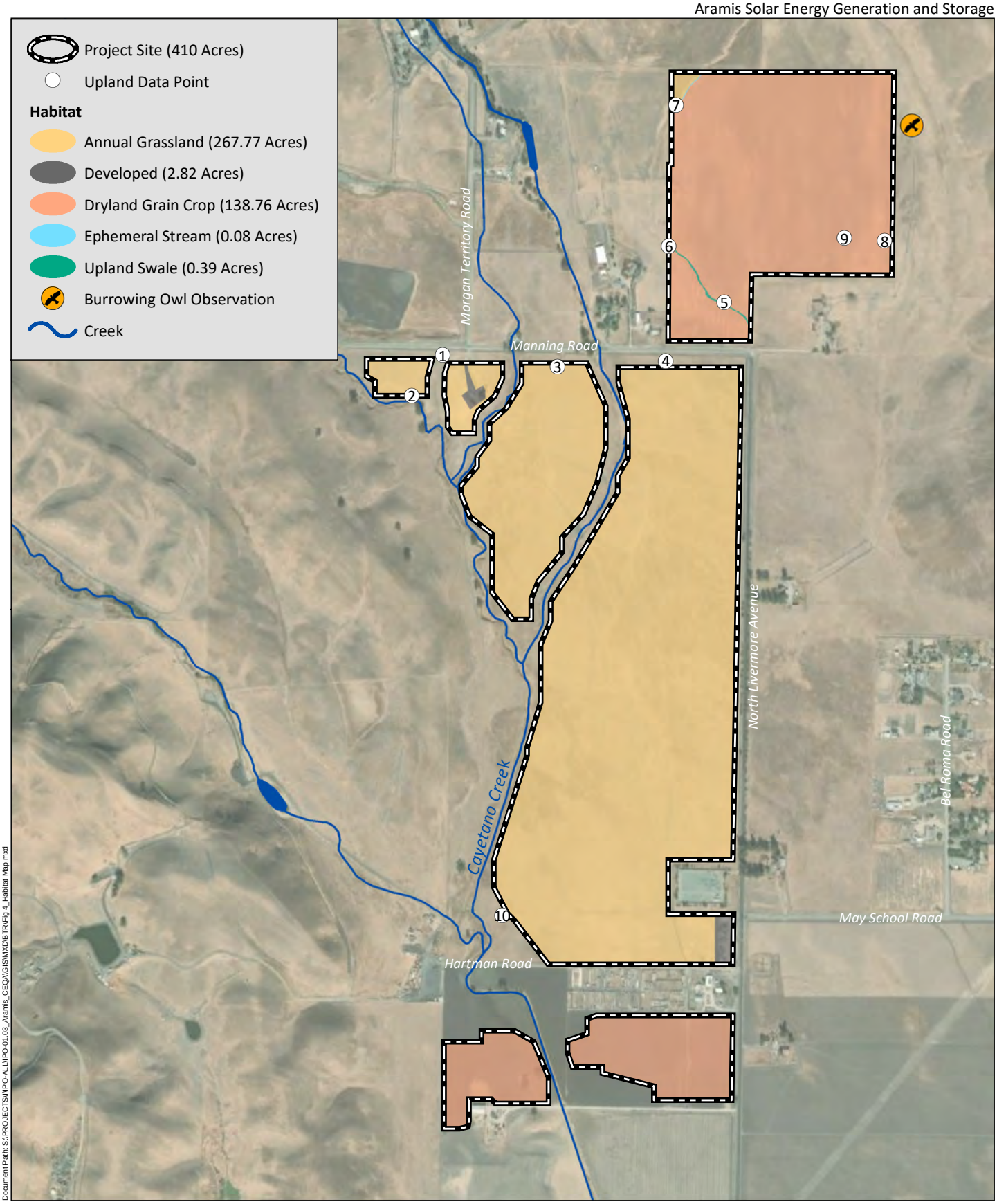
Site Plan

Figure 4



Document Path: S:\PROJECTS\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig 4_Habitat Map.mxd

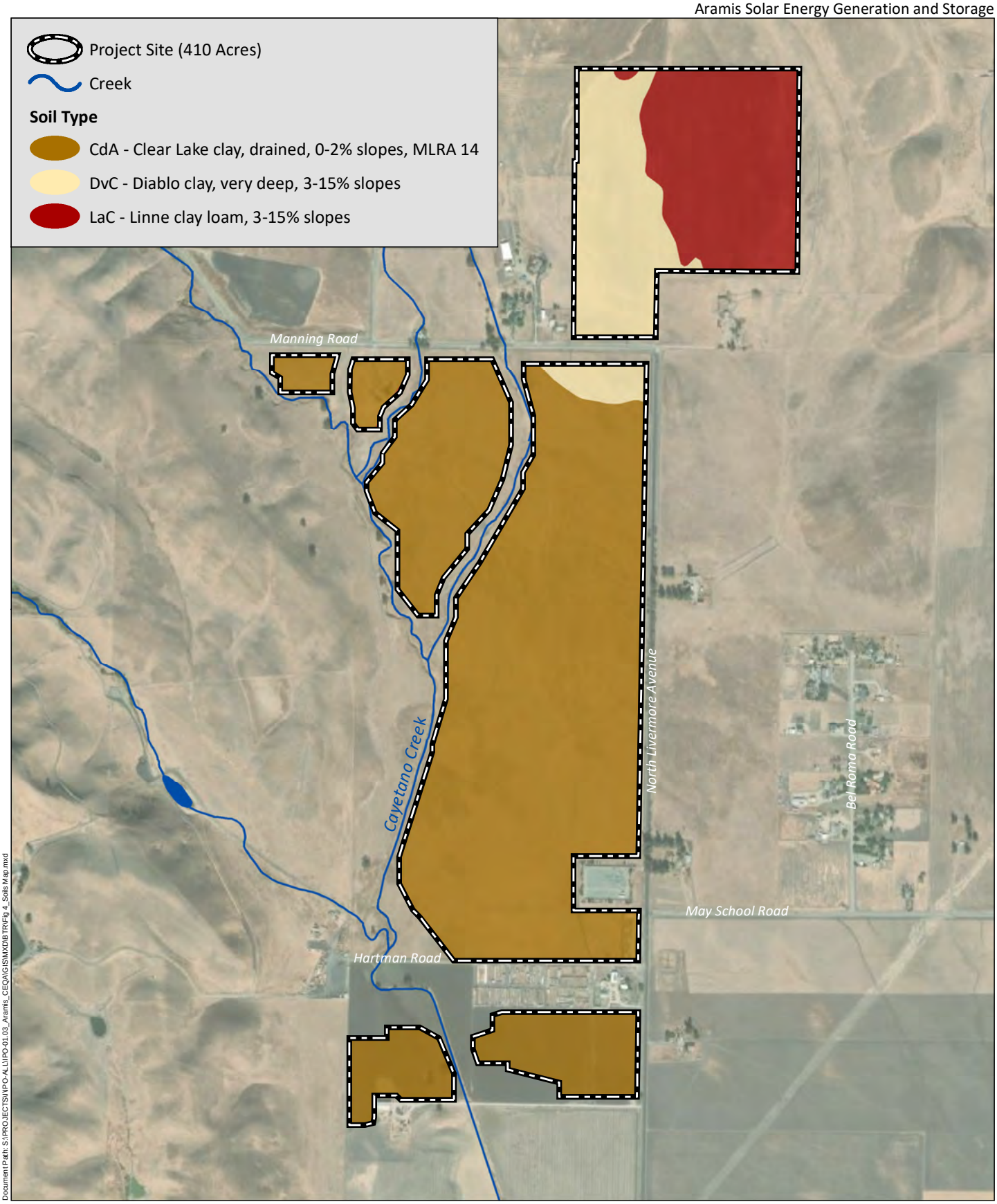
0 1,250 Feet

Source: Base Map Layers (DigitalGlobe 2018); Data (HELIX 2020)

HELIX Environmental Planning

Habitat Map

Figure 5



Document Path: S:\PROJECTS\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig 4_Soils Map.mxd

0 1,250 Feet

Source: Base Map Layers (DigitalGlobe 2018): Data (NRCS 2020)

HELIX Environmental Planning

Soils Map

Figure 6

Appendix B

CNDDB, CNPS, and USFWS Lists of Regionally Occurring Special-Status Species

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Selected Elements by Element Code

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Livermore (3712167) OR Tassajara (3712177))

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
AAAAA01180	***Ambystoma californiense*** California tiger salamander	Threatened	Threatened	G2G3	S2S3	WL
AAABH01022	***Rana draytonii*** California red-legged frog	Threatened	None	G2G3	S2S3	SSC
AAABH01050	***Rana boylii*** foothill yellow-legged frog	None	Endangered	G3	S3	SSC
ABNKC06010	***Elanus leucurus*** white-tailed kite	None	None	G5	S3S4	FP
ABNKC11011	***Circus hudsonius*** northern harrier	None	None	G5	S3	SSC
ABNKC19120	***Buteo regalis*** ferruginous hawk	None	None	G4	S3S4	WL
ABNKC22010	***Aquila chrysaetos*** golden eagle	None	None	G5	S3	FP
ABNKD06071	***Falco peregrinus anatum*** American peregrine falcon	Delisted	Delisted	G4T4	S3S4	FP
ABNKD06090	***Falco mexicanus*** prairie falcon	None	None	G5	S4	WL
ABNSB10010	***Athene cunicularia*** burrowing owl	None	None	G4	S3	SSC
ABPAT02011	***Eremophila alpestris actia*** California horned lark	None	None	G5T4Q	S4	WL
ABPBXB0020	***Agelaius tricolor*** tricolored blackbird	None	Threatened	G2G3	S1S2	SSC
AMACC05030	***Lasiurus cinereus*** hoary bat	None	None	G5	S4	
AMACC08010	***Corynorhinus townsendii*** Townsend's big-eared bat	None	None	G3G4	S2	SSC
AMAFF08082	***Neotoma fuscipes annectens*** San Francisco dusky-footed woodrat	None	None	G5T2T3	S2S3	SSC
AMAJA03041	***Vulpes macrotis mutica*** San Joaquin kit fox	Endangered	Threatened	G4T2	S2	
AMAJF04010	***Taxidea taxus*** American badger	None	None	G5	S3	SSC
ARAAD02030	***Emys marmorata*** western pond turtle	None	None	G3G4	S3	SSC
ARADB21031	***Masticophis lateralis euryxanthus*** Alameda whipsnake	Threatened	Threatened	G4T2	S2	
CTT36210CA	***Valley Sink Scrub*** Valley Sink Scrub	None	None	G1	S1.1	

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
CTT42110CA	***Valley Needlegrass Grassland*** Valley Needlegrass Grassland	None	None	G3	S3.1	
CTT62100CA	***Sycamore Alluvial Woodland*** Sycamore Alluvial Woodland	None	None	G1	S1.1	
ICBRA03030	***Branchinecta lynchi*** vernal pool fairy shrimp	Threatened	None	G3	S3	
ICBRA06010	***Linderiella occidentalis*** California linderiella	None	None	G2G3	S2S3	
IIHYM24250	***Bombus occidentalis*** western bumble bee	None	Candidate Endangered	G2G3	S1	
IIHYM24480	***Bombus crotchii*** Crotch bumble bee	None	Candidate Endangered	G3G4	S1S2	
NBMUS80010	***Anomobryum julaceum*** slender silver moss	None	None	G5?	S2	4.2
PDAST4M020	***Helianthella castanea*** Diablo helianthella	None	None	G2	S2	1B.2
PDAST4R0P1	***Centromadia parryi ssp. congdonii*** Congdon's tarplant	None	None	G3T1T2	S1S2	1B.1
PDBOR01050	***Amsinckia grandiflora*** large-flowered fiddleneck	Endangered	Endangered	G1	S1	1B.1
PDBOR0V0B0	***Plagiobothrys glaber*** hairless popcornflower	None	None	GX	SX	1A
PDBRA2R010	***Tropidocarpum capparideum*** caper-fruited tropidocarpum	None	None	G1	S1	1B.1
PDCAR0W062	***Spergularia macrotheca var. longistyla*** long-styled sand-spurrey	None	None	G5T2	S2	1B.2
PDCHE041F3	***Extriplex joaquinana*** San Joaquin spearscale	None	None	G2	S2	1B.2
PDCHE042L0	***Atriplex depressa*** brittlescale	None	None	G2	S2	1B.2
PDCHE042M0	***Atriplex minuscula*** lesser saltscale	None	None	G2	S2	1B.1
PDCPR07080	***Viburnum ellipticum*** oval-leaved viburnum	None	None	G4G5	S3?	2B.3
PDERI04040	***Arctostaphylos auriculata*** Mt. Diablo manzanita	None	None	G2	S2	1B.3
PDERI04273	***Arctostaphylos manzanita ssp. laevigata*** Contra Costa manzanita	None	None	G5T2	S2	1B.2
PDFAB400R5	***Trifolium hydrophilum*** saline clover	None	None	G2	S2	1B.2
PDLIN01030	***Hesperolinon breweri*** Brewer's western flax	None	None	G2	S2	1B.2

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
PDPLM0C0Q0	***Navarretia prostrata*** prostrate vernal pool navarretia	None	None	G2	S2	1B.2
PDSCR0J0J0	***Chloropyron palmatum*** palmate-bracted bird's-beak	Endangered	Endangered	G1	S1	1B.1
PMLIL0D160	***Calochortus pulchellus*** Mt. Diablo fairy-lantern	None	None	G2	S2	1B.2
PMPOA53110	***Puccinellia simplex*** California alkali grass	None	None	G3	S2	1B.2

Record Count: 45

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CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

19 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3712167 and 3712177;

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Amsinckia grandiflora	large-flowered fiddleneck	Boraginaceae	annual herb	(Mar)Apr-May	1B.1	S1	G1
Arctostaphylos auriculata	Mt. Diablo manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.3	S2	G2
Arctostaphylos manzanita ssp. laevigata	Contra Costa manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar(Apr)	1B.2	S2	G5T2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	Mar-Oct	4.2	S3	G4T3
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
Calochortus pulchellus	Mt. Diablo fairy-lantern	Liliaceae	perennial bulbiferous herb	Apr-Jun	1B.2	S2	G2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S1S2	G3T1T2
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	1B.1	S1	G1
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Helianthella castanea	Diablo helianthella	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
Hesperolinon breweri	Brewer's western flax	Linaceae	annual herb	May-Jul	1B.2	S2	G2

Monardella antonina ssp. antonina	San Antonio Hills monardella	Lamiaceae	perennial rhizomatous herb	Jun-Aug	3	S1S3	G4T1T3Q
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	Mar-May	1A	SH	GH
Spergularia macrotheca var. longistyla	long-styled sand-spurrey	Caryophyllaceae	perennial herb	Feb-May(Jun)	1B.2	S2	G5T2
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
Viburnum ellipticum	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	May-Jun	2B.3	S3?	G4G5

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 13 July 2020].

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California Native Plant Society's East Bay Chapter's Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties


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create excel file (limited to 600 records)
47 matching records

To see record details, click on the **Scientific Name**

Family	Scientific Name	notes	East Bay CNPS rarity rank	California rarity rank	habitat	comments	criteria	common name	elevation (Feet)	county	blooming period	cnddb element	last_updated	created
	Allium amplectens		A2	CEQA	Open Dry Slope, Serpentine or Serpentine-derived soils, Woodland, Miscellaneous		Small Populations	narrow-leaved onion	<5906	ALA, CCA	Apr-Jul			
	Arctostaphylos auriculata		*A2	1B.3 S2.2(CEQA) G2	Chaparral, Sand, Sandstone	(does not occur outside of CCA county)	Small Geographical Range	Mount Diablo manzanita	492-2133	CCA	Feb-Mar	PDERI04040		
	Arctostaphylos manzanita subsp. laevigata		*A2	1B.2 S2(CEQA) G5T2	Chaparral, Sand, Sandstone	(does not occur outside of CCA county)	Small Geographical Range	Contra Costa manzanita	787-3609	CCA	Feb-May	PDERI04273		
	Aspidotis californica		A1	CEQA	Rock, Tallus, Scree			California lace fern	66-4265	ALA, CCA	-		2020-05-13	
	Berberis aquifolium var. dictyota		A2	CEQA	Chaparral, Forest, Rock, Tallus, Scree, Scrub (Coastal or Interior), Woodland	Confusion with other vars	Small Populations	Jepson's mahonia	295-7218	ALA, CCA	Mar-May		2020-05-16	
	Calochortus pulchellus		*A2	1B.2 S2.1(CEQA) G2	Chaparral, Serpentine or Serpentine-derived soils, Woodland	More than 5 regions but: Rare, Threatened or Endangered statewide (does not occur outside of ALA and CCA counties)	Small Geographical Range	Mount Diablo fairy-lantern	656-2625	ALA?, CCA	Apr-Jun	PMLIL0D160		
	Calochortus splendens		A2	CEQA	Chaparral, Grassland (Annual or Perennial), Open Dry Slope		Narrow Range in ALA & CCA	splendid mariposa-lily	<9186	CCA	May-Jul		2020-05-23	
	Claytonia exigua subsp. glauca	(ssp. exigua is more common)	A1x	CEQA	Miscellaneous, Open Dry Slope, Sand, Sandstone, Serpentine or Serpentine-derived soils			claytonia	<3281	CCA	Apr-Jul		2020-06-22	
	Cryptantha decipiens		A2	CEQA	Grassland (Annual or Perennial), Sand, Sandstone, Scrub (Coastal or Interior)			GRAVEL CRYPTANTHA	646-15069	ALA,CCA	Mar-May		2015-02-14	2015-02-14
	Cryptantha microstachys		A2	CEQA	Chaparral, Woodland	ID confusion	Narrow Range in ALA & CCA Small Populations	Tejon cryptantha	164-6398	ALA, CCA	Apr-Jun		2020-06-28	
	Cryptantha nevadensis var. rigida		A1	CEQA	Rock, Tallus, Scree, Sand, Sandstone	ID confusion	N Limit Declining	Nevada cryptantha	262-7808	ALA	Mar-Jul		2020-05-16	
	Cryptantha rattanii		*A2	4.3 S3.3(CEQA) G3	Grassland (Annual or Perennial), Scrub (Coastal or Interior), Sand, Sandstone	ID confusion	Disjunct N Limit	Rattan's cryptantha, gravel cryptantha	492-2559	ALA, CCA	Apr-Jul	PDBOR0A2H0		
			A2	CEQA						CCA	May-Jul			

	Delphinium hansenii subsp. hansenii				Chaparral, Woodland			Hansen's larkspur	492-9843				2012-03-25	2004-08-22
	Delphinium parryi subsp. parryi		A2	CEQA	Chaparral, Woodland		Narrow Range in ALA & CCA	Parry's larkspur	656-5577	ALA	Apr-Jun		2020-06-10	
	Elymus stebbinsii		A1	CEQA	Chaparral, Forest, Open Dry Slope			Stebbins' wheat grass, Parish's wheat-grass	<7316	ALA, CCA	Jun-Jul		2020-01-20	
	Epilobium torreyi		A2	CEQA	Riparian	Overlooked?	Limited/Threatened Habitat	narrow-leaved boisduvalia	164-8530	ALA, CCA	May-Aug			
	Eriastrum abramsii		A1	CEQA	Open Dry Slope		Small Populations	Abram's eriastrum	<3937	ALA, CCA	Apr-Jun		2020-05-14	
	Fraxinus dipetala		A2	CEQA	Chaparral, Woodland, Miscellaneous	W limit?	Narrow Range in ALA & CCA Small Populations	California ash, flowering ash	328-4265	ALA?, CCA	Apr-Jun			
	Fremontodendron californicum		A1x	CEQA	Chaparral, Rock, Tallus, Scree, Woodland	Planted at many other sites		flannelbush	591-7612	CCA	Apr-Jul		2016-03-01	
	Galium andrewsii subsp. gatense		*A2	4.2 S3.2(CEQA) G5T3	Chaparral, Serpentine or Serpentine-derived soils, Woodland	More than 5 regions but: Rare, Threatened or Endangered statewide		phlox-leaf serpentine bedstraw, serpentine bedstraw	722-4757	ALA, CCA	Apr-Jun			
	Gilia achilleifolia subsp. unknown		A2	CEQA	Miscellaneous			California gilia		ALA; CCA	-			2000-11-20
	Gilia tricolor subsp. tricolor		A2	CEQA	Grassland (Annual or Perennial)	ID's correct? Ssp. rarely indicated, but ssp. diffusa is the more common one here.		birds-eye gilia	<3937	ALA, CCA	-		2020-06-20	
	Githopsis specularioides		A2	CEQA	Burns, Chaparral, Woodland	Overlooked?	Small Populations Fire Follower	common bluecup	197-4921	ALA, CCA	Apr-May		2020-06-10	
	Helianthella castanea		*A2	1B.2 S2(CEQA) G2	Chaparral, Grassland (Annual or Perennial), Woodland	More than 5 regions but: Rare, Threatened or Endangered statewide Occurs in transition areas between habitats Populations in southern ALA are intermediate to H. californica	Small Geographical Range Small Populations	Diablo helianthella	656-4265	ALA, CCA	Apr-Jun	PDAST4M020		
	Hesperolinon breweri		*A2	1B.2 S2.2(CEQA) G2	Grassland (Annual or Perennial), Serpentine or Serpentine-derived soils		Limited/Threatened Habitat Small Geographical Range	Brewer's western flax	98-2297	CCA	May-Jun	PDLIN01030		
	Juglans hindsii	(formerly J. californica var.	*A2	1B.1 S1.1(CEQA) G1	Riparian	More than 5 regions but: Rare, Threatened or Endangered statewide Most sites are planted. Confusion about how many natural populations exist Only natural populations	Limited/Threatened Habitat	northern California black walnut, Northern California black	<984	ALA, CCA	Apr-May	PDJUG02040		

						are protected								
	Lasthenia microglossa		A2	CEQA	Chaparral, Grassland (Annual or Perennial), Miscellaneous Wetlands, Woodland	Overlooked?	N Limit	small-ray goldfields	<3281	ALA, CCA	Mar-May		2020-06-20	
	Layia gaillardioides		A2	CEQA	Scrub (Coastal or Interior), Woodland		Declining	woodland layia	<4265	ALA, CCA	Mar-Aug		2020-06-28	
	Leptosiphon pygmaeus subsp. continentalis	(formerly Linanthus p. ssp. c.	A2	CEQA	Miscellaneous	Overlooked?		pygmy linanthus, pygmy leptosiphon	<5577	CCA	Mar-Jun			1998-10-20
	Minuartia pusilla		A1	CEQA	Chaparral, Forest			annual sandwort, least sandwort	<7874	ALA, CCA	-		2020-01-20	
	Muilla maritima		A2	CEQA	Alkali Areas, Grassland (Annual or Perennial), Miscellaneous Wetlands, Open Dry Slope, Scrub (Coastal or Interior), Serpentine or Serpentine-derived soils, Woodland	Very scattered, uncommon, . Frequently found in botanical 'hot spots' (Chris Thayer, notes 1993)	Small Populations Declining	common muilla	<7546	ALA, CCA	Mar-Jun		2020-06-28	
	Navarretia intertexta subsp. intertexta		A1	CEQA	Vernal Pool, Miscellaneous Wetlands		Limited/Threatened Habitat	needle-leaved navarretia	<6890	ALA	May-Jul			2000-02-09
	Osmorhiza brachypoda		A2	CEQA	Forest, Riparian, Woodland		N Limit	California cicely	656-6562	ALA, CCA	Mar-May		2020-06-20	
	Pectocarya pusilla		A2	CEQA	Grassland (Annual or Perennial), Miscellaneous, Woodland			little pectocarya	328-5906	ALA, CCA	Mar-Jun		2020-06-20	
	Pentachaeta alsinoides		A2	CEQA	Grassland (Annual or Perennial)	Overlooked	Declining	tiny pentachaeta	<1804	ALA, CCA	Mar-Jun			
	Piperia michaelii		*A2	4.2 S3.2(CEQA) G3	Forest, Scrub (Coastal or Interior), Woodland	More than 5 regions but: Rare, Threatened or Endangered statewide. ID confusion		Michael's rein-orchid	<2297	ALA, CCA	Apr-Aug	PMORC1X110	2016-02-29	
	Piperia unalascensis		A1	CEQA	Forest, Scrub (Coastal or Interior), Woodland	ID Questions		Alaska piperia, slender-spire orchid	<9843	ALA, CCA	May-Aug		2020-06-09	
	Plectritis congesta subsp. congesta		A1	CEQA	Coastal Bluff, Woodland	Taxonomic problems. ID questionable for all Plectritis spp.		sea blush	<5577	ALA, CCA	Mar-Jun		2020-01-20	
	Pogogyne zizyphoroides		A1	CEQA	Vernal Pool		Limited/Threatened Habitat Declining	Sacramento beardstyle	<1312	ALA	Mar-Jun		2020-05-16	
	Quercus xjolonensis		A1?	CEQA	Forest, Woodland	Many trees with characters of both Q. lobata and Q. douglasii, but few confirmed as this hybrid		blue oak x valley oak		ALA	-		2020-07-01	
			A2	CEQA	Grassland (Annual or	R. occid., R. canus, & R.	Narrow Range in ALA & CCA	western buttercup	<4921	ALA, CCA	Mar-Jul		2020-06-28	

	Ranunculus occidentalis var. occidentalis				Perennial), Woodland	calif. all meet in the E Bay and can often be hard to distinguish and may intermingle								
	Thysanocarpus radians		A2	CEQA	Miscellaneous		Narrow Range in ALA & CCA	ribbed fringe pod	<2625	CCA	Mar-Apr		2020-06-09	
	Trifolium dichotomum		A2	CEQA	Coastal Bluff, Grassland (Annual or Perennial), Miscellaneous, Open Dry Slope, Woodland	Near	S Limit	branched indian clover	<4265	ALA, CCA	Apr-Jun		2020-06-20	
	Trifolium olivaceum		A2	CEQA	Miscellaneous	Overlooked?	Declining	olive clover	<2625	ALA, CCA	Apr-May		2020-06-09	
	Triodanis biflora		A2	CEQA	Burns, Miscellaneous		Small Populations Declining Fire Follower	Venus' looking-glass	<6562	ALA, CCA	Apr-Jun		2020-05-23	
	Tropidocarpum gracile		A2	CEQA	Alkali Areas, Grassland (Annual or Perennial)	More than 5 locations but:	Small Populations Declining	slender tropidocarpum	<4757	ALA, CCA	Mar-May		2020-06-20	
	Vicia hassei		A2	CEQA	Grassland (Annual or Perennial), Scrub (Coastal or Interior)			slender vetch	<3937	ALA, CCA	Mar-May			

Query: whatShow=Species records;sorting=Scientific Name;elevBelow=300;elevUnits=Meters;ebrarity=any A
botanicalRegion=Morgan Territory Area
Your query took: 0.507 seconds.

Citation:
Lake, Dianne: Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties [web application].
2020 Berkeley, California: East Bay Chapter of the California Native Plant Society [a non-profit organization].
URL: https://ruspdb.ebcnps.org/cgi-bin/ebrare/ebrare.cgi (Accessed: Jul 2, 2020).
If an individual record is referenced, the record number, observer, and source must be included at the end of the citation.

United States Department of the Interior

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In Reply Refer To:
Consultation Code: 08ESMF00-2020-SLI-0538
Event Code: 08ESMF00-2020-E-07263
Project Name: Aramis

July 13, 2020

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2020-SLI-0538

Event Code: 08ESMF00-2020-E-07263

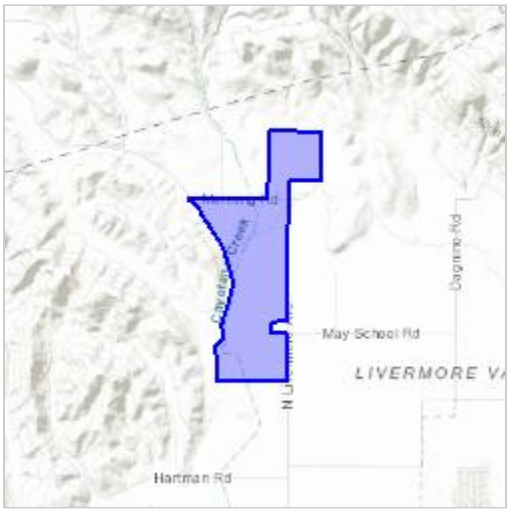
Project Name: Aramis

Project Type: ** OTHER **

Project Description: PV Solar Project

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.74616598468979N121.77424483179388W



Counties: Alameda, CA

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
San Joaquin Kit Fox *Vulpes macrotis mutica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered

Reptiles

NAME	STATUS
Alameda Whipsnake (=striped Racer) *Masticophis lateralis euryxanthus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5524	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/205/office/11420.pdf	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
San Bruno Elfin Butterfly *Callophrys mossii bayensis* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3394	Endangered
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/436/office/11420.pdf	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Large-flowered Fiddleneck *Amsinckia grandiflora*	Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5558	
Palmate-bracted Bird's Beak *Cordylanthus palmatus*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1616	

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Appendix C

Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

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Appendix C
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Table C-1. Regionally-Occurring Special-Status Species with the Potential to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Plants			
Amsinckia grandiflora large-flowered fiddleneck	FE/SE/CRPR 1B.1	Annual herb. Grows in cismontane woodlands and valley and foothill grassland. Occurs at elevations from 270 – 550 meters (m) above mean sea level (amsl). Flowering period (March) April – May (CNPS 2020).	**Will not occur.** There is no suitable habitat in the project site and the site is below the lower elevation limit for this species. This site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Arctostaphylos auriculata Mt. Diablo manzanita	--/--/CRPR 1B.3	Perennial evergreen shrub. Grows in chaparral and cismontane woodlands in sandstone. Occurs at elevations from 135 – 650 m amsl. Flowering period January – March (April) (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. This species was not observed in the project site during botanical surveys conducted during the blooming season. No manzanita plants are present on the site.
Arctostaphylos manzanita ssp. *laevigata* Contra Costa manzanita	--/--/CRPR 1B.2	Perennial evergreen shrub. Grows in chaparral on rocky slopes. Occurs at elevations from 430 – 1,100 m amsl. Flowering period January – March (April) (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. This species was not observed in the project site during botanical surveys conducted during the blooming season. No manzanita plants are present on the site.
Astragalus tener var. *tener* alkali milkvetch	--/--/CRPR 1B.2	Annual herb. Grows in playas, valley and foothill grassland (adobe clay), vernal pools in alkaline conditions. Occurs at elevations from 1 – 60 m amsl. Flowering period March – June (CNPS 2020).	**Will not occur.** Suitable habitat is not present on the project site. Playas and vernal pools are absent. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			of non-native and invasive plant species and lacks mesic areas. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Atriplex cordulata var. *cordulata* heartscale	--/--/CRPR 1B.2	Annual herb. Grows in chenopod scrub, meadows, seeps, valley and foothill grasslands (sandy). Prefers saline/alkaline conditions. Occurs at elevations from 0 – 560 m amsl. Flowering period April – October (CNPS 2020).	**Will not occur.** There is no suitable habitat in the project site. This species was not observed in a focused rare plant survey conducted during the appropriate blooming period for this species. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species.
Atriplex depressa brittlescale	--/--/CRPR 1B.2	Annual herb. Grows in chenopod scrub, meadows, seeps, playas, valley and foothill grasslands, vernal pools. Prefers clay/alkaline conditions. Occurs at elevations from 1 – 320 m amsl. Flowering period April – October (CNPS 2020).	**Will not occur.** Suitable habitat is not present on the project site. Chenopod scrub, meadows, seeps, and playas are absent from the site. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed during a focused rare plant survey conducted during the appropriate blooming period for this species.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Atriplex minuscula lesser salt scale	--/--/CRPR 1B.1	Annual herb. Grows in chenopod scrub, playas, and valley and foothill grasslands. Prefers sandy/alkaline conditions. Occurs at elevations from 15 – 200 m amsl. Flowering period May – October (CNPS 2020).	**Will not occur.** There is no suitable habitat in the project site. Chenopod scrub and playas are absent. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in a focused rare plant survey conducted during the appropriate blooming period for this species.
Balsamorhiza macrolepis big-scale balsamroot	--/--/CRPR 1B.2	Perennial herb. Grows on slopes in chaparral, cismontane woodland, and valley and foothill grassland, sometimes in serpentinite soil. Occurs at elevations from 45 – 1,555 m amsl. Flowering period March – June (CNPS 2020).	**Will not occur.** Suitable habitat is not present in the project site. Chaparral and woodland are absent from the site. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Calochortus pulchellus Mt. Diablo fairy-lantern	--/--/CRPR 1B.2	Perennial bulbiferous herb. Occurs in chaparral, cismontane woodland, riparian woodland, valley and foothill grassland. Occurs at elevations from 30 – 840 m amsl. Flowering period April – June (CNPS 2020).	**Will not occur.** Suitable habitat is not present in the project site. Chaparral and woodland habitats are absent. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Centromadia parryi ssp. *condonii* Congdon's tarplant	--/--/CRPR 1B.2	Annual herb. Occurs in valley and foothill grassland in alkaline conditions. Occurs at elevations from 0 – 230 m amsl. Flowering period May – October (November) (CNPS 2020).	**Will not occur.** Suitable habitat is not present on the site. This site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. In addition, this species was not observed during a focused rare plant survey conducted during the appropriate blooming period for this species.
Chloropyron palmatum palmated-bracted bird's-beak	FE/SE/CRPR 1B.1	Annual herb (hemiparisitic). Occurs in wetlands in chenopod scrub and valley and foothill grassland. Prefers alkaline conditions. Occurs at elevations from 5 – 155 m amsl. Flowering period May – October (CNPS 2020).	**Will not occur.** Habitat is not present in the project site, and wetland habitat that could support this species is not present. This species was not observed in a focused rare plant survey conducted during the blooming season.
Extriplex joaquinana San Joaquin spearscale	--/--/CRPR 1B.2	Annual herb. Occurs in chenopod scrub, meadows and seeps, playas, valley and foothill grassland in alkaline conditions. Occurs at elevations from 1 – 835 m amsl. Flowering period April – October (CNPS 2020).	**Will not occur.** Suitable habitat is not present in the project site. Chenopod scrub, meadows and seeps, and playas are absent. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in a focused rare plant survey conducted during the blooming season.
Helianthella castanea Diablo helianthella	--/--/CRPR 1B.2	Perennial herb. Occurs in broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. Typically, in partial shade in rocky/axonal soil. Occurs at elevations from 60 – 1,300 m amsl. Flowering period March – June (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. Chaparral, forest, scrub and woodland habitats are absent and shaded, rocky soils are not present. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Hesperolinon breweri Brewer's western flax	--/--/CRPR 1B.2	Annual herb. Occurs in chaparral, cismontane woodland, valley and foothill grassland. Usually occurs in serpentinite soil. Occurs at elevations from 30 – 945 m amsl. Flowering period May – June (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. Chaparral and woodland habitats are absent, as are serpentinite soils. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Monardella antonina ssp. *antonina* San Antonio Hills monardella	--/--/CRPR 3	Perennial rhizomatous herb. Occurs in chaparral and cismontane woodland. Occurs at elevations from 320 – 1,000 m amsl. Flowering period June – August (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. Chaparral and woodland habitats are absent and the site is below the lower elevation limit for this species. This species was not observed in a focused rare plant survey conducted during the appropriate blooming period for this species.
Navarretia prostrata prostrate vernal pool navarretia	--/--/CRPR 1B.1	Annual herb. Occurs in coastal scrub, meadows and seeps, vernal pools and valley and foothill grassland (alkaline). Prefers mesic conditions. Occurs at elevations from 3 – 1,210 m amsl. Flowering period April – July (CNPS 2020).	**Will not occur.** Mesic habitat is not present in the project site. Scrub, meadows and seeps, and vernal pools are absent. The grassland in the site does not provide mesic conditions generally. This species was not observed in a focused rare plant survey conducted during the appropriate blooming period for this species.
Plagiobothrys glaber hairless popcornflower	--/--/CRPR 1A	Annual herb. Occurs in coastal salt marshes and swamps, meadows and seeps (alkaline). Occurs at elevations from 15 – 180 m amsl. Flowering period March – May (CNPS 2020).	**Will not occur.** Marsh, swamps and seep habitat is not present in the project site. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Puccinellia simplex California alkali grass	--/--/CRPR 1B.2	Annual herb. Occurs in chenopod scrub, meadows and seeps, vernal pools and valley and foothill grassland. Occurs at elevations from 2 – 930 m amsl. Flowering period March – May (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. Chenopod scrub, meadows and seeps, and vernal pools are absent. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			This species was not observed in the project site during botanical surveys conducted during the blooming season.
Spergularia macrotheca var. *longistyla* long-styled sand-spurrey	--/--/CRPR 1B.2	Annual herb. Occurs in marshes and swamps, meadows and seeps and hot springs. Occurs in alkaline conditions. Occurs at elevations from 0 – 255 m amsl. Flowering period February – May (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Trifolium hydrophilum saline clover	--/--/CRPR 1B.2	Annual herb. Occurs in marshes and swamps, vernal pools and valley and foothill grassland (mesic and alkaline). Occurs at elevations from 0 – 300 m amsl. Flowering period April – June (CNPS 2020).	**Will not occur.** Suitable mesic habitat is not present in the project site. Additionally, this site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Tropidocarpum capparideum caper-fruited tropidocarpum	--/--/CRPR 1B.1	Annual herb. Occurs in valley and foothill grassland. Occurs in alkaline hills. Occurs at elevations from 1 – 455 m amsl. Flowering period March – April (CNPS 2020).	**Will not occur.** Suitable habitat is not present in the project site. This site has been converted to agricultural use for nearly a century and native plant assemblages are no longer present. Grassland habitat on the site is comprised almost entirely of non-native and invasive plant species. This species was not observed in the project site during botanical surveys conducted during the blooming season.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Viburnum ellipticum oval-leaved viburnum	--/--/CRPR 2B.3	Perennial deciduous shrub. Occurs in chaparral, cismontane woodland, and lower montane coniferous forest. Occurs at elevations from 215 – 1,400 m amsl. Flowering period May – June (CNPS 2020).	**Will not occur.** Habitat is not present in the project site. This species was not observed in the project site during botanical surveys conducted during the blooming season.
Wildlife			
Invertebrates			
Bombus crotchii Crotch's bumblebee	--/SCE/--	Crotch's bumble bee occurs in grassland and scrub habitats (California Department of Fish and Wildlife [CDFW] 2019a). New colonies are initiated by solitary queens, generally in the early spring, which typically occupy abandoned rodent burrows (CDFW 2019). This species is a generalist forager and have been reported visiting a wide variety of flowering plants. A short-tongued bumble bee; food plants include *Asclepias* spp., *Antirrhinum* spp., *Clarkia* spp., *Eschscholzia* spp., *Eriogonum* spp., *Chaenactis* spp., *Lupinus* spp., *Medicago* spp., *Phacelia* spp., and *Salvia* spp. (Koch et al. 2012). The flight period for queens in California is from February to October. New queens hibernate over the winter and initiate a new colony the following spring (CDFW 2019). Rare throughout its range and in decline in the Central Valley and southern California (CDFW 2019).	**Will not occur.** Grassland habitat is present on the site and some select food plants are present on site. However, Crotch's bumble bee was not observed in the project site during surveys in 2018 or 2020. Other bumble bee species observed during the survey in February 2020 included yellow-faced bumble bee (*Bombus vosnesenskii*) which is common and uses habitat found in the project site. Crotch's bumble bee is currently rare across its range in California (CDFW 2019) is presumed to be extirpated in Alameda County (NatureServe 2020). The nearest CNDDB occurrence for this species is located approximately 6.4 miles southwest of the project site near Pleasanton (CDFW 2020). However, this record is from 1932 and there are no other nearby current records that document this species near the project site. The closest confirmed account of this species is approximately 12 miles northeast near Discovery Bay documented in 2017 (iNaturalist 2020).

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Bombus occidentalis Western bumble bee	--/SCE/--	Bumble bees are primitively eusocial insects that live in underground colonies made up of one queen, female workers, and reproductive members of the colony. New colonies are initiated by solitary queens, generally in the early spring, which typically occupy abandoned rodent burrows (Thorp et al. 1983). This species is a generalist forager and have been reported visiting a wide variety of flowering plants. A short-tongued bumble bee; select food plants include *Melilotus* spp., *Cirsium* spp., *Trifolium* spp., *Centaurea* spp., *Eriogonum* spp., and *Chrysothamnus* spp. (Koch et al. 2012). This species has a short tongue and typically prefers open flowers with short corollas but is known to chew through the base of flowers with long corollas. The flight period for queens in California is from early February to late November, peaking in late June and late September. New queens hibernate over the winter and initiate a new colony the following spring (Thorp et al. 1983). Rare throughout its range and in decline west of the Sierra Nevada crest.	**Will not occur.** Habitat is present for western bumble bee and some select food plants are present on site. However, this species is currently rare across its range and in California it is currently limited to high elevation meadows in the Sierra Nevada and small coastal populations (CDFW 2019). The nearest CNDDB occurrence for this species is located approximately 6.4 miles southwest of the project site near Pleasanton (CDFW 2020). However, this record is from 1932 and there are no other nearby current records that document this species near the project site. Western bumble bee was not observed in the project site during surveys.
Branchinecta conservatio conservancy fairy shrimp	FE/--/--	Occupies large clay bottomed vernal pools to vernal lakes with turbid water in grasslands. The historical distribution of this species is unknown, and it is currently distributed throughout the Central Valley and southern coastal regions of California (USFWS 2005).	**Will not occur.** There are no large vernal pools, lakes or other large suitable wetland habitats in the project site.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Branchinecta lynchi vernal pool fairy shrimp	FT/--/--	Vernal pools ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. It is most frequently found in pools measuring less than 0.05 acre; although has been collected from vernal pools exceeding 25 acres. The known range within California includes the Central Valley and southern California. (USFWS 2005).	**Will not occur.** There are no vernal pools or other suitable wetland habitats in the project site.
Callophrys mossii bayensis San Bruno elfin butterfly	FE/--/--	Inhabits north-facing slopes on San Bruno Mountain and nearby summits on the Peninsula south of San Francisco. Larvae are restricted to stonecrop (*Sedum spathulifolium*), which grows on steep slopes in chaparral from 50 – 2,500 m amsl (USFWS 1984).	**Will not occur.** Will not occur since the host plant and habitat for the host plant is not present. The project site is outside of this species known range.
Desmocerus californicus californicus valley elderberry longhorn beetle	FT/--/--	Endemic to elderberry shrubs (*Sambucus* spp.) occurring in riparian habitat in the Sacramento and San Joaquin Valleys, riparian habitats in the Sacramento and San Joaquin Valleys, and less common throughout riparian forests of the Central Valley from Redding to Bakersfield typically below 152 m amsl (USFWS 2017).	**Will not occur.** There are no elderberry shrubs in the project site. The project site is outside of this species presumed and historical range (USFWS 2014).
Speyeria callippe callippe Callippe silverspot butterfly	FE/--/--	This species has one flight of adults per year. It historically inhabited hilly grasslands of seven counties bordering the San Francisco Bay. Since 1998 records have documented at San Bruno Mountain, Signal Hill (San Mateo County), hills near Pleasanton (Alameda County), Sears Point (Sonoma County) and the hills between Vallejo and Cordelia, CA (USFWS 2009). Larvae are restricted to Johnny jump-up (*Viola pedunculata*), which grows on grassy slopes, hillsides, chaparral, and oak woodland in full sun below 1,540 m amsl (Black and Vaughan 2005). Hilltops and ridges are important for mating. Adults lay eggs on the larval host plant or on	**Will not occur.** Will not occur since the host plant and its habitat are not present. Hilltop and ridge habitat, which are important for mating, are also not present. In addition, the project site is outside of this species current range.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
		surrounding debris. Adults feed on the nectar of Johnny jump-up in addition to several other flowers (USFWS 2009).	
Fish			
Hypomesus transpacificus Delta smelt	FT/SE/--	Delta smelt are tolerant of a wide salinity range. They have been collected from estuarine waters up to 14 ppt (parts per thousand) salinity. For a large part of their one-year life span, delta smelt live along the freshwater edge of the mixing zone (saltwater-freshwater interface), where the salinity is approximately 2 ppt. Shortly before spawning, adults migrate upstream from the brackish-water habitat associated with the mixing zone and disperse into river channels and tidally-influenced backwater sloughs. They spawn in shallow, fresh or slightly brackish water upstream of the mixing zone. Most spawning happens in tidally-influenced backwater sloughs and channel edge-waters. Although spawning has not been observed in the wild, the eggs are thought to attach to substrates such as cattails, bulrush, tree roots and submerged branches. Delta smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties (USFWS 1995).	**Will not occur.** There is no suitable habitat for this species in the project site.
Amphibians			
Ambystoma californiense California tiger salamander	FT/ST/--	California tiger salamanders are generally restricted to vernal pools and seasonal ponds, including many constructed stockponds, in grassland and oak savannah plant communities from sea level to about 1,500 feet in central California. This species spends the majority of its life in upland areas in the vicinity of suitable breeding ponds, where it inhabits rodent	**May occur.** There is no suitable breeding habitat in the project site and upland refugia is very limited. Cayetano Creek does not provide suitable breeding habitat for this species. Suitable ponds near the project site provide habitat and known records of breeding CTS.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
		burrows. In order to provide suitable habitat for this species, suitable breeding habitat must be present in combination with suitable upland habitat. In the Coastal region, populations are scattered from Sonoma County in the northern San Francisco Bay Area to Santa Barbara County, and in the Central Valley and Sierra Nevada foothills from Yolo to Kern counties (USFWS 2017).	CTS could occur moving through the project site and use Cayetano Creek as aquatic non-breeding habitat during periods of dispersal. California ground squirrel burrows that could provide upland habitat or any other fossorial mammal were virtually absent from the project site. The only upland refugia present for this species were soil cracks in the clay soil.
Rana boylii Foothill yellow-legged frog	--/SCE/SSC	The foothill yellow-legged frog occurs along the coast ranges from Oregon to Los Angeles and along the western side of the Sierra Nevada. This species uses perennial rocky streams in a wide variety of habitats up to 6,400 feet amsl. This species rarely ventures far from water, is usually found basking in the water, or under surface debris or underground within 165 feet of water. Eggs are laid in clusters attached to gravel or rocks along stream margins in flowing water. Tadpoles typically require up to four months to complete aquatic development. Breeding typically follows winter rainfall and snowmelt, which varies based upon location (Jennings and Hayes 1994).	**Will not occur.** Cayetano Creek does not provide habitat for foothill yellow-legged frog and this species was not observed in the project site during two seasons of protocol surveys for CRLF. Cayetano Creek has a brief hydroperiod and dries up in the spring and does not provide perennial water for this species or rocky substrate for egg laying. There is one historical record of this species collected and deposited in the Museum of Vertebrate Zoology from 1973. The specimen was collected from a nonspecific area near Livermore (CDFW 2020) south of the project site.
Rana draytonii California red-legged frog	FT/--/SSC	The California red-legged frog occupies a distinct habitat, combining both specific aquatic and riparian components. The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (greater than 2 1/3-foot deep) still or slow-moving water. The largest densities of California red-legged frogs are associated with deep-water pools with dense	**May occur.** There is no suitable breeding habitat in the project site and this species was not observed in the project site during protocol surveys. Cayetano Creek and other tributaries in the project site do not provide suitable breeding habitat for this species since the water is shallow

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
		stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter. California red-legged frogs aestivate (enter a dormant state during summer or dry weather) in small mammal burrows and moist leaf litter. They have been found up to 100 feet from water in adjacent dense riparian vegetation. Studies have indicated that this species cannot inhabit water bodies that exceed 70° F, especially if there are no cool, deep portions (USFWS 2002).	and does not persist for long enough duration to support larval development. Suitable ponds near the project site provide habitat and known records of breeding CRLF. CRLF could occur moving through the project site and use Cayetano Creek as aquatic non-breeding habitat during periods of dispersal.
Reptiles			
Actinemys (=Emys) marmorata western pond turtle	--/--/SSC	Turtle that inhabits slow-moving water with dense submerged vegetation, abundant basking sites, gently sloping banks, and dry clay or silt soils in nearby uplands. Turtles will lay eggs up to 0.25-mile from water, but typically go no more than 600 feet (Jennings and Hayes 1994).	**Will not occur.** The segment of Cayetano Creek adjacent to the project site does not provide suitable aquatic habitat for western pond turtle since it has a flashy hydroperiod, flows are very shallow, and it typically dries up in the spring. Sufficient water to support western pond turtle was not present in the project site and this species was not observed during two season of protocol surveys for CRLF or during any other biological surveys conducted for the project.
Masticophis lateralis euryxanthus Alameda whipsnake	FT/ST/--	Inhabits chaparral and scrub communities and utilizes adjacent grasslands, oak savannah, and oak-bay woodlands. Favors sunny slopes with rock outcrops. Currently known from 5 populations, the nearest of which is in the Hayward-Pleasanton Ridge area (USFWS 2006). Nearest records are from Niles, Hayward, and La	**Will not occur.** The project site does not provide suitable habitat for this species. Chaparral and scrub communities inhabited by this species are absent in and adjacent to the project site. In addition, this species is

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
		Costa Valley quads, >3 miles east and north of the project site (CDFW 2020).	not known to occur in the project vicinity.
Birds			
Agelaius tricolor tricolored blackbird	--/SC/--	Common locally throughout central California. Nests and seeks cover in emergent wetland vegetation and thorny vegetation such as Himalayan blackberry (*Rubus armeniacus*) as well as cattails and tules. Nesting area must be large enough to support a minimum colony of 50 pairs as they are a highly colonial species. Forages on ground in croplands, grassy fields, flooded land, and edges of ponds for insects (Shuford and Gardali 2008). Preferred foraging habitat is typically in vegetation that is less than 15 centimeters tall (Shuford and Gardali 2008).	**Not Expected.** There is no suitable marsh habitat or nesting substrate in the project site. This species was not observed on the project site during any of the numerous biological surveys that were conducted. The possibility this species foraging on the site cannot be ruled out with 100% certainty, however, this species was not observed on the site and is not expected to use the site extensively (see text for discussion).
Ammodramus savannarum Grasshopper sparrow	--/--/SSC	A summer resident of foothills and lowlands west of the Cascade-Sierra Nevada crest. Occurs in grasslands with scattered shrubs or other tall structures which it utilizes as singing perches. Nests on the ground in dense grass with overhanging taller grasses and forbs (Zeiner et al. 1988-1990).	**High.** The project site consists of open habitat with non-native annual grasses and forbs that could provide nesting habitat for this species. The nearest CNDDB record is located approximately 1.6 miles east of the project site.
Aquila chrysaetos Golden eagle	--/--/FP	Typically occurs in rolling foothills, mountain areas, deserts and other open habitats up to 3,822 m amsl. Typically nests on cliff ledges or large trees in open areas in canyons. Will occasionally use other tall structures for nesting, such as electrical transmission towers. Prey consists mostly of rodents, carrion, birds, reptiles and occasionally small livestock (Zeiner et al. 1988-1990).	**Present (Foraging).** During surveys in the summer of 2018 and winter of 2020 golden eagles were observed flying over the project site. The project site consists of open habitat with an abundant source of rodent and lagomorph prey and provides foraging habitat for golden eagle. This species would not be expected to nest in the project site and no potential eagle nests have been observed in the site. There are several CNDDB records of golden eagle within

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			a 5-mile radius of the project site, with most situated around Vaqueros Reservoir approximately 2 miles north of the project site and another along Tassajara Road approximately 4 miles west of the project site (CDFW 2020).
Asio otus Long-eared owl	--/--/SSC	Nests and roosts in conifer, oak and riparian habitat. Typically nests in open forests, or in dense forests on the edge of grasslands or another open habitat. Will nest in old hawk or corvid nests, squirrel nests, woodrat nests or mistletoe brooms (Shuford and Gardali 2008). Usually forages in open habitat and rarely in wooded areas. Forages low over the ground and feeds almost exclusively on small mammals but will opportunistically take birds and rabbits (Shuford and Gardali 2008).	**Present.** The project site consists of open habitat consisting mainly of annual grasslands with some oak trees located along Cayetano Creek. On March 17, 2020 one long-eared owl was observed perched atop a bank of Cayetano Creek likely hunting for small mammal prey. Pellets consistent with this species and white-wash have been observed at other locations along the creek likely indicate this owl routinely forages along the steep banks of Cayetano Creek. Long-eared owl could also nest in the large trees on the project site. There are no CNDDB records for long-eared owl in or near the project site.
Athene cunicularia burrowing owl	--/--/SSC	Forages in grasslands, agricultural fields, and disturbed places where burrowing mammals are abundant. Nests in burrows, especially those of California ground squirrel (*Otospermophilus beecheyi*; Shuford and Gardali 2008).	**Present (assumed foraging).** The project site consists of open habitat in cattle grazed land with rodent burrows and manmade structures, such as culverts which could support nesting or overwintering burrowing owls. Most burrows that provide habitat for this species are in the dryland grain crop north of Manning Road. Fences surrounding the perimeter of the project site and other structures provide perches for

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			hunting. No burrowing owl were observed on the project site during protocol surveys conducted in 2020; however, burrowing owl were observed adjacent to the northeast corner of the site north of Manning Road and burrowing owl could forage in the project site. There are several CNDDB records for burrowing owl documenting wintering and breeding sites near the project site, with the nearest record located one mile west of the project site.
Buteo swainsoni Swainson's hawk	--/ST/--	Forages in grasslands, suitable grain or alfalfa fields, or livestock pastures adjacent to nesting habitat. Nests on large trees in open areas (CDFW 1994).	**Not Expected (Nesting).** On two occasions during biological surveys in 2020 a single adult was observed soaring over the site along Cayetano Creek. However, the project site is well outside of this species known breeding range and there are no raptors nests in the project site. There are no confirmed successful CNDDB records for this species nesting within a 5-mile radius. In California, Swainson's hawk nests in the Sacramento and Central Valley. The closest reported nesting centers are in the delta and the Sacramento valley approximately 10 miles from the site. Although this species is expected to occasionally forage over the site, because the site is at the extreme western edge of this species range, the site is not expected to contribute significantly to potential

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
			foraging habitat for this species (see text for discussion).
Circus cyaneus northern harrier	--/--/SSC	Inhabits a variety of treeless habitats including freshwater marsh, brackish- and saltwater marsh, wet meadows, lake margins, grasslands, croplands, desert sinks, and sagebrush flats. Builds nests on large mounds of vegetation between March and August. Forages in most open habitats (Shuford and Gardali 2008).	**Present (foraging).** Grassland habitat in the project site is highly disturbed and this species was not observed nesting in the project site during surveys conducted during its nesting season, although it was observed foraging. There is only one CNDDB record for this species in a 5-mile radius from the project site located 4 miles to the west. The record documents suspected nesting activity in annual grassland (CDFW 2020).
Elanus leucurus white-tailed kite	--/--/FP	Raptor that inhabits rolling foothills and valley margins with scattered oaks, as well as river bottomlands or marshes next to deciduous woodland. Nests in isolated, dense-topped trees in open areas. Forages in a variety of habitats including grassland, marshes, and agricultural fields (Zeiner et al. 1988-1990).	**Present (foraging).** Habitat is present for this species in the project site. Trees that could support nesting habitat for this species are scattered throughout the project site and adjacent to the project boundary. Annual grasslands and agricultural lands also provide foraging habitat for this species. However, this species was not observed nesting in the project site during multiple surveys conducted during the nesting season, although it was observed foraging. The nearest CNDDB record for this species is approximately 4.5 miles west of the project site and documents a nest.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Falco peregrinus anatum American peregrine falcon	FD/SD/FP	Raptor that breeds on steep cliff faces near wetlands. Nests are minimal and may consist of a scrape and are located high on protected ledges or cliffs, including manmade structures. Forages on the wing by swooping on flying prey (Zeiner et al. 1988-1990).	**Will not occur.** There is no suitable breeding or foraging habitat in the project site.
Haliaeetus leucocephalus Bald eagle	FD/SE/FP	Requires large bodies of water with an abundant fish population. Feeds on fish, carrion, small mammals, and water-fowl. Nests are usually located within a 1-mile radius of water. Nests are most often situated in large trees with a commanding view of the area (Zeiner et al. 1988-1990).	**Will not occur.** There is no suitable breeding or foraging habitat in the project site.
Lanius ludovicianus Loggerhead shrike	--/--/SSC	This species prefers open habitats with scattered shrubs, trees, posts, or other perches. It can be found in shrublands or open woodlands with bare ground, or sparse herbaceous cover. The loggerhead shrike is often found in open cropland (Zeiner et al. 1988-1990).	**Present (foraging).** This species was observed foraging in the project site during the surveys. Nesting habitat for this species is present in trees scattered throughout the project site. Foraging habitat is present along fence lines, where this species could perch, catch and cache its prey. There are no CNDDB records documenting this species near the project site.
Melospiza melodia song sparrow (Modesto Population)	--/--/SSC	Breeds in riparian thickets in shrubs or vines near fresh or saline emergent wetland. Nests are typically situated low to the ground or on the ground under dense riparian vegetation (Zeiner et al. 1988-1990).	**Will not occur.** There is no suitable nesting habitat in the project site. This species could occur foraging in the project site.
Sterna antillarum browni California least tern	FE/SE/FP	This species nests in breeding colonies along marine and estuarine shore habitat from San Francisco Bay. Will also use abandoned salt ponds. Feeds in shallow waters on small fish. Suspected of wintering in South American along the western coast. Nesting is easily disrupted by human activities (Zeiner et al. 1988-1990).	**Will not occur.** There is no suitable nesting or foraging habitat in the project site.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
Mammals			
Bassariscus astutus ringtail	--/--/FP	Widely distributed throughout California in riparian forests, woodlands and shrub dominated habitats with rocky outcrops or tree snags with cavities. This species is omnivorous relying on variety of vertebrate and invertebrate prey in addition to berry producing plants such mistletoe (*Phoradendron* spp.). Avoids open ground and prefers moving from tree to tree through the canopy or jumping from trunk to trunk. This species is poorly known and is currently not tracked by the California Department of Fish and Game.	**Will not occur.** There is no suitable woodland habitat in the project site.
Corynorhinus townsendii Townsend's big-eared bat	--/--/SSC	Widely distributed throughout California except alpine and subalpine habitats. This species eats moths, beetle and other insects which it catches on the wing or by gleaning from vegetation. Typically found near water since it is poor at concentrating its urine. This species uses caves, mines, tunnels, buildings and human made structures for roosting. Maternity roosts are typically in warm sites. Hibernation sites are typically cold, but not freezing. This species is very sensitive to disturbance and may abandon its roost after one visit (Zeiner et al. 1988-1990).	**Will not occur.** There is no suitable roosting habitat in the project site.
Neotomas fuscipes annectens San Francisco dusky-footed woodrat	--/--/SSC	This species is widespread and inhabits a wide range of habitats in California with canopy closure and a dense understory such as oak woodlands or riparian forests. Builds nests that may be as large as 8 feet wide and 8 feet tall. Nests are typically built at the base of trees, stumps, shrubs or other structures. Woodrats will defend their nests from competitors. Diet consists mainly of vegetation, such as leaves,	**Will not occur.** There is no suitable woodland habitat in the project site. Potential woodrat nests were not detected in the project site.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Species Name/ Common Name[1]	Status[2]	Habit, Ecology and Life History	Potential to Occur[3]
		grasses, flowers, and acorns. May also eat fungi (Zeiner et al. 1988-1990).	
Taxidea taxus American badger	--/--/SSC	Inhabits drier open stages of most shrub, forest, and herbaceous habitats with loose, friable soils. Preys on a wide variety of mammals, reptiles, birds, and carrion, and hunts mostly by digging out fossorial prey. Occasionally takes prey on the surface. Not tolerant of cultivation. No longer occur in the Central Valley except in the extreme western edge (Williams 1986).	**May Occur.** Suitable habitat is present in the project site since fossorial prey is present, primarily in the project site north of Manning Road. The nearest CNDDB record is located approximately 4.5 miles west from the project site, which documents a mother badger with young (CDFW 2020). However, badger or potential dens suitable for this species were not observed in the project site.
Vulpes macrotis mutica San Joaquin kit fox	FE/ST/--	Inhabits grasslands, agricultural areas, playas, and scrublands. Formerly widespread in the Central Valley; now primarily found in foothills at the margins of the Central Valley and in the interior Coast Ranges. Uses natural and artificial burrows with entrances between 8 and 10 inches in diameter and occupies many different burrows in a single season (USFWS 1998).	**May Occur.** Marginal denning habitat is present for this species since friable soils are absent and fossorial prey is present in dryland grain crop vegetation community. However, potential kit fox burrows or excavations were not observed during numerous biological surveys. The project site is at the northwestern extent of this species' known range. There are several CNDDB records for this species within a 5-mile radius of the project site, with the nearest located approximately 2.7 miles north of the project site. The record documents a natal den from 1989. Subsequent surveys have not identified kit fox in Alameda County.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Note: **Bold font indicates a species that is evaluated in detail in the body of the report.**

[1] Sensitive species reported in CNDDB, USFWS or CNPS lists for the 'Livermore and Byron Tassajara' USGS quad. Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties are not included in this table due to the high volume of plants reported in the database.

[2] Status is as follows: Federal (ESA) listing/State (CESA) listing/other CDFW status or CRPR. F = Federal; S = State of California; E = Endangered; T = Threatened; FP=Fully Protected; R = Rare; C = Candidate to be listed; SSC=Species of Special Concern.

[3] Status in the Project site is assessed as follows. **Will Not Occur**: Species is either sessile (i.e., plants) or so limited to a particular habitat that it cannot disperse on its own and/or habitat suitable for its establishment and survival does not occur on the project site; **Not Expected**: Species moves freely and might disperse through or across the project site, but suitable habitat for residence or breeding does not occur on the project site, potential for an individual of the species to disperse through or forage in the site cannot be excluded with 100% certainty; **Presumed Absent:** Habitat suitable for residence and breeding occurs on the project site; however, focused surveys conducted for the current project were negative; **May Occur**: Species was not observed on the site and breeding habitat is not present but the species has the potential to utilize the site for dispersal, **High**: Habitat suitable for residence and breeding occurs on the project site and the species has been recorded recently on or near the project site, but was not observed during surveys for the current project; **Present**: The species was observed during biological surveys for the current project and is assumed to occupy the project site or utilize the project site during some portion of its life cycle.

CRPR = California Rare Plant Rank: 1A – presumed extinct; 1B – rare, threatened, or endangered in California and elsewhere; 2A – presumed extirpated in California but more common elsewhere; 2B – rare, threatened, or endangered in California but more common elsewhere; 3 – more information needed. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Table C-2: East Bay CNPS Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties Having the Potential to occur in the Project Site*

Species	Rank	Blooming Period	Habitat	Present (Yes or No)**
Calochortus splendens	A2	May-July	chaparral, grassland, open dry slope	No
Cryptantha decipiens	A2	Mar-May	Grassland, sand, sandstone, scrub	No
Cryptantha rattanii	A2	April-July	Grassland, sand, sandstone, scrub	No
Epilobium torreyi	A2	May-August	Riparian	No
Gilia tricolor subsp. tricolor	A2	Not listed	grassland	No
Juglans hindsii	A2	April-May	riparian	No
Lasthenia microglossa	A2	March-May	Chaparral, grassland, wetlands, woodland	No
Muilla maritima	A2	March-June	Alkali areas, grassland, wetlands, open dry slope, woodland, scrub, serpentine soils	No
Osmorhiza brachypoda	A2	March-May	Forest, riparian, woodland	No
Pectocarya pusilla	A2	March-June	Grassland, woodland, miscellaneous	No
Pentachaeta alsinoides	A2	March-June	grassland	No
Ranunculus occidentalis var. occidentalis	A2	March-July	Grassland, woodland	No
Thysanocarpus radians	A2	March-April	miscellaneous	No
Trifolium dichotomum	A2	April-June	Coastal bluff, grassland, open dry slope, woodland, miscellaneous	No
Trifolium olivaceum	A2	April-May	miscellaneous	No
Tropidocarpum gracile	A2	March-May	Alkali areas, grassland	No
Vicia hassei	A2	March-May	Grassland, scrub	No

* Plants from the database with a rank of "A" identified as having the potential to occur in the Morgan Territory area (Dmg) and habitats present on the project site (grassland, riparian or miscellaneous) with an elevational range below 250 meters.

** Based on the negative results of botanical surveys conducted during the blooming season, as well as the overall disturbed condition of the site and the general lack of suitable habitat on the site for special-status plants.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

REFERENCES

Black, S. H., and D. M. Vaughan. 2005c. Species Profile: Speyeria callippe callippe. In Shepherd, M. D., D. M. Vaughan, and S. H. Black (Eds). Red List of Pollinator Insects of North America. CD-ROM Version 1 (May 2005). Portland, OR: The Xerces Society for Invertebrate Conservation.

California Department of Fish and Wildlife (CDFW). 2020. California Department of Fish and Wildlife, Natural Diversity Database Biogeographic Data Branch. Sacramento, California. Last accessed online July 13, 2020.

California Native Plant Society, Rare Plant Program (CNPS). 2020. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed July 13, 2020].

iNaturalist.org (2020). iNaturalist Research-grade Observations: Crotch Bumble Bee. Occurrence dataset https://www.inaturalist.org/taxa/271451-Bombus-crotchii accessed via GBIF.org on 2020-02-03.

Koch, J., J. Strange, and P. Williams. 2012. Bumble bees of the Western United States. USDA-Forest Service, Pollinator Partnership. Washington, DC. 144 pp.

U.S. Fish and Wildlife Service (USFWS). 1984. Recovery Plan for the San Bruno Elfin and Mission Blue Butterflies. U.S. Fish and Wildlife Service, Portland, Oregon. 81 pp.

1995. Sacramento – San Joaquin Delta Native Fishes Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.

1998. Recovery plan for upland species of the San Joaquin Valley, California, Region 1, Portland, Oregon. 319 pages.

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

2006. Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for the Alameda Whipsnake; Final Rule. Federal Register 71:190; 58176-58231.

2009. Calliope Silverspot Butterfly (*Speyeria callippe callippe*) 5-Year Review: Summary and Evaluation. Prepared by the Sacramento Fish and Wildlife Office.

2014. 50 CFR Part 17 RIN–1018–AV29 Endangered and Threatened Wildlife and Plants; Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle from the Federal List of Endangered and Threatened Wildlife. Federal Register Vol. 79, No. 180. September 17.

Thorp, R. W., D. S Horning and L. L. Dunning. 1983. Bumble bees and cuckoo bumble bees of California (Hymenoptera: Apidae). Bulletin of the California Insect Survey 23: viii.

Appendix C (cont.)
Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

Williams, D.F. 1986. California Mammal Species of Special Concern in California. Department of Biological Sciences California State University, Stanislaus and California Department of Fish and Game, Sacramento.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

Appendix D

Plant and Wildlife Species Observed in the Project Site

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Appendix D
Plant and Wildlife Species Observed in the Project Site

D-1. Plant Species Observed

Family	Species Name	Common Name	Status
Native			
Anacardiaceae	*Schinus molle*	Peruvian pepper tree	Limited
Apocynaceae	*Asclepias fascicularis*	narrow-leaf milkweed	--
Asteraceae	*Artemisia douglasiana*	mugwort	--
	Grindelia camporum	common gumplant	--
	Hemizonia congesta ssp. *luzulifolia*	hayfield tarweed	--
	Holocarpha virgata ssp. *virgata*	narrow tarplant	--
	Pseudognaphalium canescens	everlasting	--
	Xanthium strumarium	cocklebur	--
Boraginaceae	*Amsinckia intermedia*	rancher's fiddleneck	--
	Heliotropium curassavicum var. oculatum	Alkali heliotrope	
Brassicaceae	*Lepidium nitidum*	shining peppergrass	--
Convolvulaceae	*Cressa truxillensis*	alkali weed	--
Crassulaceae	*Crassula connata*	pygmy-weed	--
Cyperaceae	*Cyperus eragrostis*	tall flatsedge	--
	Carex spp.	sedge	--
	Schoenoplectus californicus	California bulrush	--
	Eleocharis macrostachya	common spikerush	--
Euphorbiaceae	*Croton setigerus*	dove weed	--
Fabaceae	*Acmispon americanus*	Spanish clover	--
	Lotus corniculatus	birdfoot trefoil	--
	Lupinus bicolor	dwarf lupine	--
	Lupinus succulentus	arroyo lupine	--
	Melilotus indicus	sourclover	
Fagaceae	*Quercus lobata*	valley oak	--
Juglandaceae	*Juglans hindsii*	northern black walnut	1B.1
Juncaceae	*Juncus balticus* ssp. *ater*	Baltic rush	--
	Juncus bufonius	toad rush	--
	Juncus xiphioides	iris-leaved rush	--
Malvaceae	*Malvella leprosa*	alkali mallow	--
Onagraceae	*Epilobium brachycarpum*	annual fireweed	--
Orobanchaceae	*Castilleja exserta*	purple owl's clover	--
Poaceae	*Distichlis spicata*	saltgrass	--
	Elymus triticoides	beardless wild rye	--
Phrymaceae	*Erythranthe guttata*	seep monkeyflower	
Rosaceae	*Rosa californica*	California rose	--
Salicaceae	*Populus fremontii*	Fremont cottonwood	--
	Salix laevigata	red willow	--
Typhaceae	*Typha latifolia*	broad-leaved cattail	--
Verbenaceae	*Phyla nodiflora*	common lippia	--
Non-native			
Anacardiaceae	*Schinus molle*	Peruvian pepper tree	Limited
Apiaceae	*Foeniculum vulgare*	fennel	High
Asteraceae	*Carduus pycnocephalus*	Italian thistle	Moderate

Appendix D (cont.)
Plant and Wildlife Species Observed in the Project Site

Family	Species Name	Common Name	Status
	Centaurea solstitialis	yellow star thistle	High
	Cirsium vulgare	bull thistle	Moderate/C
	Conium maculatum	poison hemlock	Moderate
	Helminthotheca echioides	bristly ox-tongue	Limited
	Lactuca serriola	wild lettuce	--
	Matricaria discoidea	pineapple weed	--
	Senecio vulgaris	common groundsel	--
	Silybum marianum	milk thistle	Limited
	Sonchus asper	prickly sow thistle	--
Brassicaceae	*Brassica nigra*	black mustard	Moderate
	Lepidium latifolium	perennial pepperweed	High
	Sisymbrium altissimum	tumble mustard	--
Caryophyllaceae	*Spergularia marina*	salt sand spurrey	--
Chenopodiaceae	*Atriplex prostrata*	triangle orache	--
	Atriplex semibaccata	Australian saltbush	Moderate
	Salsola tragus	Russian thistle	Limited/C
Convolvulaceae	*Convolvulus arvensis*	Field bindweed	--/C
Fabaceae	*Medicago polymorpha*	burclover	Limited
	Robinia pseudoacacia	black locust	Limited
	Trifolium hirtum	rose clover	Limited
	Vicia villosa	winter vetch	--
Geraniaceae	*Erodium botrys*	long-beak filaree	--
	Erodium cicutarium	redstem filaree	Limited
	Geranium molle	crane's bill geranium	--
Lamiaceae	*Prunella vulgaris* var. *vulgaris*	selfheal	--
Lythraceae	*Lythrum hyssopifolia*	grass poly	Limited
Malvaceae	*Malva parviflora*	cheeseweed	--
Myrsinaceae	*Lysimachia arvensis*	scarlet pimpernel	--
Poaceae	*Avena fatua*	wild oats	Moderate
	Bromus diandrus	ripgut brome	Moderate
	Bromus hordeaceus	soft brome	Limited
	Bromus madritensis	foxtail chess	--
	Cynodon dactylon	Bermuda grass	Moderate
	Elymus caput-medusae	Medusa head	High
	Festuca perennis	Italian ryegrass	--
	Hordeum marinum	seaside barley	--
	Hordeum murinum	hare barley	Moderate
	Phalaris paradoxa	hood canarygrass	--
	Polypogon monspeliensis	annual beardgrass	Limited
Polygonaceae	*Polygonum aviculare* ssp. *depressa*	common knotweed	--
	Rumex crispus	curly dock	Limited
	Rumex pulcher	fiddle dock	--
Solanaceae	*Nicotiana glauca*	tree tobacco	Moderate

CRPR = California Rare Plant Rank: 1B – rare, threatened, or endangered in California and elsewhere; Extension codes: .1 – seriously endangered.

Appendix D (cont.)
Plant and Wildlife Species Observed in the Project Site

D-2. Wildlife Species Observed

Order/Family	Species Name	Common Name	Status*
Amphibians			
Anura			
Bufonidae	*Anaxyrus boreas halophilus*	California toad	--
Hylidae	*Psuedacris sierra*	Sierran treefrog	--
Reptiles			
Squamata			
Phrynosomatidae	*Sceloporus occidentalis*	western fence lizard	--
Birds			
Accipitriformes			
Accipitridae	*Accipiter cooperii*	Cooper's hawk	WL
	Aquila chrysaetos	golden eagle	FP
	Buteo jamaicensis	red-tailed hawk	--
	Buteo lineatus	red-shouldered hawk	--
	Buteo regalis	Ferruginous hawk	WL
	Buteo swainsoni	Swainson's hawk	ST
	Circus hudsonianus	northern harrier	SSC
	Elanus leucurus	white-tailed kite	FP
Apodiformes			
Trochilidae	*Calypte anna*	Anna's hummingbird	--
Charadriformes			
Charadriidae	*Charadrius vociferus*	killdeer	--
Ciconiformes			
Cathartidae	*Cathartes aura*	turkey vulture	--
Columbiformes			
Columbidae	*Zenaida macroura*	mourning dove	--
Falconiformes			
Falconidae	*Falco sparverius*	American kestrel	--
Galliformes			
Odontophoridae	*Callipepla californica*	California quail	--
Passeriformes			
Aegithalidae	*Psaltriparus minimus*	Bushtit	--
Corvidae	*Aphelocoma californica*	California scrub jay	--
	Corvus brachyrhynchos	American crow	--
	Corvus corax	common raven	--
Emberizidae	*Aimophila ruficeps*	rufous-crowned sparrow	--
	Passerculus sandwichensis	savanna sparrow	--
	Zonotrichia leucophrys	white-crowned sparrow	--
Fringillidae	*Carduelis psaltria*	lesser goldfinch	--
	Haemorhous mexicanus	house finch	--
Hinundiridae	*Tachycineta bicolor*	tree swallow	--
Icteridae	*Agelaius phoeniceus*	red-winged blackbird	--
	Euphagus cyanocephalus	Brewer's blackbird	--
	Icterus bullockii	Bullock's oriole	--
	Sturnella neglecta	western meadowlark	--
Laniidae	*Lanius ludovicianus*	loggerhead shrike	SSC
Mimidae	*Mimus polyglottos*	northern mockingbird	--
Paridae	*Baeolophus inornatus*	oak titmouse	--

Appendix D (cont.)
Plant and Wildlife Species Observed in the Project Site

Order/Family	Species Name	Common Name	Status*
Parulidae	*Setophaga coronata*	Yellow-rumped warbler	--
Passeridae	*Passer domesticus*	house sparrow	--
Sittidae	*Sitta carolinensis*	white-breasted nuthatch	--
Sturridae	*Sturnus vulgaris*	European starling	--
Turdidae	*Sialia mexicana*	western bluebird	--
	Turdus migratorius	American robin	--
Tyrannidae	*Sayornis nigricans*	black phoebe	--
	Sayornis saya	Say's phoebe	
	Tyrannus verticalis	western kingbird	--
Piciformes			
Picidae	*Melanerpes formicivorus*	acorn woodpecker	--
	Dryobates nuttallii	Nuttall's woodpecker	--
Strigiformes			
Strigidae	*Asio otus*	long-eared owl	SSC
	Bubo virginianus	Great horned owl	--
Tytonidae	*Tyto alba*	barn owl	--
Mammals			
Artiodactyla			
Cervidae	*Odocoileus hemionus*	mule deer	
Carnivora			
Canidae	*Canis latrans*	coyote	--
Lagomorpha			
Leporidae	*Lepus californicus*	black-tailed jackrabbit	--
	Sylvilagus audubonii	Audobon's cottontail	--
Rodentia			
Cricetidae	*Microtus californicus*	California vole	--
Geomyidae	*Thomomys bottae*	Botta's pocket gopher	--
Sciuridae	*Otospermophilus beecheyi*	California ground squirrel	--
Insects			
Hymenoptera			
Apidae	*Bombus vosnesenskii*	Yellow-faced bumblebee	--

* Status for animal species: ST = California Threatened; FP = Listed as California Department of Fish and Wildlife (CDFW) Fully Protected; SSC = CDFW Species of Special Concern, WL = CDFW watchlist species.

Appendix E

Representative Site Photos

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Photo 1. View of dryland grain crop in the project site looking south from the northern portion of the northern parcel north of Manning Road. Photo date 8/1/2018.



Photo 2. View of dryland grain crop in the project site looking north from the southern portion of the northern parcel north of Manning Road. Photo date 8/1/2018.



Photo 3. View of westernmost ephemeral stream south of data point 1 looking south from the northern boundary of the central parcel. The project was designed to avoid this stream and it is not within the project site. Photo date 7/31/2018.



Photo 4. View of the banks of Cayetano Creek adjacent to the central portion of the central parcel. Photo date 7/31/2018.



Photo 5. View of Cayetano Creek adjacent to the project site looking west from the northwestern portion of the central parcel near Manning Ave. Photo date 7/31/2018.



Photo 6. Representative view of Cayetano Creek adjacent to the central portion of the central parcel. Photo was taken looking south. Photo date 7/31/2018.



Photo 7. View of Cayetano Creek adjacent to the central parcel with drift deposits (blue arrow) and exposed roots (red arrow) from a valley oak indicating flowing water. Photo date 7/31/2018.



Photo 8. View of a pool along Cayetano Creek adjacent to the southern boundary of the project site. Photo date 6/21/2018.



Photo 9. View of annual grassland looking north from the southern boundary of the project site. Photo date 7/31/2018.



Photo 10. View of a developed area looking east from the southern boundary of the project site. Photo date 8/1/2018.

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Appendix F

California Red-Legged Frog Site Assessment and Protocol Survey Report

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Aramis Solar Energy Generation and Storage Project

California Red-Legged Frog Site Assessment and Protocol Survey Report

July 2020 | IPO-01.03



Prepared for:

Alameda County Planning Department
244 West Winton Avenue
Hayward, CA 94544

Prepared by:

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Folsom, CA 95630

Aramis Solar Energy Generation and Storage Project

California Red-Legged Frog Site Assessment and Protocol Survey Report

Prepared for:

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Hayward, CA 94544

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1.0 INTRODUCTION

Under contract with IP Aramis LLC (a subsidiary of Intersect Power, LLC), HELIX Environmental Planning, Inc. (HELIX) conducted a site assessment and protocol surveys for the federally listed as threatened California red-legged frog (CRLF; *Rana draytonii*) for the proposed Aramis Solar Energy Generation and Storage Project (project). The purpose of the site assessment and protocol surveys were to assess the site's suitability to support CRLF as well as determine whether this species is currently using the site for breeding and/or dispersal.

1.1 PROJECT LOCATION AND DESCRIPTION

The 410-acre project site is located in unincorporated Alameda County, approximately 2.5 miles north of Livermore (Attachment A: Figure 1). The project site is located on portions of four privately-owned parcels – Assessor's Parcel Numbers 903-0006-001-02 (eastern 269 acres of a 523-acre parcel), 903-0007-002-01 (52 acres), 903-0006-003-07 (38 acres), and 902-0001-005-00 (51 acres) (Attachment A: Figure 2). The project site is within Sections 16 and 17 of Township 02 South, Range 02 East and un-surveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" USGS 7.5-minute quadrangles (Attachment A: Figure 3). The project site lies at an elevation of roughly 550 to 700 feet above mean sea level (amsl).

IP Aramis, LLC is the project applicant and is seeking a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) facility for at least 50 years. The project would generate 100 megawatts (MW) of PV power on the 410-acre site. The project would provide solar power to utility customers by connecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E) existing Cayetano 230 kilovolt (kV) substation located adjacent and interior to the project site. The project would serve East Bay Clean Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract.

1.2 CALIFORNIA RED-LEGGED FROG BACKGROUND

The federally-listed as threatened CRLF is one of two subspecies of red-legged frog. The historic range of CRLF extends from Baja California, Mexico, north to the vicinity of Redding inland, and at least to Point Reyes, California coastally (Jennings and Hayes 1994). The other subspecies is northern red-legged frog (*Rana aurora aurora*), which is a California species of special concern. Its range is located north of the CRLF range in northern California and is largely geographically isolated from CRLF. Today the species is known to occur in about 238 streams or drainages in 23 counties and is found primarily in wetlands and streams in the coastal drainages of Central California. Records of the species are known from Riverside County to Mendocino County along the Coast Range, from Calaveras County to Butte County in the Sierra Nevada, and in Baja California, Mexico. CRLF are still locally abundant within portions of the San Francisco Bay area (including Marin County) and the central coast. Within the remaining distribution of the species, only isolated populations have been documented in the Sierra Nevada, northern Coast, and northern Transverse ranges (USFWS 2010). In the Sierra Nevada, CRLF historically occupied portions of the lower elevations west of the crest from Shasta County south to Tulare County. Almost all known CRLF populations have been documented at elevations below 3,500 feet amsl with some historical sightings documented at elevations up to 5,200 feet amsl.

Within its range, CRLF occupies a distinct habitat of both aquatic and terrestrial components that consist of aquatic breeding and non-breeding areas embedded within a matrix of habitats used for dispersal, or refugia. Breeding and non-breeding aquatic habitat consists of low-gradient freshwater bodies, including ponds, marshes, sag ponds, dune ponds, stock ponds, lagoons, seeps, springs, and backwaters within streams and creeks. This species does not inhabit water bodies that exceed 70 degrees Fahrenheit if there are no cool, deep portions (USFWS 2002). Important characteristics of aquatic breeding habitat include still or slow moving fresh water (with salinities of less than 7.0 parts per thousand) deeper than 2.3 feet (0.7 meter) with dense, shrubby emergent or overhanging vegetation that provides egg deposition sites and cover for adult frogs (Jennings and Hayes 1994; USFWS 2002) and that persists for a minimum of 20 weeks following the breeding season to allow tadpoles to mature (USFWS 2010).

CRLF typically breed along the margins and shallow parts of sunlit pools, which can be natural or manmade ponds, wide slow sections of streams, or even small, spring-fed puddles, typically without centrarchid fish (Hayes and Jennings 1988 in Berry and Fellers 2013). The breeding season typically occurs from November through April (USFWS 2002) and is likely influenced by local precipitation and ambient temperature. Females typically lay eggs between December and early April. Tadpoles typically metamorphose in 11 to 20 weeks, from July to September, but may overwinter in some sites. The largest populations of CRLF are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) intermixed with cattails (*Typha* spp.). Adults feed primarily on aquatic and terrestrial invertebrates, but may feed on tadpoles, smaller frogs, small mammals, and fish. Juvenile frogs are active diurnally and nocturnally, and adult frogs are largely nocturnal (USFWS 2002).

CRLF are generally found in or near water but may disperse into uplands during the wet season to migrate to breeding habitat or for foraging, or in response to receding water during the driest time of the year. Well-vegetated terrestrial areas within a riparian corridor may provide important sheltering habitat when temperatures are cold in the winter or when water is unavailable during dry periods. CRLF spend considerable time resting and foraging in riparian vegetation when it is present (USFWS 2002). The use of the adjacent riparian corridor during summer is most often associated with drying of creeks in mid- to late-summer (Rathbun in litt., 1994 in USFWS 1996). During dry periods, CRLF remain close to water and often disperse upstream or downstream from their breeding habitat to forage or seek aestivation sites if water is not available (USFWS 2002). This habitat may include shelter under boulders, rocks, logs, industrial debris, agricultural drains, water troughs, small mammal burrows, incised stream channels, or areas with moist leaf litter (Jennings and Hayes 1994; USFWS 2002). Most CRLF do not disperse farther than the nearest suitable cold-shelter or aestivation habitat. CRLF have been found up to 200 feet from water in adjacent dense riparian vegetation (USFWS 2010).

During periods of wet weather, individuals may disperse through uplands to migrate between aquatic breeding sites and have been observed making straight-line point to point migrations rather than using stream corridors (USFWS 2002). Movements of up to two miles have been reported (Fellers 2005), but one mile represents a more typical dispersal distance for breeding migration. Most overland movements occur at night (USFWS 2002).

The decline of the red-legged frog is attributable to a variety of factors. Large-scale commercial harvesting of red-legged frogs led to severe depletions of populations at the turn of the century (Jennings and Hayes 1985). Subsequently, exotic aquatic predators such as bullfrogs (*Rana catesbeiana*), crayfish (*Procambarus clarki*), and various species of fish became established and contributed to the continued decline of the species (Hayes and Jennings 1986). Habitat alterations such as conversion of land to agricultural and commercial uses, reservoir construction, off-road vehicle use, and land-use

practices (i.e., livestock grazing) threaten the remaining populations (Bohn and Buckhouse 1986; Jennings and Hayes 1994; Kauffman et al. 1983; Kauffman and Krueger 1984).

The primary constituent elements of habitat for CRLF are aquatic and upland areas where suitable breeding and non-breeding habitat is interspersed throughout the landscape and is interconnected by unfragmented dispersal habitat. Specifically, to be considered to have the primary constituent elements, an area must include two (or more) suitable breeding locations, a permanent water source, associated uplands surrounding these water bodies up to 300 feet from the water's edge, all within 1.25 miles of one another and connected by barrier-free dispersal habitat that is at least 300 feet in width (USFWS 2002).

1.3 REGULATORY SETTING

The CRLF was listed as a threatened species under the federal Endangered Species Act by the USFWS on May 23, 1996 (61 Federal Register [FR] 25813-25833). Critical habitat, which is defined as "a specific area needed by an endangered or threatened animal or plant for it to survive, not go extinct, and recover to a healthy population" was originally designated for CRLF on April 13, 2006 (USFWS 2006; 71 FR 19244-19346). An increase in critical habitat for the CRLF was proposed by the USFWS in a news release on September 16, 2008 and an update to critical habitat for the CRLF was designated on March 17, 2010. Approximately 1,636,609 acres of Critical Habitat in 27 California counties was established for the species in a final revised designation effective April 16, 2010 (75 FR 12816-12959).

2.0 ENVIRONMENTAL SETTING

The project site lies in a rural area of northeastern Alameda County and is surrounded primarily by undeveloped land supporting grazing and agricultural uses. Los Vaqueros Reservoir lies 3 miles north and the City of Livermore lies approximately 2.5 miles south of the project site. Other communities in the area include the community of Tassajara located west of the project site and the City of Dublin, located southwest of the project site.

Alameda County is in central California and spans the Coastal Mountain Range. The County's boundaries are the San Francisco Bay on the west and Contra Costa County on the north, Santa Clara County to the south and San Joaquin County to the east. The eastern part of Alameda County in Livermore Valley is characterized by rolling foothills and annual grasslands. The project site is in a valley and is surrounded by peaks of the Coast Range reaching a height of roughly 2,200 feet.

The climate of Alameda County is Mediterranean, characterized by wet, cool winters and dry, hot summers. The nearest weather station is the Livermore Municipal Airport, located approximately 3.8 miles southwest of the project site in Alameda County. Mean daily maximum and minimum temperatures are 88 degrees in July and 57 degrees Fahrenheit in July, and 58 and 38 degrees Fahrenheit in January (NRCS 2020). The mean annual precipitation is 14.0 inches, with nearly 100 percent occurring as rain from September through May. The weather station at the Livermore Municipal Airport received 11.3 inches of rainfall in the 2019/2020 rain season (from October to September) or about 81% of normal. During the 2018/2019 rain year, the weather station received 13.7 inches of precipitation, which is nearly average. In the 2017/2018 rain year, the nearby weather station received 25.6 inches of precipitation, which is 183% of normal.

3.0 METHODS

3.1 SITE ASSESSMENT

The methods used for this CRLF site assessment are derived from the USFWS *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS 2005). The site assessment included a review of available resources to provide an overview of the upland and aquatic habitats present within the project site and surrounding vicinity. The California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB; CDFW 2020) and the *Recovery Plan for the California Red-legged Frog* (*Rana aurora draytonii*; USFWS 2002) were reviewed for information regarding known existing and historic populations of CRLF in the project region. A listing of other information sources reviewed to assess suitability of the site and vicinity for CRLF is provided below:

- USGS "*Livermore, California"* and "*Tassajara*, California" 7.5-minute topographic quadrangle maps;
- Aerial photography of the property and vicinity from 1939 to 2018 (Google Earth 2020);
- National Wetland Inventory (NWI) map for the project site and vicinity from the Wetlands Online Mapper (USFWS 2020a); and
- USFWS online species information for CRLF (USFWS 2020b).

Three criteria were used to assess the likelihood of CRLF presence in or within the vicinity of the project site: (1) the location of the project site with respect to the current and historic range of CRLF, (2) the presence/absence of known records of CRLF within a one-mile radius of the project site, and (3) the habitat types occurring within the project site and within a one-mile radius.

A biological reconnaissance survey and CRLF habitat assessment of the site was conducted on December 6, 2017 by HELIX Principal Biologist Stephen Stringer, M.S. All aquatic habitats on the project site were identified and assessed for the potential to support CRLF. Habitats were determined to meet the criteria for suitable CRLF breeding habitat if they met the criteria for aquatic habitat in the literature (USFWS 2002 and USFWS 2005). Such habitats include low-gradient freshwater bodies, including ponds, marshes, sag ponds, dune ponds, stock ponds, lagoons, seeps, springs, and backwaters within streams and creeks with still or slow moving fresh water deeper than 2.3 feet (0.7 meter) with dense, shrubby emergent or overhanging vegetation that provides egg deposition sites and cover for adult frogs and that persists for a minimum of 20 weeks following the breeding season (November through April).

All land surrounding the project site is private property and was inaccessible on foot during the site assessment. Therefore, the review of potential aquatic habitat for CRLF within a one-mile radius of the site was conducted from the project site, public roads, and using desktop analysis of the sources listed above.

3.2 PROTOCOL SURVEYS

Based on the results of the site assessment, protocol surveys were deemed necessary and conducted in 2018. Due to delays in the project schedule, another full set of protocol surveys was conducted in 2020.

Therefore, two full seasons of protocol surveys for CRLF were conducted in all suitable aquatic habitats on and adjacent to the site. Protocol surveys in 2018 were conducted from January 30 to July 31, 2018 and protocol surveys in 2020 were conducted from February 6, 2020 to July 14, 2020. A total of eight surveys were conducted for CRLF at the project site during winter, spring and summer of 2018 and again in 2020.

The CRLF protocol breeding season surveys in 2018 were conducted by CRLF permitted biologists Gretchen Padgett-Flohr, Ph.D. and Jennifer Gonterman (TE-006112-7) from Surf to Snow (previously Californian Environmental Services) and HELIX Principal Biologist Stephen Stringer, M.S. with assistance from HELIX Senior Wildlife Biologist Patrick Martin (CRLF permitted biologist TE-778195-14) and HELIX Senior Botanist/Biologist George Aldridge, Ph.D. for non-breeding season surveys. The CRLF protocol surveys in 2020 were conducted by Mr. Martin with assistance from HELIX Biologist Stephanie McLaughlin, M.S. and HELIX Biologist Halie Goeman. Survey dates and personnel are summarized in Table 1. All suitable aquatic habitat identified during the site assessment as having the potential to support CRLF was surveyed during each survey event. Data sheets are included in Attachment C. Qualifications of surveyors are included following the table.

Table 1
SUMMARY OF SURVEY EFFORT

Survey Date	Time (Day or Night)	Breeding/ Non-breeding	Personnel
January 30, 2018	Day (1)	Breeding	Stephen Stringer, Gretchen Padgett-Flohr, Ph.D, and Jennifer Gonterman
January 31, 2018	Night (2)	Breeding	Stephen Stringer and Jennifer Gonterman
March 15, 2018	Night (3)	Breeding	Stephen Stringer and Jennifer Gonterman
March 29, 2018	Night (4)	Breeding	Stephen Stringer and Jennifer Gonterman
April 23, 2018	Night (5)	Breeding	Stephen Stringer and Jennifer Gonterman
May 3, 2018	Day (6)	Breeding	Stephen Stringer and Jennifer Gonterman
July 31, 2018	Day (7)	Non-breeding	George Aldridge and Patrick Martin
July 31, 2018	Night (8)	Non-breeding	George Aldridge and Patrick Martin
February 6, 2020	Day (1)	Breeding	Patrick Martin and Haile Goeman
March 9, 2020	Day (2)	Breeding	Patrick Martin and Stephanie McLaughlin
March 9, 2020	Night (3)	Breeding	Patrick Martin and Stephanie McLaughlin
March 17, 2020	Night (4)	Breeding	Patrick Martin and Halie Goeman
April 6, 2020	Night (5)	Breeding	Patrick Martin and Haile Goeman
April 28, 2020	Night (6)	Breeding	Patrick Martin
July 14, 2020	Day (7)	Non-breeding	Patrick Martin
July 14, 2020	Night (8)	Non-breeding	Patrick Martin

Mr. Stringer holds a B.S. in Biological Conservation and an M.S. in Biological Sciences (emphasis in Conservation Biology) from California State University, Sacramento (CSUS). He has approximately 17 years of experience in the public and private sector conducting biological, botanical, and wetland studies. Mr. Stringer holds a USFWS Section 10(a)(1)(A) Recovery Permit (TE-141359-3) for federally-listed vernal pool branchiopods throughout the range of the species in California and Oregon and for the Central Valley Distinct Population Segment of California tiger salamander (*Ambystoma californiense*) (CTS). Mr. Stringer has conducted biological surveys for hundreds of projects throughout California and is familiar with amphibians and reptiles found throughout the state. He has also conducted dozens of CRLF site assessments and protocol surveys. His formal training in amphibian identification includes

coursework in identification and natural history of native reptiles and amphibians at CSUS and completion of the Rare Pond Species Workshop conducted by the Laguna de Santa Rosa Foundation in 2008. The workshop included classroom and field studies of CRLF involving ecology, identification of all life stages, and surveying techniques. Mr. Stringer encountered numerous CRLF during the workshop both in the classroom and field portions.

Dr. Aldridge holds a B.S. in Botany from Humboldt State University and a Ph.D. in Biology from the University of California, Irvine. He has over 13 years of experience in field and laboratory studies and teaching in the field of biology and botany. His biological field studies have been performed throughout California. He has also conducted biological field studies and has taught classes within California, in Humboldt and Orange Counties, as well as Colorado. Dr. Aldridge's biological field study experience includes vegetation mapping, general biological surveys, rare plant surveys, and focused surveys for special-status animal species including CRLF and arroyo toad (*Anaxyrus californicus*). Dr. Aldridge is familiar with amphibians throughout the state. His formal training in amphibian identification includes completion of the Rare Pond Species Workshop conducted by the Laguna de Santa Rosa Foundation in 2017.

Mr. Martin (CRLF and CTS permitted biologist TE-778195-14) holds a B.S. in Ecology and Evolution with a minor in Earth Sciences from the University of California at Santa Cruz (UCSC). He has approximately 13 years of experience in the private sector conducting wildlife surveys, including wetland and botanical studies. Mr. Martin has conducted biological surveys for projects throughout California and is familiar with amphibians and reptiles found throughout the state. He has conducted several CRLF site assessments, in addition to habitat assessments for other amphibians such as CTS, Sierra Nevada yellow-legged frog (*Rana sierrae*) and Yosemite toad (*Anaxyrus canorus*). Mr. Martin conducted protocol surveys for CRLF and arroyo toad in the Los Padres National Forest with forest service biologists through a partnership with the Santa Barbara Zoological Gardens. His formal training in amphibian identification includes coursework in identification and natural history of native reptiles and amphibians at UCSC (Herpetology class and lab) and completion of the California Red-legged Frog Workshop conducted by the Alameda County Conservation Partnership in 2010. The workshop included classroom and field studies of CRLF involving ecology, identification of all life stages, and surveying techniques. Mr. Martin encountered numerous CRLF during the workshop both in the classroom and field portions. Mr. Martin also encountered several CRLF tadpoles during the CTS Workshop conducted by the Elkhorn Slough Coastal Training Program in 2011.

Dr. Gretchen Padgett-Flohr has over 30 years of experience in research and biological consulting and has worked extensively with CRLF, including mitigation and recovery planning and numerous surveys. Dr. Padgett-Flohr holds 10(a)(1)(A) federal recovery permits for CRLF, CTS, and salt marsh harvest mouse. Jennifer Gonterman is an experienced field biologist with over 17 years of experience conducting protocol surveys and construction monitoring for salt marsh harvest mouse (*Reithrodontomys raviventris*), Foothill yellow-legged frog (*Rana boylii*), CRLF, CTS, western pond turtle (*Actinemys marmorata*), and nesting birds. Listed as an independent investigator on Dr. Gretchen Padgett-Flohr's 10(a)(1)(A) federal recovery permits for CRLF, CTS, and salt marsh harvest mouse, she has extensive experience with rescue and relocation of special-status amphibians and reptiles, including draining of ponds to eradicate non-native predators. For the Carmel River Re-route project she was involved in capturing and relocating over 10,000 CRLF.

Ms. McLaughlin is a biologist and International Society of Arboriculture (ISA)-certified Arborist (WE-12922A). She performs biological and arborist field surveys, habitat and vegetation mapping, and

biological and construction monitoring. She has experience surveying for sensitive wildlife species, including special-status birds and other wildlife. She possesses a U.S. Fish and Wildlife Service 10(a)1(A) permit for western snowy plover and California least tern. Ms. McLaughlin has seven years of experience as a biologist for transportation, renewable energy, private development, and restoration projects and has been approved by CDFW to monitor for CRLF and other special-status amphibians and reptiles.

Ms. Goeman is a biologist that has performed biological field work throughout Nevada and Northern California including Sacramento, Lassen, Alameda, Shasta, San Joaquin, and El Dorado Counties. She has an academic background in wildlife ecology and conservation from the University of Nevada, Reno. She has gained extensive experience with volunteer opportunities within her time at the university. She has performed focused surveys for burrowing owls, bald eagles, and greater sage grouse. In addition, Ms. Goeman has performed raptor nest surveys. Ms. Goeman has also conducted protocol-level surveys for the federally endangered Carson wandering skipper. Ms. Goeman is particularly skilled in terrestrial and aquatic habitat assessments, special-status animal surveys, public outreach, and science education. Additionally, Ms. Goeman has gained experience with environmental consulting as well as serving in a public agency with her time at the Bureau of Land Management.

4.0 RESULTS

4.1 SITE ASSESSMENT RESULTS

4.1.1 Current and Historic Range of CRLF in Relation to the Project

The project site is located within the current and historic range of CRLF and there are documented populations of breeding CRLF within one mile of the project site, as discussed in further detail below.

The project site is located within the current and historic range of CRLF per the *Recovery Plan for the California Red-legged Frog* (*Rana aurora draytonii*; USFWS 2002). The Recovery Plan designated eight Recovery Units within California. Within these Recovery Units, specific Core Units are identified for focused recovery efforts. The project site is located within Recovery Unit 4: South and East San Francisco Bay. The project site is located within the East San Francisco Bay Core Unit 16. Core Unit 16 includes Alameda Creek, East Bay Cities, and North Diablo Range hydrologic sub-areas. Conservation needs for Core Unit 16 include protection of existing populations; control of non-native predators; studying the effects of grazing in riparian corridors, ponds, and uplands (e.g., on EBRPD lands); reduce impacts associated with livestock grazing; protect habitat connectivity; minimize effects of recreation and off-road vehicle use; avoid and reduce impacts of urbanization; and protect habitat buffers from nearby urbanization.

The project site is located adjacent to Critical Habitat Unit CCS-2B, Mount Diablo, which is in Alameda County and Contra Costa County, north of Interstate 580. This Critical Habitat was considered occupied at the time of the April 16, 2010 ruling, and is in the San Francisco Bay watershed. The western portion of APN 903-0006-001-02, which is being split off as a separate parcel and is not part of the project site, is within designated Critical Habitat Unit CSS-2B. The project site was chosen in part because it is not located within the designated Critical Habitat and does not support breeding habitat surrounded by high quality upland habitat.

The CNDDB was also consulted to determine if there are any known occurrences of CRLF in the project site or vicinity. There are five documented occurrences of CRLF within a 1-mile radius of the project site (discussed in Section 4.1.2), although there are no records of occurrences within the project site.

4.1.2 Assessment of CRLF Records Within a One-Mile Radius of the Project Site

There are 5 documented locations where CRLF have been reported in the CNDDB within a one-mile radius of the project site (Attachment A: Figure 4). There are 9 additional reported occurrences on the Byron Hot Springs quad that show up within a one-mile radius search, but these records are non-specific records that cover the entire quad. The actual location of these reported occurrences appears to be outside of the one-mile radius and these records are not reported here.

The closest reported occurrence (Occurrence no. 297) of CRLF to the project site is a polygon that extends to within 100 feet southeast of the project site where juveniles were observed dispersing from Altamont Creek in non-native annual grassland in January of 1997. The next closest record (Occurrence no. 1382) is approximately 0.6 miles west of the western project boundary south of Manning Road and along a branch of Cayetano Creek (CDFW 2020). That record is of two adult CRLF and approximately 50 tadpoles that were observed in May 2013 in a riparian area dominated by willow. The creek was not flowing, but a remnant pool with a depth of between 2-3 feet provided habitat for California red-legged frog (CDFW 2020). The branch of Cayetano Creek where the CRLF have been reported has stretches of dense riparian vegetation and holds water into at least late August in at least some years based on aerial imagery (Google Earth 2020; imagery date 8/31/2017), whereas the segment of Cayetano Creek adjacent to the project site has very sparse riparian vegetation consisting primarily of single trees and rarely holds any water past spring based on survey results and a review of aerial imagery (Google Earth 2020). CRLF records within one mile of the site have been compiled and are listed below in Table 2.

Table 2
CNDDB RESULTS FOR CRLF RECORDS WITHIN A ONE-MILE RADIUS OF THE PROJECT SITE

Occurrence Number	USGS Quadrangle	Presence	UTM Zone-10	Date	Information
117	Tassajara	Presumed Extant	N4180829, E607290	19811112	Farm pond near Cayetano Creek in grazed annual grasslands. One adult observed.
297	Livermore	Presumed Extant	N4175380, E609080	19970123	Juveniles dispersing from Altamont Creek in non-native annual grassland.
456	Byron Hot Springs	Presumed Extant	Not available	20070703	Juveniles dispersing from Altamont Creek in non-native annual grassland.
864	Tassajara	Presumed Extant	N4179158, E605668	20121002	Riparian corridor surrounded by grazed annual grassland with remnant pool. Several adults, juveniles and tadpoles observed.
1382	Livermore	Presumed Extant	Not available	20130531	Habitat consists of riparian vegetation in a pool within a branch of Cayetano Creek. Creek is not flowing and is approximately 2-3 feet deep. Two adults and 50 tadpoles observed.

4.1.3 Habitat Types Occurring in the Project Site and Within a One-Mile Radius

4.1.3.1 Upland Habitat

The predominant upland habitat types within a one-mile radius of the project site are annual grassland and agricultural land, particularly dryland grain crops. Annual grassland, much of which is used for grazing, is the primary upland land cover to the north and west of the site, which consists primarily of undeveloped areas. Dryland grain crop is the primary upland land cover to the east and south where rural residential farmsteads predominate. Dryland grain crop is regularly cultivated and harvested for hay or cattle grazed lands. There are also smaller patches of developed land consisting of residences and small commercial/industrial developments.

The project site itself is predominantly comprised of annual grassland and dryland grain crops. Annual grassland occurs in the central parcel south of Manning Road, which is grazed by cattle with small areas of developed land consisting of a residence and a graveled staging area. Dryland grain crop occurs in the northern parcel north of Manning road and in the two southern parcels. The site exhibits evidence of prior agricultural use (e.g., disking/furrowing), likely production of feed for cattle such as hay crops. Several large valley oak trees (*Quercus lobata*) and a mix of willows, walnut (*Juglans* spp.) and Fremont cottonwood (*Populus fremontii*) are also scattered individually along the banks of Cayetano Creek adjacent to the western boundary of the central parcel.

Potentially suitable upland refugia in the form of mammal burrows and deadfall from large trees is mostly limited to areas adjacent to the project site along Cayetano Creek. On the project site, mammal burrows are mostly located in the northern parcel north of Manning Road. North Livermore Avenue and Manning Road, adjacent to the northern and central parcels, are moderately well travelled rural roadways and may present a hazard to dispersing CRLF.

4.1.3.2 Aquatic Habitat

Aquatic habitats can be used by CRLF for breeding, refugia, or dispersal corridors between other suitable habitats. Aquatic habitats within a one-mile radius of the project site deemed potentially suitable for CRLF breeding were identified on Figure 5 in Attachment A. A total of 11 aquatic habitats were identified outside of the project boundaries but within a one-mile radius that could provide breeding habitat for CRLF as determined based on a review of aerial imagery. Aquatic habitats that could be suitable for CRLF breeding occur primarily to the north and west where the land is undeveloped and consist primarily of annual grassland used for grazing. Lands to the east and south are more developed and less suitable.

Potential aquatic habitat for CRLF within a one-mile radius of the project site consists primarily of stock ponds within annual grassland and seasonal drainages with riparian habitat or deeper pools, as determined using aerial photography (Google Earth 2020). A brief discussion of the site assessment locations is included below.

Site Assessment Locations 1-6: Site assessment locations 1-6 are small to mid-sized ponds (likely stock ponds or agricultural tailwater) located north of Manning Ave. Locations 1, 2, and 4 are located within designated Critical Habitat and reported occurrences of CRLF correspond with the general proximity of Locations 2 and 4. These ponds are generally scattered through annual grasslands and grazing lands and lack aquatic connectivity but generally have fair to good quality upland connectivity. Location 1 is a

mid-sized stock pond that holds water at least into August (Google Earth 2020) and is therefore assumed to be potentially suitable breeding habitat for CRLF. Location 2 appears to be a small depression within grazing land that is potentially drinking water for cattle. Based on a review of aerial imagery (Google Earth 2020), Location 2 does not appear to hold water long enough to meet the breeding habitat requirements for CRLF. This small pond is dry by April in most years. Location 3 is also a small pond likely for cattle. This pond holds water into late summer at least in some years and is likely potential breeding habitat for CRLF. Location 4 is a mid-sized pond that holds water at least into August (Google Earth 2020) and is therefore assumed to be potentially suitable breeding habitat for CRLF. Location 5 is a constructed pond fed by an inlet pipe that appears to dry up in most years by June and likely is not suitable breeding habitat for CRLF. Location 6 is directly across Manning Ave from the northern boundary of the central project site parcel. Location 6 appears to be a basin constructed to collect water for agricultural purposes. Based on a review of aerial imagery (Google Earth 2020), Location 6 does not appear to hold water long enough to meet the breeding habitat requirements for CRLF. This small pond is dry by April in most years.

Site Assessment Locations 7-9, and 11: Site assessment locations 7-9 and 11 are located west of the project site's central and southern parcels within an annual grassland matrix. These ponds are all located within designated Critical Habitat and are all constructed ponds along branches of Cayetano Creek that hold water into late summer at least and are potentially suitable breeding habitat for CRLF. These ponds are connected by intermittent or ephemeral drainages with riparian vegetation and are high quality habitat for CRLF. A reported occurrence of CRLF in the CNDDB corresponds to the general proximity of Location 7.

Site Assessment Location 10: Site assessment location 10 is located adjacent to the southern boundary of the southwest parcel within cultivated dryland grain crop (hay) and appears to be a basin constructed to collect water for agricultural purposes. Based on a review of aerial imagery (Google Earth 2020), Location 10 does not appear to hold water long enough to meet the breeding habitat requirements for CRLF. This small pond is dry by June in most years.

There are no aquatic habitats on the project site that are suitable for CRLF breeding. The segment of Cayetano Creek and its tributaries adjacent to the project site was deemed potentially suitable habitat for CRLF and was included in protocol surveys (Attachment A-Figure 5: Survey Location 1). This segment of Cayetano Creek and portions of its banks are located in the critical habitat unit CCS-2B, Mount Diablo. Only one ephemeral drainage was identified on the project site that appears to support flowing water at least periodically (Attachment A-Figure 5: Survey Location 2). Surveyed habitats and their corresponding acreages are included in Table 3 and discussed briefly following the table. Photos of surveyed habitats are included in Attachment B.

Table 3
CRLF SITE ASSESSMENT LOCATIONS

Site Assessment Location	Habitat Type	Approximate Surface Area Acres/Linear Feet
Survey Location 1	Intermittent Stream	4.37/9,605
Survey Location 2	Ephemeral Stream	0.09/577

Survey Location 1: The segment of Cayetano Creek adjacent to the project site is a natural stream that supports seasonal flow during and shortly after periods of precipitation. Cayetano Creek is also fed by some groundwater which allows the stream to persist for longer periods than its ephemeral tributaries.

The main stem of Cayetano Creek flows north to south just outside the western boundary of the central parcel and bisects the southern parcels. This segment of the creek collects runoff from the adjacent fields, surrounding hillslopes and small ephemeral tributary streams and is a tributary to Alameda Creek, which drains to the San Francisco Bay.

The segment of Cayetano Creek adjacent to the project site has a maximum potential depth of approximately 3-4 feet when flowing as evidenced by scour and drift deposits (Photo 1), although it likely never holds water more than 12 inches deep in this segment based on field observations. The ephemeral tributaries to Cayetano Creek adjacent to the project site have a brief hydroperiod which is not supported by groundwater, and flow in the streams stops after precipitation events have ceased or shortly thereafter. These ephemeral streams do not support wetlands due to their brief hydroperiods, although they have incised banks.

The segment of Cayetano Creek and its tributaries adjacent to the project site are largely unvegetated or dominated by vegetation consistent with annual grassland habitat which consist primarily of wild oats (*Avena fatua*), soft brome (*Bromus hordeaceus*), yellow star-thistle (*Centaurea solstitialis*) and ripgut brome (*Bromus diandrus*) (Photo 2). Small portions of Cayetano Creek adjacent to the northern and southern limits of the central parcel in the project site support a dominance of hydrophytes (Photo 3) that consist of broad-leaved cattail (*Typha latifolia*), California bulrush (*Schoenoplectus californicus*), tall flatsedge (*Cyperus eragrostis*), saltgrass (*Distichlis spicata*), and common spikerush (*Eleocharis macrostachya*). Hydrophytes are limited to small portions of the stream and represent seasonally inundated herbaceous riparian wetlands in the stream channel. The entire stream channel was mostly dry following the May 2018 protocol survey. During the 2020 protocol surveys, Cayetano Creek was intermittently flowing with shallow water of 12 inches or less in some small short-lived pools. Sierran tree frog (*Pseudacris sierra*) and western toad (*Anaxyrus boreas*) adults and tadpoles were observed in the stream (Photo 4) in pools along Cayetano Creek (Photo 5 and 6) during 2018 and 2020.

The segment of Cayetano Creek adjacent to the project site does not meet the breeding habitat requirements for CRLF due to the shallow depth and the short duration of water, which does not persist for long enough to support larval development of CRLF. However, this segment of Cayetano Creek fulfills aquatic non-breeding habitat primary constituent elements where it is located adjacent to the project site and primary constituent upland habitat in areas where there are surface soil cracks in the soil. Surface soil cracks provide refuge during periods of dispersal for juvenile and adult CRLF.

In contrast to the segment of Cayetano Creek adjacent to the project site, the branch of Cayetano Creek where CRLF have been reported within one mile of the site has stretches of dense riparian vegetation and holds water into at least late August in at least some years based on aerial imagery (Google Earth 2020; imagery date 8/31/2017). The segment of Cayetano Creek adjacent to the project site has very sparse riparian vegetation consisting primarily of single trees and rarely holds any water past spring based on survey results and a review of aerial imagery (Google Earth 2020).

Survey Location 2: This ephemeral stream is a natural drainage (Photo 7). The stream likely only carries water during and shortly after precipitation events and does not seem to flow frequently as evidenced by the lack of scour and drift deposits; it would be best characterized as a gully. The stream supports one hydrophyte, Italian ryegrass (*Festuca perennis*) although other upland vegetation consistent with annual grassland is abundant in the ephemeral stream. Survey Location 2 collects runoff from the adjacent hillslopes and water impoundments upstream and carries it downslope where it terminates into uplands and dissipates into dryland grain crop as an upland swale (Photo 8). Survey Location 2 has a

maximum potential depth of less than 3-4 feet at the top of the bank, but this stream rarely holds more than a few inches of water when it does carry water infrequently. During 2018 and 2020 surveys, no water was observed in this feature. No aquatic species were detected in this feature and California ground squirrel (*Otospermophilus beecheyi*) burrows were observed in the bed of this stream. Survey Location 2 does not meet the breeding habitat requirements for CRLF due to the shallow depth and it does not hold water for long enough duration to provide breeding habitat for CRLF. This feature may provide limited dispersal habitat for CRLF.

4.2 PROTOCOL SURVEY RESULTS

Protocol surveys for CRLF were conducted in the segment of Cayetano Creek and its tributaries adjacent to the project site and in one ephemeral drainage on the project site in the northern parcel (see Attachment A: Figure 5). These aquatic features were included in the protocol surveys because they were determined to provide potential habitat for CRLF. A total of eight surveys were conducted between January 30th and July 31st of 2018 and an additional eight surveys were conducted from February 6th to July 14th of 2020. The segment of Cayetano Creek surveyed adjacent to the project site supported small and isolated pools of water in the main channel but was mostly dry during almost all of the survey events including surveys conducted in January through May of 2018. No aquatic features on the site contained water and the segment of Cayetano Creek was nearly dry by May 3, 2018 and by April 28, 2020. Observed hydrology in the stream was a result of a leaking water well that drained into Cayetano Creek. Water was of sufficient depth to support Sierran treefrog and western toad larval development although it did not persist for long enough duration to support breeding CRLF. The maximum water depth observed during any of the CRLF surveys was only a few inches in 2018 and approximately 12 inches in 2020 in a few small short-lived pools. Pools along the stream are small and shallow and are mostly located at the southern and northern reaches of the stream (see photos in Attachment B). Potential aquatic predators of CRLF were not observed during protocol surveys. Data sheets are included as Attachment C.

No CRLF were observed within Cayetano Creek, its tributaries, or the ephemeral drainage during any of the protocol surveys. None of the aquatic habitats surveyed meet the habitat requirements for CRLF breeding because they are too shallow and do not provide water for a sufficient period of time to support larval development through late spring or early summer. CRLF could potentially use the streams adjacent to the project site and/or uplands in the project site for dispersal between other more suitable habitats offsite. Upland refuge sites for CRLF are sparse in the project site since deadfall or other surface debris and mammal burrows are not abundant. Large surface cracks in the clay soil could provide temporary refuge for dispersing juvenile CRLF.

5.0 DISCUSSION

Based on the results of the site assessment for CRLF, the project site lacks suitable breeding habitat for CRLF but provides potential upland dispersal habitat for CRLF since the project site is within the current range of CRLF, federally designated Critical Habitat occurs adjacent to the project site to the north, east, and west, this species is documented breeding within one mile of the project site in the CNDDB, and there are other pools within one mile of the project site that provide potential breeding habitat for CRLF. Potential dispersal by CRLF could occur through the uplands on the site as well as through segments of Cayetano Creek and its tributaries adjacent to the site. However, no CRLF were observed in

or adjacent to the site during two seasons of CRLF protocol surveys or any other biological surveys. The project site does not provide suitable breeding habitat and is not being used by CRLF for breeding.

The project site is located within a larger geographic area that provides high quality habitat for CRLF and supports populations of CRLF breeding in constructed and natural ponds within a grassland matrix with dispersal habitat consisting of uplands as well as intermittent and ephemeral drainages. The project site itself does not provide breeding habitat for CRLF and is not a high quality dispersal corridor. Although the project site supports annual grassland and provides potential for upland dispersal, it is peripheral to designated Critical Habitat and these higher quality habitats for CRLF and is on the edge of developed areas that are less suitable. The central and southern parcels in the project site are bordered by North Livermore Ave. on the east and the central parcel is also bordered by Manning Road on the north; these roadways pose hazards to dispersing CRLF and may be a partial dispersal barrier as does the chicken farm that separates the central and southern parcels. Although the potential for CRLF to disperse through the uplands or use the site for upland refugia (particularly in portions of the site adjacent to Cayetano Creek and its tributaries) cannot be ruled out, the site otherwise lacks suitable habitat for CRLF and would not be expected to be highly utilized by this species as evidenced by the lack of sightings.

6.0 REFERENCES

Bohn, C. C., and J. C. Buckhouse. 1986. Effects of grazing management on streambanks. Transactions of the North American Wildlife and Natural Resource Conference 51:265- 271.

California Department of Fish and Wildlife (CDFW). 2020. RareFind 5.0, California Natural Diversity Database. Sacramento, California. Accessed July 13, 2020.

Fellers, G. M. 2005. Rana draytonii Baird and Girard 1852, California Red-Legged Frog. In M. Lannoo (ed.), Amphibian Declines: The Conservation Status of United States Species. Volume 2, pp. 552-554. University of California Press, Berkeley.

Google Earth. 2020. Aerial Imagery 1939-2018. Accessed August 2018.

Hayes, M.P. and M.R. Jennings. 1986. Decline of Ranid Frog Species in Western North America: Are Bullfrogs (*Rana catesbeiana*) Responsible? Journal of Herpetology. Volume 2, No. 4 pp. 490 509.

1988. Habitat correlates of distribution of the California red–legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): implications for management, p 144–158. In Proc. Sym. on the management of amphibians, reptiles, and small mammals in North America. USDA For. Serv., Gen. Tech. Rep. GTR–RM–166, Fort Collins, Colorado.

Jennings, M. R., and M. P. Hayes. 1985. Pre-1900 overharvest of the California redlegged frog (*Rana aurora draytonii*): The inducement for bullfrog (*Rana catesbeiana*) introduction. Herpetologica 41(1):94-103.

1994. Amphibians and Reptiles of Special Concern. California Department of Fish and Game, Inland Fisheries Division.

Kauffman, J. B., and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications: A review. Journal of Range Management 37(5): 430-437.

Kauffman, J. B., W. C. Krueger, and M. Varva. 1983. Impacts of cattle on streambanks in northeastern Oregon. Journal of Range Management 36(6):683-685.

Natural Resources Conservation Service (NRCS). 2020. Climate Data and Summary Reports from AgACIS. Accessed online July 7, 2020 at: http://agacis.rcc-acis.org/?fips=06001.

U.S. Fish and Wildlife Service (USFWS). 2020a. National Wetlands Inventory. Accessed July 13, 2020 from http://www.fws.gov/nwi/.

2020b. List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. Accessed June 2018.

2010. Final Rule – Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red-Legged Frog. March 17, 2010. 75(51); 12816-12959. Available at: http://edocket.access.gpo.gov/2010/pdf/2010-4656.pdf. Accessed August 9, 2018.

2006. Final Rule – Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Red-Legged Frog, and Special Rule Exemption Associated with Final Listing for Existing Routine Ranching Activities. April 13, 2010. 71(71); 19244-19346.

2005. Revised Guidance on Site Assessments and Field Surveys for the California red-legged frog. Available at: http://www.fws.gov/sacramento/es/documents/crf_survey_guidance_aug2005.pdf.

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

1996. Final Rule – Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the California Red-legged Frog. May 23, 1996. 61(101) 25813-25833.

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Attachment A

Figures

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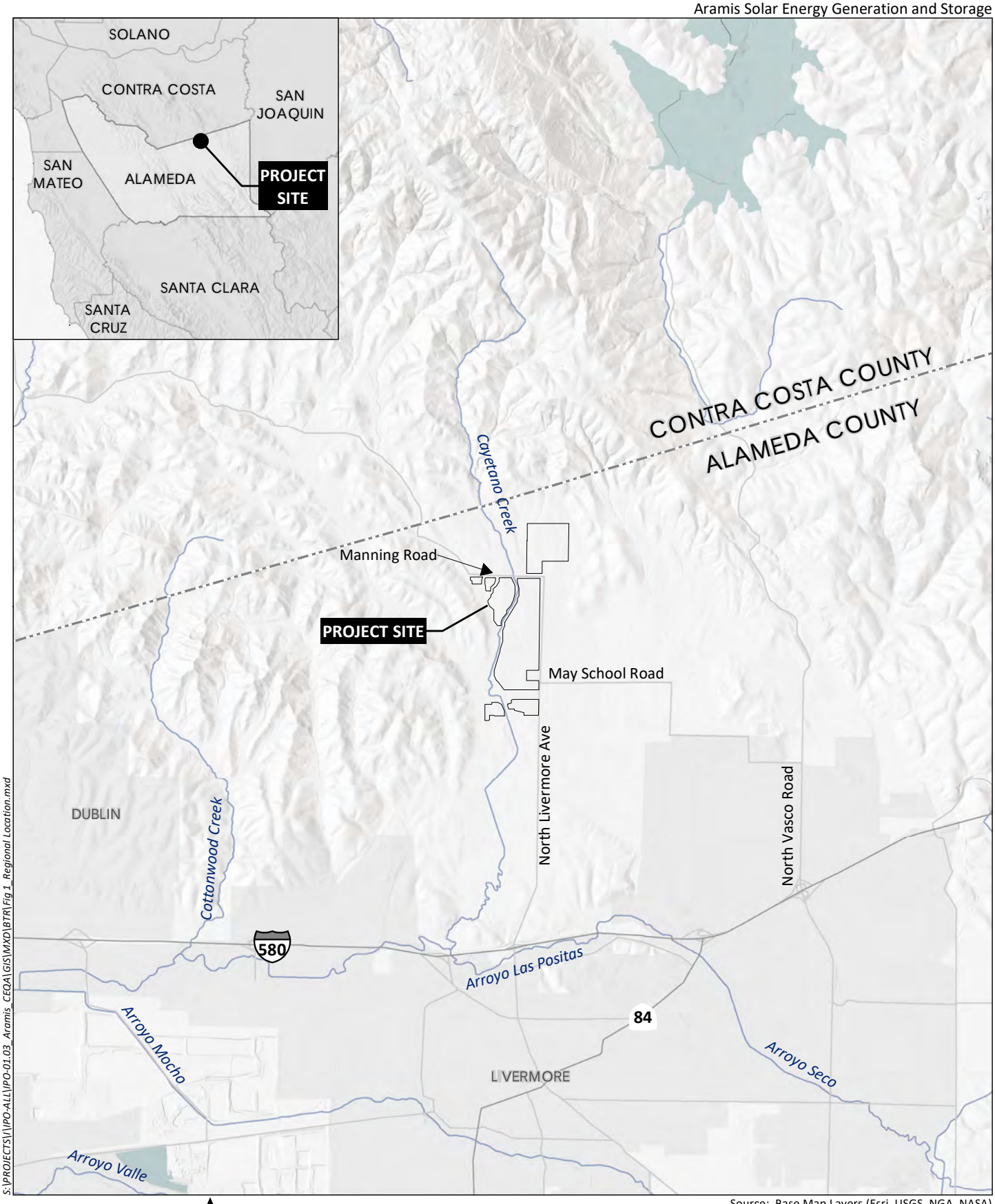

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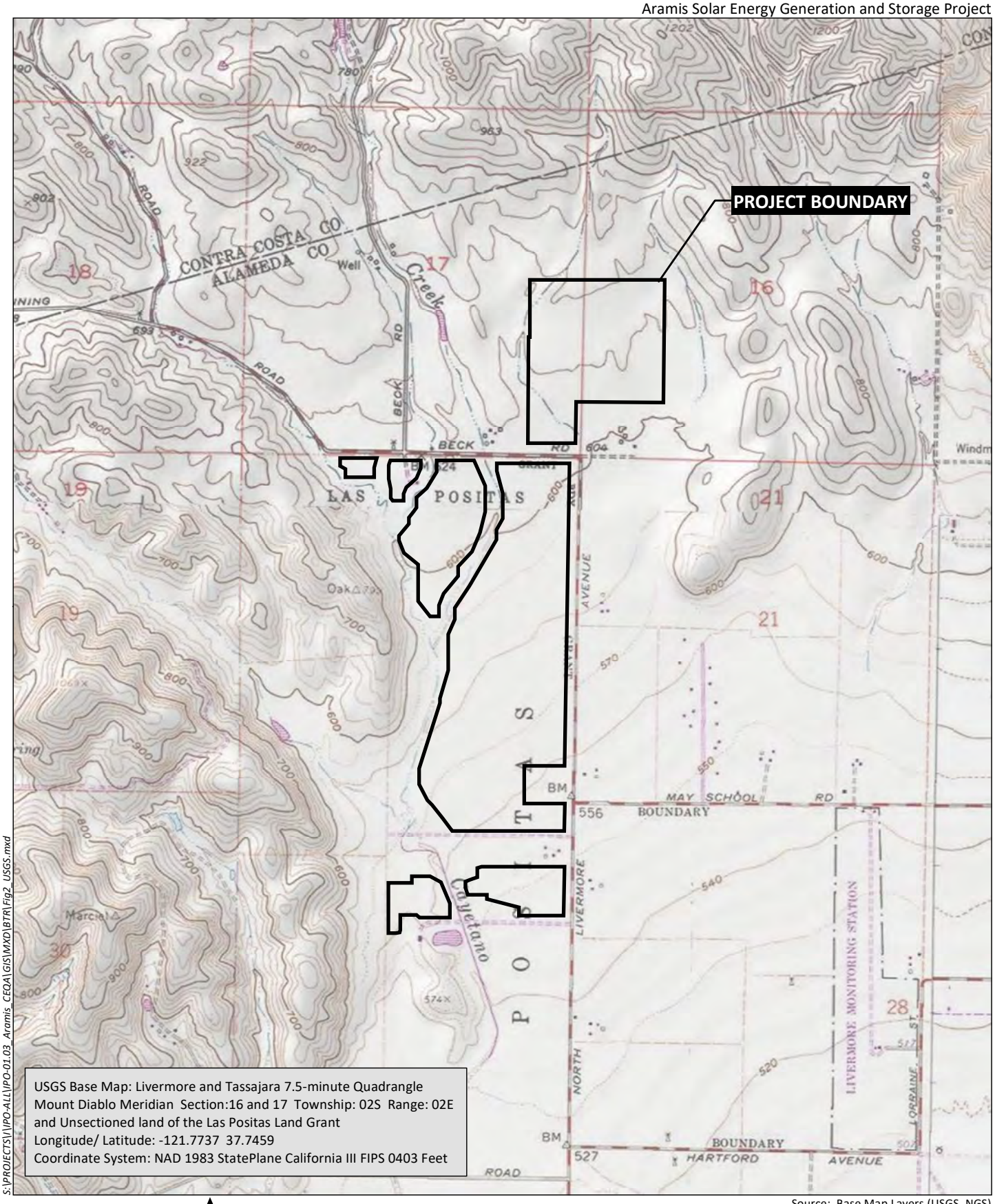
Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX Environmental Planning

Regional Location

Figure 1



USGS Base Map: Livermore and Tassajara 7.5-minute Quadrangle
Mount Diablo Meridian Section:16 and 17 Township: 02S Range: 02E
and Unsectioned land of the Las Positas Land Grant
Longitude/ Latitude: -121.7737 37.7459
Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

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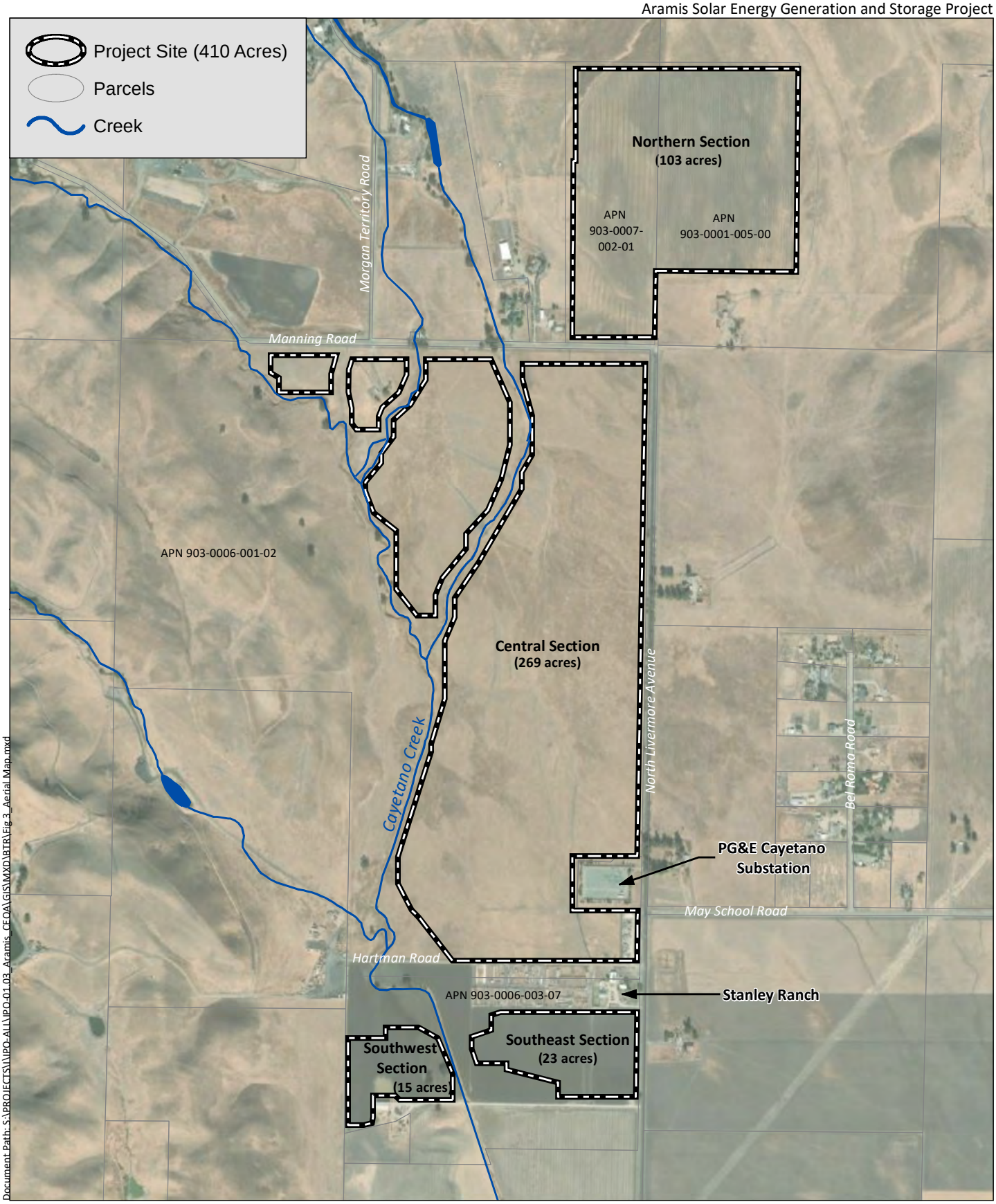
Source: Base Map Layers (USGS, NGS)

USGS 7.5-minute Quadrangle Map

Figure 2

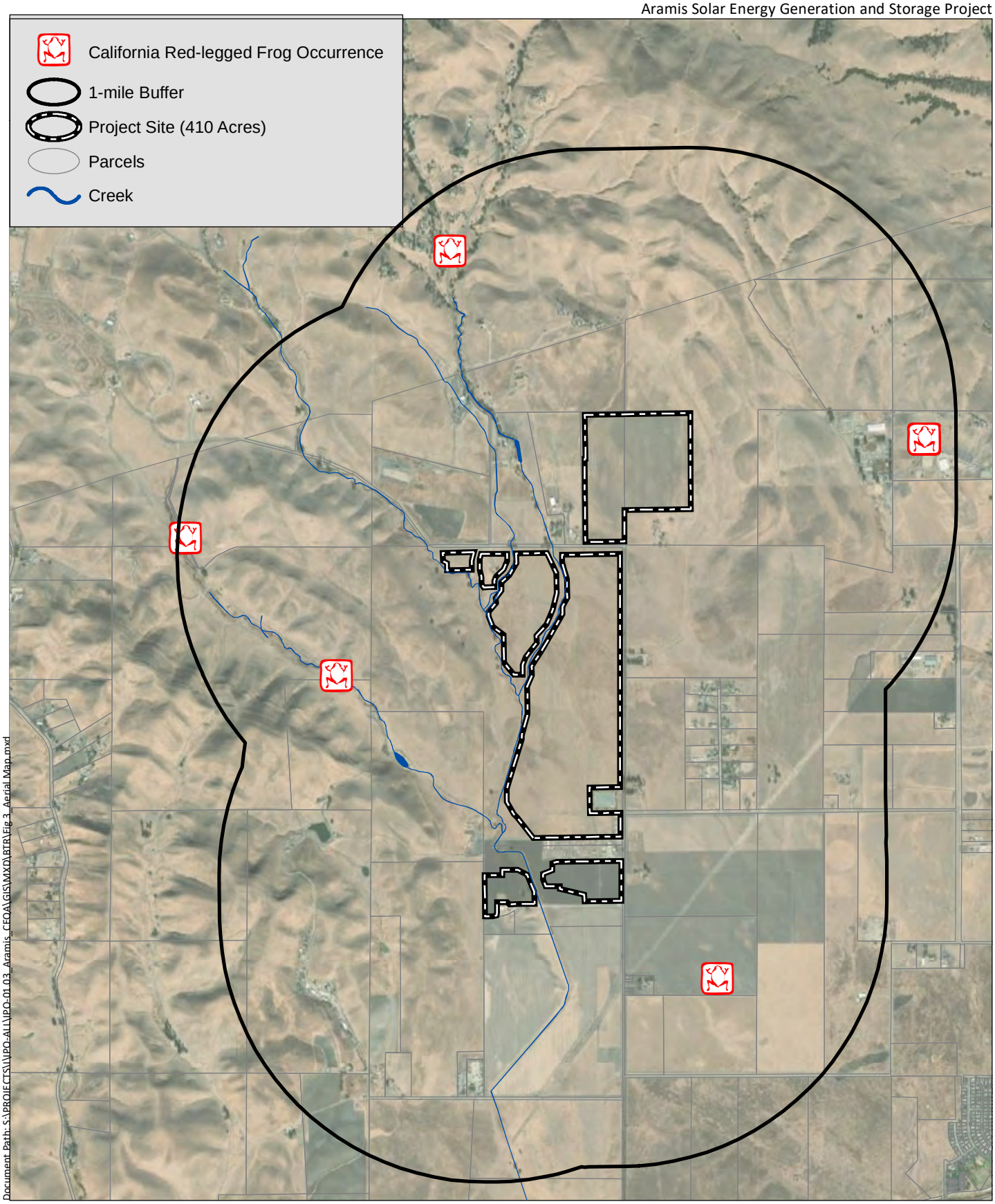


Source: Base Map Layers (DigitalGlobe 2018); Data (Alameda County 2017)

HELIX Environmental Planning

Aerial Map

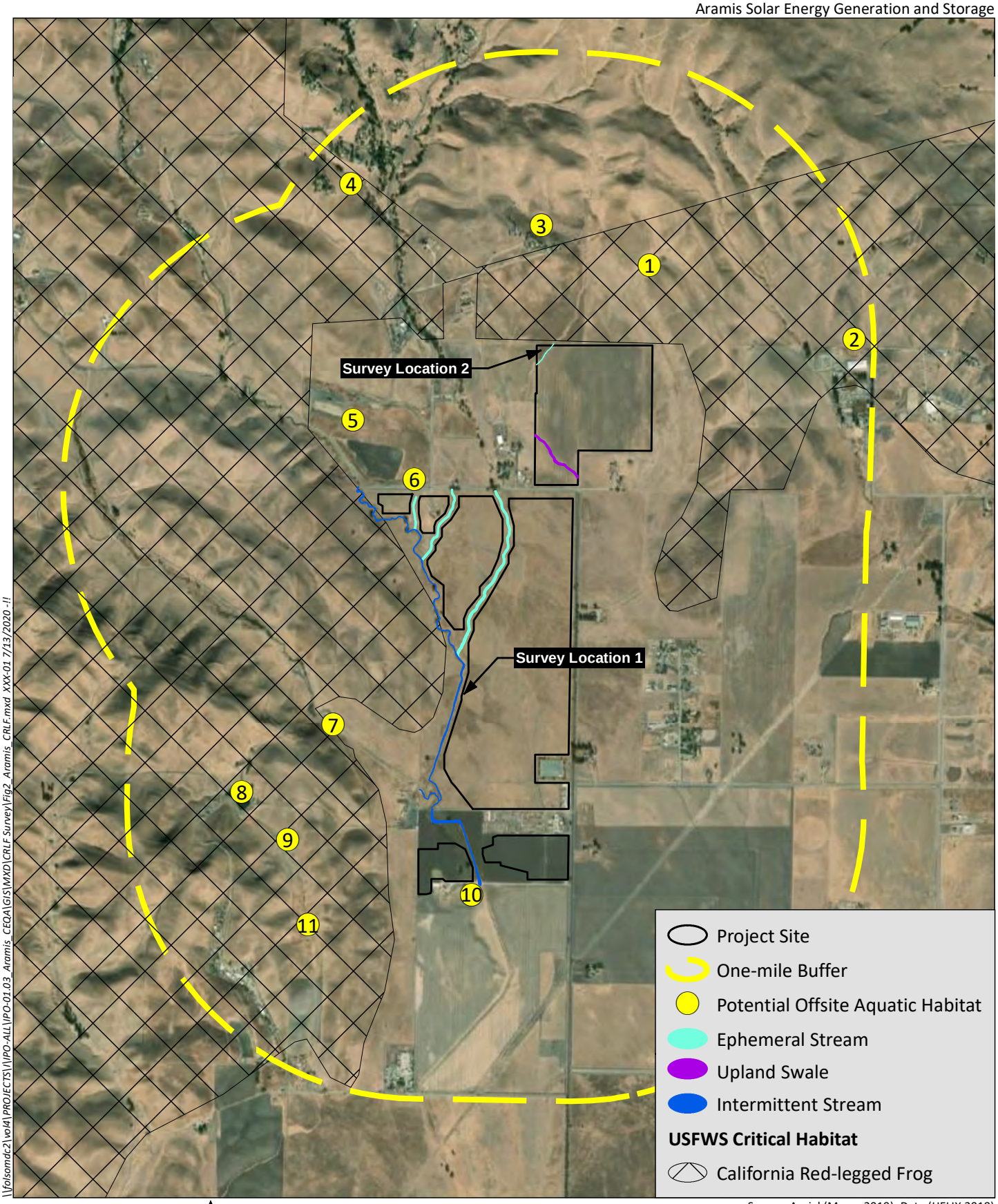
Figure 3



HELIX Environmental Planning

CRLF Occurrences within One-mile of Project Site

Figure 4



\\folsomdc2\vol4\PROJECTS\VPO-ALL\PO-01.03_Aramis_CEQA\GIS\MXD\CRLF Survey\Fig2_Aramis_CRLF.mxd XXX-01 7/13/2020 -JI

Source: Aerial (Maxar 2019); Data (HELIX 2018)

HELIX Environmental Planning

California Red-legged Frog Survey Locations & Potential Habitat

Figure 5

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Attachment B

Site Photos

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Photo 1. View of Cayetano Creek adjacent to the site looking downstream from south of Manning Road. Photo date 7/31/2018.



Photo 2. Representative view of Cayetano Creek adjacent to the site from the central portion of the survey segment adjacent to the site looking south. Photo date 7/31/2018.



Photo 3. View of Cayetano Creek adjacent to the site with drift deposits (blue arrow) and exposed roots (red arrow) from a valley oak indicating flowing water had been present over the winter. Photo date 7/31/2018.



Photo 4. View of Sierran treefrog (red circle) detected during protocol survey along the southern end of Cayetano Creek adjacent to the site. Photo date 7/31/2018.



Photo 5. View of a pool along Cayetano Creek looking north from the southern limits of the survey segment adjacent to the project site. Photo date 6/21/2018.



Photo 6. View of a small pool below a culvert outfall along a tributary to Cayetano Creek looking west from just west of the southwest corner of the central parcel. Photo date 6/21/2018.



Photo 7. View of dry ephemeral stream in the northern parcel looking northeast from the southwestern end of the feature. Photo date 8/1/2018.



Photo 8. View of upland swale in the northern parcel looking southeast. Photo date 8/1/2018.



Photo 9. View of the small pool (same feature as Photo 6) below a culvert outfall along Cayetano Creek looking west from west of the southern boundary of the central parcel. Photo date 2/6/2020.



Photo 10. View of a pool along Cayetano Creek looking north from the southern limit of the survey segment adjacent to the project site. Photo date 2/6/2020.



Photo 11. View of a pool (wet) along Cayetano Creek looking north from the southern boundary of the survey segment adjacent to the project site. Photo date 2/25/2020.



Photo 12. View of a small pool (same as Photos 6 and 9) below a culvert outfall along Cayetano Creek looking west from west of the southern boundary of the central parcel. Photo date 2/25/2020.



Photo 13. View of a small pool (same as Photos 6, 9, and 12) below a culvert outfall along Cayetano Creek looking north from the southern boundary of the survey segment adjacent to the project site. Photo date 3/9/2020.



Photo 14. View of a small shallow pool along Cayetano Creek adjacent to the site looking south from the south side of Manning Road. Photo date 3/9/2020.

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Attachment C

Protocol Survey Data Sheets

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Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 01/30/2018 (mm/dd/yyyy)

Survey Biologist: Flohr (Last name) Gretchen/Jennifer (first name)

Survey Biologist: Stringer (Last name) Stephen (first name)

Site Location: Alameda County, Crosby Property
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:

proposed large scale solar facility

Type of Survey (circle one): (DAY) NIGHT (BREEDING) NON-BREEDING

Survey number (circle one): (1) 2 3 4 5 6 7 8

Begin Time: 9:00 am **End Time:** 12:00 noon

Cloud cover: none **Precipitation:** none

Air Temperature: 60°F **Water Temperature:** 55°F

Wind Speed: 0-1 mph **Visibility Conditions:** good

Moon phase: Full moon **Humidity:** very low

Description of weather conditions: sunny, warm, clear, calm

Brand name and model of light used to conduct surveys: N/A

Were binoculars used for the surveys (circle one)? YES (NO)
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pacific chorus frog	3	H			100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed

Other notes, observations, comments, *etc.*

Cayetano Creek is mostly dry except for far northern segment on site and far southern segment. Minimal breeding habitat for CRLF currently.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ (FWS Field Office) _____ (date) _____ (biologist)

Date of Survey: 01/31/2018 (mm/dd/yyyy) **Survey Biologist:** Stringer (Last name) Stephen (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: Alameda County, Broadman Property
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:
proposed large scale solar facility

Type of Survey (circle one): (DAY) NIGHT (BREEDING) NON-BREEDING

Survey number (circle one): (1) 2 3 4 5 6 7 8

Begin Time: 3:30 pm **End Time:** 5:00 pm

Cloud cover: none **Precipitation:** none

Air Temperature: 56 **Water Temperature:** N/A

Wind Speed: 0-2 mph **Visibility Conditions:** good

Moon phase: Full moon **Humidity:** very low

Description of weather conditions: sunny, mild, calm

Brand name and model of light used to conduct surveys: N/A

Were binoculars used for the surveys (circle one)? YES (NO)
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
none					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed

Other notes, observations, comments, *etc.*

ephemeral drainage on site is dry, no aquatic habitat at time of survey

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 01/31/18 (mm/dd/yyyy)

Survey Biologist: Fahr (Last name) Jennifer (first name)

Survey Biologist: Stringer (Last name) Stephen (first name)

Site Location: Crosby Property, Alameda County
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)****

Proposed project name: Aramis Solar
Brief description of proposed action:
proposed large scale solar facility

Type of Survey (circle one): **DAY** **(NIGHT)** 1st nighttime 2nd overall **(BREEDING)** **NON-BREEDING**

Survey number (circle one): **(1)** **(2)** 3 4 5 6 7 8

Begin Time: 6:00 pm **End Time:** 9:30 pm

Cloud cover: none **Precipitation:** none

Air Temperature: 50°F **Water Temperature:** 52°F

Wind Speed: 0-1 mph **Visibility Conditions:** good

Moon phase: Full moon **Humidity:** very low

Description of weather conditions: cool, clear, calm

Brand name and model of light used to conduct surveys: _____

Were binoculars used for the surveys (circle one)? **YES** **(NO)**
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pacific chorus frog	~12	O/H	adult	large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed. No bullfrogs, fish, or raccoons obs.

Other notes, observations, comments, *etc.*

Cayetano Creek is mostly dry except for far northern and southern extents. Limited breeding habitat currently, dry conditions.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 03/15/2018 (mm/dd/yyyy) **Survey Biologist:** Jennifer Flohr (Last name) (first name)
Survey Biologist: Stephen Stringer (Last name) (first name)

Site Location: Alameda, North Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar, Crosby Property
Brief description of proposed action:
proposed utility scale solar development

Type of Survey (circle one): **DAY** (**NIGHT**) (**BREEDING**) **NON-BREEDING**

Survey number (circle one): **1** **2** (**3**) **4** **5** **6** **7** **8**

Begin Time: 19:30 **End Time:** 21:30

Cloud cover: 100% **Precipitation:** light rain

Air Temperature: 52°F **Water Temperature:** 50°F

Wind Speed: 0-1 **Visibility Conditions:** good

Moon phase: new **Humidity:** high/100%

Description of weather conditions: overcast, light rain, calm

Brand name and model of light used to conduct surveys: _____

Were binoculars used for the surveys (circle one)? **YES** (**NO**)
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pacific chorus frog	10s	O/H	adult	large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none

Other notes, observations, comments, *etc.*

Chorus frogs were breeding. Broadman property was visited immediately prior to Crosby property and no water or CRLF aquatic habitat is present.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 03/29/18 (mm/dd/yyyy) **Survey Biologist:** Jennifer Conterman (Last name) (first name)
Survey Biologist: Stephen Stringer (Last name) (first name)

Site Location: Alameda North Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:
utility scale solar

Type of Survey (circle one): **DAY** (**NIGHT**) (**BREEDING**) **NON-BREEDING**

Survey number (circle one): **1** **2** **3** (**4**) **5** **6** **7** **8**

Begin Time: 7:30 **End Time:** 9:30

Cloud cover: clear **Precipitation:** none

Air Temperature: 69°F **Water Temperature:** 71°F

Wind Speed: 0-1 **Visibility Conditions:** good

Moon phase: Full **Humidity:** low

Description of weather conditions: clear, calm, warm

Brand name and model of light used to conduct surveys: Headsup Lite 2640 w/ 4-D-cell beltpack

Were binoculars used for the surveys (circle one)? **YES** (**NO**)
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Western toad	6	O	adult/juvenile		100%
Chorus frog	10s	O/H	adult/juvenile		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed

Other notes, observations, comments, *etc.*

No water on Broadman Property. Little water in drainage on Crosby property. No suitable CRLF breeding habitat - potential dispersal only.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____
(FWS Field Office) (date) (biologist)

Date of Survey: 04/23/2018 (mm/dd/yyyy) **Survey Biologist:** Conterman Jennifer (Last name) (first name)
Survey Biologist: Stringer Stephen (Last name) (first name)

Site Location: Alameda County, Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:
proposed large-scale solar development

Type of Survey (circle one): **DAY** (**NIGHT**) **BREEDING** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** (**5**) **6** **7** **8**

Begin Time: 20:00 **End Time:** 21:30

Cloud cover: 20% **Precipitation:** none

Air Temperature: 71°F **Water Temperature:** 74°F

Wind Speed: 1-2 mph **Visibility Conditions:** good

Moon phase: 3/4 **Humidity:** low

Description of weather conditions: clear (mostly), warm, light breeze

Brand name and model of light used to conduct surveys: Headsup lite 2640 w/ 4 D-cell beltpack

Were binoculars used for the surveys (circle one)? **YES** (**NO**)
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Chorus Frog	100s	O/H	adult/ tadpole		100%
western toad	1	O	adult		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed

Other notes, observations, comments, *etc.*

Water quality in creek appears to be very low quality due to heavy cattle use and warm conditions.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 5/3/2018 (mm/dd/yyyy) **Survey Biologist:** Conterman (Last name) Jennifer (first name)
Survey Biologist: Stringer (Last name) Stephen (first name)

Site Location: Aramis, Alameda, North Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:

proposed utility-scale solar

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **(6)** **7** **8**

Begin Time: 15:00 **End Time:** 16:30

Cloud cover: 10% **Precipitation:** none

Air Temperature: 69° **Water Temperature:** 70°

Wind Speed: 3-4 mph **Visibility Conditions:** good

Moon phase: new **Humidity:** Low

Description of weather conditions: mild, sunny, light breeze

Brand name and model of light used to conduct surveys: N/A

Were binoculars used for the surveys (circle one)? **YES** **(NO)**
Brand, model, and power of binoculars: _____

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Chorus Frog	100s	O	1 adult many tadpoles		100%
Western toad	100s	O	tadpole		100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none observed

Other notes, observations, comments, *etc.*

nearly dry

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/31/2018 (mm/dd/yyyy)

Survey Biologist: Aldridge (Last name) George (first name)

Survey Biologist: Martin (Last name) Patrick (first name)

Site Location: Alameda County, Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:
Proposed large scale solar development.

Type of Survey (circle one): **DAY** NIGHT BREEDING NON-BREEDING

Survey number (circle one): 1 2 3 4 5 6 (7) 8

Begin Time: 1100 **End Time:** 1245

Cloud cover: 0% **Precipitation:** None

Air Temperature: 81°F **Water Temperature:** N/A

Wind Speed: 3-5 mph **Visibility Conditions:** Excellent

Moon phase: 3rd Quarter **Humidity:** 25%

Description of weather conditions: Clear and hot.

Brand name and model of light used to conduct surveys: Heads Up 2640 w/ 4-D battery pack Fenix PD35 flashlight @ 200 lumen

Were binoculars used for the surveys (circle one)? **YES** NO
Brand, model, and power of binoculars: Vortex Talon 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
None					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Coyote scat observed along stream channel. Foraging raptors such as American kestrel and red-tailed hawk are present.

Other notes, observations, comments, *etc.* Stream is completely dry.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/31/2018 (mm/dd/yyyy)

Survey Biologist: Aldridge (Last name) George (first name)

Survey Biologist: Martin (Last name) Patrick (first name)

Site Location: Alameda County, Livermore
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: Aramis Solar
Brief description of proposed action:
Proposed large scale solar development.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

Begin Time: 2055 **End Time:** 2145

Cloud cover: 0% **Precipitation:** None

Air Temperature: 73°F **Water Temperature:** N/A

Wind Speed: 4-5 mph **Visibility Conditions:** Excellent

Moon phase: 3rd Quarter **Humidity:** 35%

Description of weather conditions: Clear and warm.

Brand name and model of light used to conduct surveys: Fenix PD35 flashlight @ 200 lumen; HeadsUp 2640 w/ 4-D battery pack

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Vortex Talon 10 x 42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	1	O	Adult	small	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Coyote scat detected along drainage in addition to unidentified Mesocarnivore scat. Barn owl nest detected near project site (detected by sound).

Other notes, observations, comments, *etc.* No water in stream.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 02/06/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: Goeman (Last name) Hailee (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **NIGHT** **NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 0938 **End Time:** 1230

Cloud cover: 0 **Precipitation:** 0

Air Temperature: 56-59 degrees F **Water Temperature:** N/A

Wind Speed: 0-5 mph **Visibility Conditions:** 8 miles

Moon phase: Waxing gibbous **Humidity:** 72%

Description of weather conditions: Cool conditions with calm wind in the streambed which is protected from gustier wind to 5 mph above the banks.

Brand name and model of light used to conduct surveys: The sun

Were binoculars used for the surveys (circle one)? **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Wingspan 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	20	H	Adult	N/A	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Cayetano Creek was dry during the survey with the upper 20% of the drainage supported hydrophytes with saturated soil. Potential predator tracks included coyote and raccoon in the creek.

Other notes, observations, comments, *etc.*

Sierran treefrogs were detected by sound in the surrounding annual grassland. No treefrogs or any other amphibians were observed.

No breeding habitat for CRLF is present on site. All waterways were dry.

Abnormally dry season with very little rain.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 03/09/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: McLaughlin (Last name) Stephanie (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **NIGHT** **NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 1715 **End Time:** 1930

Cloud cover: 70 **Precipitation:** 10 %

Air Temperature: 64 degrees F **Water Temperature:** 60 degrees F

Wind Speed: 6-9 mph **Visibility Conditions:** 10 miles

Moon phase: Waning gibbous **Humidity:** 41%

Description of weather conditions: Cool to warm conditions with calm wind (0-2 mph) in the streambed which is protected from gustier wind to 9 mph above the banks.

Brand name and model of light used to conduct surveys: The sun

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Nikon Monarch 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	5	H/O	Adult	Large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Cayetano Creek was mostly dry during the survey with the upper 20% of the drainage supporting hydrophytes with saturated soil. One small pool (6 inches deep and 60 F) was observed in the northern reach of Cayetano Creek. One Sierran treefrog was observed in this pool. Birds that could prey on CRLF include common raven, white-tailed kite, red-tailed hawk and barn owl which were observed in the loitering and/or nesting near the creek. Potential predator tracks included coyote and raccoon in the creek.

Other notes, observations, comments, *etc.*

Upper 20% of Cayetano Creek was intermittently damp with one small shallow pool with Eleocharis sp. Typha sp. One Sierran treefrog was observed in this pool. No other amphibians were observed along the stream.

No breeding habitat for CRLF is present on site.

Abnormally dry season with very little rain, however some precipitation occurred over the weekend that preceded the survey.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 03/09/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: McLaughlin (Last name) Stephanie (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

ATTACH A MAP (include habitat types, important features, and species locations)

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** **N** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

Begin Time: 2012 **End Time:** 2130

Cloud cover: 50 **Precipitation:** 10 %

Air Temperature: 54 degrees F **Water Temperature:** 60 degrees F

Wind Speed: 0-6 mph **Visibility Conditions:** 10 miles

Moon phase: Waning gibbous **Humidity:** 53%

Description of weather conditions: Cool to warm conditions with calm wind (0-2 mph) in the streambed which is protected from gustier wind to 9 mph above the banks.

Brand name and model of light used to conduct surveys: Fenix PD35 @ 200 lumens and Black Diamond Cosmo @ 160-225 lumens

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Nikon Monarch 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	3	H/O	Adult	Large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Cayetano Creek was mostly dry during the survey with the upper 20% of the drainage supporting hydrophytes with saturated soil. One small pool (6 inches deep and 60 F) was observed in the northern reach of Cayetano Creek. No amphibians were observed in this pool in the evening. Birds observed that could prey on CRLF at night include barn owl. Coyotes were heard howling on site but were never directly visible. Potential predator tracks included coyote and raccoon in the creek.

Other notes, observations, comments, *etc.*

Upper 20% of Cayetano Creek was intermittently damp with one small shallow pool with Eleocharis sp. Typha sp. One Sierran treefrog was observed in this pool. No other amphibians were observed along the stream.

No breeding habitat for CRLF is present on site.

Abnormally dry season with very little rain, however some precipitation occurred over the weekend that preceded the survey.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 03/17/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: Goeman (Last name) Haile (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

ATTACH A MAP (include habitat types, important features, and species locations)

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** **N** **NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 2020 **End Time:** 2200

Cloud cover: 100 **Precipitation:** 60 %

Air Temperature: 44 degrees F **Water Temperature:** 58 degrees F

Wind Speed: 0-2 mph **Visibility Conditions:** 3 miles

Moon phase: Waxing crescent **Humidity:** 90%

Description of weather conditions: Cold conditions with few intermittent showers, but mostly dry after storm event earlier.
Most vegetation is wet and Cayteno Creek is intermittently flowing in the northern stretch and has puddles in the southern stretch.

Brand name and model of light used to conduct surveys: Fenix PD35 @ 200 lumens and Black Diamond spot @ 160-325 lumens

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Nikon Monarch 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	300+	H/O	Adult	Large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Coyotes were heard howling on site but were never directly visible. Potential predator tracks included coyote and raccoon in the creek. Long-eared owl was observed foraging in the creek.

Other notes, observations, comments, *etc.*

Cayetano Creek was mostly dry during the survey with the upper with 30% of the drainage with flowing water and pools following several days of precipitation. Pools were approximately 58 degrees F. Several Pseudacris sierra were observed throughout the site calling or amplexing in the water. No other amphibians were observed along the stream.

No breeding habitat for CRLF is present on site.

Abnormally dry season with very little rain, however precipitation occurred over the weekend that preceded the survey the created several pools that encouraged treefrogs to breed. Pools in Cayetano creek were up to approximately 12 inches deep.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 04/6/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: Goeman (Last name) Haile (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

ATTACH A MAP (include habitat types, important features, and species locations)

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** **N** **NON-BREEDING**

Survey number (circle one): 1 2 3 4 5 6 7 8

Begin Time: 2036 **End Time:** 2135

Cloud cover: 40-60 **Precipitation:** 60 %

Air Temperature: 51 degrees F **Water Temperature:** 60 degrees F

Wind Speed: 0-3 mph **Visibility Conditions:** 6 miles

Moon phase: Full moon **Humidity:** 90%

Description of weather conditions: Intermittent and isolated thunderstorms with light precipitation but mostly dry after storm event earlier.
Most vegetation is wet and Cayteno Creek is intermittently flowing in the northern stretch and has puddles in the southern stretch. The deepest puddles are up to 12 inches.

Brand name and model of light used to conduct surveys: Fenix PD35 @ 200 lumens and Black Diamond spot @ 160-325 lumens

Were binoculars used for the surveys (circle one)? **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Nikon Monarch 8x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	300+	H/O	Adult	Large	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Coyotes were heard howling on site but were never directly visible. Potential predator tracks included coyote and raccoon in the creek. Barn owl was observed foraging in the grasslands above the bank of Cayetano Creek.

Other notes, observations, comments, *etc.*

Cayetano Creek was mostly dry during the survey with the upper with 40% of the drainage with flowing water and pools to 12 inches deep following multiple days of precipitation. Pools were approximately 60 degrees F. Several Pseudacris sierra were observed throughout the site calling or amplexing in the water, however less than the previous site visit. No other amphibians were observed along the stream.

No breeding habitat for CRLF is present on site.

Abnormally dry season with little rain, however precipitation occurred over the weekend that preceded the survey that created several pools that encouraged treefrogs to breed. Pools in Cayetano creek were up to approximately 12 inches deep.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 04/28/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** **N** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **7** **8**

Begin Time: 2045 **End Time:** 1000

Cloud cover: 10 **Precipitation:** 10%

Air Temperature: 64 degrees F **Water Temperature:** --

Wind Speed: 0-6 mph **Visibility Conditions:** 8 miles

Moon phase: Waxing crescent **Humidity:** 67%

Description of weather conditions: Clear and warm. Light wind is diminished in streambed.
Only two puddles remain on site, one in the upper reach of Cayetano Creek and the other at the southwestern boundary along a separate Cayetano Creek branch.

Brand name and model of light used to conduct surveys: Fenix PD35 @ 200 lumens

Were binoculars used for the surveys (circle one)? **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris sierra	12	H	Adult	unknown	100%
Anaxyrus boreas	2	O	Juvenile	small	100%

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Potential predator tracks included coyote and raccoon in the creek. Barn owl was observed foraging in the grasslands above the bank of Cayetano Creek. Barn owl is also likely nesting in large valley oak trees along Cayetano Creek.

Other notes, observations, comments, *etc.*

Cayetano Creek was mostly dry during the survey with only two small and shallow puddles supporting water. Pseudacris sierra tadpoles were observed in one shallow pool and appeared to be struggling to survive with beetles eating them. Adults treefrogs were heard calling in uplands. Two juvenile Anaxyrus boreas were detected while walking the creek. One individual was actively foraging while the other was hiding in a crevice in a damp section of the creek. No other amphibians were observed along the stream.

No breeding habitat for CRLF is present on site and this creek is dry by May.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/14/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: Goeman (Last name) Hailee (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** **NIGHT** **BREEDING** **NON-BREEDING**

Survey number (circle one): **1** **2** **3** **4** **5** **6** **7** **8**

Begin Time: 0630 **End Time:** 0800

Cloud cover: 0 **Precipitation:** 0

Air Temperature: 81 degrees F **Water Temperature:** N/A

Wind Speed: 0-5 mph gusts to 10 **Visibility Conditions:** 10 miles

Moon phase: Waning Crescent **Humidity:** 38%

Description of weather conditions: Warm and calm conditions.
Some intermittent wind, but overall calm in Cayetano Creek.

Brand name and model of light used to conduct surveys: The sun

Were binoculars used for the surveys (circle one)? **YES** **NO**
Brand, model, and power of binoculars: Vortex Talon 10x42 and Wingspan 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
None	--	--	--	--	--

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Cayetano Creek was dry during the survey with the upper 20% of the drainage supported hydrophytes with saturated soil. Potential predator tracks included coyote and raccoon in the creek.

Other notes, observations, comments, *etc.*

No amphibians detected today.

No breeding habitat for CRLF is present on site and this creek is dry. The northern portion of Cayetano Creek supports hydrophytes with damp soil.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix E.
California Red-legged Frog Survey Data Sheet

Survey results reviewed by _____ _____ _____
(FWS Field Office) (date) (biologist)

Date of Survey: 7/14/2020 (mm/dd/yyyy)

Survey Biologist: Martin (Last name) Patrick (first name)

Survey Biologist: Goeman (Last name) Hailee (first name)

Site Location: Alameda County, S17 of T02 South, R02 East
(County, General location name, UTM Coordinates or Lat./Long. or T-R-S).

****ATTACH A MAP** (include habitat types, important features, and species locations)**

Proposed project name: _____
Brief description of proposed action:
Construct, operate, and maintain a solar photovoltaic facility for at least 50 years.

Type of Survey (circle one): **DAY** (T) **BREEDING** **N** (G)

Survey number (circle one): **1** **2** **3** **4** **5** **6** **7** (circled)

Begin Time: 930 **End Time:** 1030

Cloud cover: 0 **Precipitation:** 0

Air Temperature: 66 degrees F **Water Temperature:** N/A

Wind Speed: 0-5 mph gusts to 10 **Visibility Conditions:** 10 miles

Moon phase: Waning Crescent **Humidity:** 64%

Description of weather conditions: Cool and calm conditions.
Some intermittent wind, but overall calm in Cayetano Creek.

Brand name and model of light used to conduct surveys: Fenix PD35 @ 200 lumens

Were binoculars used for the surveys (circle one)? (NO)
Brand, model, and power of binoculars: Vortex Talon 10x42 and Wingspan 10x42

Appendix E.
California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
None	--	--	--	--	--

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Cayetano Creek was dry during the survey with the upper 20% of the drainage supported hydrophytes with saturated soil. Potential predator tracks included coyote and raccoon in the creek.

Other notes, observations, comments, *etc.*

No amphibians detected tonight.

No breeding habitat for CRLF is present on site and this creek is dry. The northern portion of Cayetano Creek supports hydrophytes with damp soil.

Necessary Attachments:

1. All field notes and other supporting documents
2. Site photographs
3. Maps with important habitat features and species locations

Appendix G

Burrowing Owl Habitat Assessment and Protocol Survey Report

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HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 150
Folsom, CA 95630
916.365.8700 tel
619.462.0552 fax
www.**helixepi**.com

July 27, 2020 Project #IPO-01.03

Mr. Andrew Young
Senior Planner
Alameda County Planning Department
244 West Winton Avenue
Hayward, CA 94544

Subject: Burrowing Owl Survey Report
Aramis Solar Energy Generation and Storage Project, Alameda County, California

Dear Mr. Young:

Under contract with IP Aramis LLC, HELIX Environmental Planning, Inc. (HELIX) conducted a habitat assessment and protocol surveys for burrowing owl (*Athene cunicularia*), a California species of special concern, for the proposed Aramis Solar Energy Generation and Storage Project (Project). The purpose of the habitat assessment and protocol surveys was to assess the site's suitability to support burrowing owl (BUOW), as well as determine whether this species is currently present on or adjacent to the site. This report describes the methods used to conduct the burrowing owl surveys and summarizes the findings.

PROJECT LOCATION AND DESCRIPTION

The 410-acre project site is located in unincorporated Alameda County, approximately 2.5 miles north of Livermore (Attachment A: Figure 1). The proposed project would be located on portions of four privately-owned parcels – Assessor's Parcel Numbers 903-0006-001-02 (eastern 269 acres of a 523-acre parcel), 903-0007-002-01 (52 acres), 903-0006-003-07 (38 acres), and 902-0001-005-00 (51 acres) (Attachment A: Figure 2). The project site is located within Sections 16 and 17 of Township 02 South, Range 02 East and un-surveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" USGS 7.5-minute quadrangles (Attachment A: Figure 3). The project site lies at an elevation of roughly 550 – 700 feet above mean sea level.

IP Aramis, LLC is the project applicant and is seeking a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) facility for at least 50 years. The project would generate 100 megawatts (MW) of PV power on the 410-acre site. The project would provide solar power to utility customers by connecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E) existing Cayetano 230 kilovolt (kV) substation located adjacent and interior

to the project site. The project would serve East Bay Clean Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract.

PROJECT SETTING AND EXISTING CONDITIONS

The project site lies in a rural area of northern Alameda County and is surrounded primarily by undeveloped land supporting grazing and agricultural uses. Los Vaqueros Reservoir lies 3 miles north and the City of Livermore lies approximately 2.5 miles south of the project site. Other communities in the area include the community of Tassajara located west of the project site and the City of Dublin located southwest of the project site.

Alameda County is in central California and spans the Coast Range. The County's boundaries are the San Francisco Bay on the west and Contra Costa County on the north, Santa Clara County to the south and San Joaquin County to the east. The eastern part of Alameda County in Livermore Valley is characterized by rolling foothills and annual grasslands. The project site is in a valley and is surrounded by peaks of the Coast Range reaching a height of approximately 2,200 feet.

Five vegetation communities/land cover types are present in the project site: developed (2.82), annual grassland (267.77 acres), dryland grain crop (138.76 acres), upland swale (0.39), and ephemeral stream (0.08) (Attachment A: Figure 4). The northern parcel north of Manning Road and the two southern parcels are comprised almost entirely of dryland grain crop. This habitat is dominated by oats and other annual grasses and is harvested for hay production. The central parcel is comprised primarily of annual grassland. This annual grassland community is being used for cattle grazing and appears to have been functioning for agricultural use for nearly a century based on historical aerial imagery (Google Earth 2020). The majority of the annual grassland is dominated by wild oats (*Avena fatua*), soft brome (*Bromus hordeaceus*), yellow star-thistle (*Centaurea solstitialis*) and ripgut brome (*Bromus diandrus*). Other portions of the annual grassland community are dominated by a mix of Italian rye grass (*Festuca perennis*), black mustard (*Brassica nigra*), medusahead (*Elymus caput-medusae*) and soft brome.

METHODS

Burrowing Owl Background

BUOW are often found in open, dry grasslands, agricultural and range lands, and desert habitats. They can also inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats. BUOW occur at elevations ranging from 200 feet below mean sea level to over 9,000 feet above mean sea level (Shuford and Gardali 2008). In California, the highest elevation where BUOW are known to occur is 5,300 feet above mean sea level in Lassen County. In addition to natural habitats, BUOW can be found in urban habitats such as at the margins of airports and golf courses and in vacant urban lots. BUOW nest in burrows in the ground and commonly perch on fence posts or mounds near the burrow. The owls often use ground squirrel burrows or badger dens or artificial burrows such as abandoned pipes or culverts. BUOW forage in adjacent grasslands and other suitable habitats primarily for insects and small mammals, and less often for reptiles, amphibians, and other small birds (Shuford and Gardali 2008).

Desktop Review

The site assessment included a review of available resources to provide an overview of the habitats present within the project site and surrounding vicinity. Information sources reviewed to assess suitability of the site and vicinity for BUOW is provided below:

- USGS "Livermore, California" and "Tassajara, California" 7.5-minute topographic quadrangle maps; and

- The California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB; CDFW 2020) reported occurrences of BUOW within a 2-mile radius of the project area.

There are eight CNDDB reported occurrences of BUOW within a 2-mile radius of the project site with the nearest reported occurrence (Occurrence no. 257) located approximately 0.55 mi southeast where burrowing owls were documented nesting in grazed grassland with ground squirrel burrows in spring/summer of 1997. The next closest record (Occurrence no. 46) is located approximately 1.2 miles southeast of the project site. This observation documents two BUOWs during the winter along the road. Another CNDDB record (Occurrence no. 642) documents a pair of BUOW nesting in a preserve approximately 1.25 miles east of the project site in 2016 (CDFW 2020).

Habitat Assessment and Surveys

A habitat assessment and protocol surveys for BUOW were conducted in 2020. A habitat assessment of the site was conducted on February 6, 2020 and the site was determined to provide suitable breeding and foraging habitat for BUOW. Breeding season BUOW surveys were then conducted according to the guidelines prepared by CDFW in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The project site and adjacent areas were surveyed a total of four times during the BUOW breeding season (Table 1) by HELIX biologists with extensive experience at burrowing owl surveys.

During each survey, the entire site was surveyed by walking and stopping every 100 meters or less to scan the surrounding area for BUOW presence with binoculars. Pedestrian transects were performed in areas of suitable nesting habitat such as the margins of agricultural fields, ruderal areas, and along Cayetano Creek and its tributaries adjacent to the project site due to the presence of ground squirrel burrows in these locations. All observed mammal burrows, as well as standpipes and other structures providing perches, were searched for sign of recent use by burrowing owls such as excrement, feathers, and owl pellets.

Surveys were timed to allow for comprehensive surveys of this site and a high detection probability. The morning surveys started after morning civil twilight to allow ambient temperatures to increase to a level more suitable for BUOW detection and extended beyond 1000 hours due to the amount of time required to comprehensively examine all of the mammal burrows on the site. During the first two morning surveys, a comprehensive survey of all the mammal burrows on the site was conducted to search for owl sign around the openings of the mammal burrows. The two subsequent evening surveys could then focus on searching the site for the presence of BUOW. The evening surveys were conducted roughly between one hour before sunset and evening civil twilight. In addition, surveys were conducted for several other species by the same surveyors familiar with the site and burrowing owls, including a total of 16 California red-legged frog (*Rana draytonii*) surveys (6 daytime and 10 nighttime surveys).

Table 1
SURVEY DATES AND TIMES (ALL SURVEYS CONDUCTED IN 2020)

Date	Start/End Time	Start/End Temp (° F)	Wind Speed (mph)	Weather	Personnel
Site Assessment					
February 6	0700-1400	43/65	0-5	Clear	G. Aldridge, S. McLaughlin
Survey #1					
February 25	1600-1830	71/73	0-5	Clear	P. Martin, S. McLaughlin
February 26	0615-1100	37/70	0-3	Clear	P. Martin, S. McLaughlin
Survey #2					
April 22	1800-2030	78/68	0-2	Clear	Halie Goeman, S. McLaughlin
April 23	0600-1100	53/78	0-2	Clear	Halie Goeman, S. McLaughlin
Survey #3					
May 21	1500-1900	55/80	0-2	Clear	P. Martin, S. McLaughlin
May 22	530-1100	84/77	0-2	Clear	P. Martin, S. McLaughlin
Survey #4					
June 17	0530-1000	83/88	6-10	Clear	P. Martin
June 18	550-1145	55/90	0-2	Clear	P. Martin

RESULTS

No BUOW were observed on the project site during any of the protocol surveys or any other biological surveys conducted for this project (including a total of 10 nighttime surveys for CRLF) and the site is not currently occupied by BUOW. However, BUOW were observed adjacent to the project site (discussed below) and BUOW sign (pellets and feathers) was observed on multiple occasions along the northern boundary of the northern parcel north of Manning Road and throughout Cayetano Creek adjacent to the site during protocol surveys. The BUOW pellets and feathers were not observed in association with any burrows or owls and were likely a result of transient owls passing through the site or the creek, which represents an area used by BUOWs to forage. BUOWs and sign were not observed at any of the California ground squirrel burrows or at any of the culverts or abandoned pipes located in the project site. Additionally, very little burrow habitat was observed in the project site south of Manning Road. A few burrows located south of Manning Road were limited to areas adjacent to the site along Cayetano Creek and its banks. Most burrow habitat for this species was detected on the northern parcel north of Manning Road with several California ground squirrel burrows located throughout the northern parcel. Representative photos taken during the BUOW surveys are included as Attachment B.

On June 17 and 18, 2020, two juvenile BUOWs were observed at a burrow approximately 200 feet east of the northeast boundary of the northern parcel (Attachment A: Figure 4). Both owls were observed making short flights during daylight hours and returning to the burrow over two days. A follow up survey conducted on July 14, 2020 documented four juvenile BUOWs at this burrow. Mature BUOWs were not observed at this burrow during any of the surveys. These juvenile owls likely originated from a nest nearby and are dispersing away from the nest.

SUMMARY/CONCLUSION

HELIX biologists conducted protocol surveys for BUOW in the project site and within adjacent areas and no BUOW were observed in the project site. The project site is currently unoccupied by resident BUOW,

although based on the presence of sign (feathers and pellets), BUOW are using adjacent areas and potentially the site as well for dispersal and foraging. BUOW were observed using burrows east of the northern parcel outside of the project site within high quality habitat consisting of grazed annual grassland. The grasses are much shorter in the area where the juvenile BUOW were observed than on the majority of the project site and mammal burrows are numerous along hillsides in these areas, which provide ideal perching sites where owls have a good view of the surrounding pastures.

The project site provides potential foraging habitat for BUOW primarily in the dryland grain crop in the northern and southern parcels; much of the central parcel is comprised of tall grass, which is typically avoided by BUOW. Mammal burrows are present adjacent to the project site along Cayetano Creek, along the fence line of the northern parcel north of Manning Road, and in the dryland grain crop north of Manning Road providing potential nesting habitat for BUOW. Annual grassland habitat in the central parcel south of Manning Road is nearly devoid of burrowing mammals and the grassland consists of tall grass which is typically avoided by BUOW.

Due to the presence of suitable nesting and foraging habitat in portions of the project site and the presence of BUOW in the vicinity, the site or other adjacent areas could become occupied by BUOW in the future. Surveys for BUOW should be conducted prior to any construction activities on the site involving vegetation clearing or ground disturbance to determine whether BUOW are present on the site. This would avoid potential impacts to nesting owls.

Sincerely,

Stephen Stringer, M.S.
Principal Biologist

Attachments:

Attachment A: Figures
Attachment B: Site Photos

REFERENCES

California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency Department of Fish and Game. March 2012.

2020. California Department of Fish and Wildlife, Natural Diversity Database Biogeographic Data Branch. Sacramento, California. Accessed online July 13, 2020.

Google Earth. 2020. Aerial Imagery 1939-2020. Accessed July 2020.

Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Attachment A

Figures

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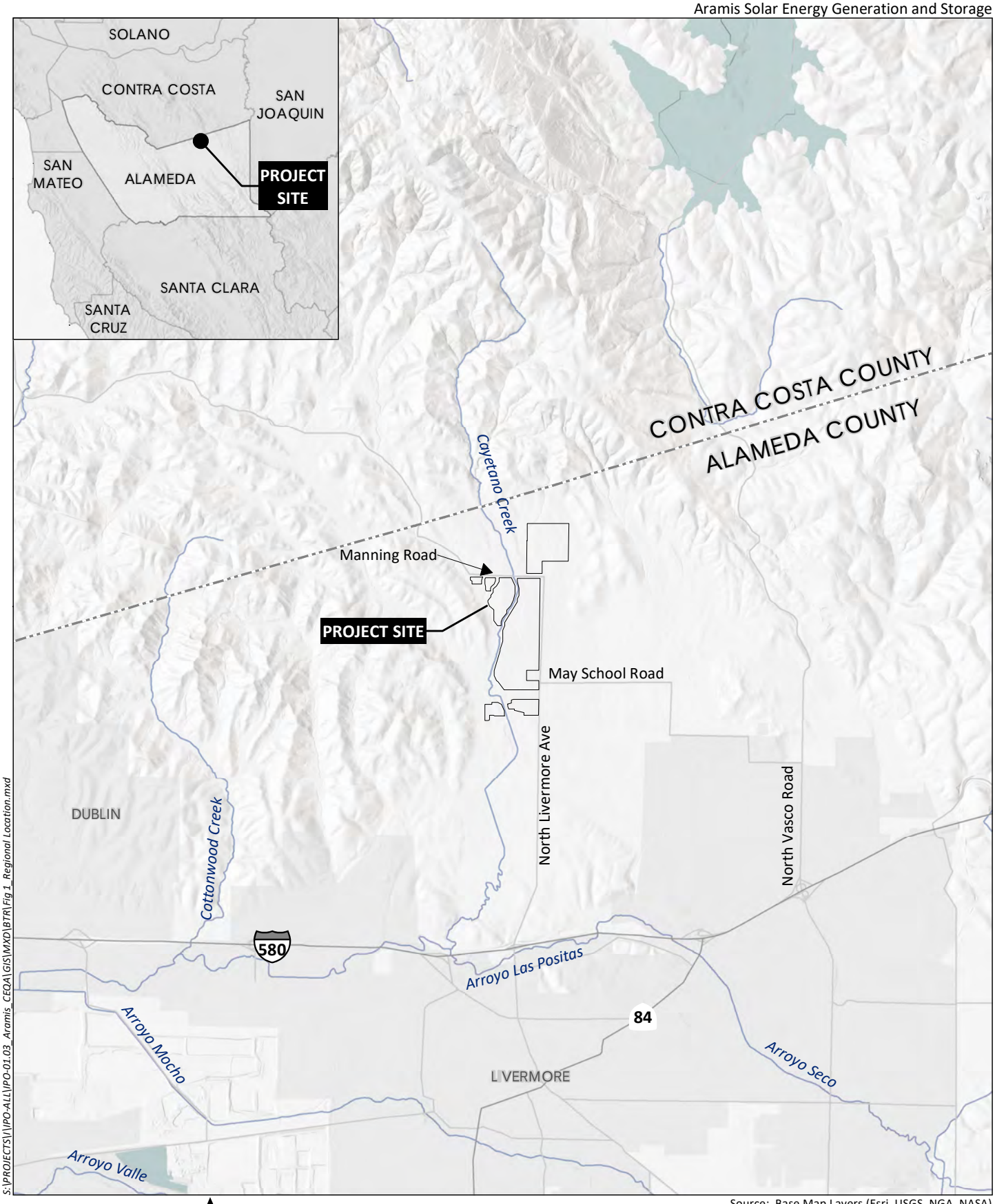


S:\PROJECTS\\IPO-ALL\IPO-01.03_Aramis_CEQA\GIS\MXD\BTR\Fig 1_Regional Location.mxd

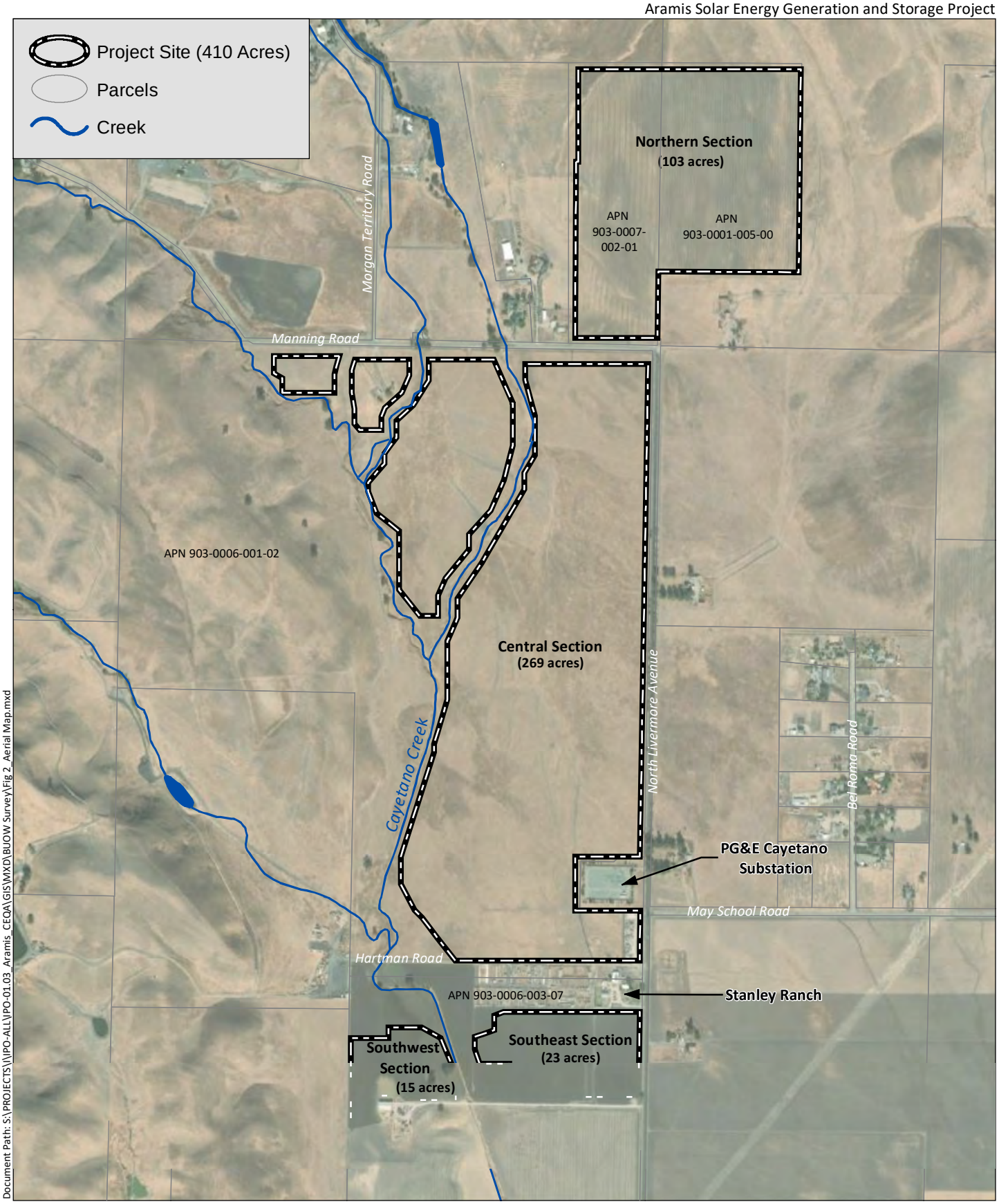
0 1.25 Miles

Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX Environmental Planning

Regional Location

Figure 1

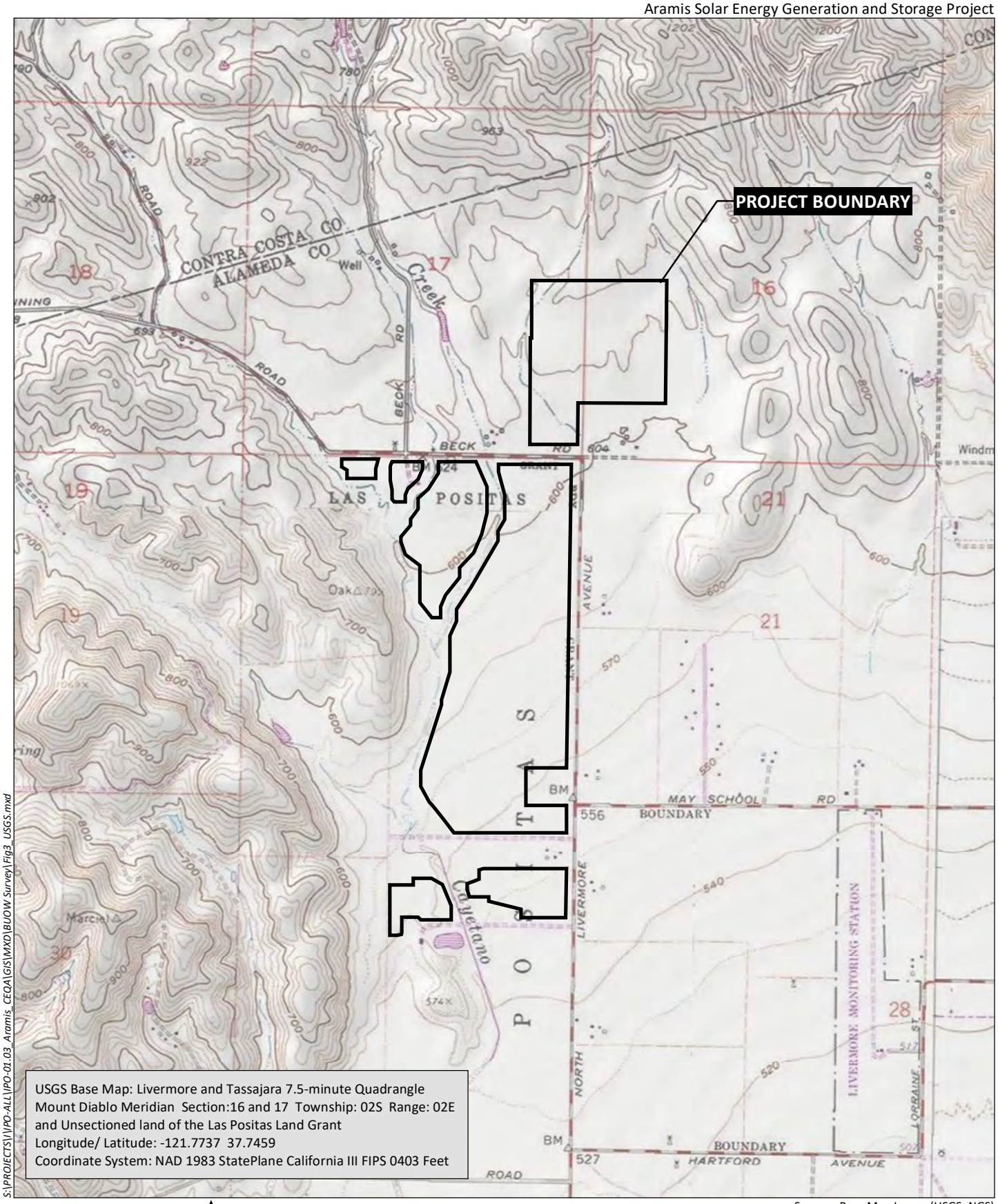


Source: Base Map Layers (DigitalGlobe 2018); Data (Alameda County 2017)

HELIX Environmental Planning

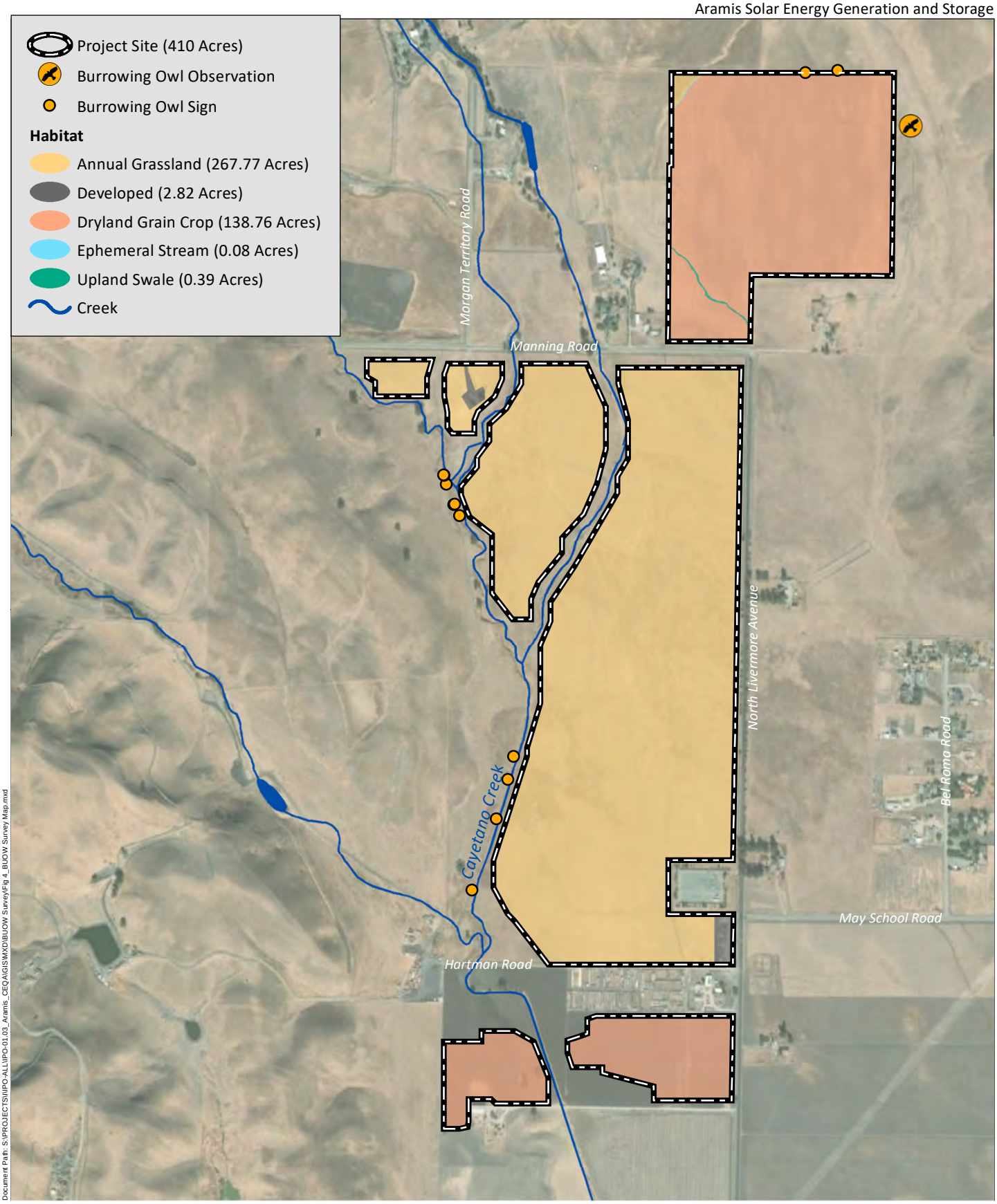
Aerial Map

Figure 2



USGS 7.5-minute Quadrangle Map

Figure 3



Habitat Map and Burrowing Owl Survey Results

Figure 4

Attachment B

Site Photos

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Photo 1. View of California ground squirrel burrows in the northern parcel north of Manning Road, looking north. Photo date 2/25/2020.



Photo 2. Representative view of Cayetano Creek adjacent to the western site boundary from the central portion of the survey area looking south. Photo date 7/31/2018.



Photo 3. View of burrowing owl pellet along Cayetano Creek adjacent to the site. Photo date 2/25/2020.



Photo 4. View of burrowing owl pellet along Cayetano Creek adjacent to the site. Photo date 2/6/2020.



Photo 5. View of dryland grain cropland in the northern parcel north of Manning Road, looking north. Photo date 5/21/2020.



Photo 6. View of burrowing owls at burrow (red circle) from the northeastern project boundary looking east. Photo date 6/17/2020.



Photo 7. Burrowing owl feather observed along the fence line on the northern boundary of the northern parcel, north of Manning Road. Photo date 6/17/2020.



Photo 8. View of long-eared owl detected during nighttime survey along Cayetano Creek adjacent to the project site. Photo date 3/17/2020.

Appendix H

Wetland Determination Data Sheets

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 7/31/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 1

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): C Lat: 37.75214 Long: -121.77989 Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

In a swale 100 feet downslope from the outfall of a ditch relief culvert under Manning Road

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Festuca perennis	25	Y	FAC
2. Juncus bufonius	15	Y	FACW
3. Hirschfeldia incana	15	Y	UPL
4. Lythrum hyssopifolium	5	N	OBL
5. Centaurea solstitialis	10	N	UPL
6.			
7.			
8.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 7/31/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 2

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: Unsectioned, T2S, R2E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): C Lat: 37.75112 Long: -121.78091 Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Depression in a swale draining Manning Road, 50 feet north of unnamed creek

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: _____)			
1. Festuca perennis	30	Y	FAC
2. Rumex pulcher	20	Y	FAC
3. Malvella leprosa	20	Y	FACU
4. Convlvulus arvensis	5	N	UPL
5. Centaurea solstitialis	5	N	UPL
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): _____

Water Table Present? Yes ____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Obvious depression

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 7/31/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 3

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: Unsectioned, T2S, R2E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): C Lat: 37.75119 Long: -121.77611 Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Swale draining Manning Road

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Festuca perennis	15	Y	FAC
2. Avena fatua	15	Y	UPL
3. Juncus bufonius	10	Y	FACW
4. Leontodon saxatilis	10	Y	FACU
5.			
6.			
7.			
8.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	15	x 3 =	45
FACU species	10	x 4 =	40
UPL species	15	x 5 =	75
Column Totals:	50 (A)		180 (B)

Prevalence Index = B/A = 3.6

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 7/31/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 4

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): C Lat: 37.75216 Long: -121.77264 Datum: NAD-83

Soil Map Unit Name: Diablo clay, very deep, 3-15 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Swale fed by a culvert under Manning Road

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Helminthotheca echioides	15	Y	FAC
2. Festuca perennis	10	Y	FAC
3. Centaurea solstitialis	2	N	UPL
4.			
5.			
6.			
7.			
8.			
	25 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 75 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Vegetation has been grazed by cattle

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 8/01/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 5

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): swale Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): C Lat: 37.75371 Long: -121.77074 Datum: NAD-83

Soil Map Unit Name: Diablo clay, very deep, 3-15 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Swale in an active oat hay field, recently harvested

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Avena fatua	75	Y	UPL
2. Medicago polymorpha	15	N	FACU
3. Centaurea solstitialis	5	N	UPL
4. Matricaria discoidea	5	N	FACU
5.			
6.			
7.			
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Recently mowed

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 8/01/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 6

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): swale Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): C Lat: 37.75371 Long: -121.77074 Datum: NAD-83

Soil Map Unit Name: Diablo clay, very deep, 3-15 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Small depression in a swale in an active oat hay field, recently harvested

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Festuca perennis	100	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Recently mowed

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100					Sa Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 8/01/2018

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 7

Investigator(s): P. Martin, G. Aldridge Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): C Lat: 37.75879 Long: -121.77233 Datum: NAD-83

Soil Map Unit Name: Diablo clay, very deep, 3-15 percent slopes NWI classification: 2

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Large gully with no bed/bank

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Festuca perennis	40	Y	FAC
2. Bromus diandrus	35	Y	UPL
3. Brassica nigra	10	N	UPL
4. Silybum marianum	5	N	UPL
5. Centaurea solstitialis	5	N	UPL
6. Rumex crispus	2	N	FAC
7.			
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	42	x 3 =	126
FACU species	0	x 4 =	0
UPL species	55	x 5 =	275
Column Totals:	97 (A)		401 (B)

Prevalence Index = B/A = 4.1

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100					Sa Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Chroma =1 but value <4 and no redox

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 2/6/2020

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 8

Investigator(s): P. Martin, H. Goeman Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): C Lat: _____ Long: _____ Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Low area mapped by US National Wetland Inventory. Site consists entirely of upland vegetation.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Avena fatua	10	N	--
2. Centaurea solstitialis	3	N	--
3. Medicago polymorpha	20	Y	FACU
4. Taraxacum officinale	10	N	FACU
5. Sonchus asper	2	N	FAC
6. Erodium bothys	5	N	FACU
7. Brassica nigra	20	Y	--
8.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Vegetation is dominated by upland vegetation.

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators detected.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Upland swale topographically low area is mapped by NWI as a seasonal emergent wetland.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 2/6/2020

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 9

Investigator(s): P. Martin, H. Goeman Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): C Lat: _____ Long: _____ Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

NWI mapped seasonal wetland is upland. Low area on hillslopes.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Avena fatua	30	Y	--
2. Brassica nigra	20	Y	--
3. Medicago polymorpha	20	N	FACU
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species 10	x 4 = 40
UPL species 50	x 5 = 250
Column Totals: 60 (A)	290 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Dominated by upland vegetation.

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators detected.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators detected.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: IP Aramis Solar City/County: Alameda Sampling Date: 2/6/2020

Applicant/Owner: IP Aramis LLC State: CA Sampling Point: 10

Investigator(s): P. Martin, H. Goeman Section, Township, Range: S17, T2S, R2E

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): C Lat: _____ Long: _____ Datum: NAD-83

Soil Map Unit Name: Clear Lake clay, drained, 0-2 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Upland point in floodplain. Location of data point does not appear to flood frequently.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus hordeaceus	25	Y	FACU
2. Hordium marinum	10	N	FAC
3. Festuca perennis	20	Y	FAC
4. Brassica nigra	30	Y	--
5.			
6.			
7.			
8.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

Dominated by upland vegetation.

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

No hydric soil indicators detected.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology indicators detected.

Appendix F

Cultural Resources Assessment

HELIX Environmental Planning

Aramis Solar Energy Generation and Storage Project

Cultural Resources Assessment Report

September 2020 | IPO-01.03

Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

Aramis Solar Energy Generation and Storage Project

Cultural Resources Assessment Report

Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

September 2020 | IPO-01.03

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1.0 INTRODUCTION

IP Aramis, LLC, a subsidiary of Intersect Power LLC, is the project applicant and proposes to construct and operate a mixed-use renewable energy project capable of generating, storing, and dispatching clean energy on approximately 410 acres in unincorporated Alameda County, California, in the North Livermore area. The Aramis Renewable Energy Project (proposed project) would consist of a 100 megawatt (MW) photovoltaic power generation station at the Point of Interconnection that would interconnect to the public distribution system at Pacific Gas and Electric Company's (PG&E) Cayetano 230 kilovolt (kV) substation located adjacent and interior to the project site. The project would serve East Bay Community Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract.

HELIX Environmental Planning, Inc. (HELIX) has prepared this report to characterize cultural resources that may be impacted by construction and operation of the Aramis Renewable Energy Project. The proposed project would include ground disturbing activities associated with land modifications to accommodate the installation of photovoltaic modules and supporting infrastructure and the staging of equipment and materials. Under the California Environmental Quality Act (CEQA), a substantial adverse change to an historical resource (i.e., a cultural resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources) constitutes a significant environmental effect that must be avoided or mitigated, where feasible. The Alameda County Community Development Agency (County) must determine the potential for the proposed project to result in significant impacts to historical resources and must consider mitigation measures and alternatives to avoid those significant impacts as part of their decision-making process.

1.1 SCOPE OF THE ASSESSMENT

This assessment report addresses the following environmental issues considered in Appendix G of the State CEQA Guidelines for cultural resources:

- Historical resources;
- Archaeological resources; and
- Human remains, including those interred outside of formal cemeteries.

This assessment examines the proposed project's potential to significantly impact historic and prehistoric archaeological resources, as well as historic built-environment (architectural) resources. The scope of work for the archaeological investigation included a records search at the Northwest Information Center (NWIC) of the California Historic Resource Inventory System (CHRIS); archival research of maps and documents; coordination with the Native American Heritage Commission (NAHC) and interested Native American groups and individuals; and an intensive pedestrian survey of the project's Area of Potential Effect (APE).

The built-environment analysis specifically addresses the Stanley Ranch property at 4400 N. Livermore Avenue (the subject property). The built-environment scope of work included review of the records search mentioned above, as well as other relevant literature; a built-environment survey of the ranch complex within the subject property; additional desktop and in-person archival research; development of a historic context for the subject property; and an evaluation of structures on the subject property for

eligibility to the California Register of Historical Resources (CRHR) and the Alameda County Register of Historic Resources.

1.2 PROJECT LOCATION AND DESCRIPTION

1.2.1 Project Location

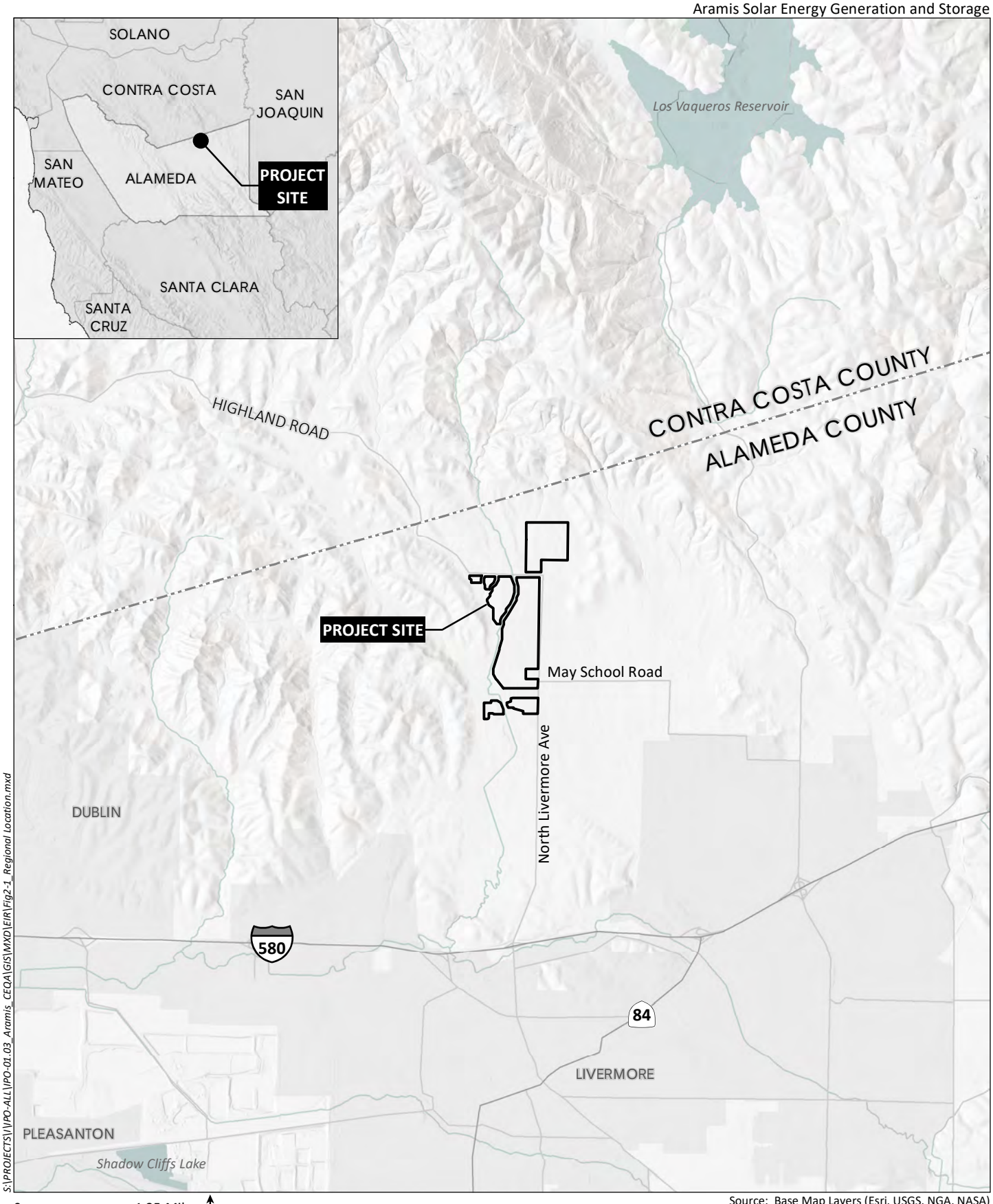
The approximately 410-acre project area is located in unincorporated Alameda County, approximately 2.5 miles north of Livermore, and comprises four privately-owned parcels, including Assessor's Parcel Number (APN) 903-0007-002-01 and portions of 903-0006-001-02, 903-0006-003-07, and 902-0001-005-00. The project area consists of four noncontiguous development areas that are split into the following sections: the northern section, measuring approximately 103 acres; the central section, measuring approximately 269 acres; the southeastern section, measuring approximately 23 acres; and the southwestern section, measuring approximately 15 acres. The project area is within Sections 16 and 17 of Township 02 South, Range 02 East and unsurveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian, as shown on the "Tassajara, CA" and "Livermore, CA" USGS 7.5-minute quadrangles. See Figure 1 for a regional location map and Figure 2 for an aerial map of the project area with the development sections depicted.

The project area lies at an elevation of roughly 500 to 700 feet above mean sea level. The area is generally flat and slopes slightly downward to the south. Cayetano Creek bisects the central section of the project area from north to south, although the project footprint has been designed to avoid the creek and the adjacent Federal Emergency Management Agency (FEMA) regulatory floodway. The parcels are currently used as cattle pasture and to cultivate hay and oats, and a review of aerial photographs and landowner interviews indicate that they have been harvested and grazed for many decades.

1.2.2 Project Description

The project applicant, is seeking a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) and electricity storage facility for at least 50 years. The project applicant further requests that the County process a parcel subdivision of APN 903-0006-001-02 to modify the eastern boundary of the legal parcel of the proposed solar facility and create a distinct parcel. The project would generate 100 MW of PV power on the 410-acre site. The project would provide solar power to utility customers by interconnecting to the nearby electricity grid at PG&E's existing Cayetano 230 kV substation located adjacent and interior to the project site. The project would serve EBCE, CPSF, and/or PG&E customers by providing local generation capacity under a long-term contract.

The proposed project would include PV modules connected in strings mounted onto a single-axis tracker racking system, which would in turn be affixed to steel piles. The maximum height of the modules would be approximately 8 feet in their stow position. The module strings would track the sun during the day, from east to west, to optimize power generation of the facility. Modules would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a medium voltage (MV) of 34.5kV (or lower suitable voltage) to collect the energy generated to a project substation.



S:\PROJECTS\V\PO-ALL\PO-01.03_Aramis_CEQA\GIS\MXD\EIR\Fig2-1_Regional Location.mxd

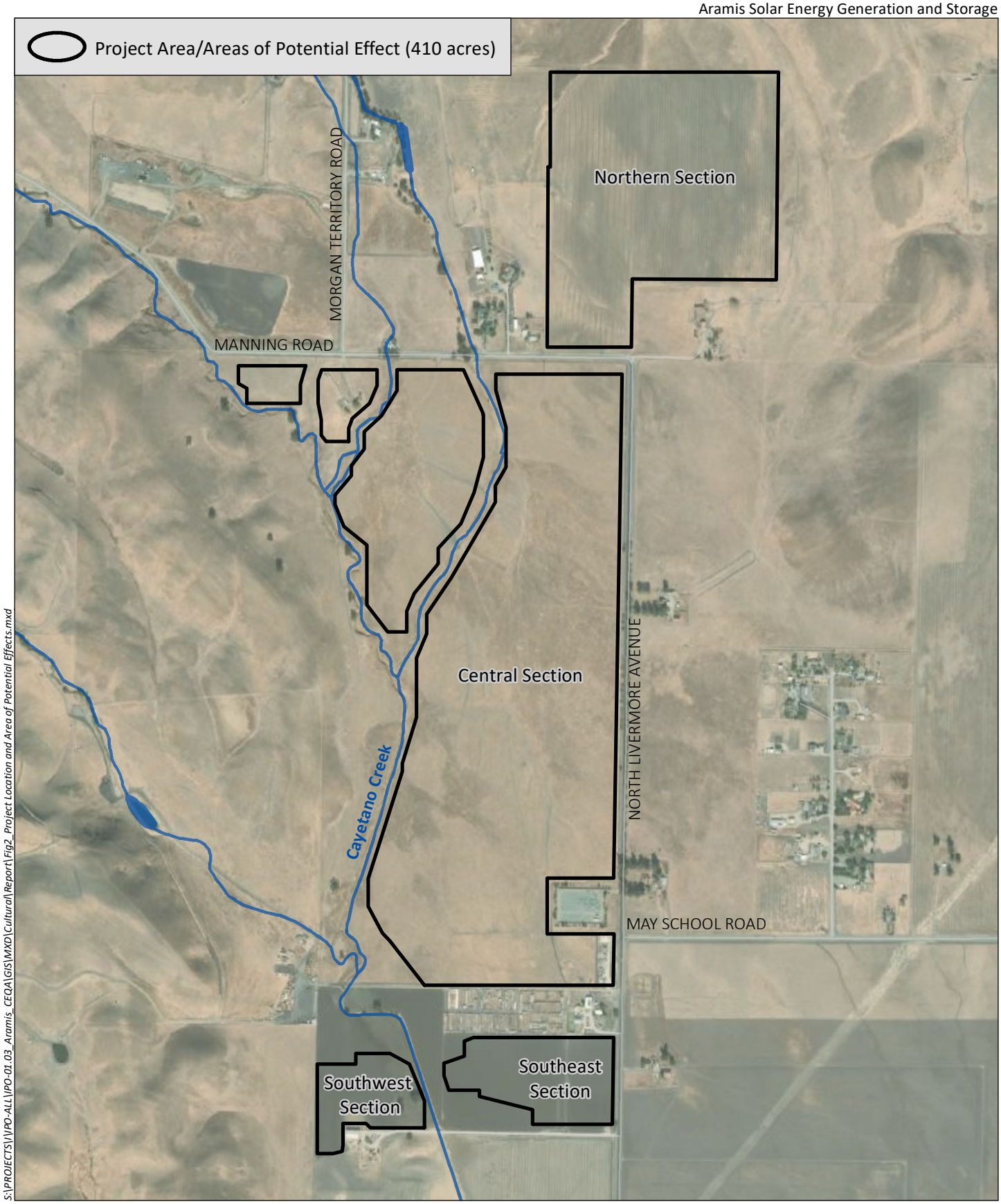
0 1.25 Miles

Source: Base Map Layers (Esri, USGS, NGA, NASA)

HELIX Environmental Planning

Regional Location

Figure 1



Source: Base Map Layers (Esri)

HELIX Environmental Planning

Project Location and Area of Potential Effects Map

Figure 2

The substation would step up the MV collected energy to the interconnect voltage via one or more step up transformers. The renewable energy system components would be enclosed by security fencing, with locked gates providing points of access.

The project substation would provide the circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure. The project's substation would be adjacent to the PG&E Cayetano substation, allowing a short overhead gen-tie that could possibly be constructed underground. Overhead lines would be supported by either tubular steel poles or wooden H-frames from 30 to 100 feet in height, depending on the entry angle required by the interconnecting utility. The northern section (north of Manning Road) of the project area would be electrically connected to the central section by overhead or underground medium-voltage distribution lines.

A 5-acre battery storage system would be located on-site adjacent to the PG&E Cayetano substation on its west side. The battery storage system could be designed to accept excess electrical load from the distribution system, and subsequently dispatch stored electricity during times of peak demand. Low-voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer. The system would either be housed in electrical enclosures or in up to four 100-foot by 180-foot buildings.

1.3 AREA OF POTENTIAL EFFECTS

The APE is defined as the geographic area or areas within which a project may directly or indirectly cause alterations in the character or use of significant historical or archaeological resources. The APE is influenced by the scale and nature of the project as well as by the types of cultural resources in the vicinity. For the purposes of this analysis, the direct APE is understood to be the area that would be subjected to ground disturbance during construction and operation of the proposed project. The proposed project's indirect APE is the area in which significant cultural resources may be subjected to secondary impacts such as vibration, visual impacts, vandalism, or looting (among others). The indirect APE varies in size depending on the type of secondary impact being considered.

The direct APE for the project measures 410 acres, corresponding to the project area shown on Figure 2. This area includes the 103-acre northern section, the 269-acre central section, the 23-acre southeastern section, and the 15-acre southwestern section. Although the project will avoid any direct impacts to the property at 4400 N. Livermore Avenue, this property is surrounded by the proposed project and therefore was analyzed for secondary, indirect impacts.

2.0 REGULATORY FRAMEWORK

2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 15064.5(b)(1) of the State CEQA Guidelines specifies that projects that cause "…physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historic resource would be materially impaired" shall be found to have a significant impact on the environment. Pursuant to CEQA, a historical resource is a resource listed in, or eligible for listing in, the CRHR (Section 2.2). In addition, resources included in a local register of historic resources, or identified as significant in a local survey conducted in accordance with state guidelines, are

also considered historic resources under CEQA, unless a preponderance of the facts demonstrates otherwise. According to CEQA, the fact that a resource is not listed in, or determined eligible for listing in, the CRHR, or is not included in a local register or survey, shall not preclude a Lead Agency, as defined by CEQA, from determining that the resource may be a historic resource as defined in California Public Resources Code (PRC) Section 5024.1.7.

CEQA applies to archaeological resources when (1) the archaeological resource satisfies the definition of an historical resource, or (2) the archaeological resource satisfies the definition of a "unique archaeological resource." A unique archaeological resource is an archaeological artifact, object, or site that has a high probability of meeting any of the following criteria (PRC § 21083.2(g)):

1. The archaeological resource contains information needed to answer important scientific research questions, and there is a demonstrable public interest in that information.

2. The archaeological resource has a special and particular quality such as being the oldest of its type or the best available example of its type.

3. The archaeological resource is directly associated with a scientifically-recognized important prehistoric or historic event or person.

2.2 CALIFORNIA REGISTER OF HISTORICAL RESOURCES

Created in 1992 and implemented in 1998, the CRHR is "an authoritative guide in California to be used by state and local agencies, private groups, and citizens to identify the state's historical resources and to indicate what properties are to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC § 5024.1(a)). Certain properties, including those listed in or formally determined eligible for listing in the National Register of Historic Places (NRHP) and California Historical Landmarks (CHLs) numbered 770 and higher, are automatically included in the CRHR. Other properties recognized under the California Points of Historical Interest program, identified as significant in historic resources surveys, or designated by local landmarks programs may be nominated for inclusion in the CRHR.

A resource, either an individual property or a contributor to an historic district, may be listed in the CRHR if the State Historical Resources Commission determines that it meets one or more of the following criteria, which are modeled on NRHP criteria (PRC § 5024.1(c)):

- Criterion 1: It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

- Criterion 2: It is associated with the lives of persons important in our past.

- Criterion 3: It 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.

- Criterion 4: It has yielded, or may be likely to yield, information important in history or prehistory.

Resources nominated to the CRHR must retain enough of their historic character or appearance to be recognizable as historic resources and to convey the reasons for their significance. It is possible that a

resource whose integrity does not satisfy NRHP criteria may still be eligible for listing in the CRHR. A resource that has lost its historic character or appearance may still have sufficient integrity for the CRHR if, under Criterion 4, it maintains the potential to yield significant scientific or historical information or specific data. Resources that have achieved significance within the past 50 years also may be eligible for inclusion in the CRHR, provided that enough time has lapsed to obtain a scholarly perspective on the events or individuals associated with the resource.

2.3 NATIVE AMERICAN HERITAGE COMMISSION

Section 5097.91 of the PRC established the NAHC, whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Under Section 5097.9 of the PRC, a State policy of noninterference with the free expression or exercise of Native American religion was articulated along with a prohibition of severe or irreparable damage to Native American sanctified cemeteries, places of worship, religious or ceremonial sites, or sacred shrines located on public property. Section 5097.98 of the PRC specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner.

2.4 GOVERNMENT CODE SECTIONS 6254(R) AND 6254.10

These sections of the California Public Records Act were enacted to protect archaeological sites from unauthorized excavation, looting, or vandalism. Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Section 6254.10 specifically exempts from disclosure requests for "records that relate to archaeological site information and reports, maintained by, or in the possession of the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a Native American tribe and a state or local agency."

2.5 HEALTH AND SAFETY CODE, SECTIONS 7050 AND 7052

Health and Safety Code, Section 7050.5 declares that, in the event of the discovery of human remains outside of a dedicated cemetery, all ground disturbance must cease and the county coroner must be notified. Section 7052 establishes a felony penalty for mutilating, disinterring, or otherwise disturbing human remains, except by relatives.

2.6 PENAL CODE, SECTION 622.5

Section 622.5 of the Penal Code provides misdemeanor penalties for injuring or destroying objects of historic or archaeological interest located on public or private lands, but specifically excludes the landowner.

3.0 CULTURAL SETTING

3.1 PREHISTORY

As is the case for archaeological research in many areas of California, the various classification schemes and chronologies used by researchers when addressing the prehistory of the San Francisco Bay area often conflict with one another. Most recently, Milliken et al. (2007) have framed an overview of past research in the area by revising Fredrickson's (1974) period scheme. The following summary of local cultural history is based on this revised chronological framework.

3.1.1 Pleistocene/Holocene Transition, ~13,500 to 9950 Years Before Present (BP)

There is no evidence of Late Pleistocene occupation in the immediate region, although the southern portion of the Central Valley shows evidence in the form of isolated, basally thinned and fluted projectile points found on the surface of remnant Pleistocene landscape features. With few exceptions these points have been found as isolates in undatable surface contexts, and therefore have been associated with the Paleo-Indian period solely on the basis of their morphological similarity to securely dated Clovis projectile points from the Great Plains and Southwest regions (Dillon 2002:115). Potential Paleo-Indian finds from the general region include a fluted point found in the Sacramento Valley, in Tehama County near Thomas Creek (Dillon 2002). Local archaeological deposits associated with the late Pleistocene, if they exist, are likely destroyed or buried by a significant period of alluvial deposition that began about 9050 cal B.P. (Rosenthal et al. 2007).

3.1.2 Early and Middle Holocene (Lower Archaic), 9950 to 5450 BP

The Lower Archaic period in Bay Area and Central Valley has been mainly represented by isolated finds, including heavy stemmed dart or spear points and flaked stone crescents that are often found in association with groundstone tools. The period was marked by high residential mobility, although the density of groundstone and expedient cobble-core tools at some sites suggest that they represent frequently visited camps in a settlement system structured around repetitive seasonal movement (Rosenthal et al. 2007). In contrast to the common interpretation that large game hunting was the focus of Lower Archaic economies, this seasonal round appears to have targeted grassland-savanna resources, particularly acorns and wild cucumbers. Seeds and nuts were processed with millingslabs and handstones.

Obsidian from Lower Archaic period sites has been sourced to both the North Coast Ranges and Eastern Sierra sources, suggesting that regional interaction spheres were well established by this time (Rosenthal et al. 2007). At CA-CCO-696, a Los Vaqueros site located approximately 5 miles west of the project area, a large-stemmed projectile point of Napa Valley obsidian was dated to 7,300 BP. At nearby CA-CCO-637, the earliest documented grave in west-central California was dated to 8520 BP (6570 cal B.C.). No comparable assemblage has been found in the San Francisco Bay area, although it shares characteristics with the Borax Lake pattern of the southern North Coast ranges (Meyer and Rosenthal 1997).

3.1.3 Early Period (Middle Archaic), 5450 to 2450 BP

The beginning of the Middle Holocene saw a substantial shift to warmer, drier conditions, with rising sea levels pushing inland to form the wetland habitats associated with the Sacramento-San Joaquin Delta. Subsistence increasingly emphasized upland plant resources. Mortars and pestles appeared in the Bay Area as early as 4050 cal B.C., and expedient cobble tools were common. Projectile points associated with the Middle Archaic period include notched, stemmed, thick-leaf, and narrow concave base dart forms, many manufactured from obsidian from North Coast Ranges and Eastern Sierra (Rosenthal et al. 2007). Red ochre and *Olivella* and *Haliotis* shell beads recovered from burials suggest that social stratification began to develop during this period (Milliken et al. 2007).

The latter half of the Early Period (ca. 4000-2000 BP) represented "the end of generalized, and often highly mobile, Early Holocene lifeways and the beginning of more specialized and intensive California hunter-gatherer-fishers known from ethnographic times" (Stevens et al. 2009:1). In the Sacramento Delta region this period is associated with the Windmiller Pattern. Windmiller was marked by westerly oriented, extended burials with grave offerings, extensive long-distance trade of exotic materials such as beads and obsidian, and adaptations that were less mobile and more specialized than previous cultures, probably representing the first intensive acorn economies in the state (Rosenthal et al. 2007; Stevens et al. 2009). The Windmiller Pattern also represents the peak in trade in Eastern Sierra obsidian, with both earlier and later intervals characterized by increased procurement and use of local toolstone (Stevens et al. 2009).

The central Bay Area during the latter half of the Early Period is characterized by the Lower Berkeley Pattern. This period exhibited a strong milling technology represented by minimally shaped cobble mortars and pestles, although metates and manos were still used. Dart and atlatl technologies during this period were characterized by non-stemmed projectile points made primarily of obsidian. Fredrickson (1974) suggests that the Lower Berkeley Pattern marked the eastward expansion of Miwok groups from the Bay Area. Typical burials occurred within the village with flexed positions, variable cardinal orientation, and some cremations. As noted by Lillard et al. (1939), the practice of spreading ground ochre over the burial was common at this time. Grave goods during this period are generally sparse and typically include only utilitarian items and a few ornamental objects. However, objects such as charmstones, quartz crystals, and bone whistles occasionally were present, which suggest the religious or ceremonial significance of the individual (Hughes 1994).

The Early Period also saw the occupation and expansion of what were to become the largest shell mound sites in the Bay Area. Initially the mounds were composed almost entirely of marine shell and other refuse that accumulated beneath seasonal village locations, but over time, these were intentionally enlarged by the addition of rocks, sand, and clay. Lightfoot (1997) argues that the mounds were constructed and periodically enlarged to keep bay shore villages above the high tide level, which continued to gradually rise through the Middle Holocene. These elevated residences would also have been ideal for the exploitation of estuarine resources that otherwise would have been difficult to access. The core deposits of mounds often contained human remains and ceremonial offerings, suggesting that the mounds also provided a way for the living to maintain a direct link to their ancestors.

3.1.4 Middle Period (Upper Archaic), 2450 to 900 BP

The climate of the prehistoric late Holocene approximated that of today, with cooler and moister conditions than the middle Holocene but drier than the early Holocene.

The Middle Period coincides with the Upper Berkeley Pattern which was marked by a decrease in residential mobility and the establishment of fixed, permanent or semi-permanent villages. Existing shell mounds grew in size, and new mounds were constructed as populations increased. For the first time sea mammals, waterfowl, and fish were exploited in significant quantities, while the use of terrestrial mammals declined; this shift to higher-cost marine resources suggests overexploitation of terrestrial game by the increasing populations. The Upper Berkeley also saw a peak in regional violence, with increased evidence of fractures, embedded points, puncture wounds, and scalping appearing in burials from the period. It is likely that the dwindling resource base was directly linked to the increased warfare and may have further encouraged mound building as a way to assert territoriality (Arnold and Walsh 2010).

3.1.5 Late Period (Emergent), 900 BP to Historic Era

The stable climate that began during the Upper Archaic continued through the Late Period. The most significant technological advancement during this period was the adoption of the bow and arrow, which replaced the atlatl and dart between about A.D. 1000 and 1300. Territorial boundaries became well established, and increased social complexity is suggested by a wider variation in burial types and furnishings. Cremation, which was reserved for high-status individuals during the beginning of the period, eventually became widespread (Rosenthal et al. 2007).

Sites established during the Late Period, or Augustine Pattern, were generally located inland, rather than on the bay shore, reflecting an increased reliance on acorn over marine resources. Year-round occupation of the shell mounds appears to have totally ceased by 450 BP, probably due to the overhunting of marine resources and a shortage of fresh water caused by drought related to the Medieval Climatic Anomaly (Arnold and Walsh 2010).

Obsidian use, including the importation of obsidian cobbles, flake blanks, and finished formal tools, also increased during the period. This obsidian was imported exclusively from Napa Valley – Patterson and DeGeorgey (2014) argue that high-quality toolstone may have been directly inaccessible to local populations due to well-developed territorial systems, and that this resulted in the development of a complex interregional exchange system.

3.2 ETHNOGRAPHY

At the time of European contact, the East Bay and Southeast Bay areas were occupied by various tribelets that were part of the Ohlone (previously Costanoan) tribe of California Native Americans (Harrington 1942; Levy 1978). The Ohlone group represents a language family consisting of eight branches of the Costanoan language that are considered too distinct to be dialects, with each being related to its geographically adjacent neighbors. These groups lived in approximately 50 separate and politically autonomous tribelet areas, each with one or more permanent villages, between the North San Francisco Bay and the lower Salinas River (Levy 1978).

The timing of the arrival of Ohlone groups into the Bay Area appears to coincide with the appearance of Augustine Pattern assemblages in the archaeological record, as documented at sites such as the Emeryville Shellmound or the Ellis Landing Shellmound. It is probable that the Ohlone moved south and west from the delta region of the San Joaquin-Sacramento River into the Bay Area during the Late Period, when they displaced Hokan-speaking groups that had traditionally occupied the area. The region surrounding the project area was occupied by speakers of the Chochenyo language, whose territory

extended from the southern end of the Carquinez Straits south to Mission San Jose (present-day Fremont), east to present-day Livermore and west to San Francisco Bay. The Livermore area is believed to have been home to the *sewnen* (El Valle) tribelet. Their direct neighbors to the east may have been tribelets associated with Northern Valley Yokuts people.

The various Ohlone tribes subsisted as hunter-gatherers and relied on local terrestrial and marine flora and fauna for subsistence (Levy 1978). The predominant plant food source was the acorn, but they also exploited a wide range of other plants, including various seeds, buckeye, berries, and roots. Protein sources included grizzly bear, elk, sea lions, antelope, and black-tailed deer as well as smaller mammals such as raccoon, brush rabbit, ground squirrels, and wood rats. Waterfowl, including Canadian geese, mallards, green-winged teal, and American widgeon, were attracted by decoys and captured in nets. Fish also played an important role in the Chochenyo diet and included steelhead, salmon, and sturgeon.

The Ohlone constructed watercraft from tule reeds and possessed bow and arrow technology. They fashioned blankets from sea otter pelts, fabricated basketry from twined reeds of various types, and manufactured a variety of stone and bone tools. Ohlone villages typically consisted of domed dwelling structures, communal sweathouses, dance enclosures, and assembly houses constructed from thatched tule reeds and a combination of wild grasses, wild alfalfa, and ferns.

The Ohlone were politically organized into autonomous tribelets that had distinct cultural territories. Tribelet territories contained one or more villages with seasonal satellite camps to facilitate resource procurement. The tribelet chief could be either male or female, and the position was inherited patrilineally, but approval of the community was required. The tribelet chief and council were essentially advisors to the community and were responsible for feeding visitors, directing hunting and fishing expeditions, ceremonial activities, and warfare on neighboring tribelets.

Ohlone culture was severely disrupted by the establishment of seven Spanish missions within their territory between 1770 and 1797. Practically the entire Ohlone population was conscripted, and the last Ohlone tribelets living an aboriginal existence had disappeared by 1810. Mission life and the subsequent Gold Rush brought disease to the native inhabitants, and by the 1850s, nearly all of the Ohlone had adapted in some way or another to economies based on cash income. Hunting and gathering activities continued to decline and were rapidly replaced with economies based on ranching and farming.

3.3 HISTORY

3.3.1 Spanish and Mexican California

The most dramatic and permanent change to the Native American lifestyle in Central California was the establishment of the Spanish Mission system. The first European contact with the local Ohlone is believed to have occurred in 1772 when the Fages Expedition entered the San Ramon Valley (Levy 1978). Under Father Junipero Serra's leadership, the Franciscan monks erected seven missions within 27 years, and forced most of the Ohlone tribal members into the missions to live and work. The nearest missions were the Mission San Carlos Borroméo de Carmelo (1770), Mission San Francisco de Asís (1776), Mission Santa Clara de Asís (1777), Mission Santa Cruz (1791), Mission Nuestra Señora de la Soledad (1791), Mission San Juan Bautista (1797), and Mission San Jose (1797). The Ohlone forced to live at the Missions were termed neophytes, which were Indians who and had either converted to Christianity or were expected to convert.

The Mexican Period (1821 to 1848) was marked by secularization of the missions and division of their lands among the Californios as land grants termed ranchos. With the declaration of Mexican independence in 1821, Spanish control of Alta California ended, although little change in the lifestyles of the local populations actually occurred. Political change did not take place until mission secularization in 1834, when Native Americans were released from missionary control and the mission lands were granted to private individuals. Shoup and Milliken (1999) state that Mission secularization removed the social protection and support on which Native Americans had come to rely. It exposed them to further exploitation by outside interests, often forcing them into a marginal existence as laborers for large ranchos. Following secularization, the Mexican population grew as the native population continued to decline. Anglo-American settlers began to arrive in Alta California during this period and often married into Mexican families, becoming Mexican citizens, which made them eligible to receive land grants. In 1846, on the eve of the United States-Mexican War (1846 to 1848), the estimated population of Alta California was 8,000 non-natives and 10,000 Native Americans. However, these estimates have been debated. Cook (1976) suggests the Native American population was 100,000 in 1850; the U.S. Census of 1880 reports the Native American population as 20,385.

In 1839, former Mission San Jose lands in the Livermore Valley under Mexican authority were granted as a rancho to Don Salvio Pacheco, who in turn transferred his interest to Robert Livermore and Jose Noriega. Rancho Las Positas measured approximately 2 leagues (8,857 acres), and was bounded by two other ranchos, Cañada de Los Vaqueros to the north, and Valle de San Jose to the west. The land grant was intended to be a place for the owners to graze their herds while they resided further to the west in more populated regions (Ziesing 1997).

3.3.2 Expansion and Settlement

Jedediah Smith was the first American to explore the Central Valley in 1828, but other expeditions soon followed. In 1848, as a result of the Treaty of Guadalupe Hidalgo, California became a United States territory. Also, in 1848, John Marshall found gold at Sutter's Mill, which marked the start of the Gold Rush. The influx of miners and entrepreneurs increased the population of California, not including Native Californians, from 14,000 to 224,000 in just four years. When the Gold Rush was over, many miners established farms, ranches, and lumber mills.

3.3.3 Alameda County and Murray Township

The following historic context is largely based on the *Historical and Cultural Resource Survey: East Alameda County* (Corbett 2005).

Following Mexico's independence from Spain in 1822, former Mission lands in Alta California were secularized and divided up into large ranchos. Beginning in 1839, Rancho de las Positas, Rancho Valle de San Jose, Rancho San Ramon, and Rancho Santa Rita were established as the result of land grants to Mexican citizens. Rancho de las Positas, which includes the study area, came into the control of Robert Livermore, an English Mexican Rancher (Corbett 2005:1).

These Ranchos were largely unfenced, allowing for large swaths of open grazing lands for cattle. Cattle were raised for their hides and tallow which were used to make leather and soap. These goods were exported to the eastern United States and Europe, making them the major export commodities of California until the Gold Rush. Vineyards, pear and olive orchards, grains, corn, and watermelon were also planted during the Mexican Rancho era (Corbett 2005:1-2).

American-settlement in Alta California began in 1841 and greatly increased during the Gold Rush beginning in 1848. California became part of the United States in 1850 after the Mexican American War. Most Mexican ranchos were divided up, but Robert Livermore was able to retain control of Rancho Las Positas after the transition (Corbett 2005:2).

The large area now known as Murray Township was first included in Contra Costa County, one of the first counties designated in California under the United States. In 1953, Alameda County was formed, and a large portion of Contra Costa County was ceded to the new County and deemed as Murray Township (named after an earlier settler - Michael Murray). Murray Township was the largest and most eastern township in Alameda County and bordered Contra Costa County to the north, San Joaquin County to the east, and Santa Clara County to the south (Figure 3).

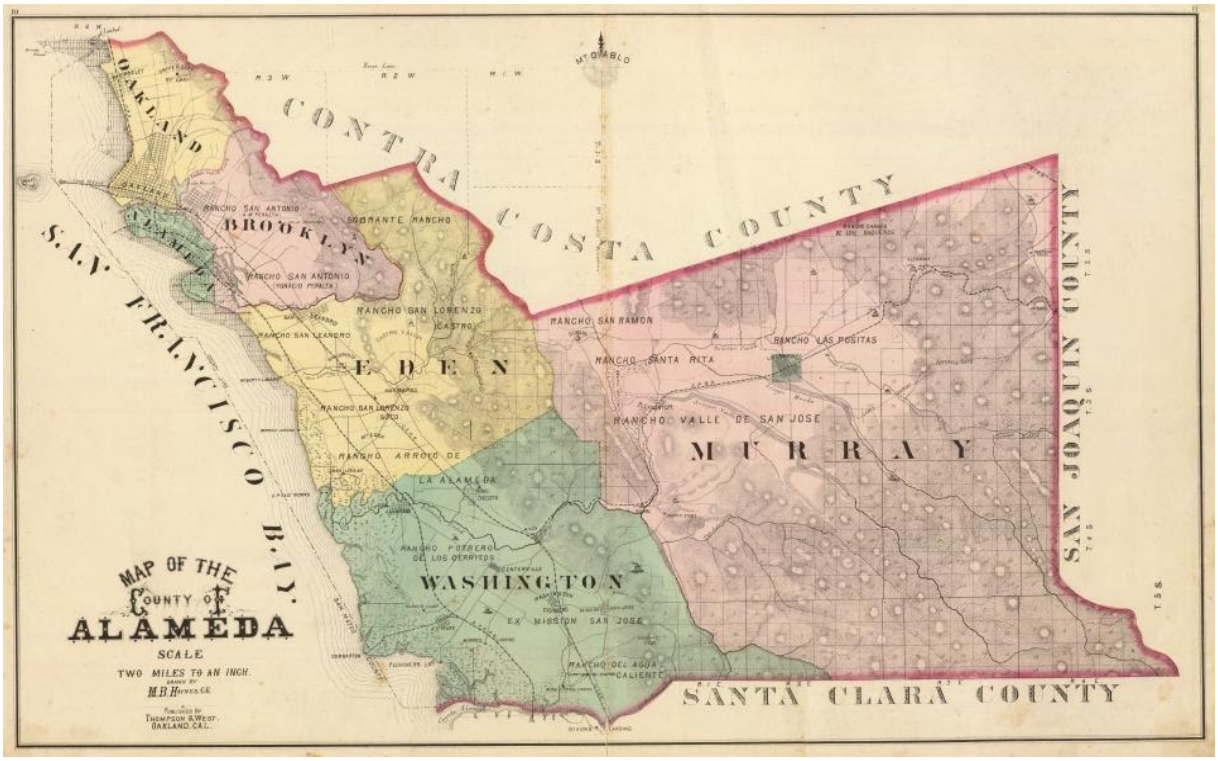


Figure 3. Map of Alameda County, 1878. Courtesy of the David Rumsey Collection (Thompson & West 1878)

Americans continued to homestead and establish farms in Murray Township in the mid and late nineteenth century. Growth increased after the establishment of the transcontinental Central Pacific Railroad in 1869 (Corbett 2005:2). The construction of the railroad to Murray Township helped establish the towns of Alisal (now Pleasanton) and Livermore (Corbett 2005:2). By 1878, Murray Township had been surveyed under the U.S. Public Land Survey System, as illustrated in the Thompson & West 1878 Atlas shown in Figure 3.

Between the 1880s and 1910s, many changes affected farming and ranching operations in Murray Township. Long-term grain farming had depleted the nutrients in the soil. As a result of increased domination by the beef industry in the Midwest, cattle ranching and hay production in Murray Township declined. Fruit production in Murray Township increased during this period, however, and the advent of the refrigerated rail car allowed for the effective exportation of fruit to other markets. Improvements in automobile transportation allowed easier access to San Francisco markets which made fruit, veggies,

poultry, and dairy viable agricultural options. Demand for fruit and vegetables also increased due to improved canning operations around the bay. Fruit and vegetable production required seasonal and experienced labor, which led to an increase in hired workers and a decrease in family farming operations in Alameda County (Corbett 2005:7-8).

Until World War II, Murray Township primarily consisted of agricultural properties, but development in the area occurred during and after World War II. A U.S. Naval Auxiliary airfield was established northwest of Livermore, and Parks Air Force Base was created near Pleasanton. By 1953 the Lawrence Livermore Laboratory was established east of Livermore, and the Vallecitos Atomic Laboratory was established in Vallecitos Valley. Interstate 680 was completed by 1967, and U.S. 50 became Interstate 580 by 1973. Housing subdivisions, shopping centers, offices, and industrial parks were also constructed within Murray Township during the mid and late twentieth century. With the lack of agricultural development after World War II, the increase in land prices, taxes, and labor wages led many farming families to sell or lease their land to large scale commercial farmers (Corbett 2005:6;8).

3.3.4 Rancho Las Positas

Rancho Las Positas is located within the Murray Township, and its land has been utilized as ranching and farmland since the mid-nineteenth century (Figure 4). Beginning in the 1860s, wheat farming became prominent within Murray Township and Rancho Las Positas. Between 1865 and 1870, there were several farmers within Murray Township with over 1,000 acres of wheat fields each, some within multiple parcels. Smaller scale family ranches usually produced grain and a single livestock type at the level where the family could manage the farm independently. Wheat was the most popular grain and was harvested using horse-drawn or steam powered threshing machines as shown in Figure 5. Livestock included sheep which grazed on the hills and were raised for meat as well as wool, cattle for meat, and horses for transportation and as draft animals. Hay was grown for feed with the excess being sold in San Francisco (Corbett 2005:7).


RANCHO LAS POSITAS
LIVERMORE
MAY DIST. SCH.
GREEN DIST. SCH.
SEE PAGE 54
Lucian B. Huff
Gen. C. Stanley
719 A.
Valentin Alviso
573 A.
Geo. May
John Green
400 A.
Jose Aurrecochea
John Taylor
736 A.
Wm. M. Mendenhall
247 A.
Mrs. Sarah Ladd
LADDSVILLE
Adam's Path
Thos. Osborn
Richard Berry
160 A.
M. F. Scott
160 A.
L. Rock
160 A.
E. Ballifraud
160 A.
Chas. Wahlgore
160 A.
Wm. Cobb
320 A.
J. M. Davis
160 A.
Geo. Dickens
160 A.
M. Waterman & Co.
160 A.
J. M. Harley
160 A.
G. G. Munch
160 A.
Anspacher Bros.
160 A.
W. R. Carr
Robt. Carr
160 A.
Joe Parker
160 A.
R. R. Bxas
Joe Brown
160 A.
H. Hartman
160 A.
Mr. Harlan
160 A.
Gleason
160 A.
M. Burke
160 A.
Henry Pratt
160 A.
F. A. Roe
160 A.
F. R. Fassett
160 A.
Walter Baugh & Bryant
320 A.
H. De Young
160 A.
O. S. Livermore
160 A.
Geo. May
160 A.
S. N. Putnam
80 A.
H. R. Huie
160 A.
L. Blanco
172 A.
M. Avila
200 A.
A. J. Leard
J. Waterman Wagner
A. Baker
72 A.
J. D. Patterson
M. P. H. Love
160 A.
J. M. Wurth
160 A.
H. Brooks
160 A.
H. Dougherty
161 A.
D. B. French
160 A.
Alameda Cr.
T. Herring
F. Ballerman
Inspacher Bros.
160 A.
Michael Murray
160 A.
T. Lynch
160 A.
P. Kimmet
159 A.
Peter Murphy
160 A.
E. Springston
160 A.
Butterman
160 A.
J. Quigley
160 A.
Cayetano
Arroyo
Las Positas Cr.
Arroyo Mocho
Arroyo Valle
Cr.
Cr.
Cr.



Figure 5. Agricultural workers in Livermore with threshing machine, circa 1900. Courtesy of the California Historical Society (California Historical Society c. 1900)

4.0 CULTURAL RESOURCES RECORDS SEARCH

A cultural resources records search was conducted at the NWIC at Sonoma State University on July 18, 2018. The records search addressed the entire 410-acre project area plus a 0.5-mile buffer. The purpose of the record search was to (1) identify prehistoric and historic resources previously documented in the project area and within 0.5 mile of project area boundaries; (2) determine which portions of the project area may have been previously studied, when those studies took place, and how the studies were conducted; and (3) ascertain the potential for archaeological resources, historical resources, and human remains and other potential Native American areas of traditional cultural significance to be found in the project area. This search also included a review of the appropriate USGS topographic maps on which cultural resources are plotted, archaeological site records, building/structure/object records, and data from previous surveys and research reports. The California Points of Historical Interest, the California Historical Landmarks, the CRHR, the NRHP, and the California State Historic Resources Inventory listings were reviewed to ascertain the presence of designated, evaluated, and/or historic-era resources within the project area. Historical maps and historical aerial photographs of the area were also examined.

An expansion of the project area necessitated that an additional, infill record search be conducted at the NWIC on February 20, 2020. This record search addressed the newly added portions of the project area plus a 0.5-mile buffer.

4.1 PREVIOUS STUDIES

The cultural resources records search identified 11 previous studies that have been conducted within a 0.5-mile radius of the proposed project area (Table 1). Of these, only one addressed a portion of the project's APE: report S-024986 investigated a small portion of the central section located immediately south of the PG&E Cayetano substation.

Table 1
PREVIOUS STUDIES CONDUCTED WITHIN 0.5 MILE OF THE PROJECT AREA

Report	Year	Author(s)	Title	Affiliation
S-001842	1979	Chris D. Porter	Cultural Resource Survey of MS 61-79, 62-79, 64-79, Three Adjacent Parcels Totaling 311.35 Acres, on Morgan Territory Road, Contra Costa County, CA	Anthropological Studies Center, Sonoma State University
S-013257	1991	Allan G. Bramlette, Mary Praetzellis, David A. Fredrickson, and Adrian Praetzellis	A Summary Inventory of Archaeological Resources Within the Los Vaqueros Project Area, Alameda and Contra Costa Counties, CA	Anthropological Studies Center, Sonoma State University
S-020335	1998	Randy S. Wiberg, Randall Dean, and Miley P. Holman	A Cultural Resources Study for the North Livermore Master Plan/Specific Plan, Environmental Impact Report, Alameda County, CA	Holman & Associates
S-024852	2002	Benjamin Annanian	Archaeological Study of Property at 13151 Morgan Territory, Livermore, CA	Unknown
S-024986	2000	Unknown	Cultural Resources Assessment, PG&E Proposed Tri-Valley 2002 Electric Power Capacity Increase Project	Basin Research Associates, Inc.
S-031014	2005	Gabriel Roark	Cultural Resources Inventory Report for the P4 North Route, Phase 3 of the Tri-Valley 2002 Capacity Increase Project, Alameda and Contra Costa Counties, CA	Jones & Stokes
S-031014a	2004	Unknown	Addendum 1 to the Cultural Resource Inventory Report for the Tri-Valley Phase III P4 North Route Access Roads, Alameda and Contra Costa Counties, California, Archaeological Survey of Three Alignment Changes	Jones & Stokes
S-042083	2013	Jennifer Thomas, Jack Meyer, and Naomi Scher	Cultural Resources Report for PG&E's Line 131 ILI Investigation Digs Project, Alameda County, CA	Far Western Anthropological Research Group, Inc.
S-042083a	2012	Jennifer Thomas and Jack Meyer	Cultural Resources Study of the PG&E Line 131 Direct Examination and Repair Project, Alameda and Contra Costa Counties, CA	Far Western Anthropological Research Group, Inc.

Table 1 (cont.)
PREVIOUS STUDIES CONDUCTED WITHIN 0.5 MILE OF THE PROJECT AREA

Report	Year	Author(s)	Title	Affiliation
S-042083b	2013	Jennifer Thomas	Cultural Resources Report for PG&E's Line 131 ILI Investigation Digs Project, Alameda County, CA	Far Western Anthropological Research Group, Inc.
S-042083c	2013	Kayla Paschal	RE: COE-2013-1010-001 Re; U.S. Army Corps of Engineers Application for Department of the Army Permit, L-131 Anomaly Dig Site 33	Pacific Gas and Electric Company

4.1.1 Prior Historical and Cultural Resource Survey: East Alameda County

A reconnaissance historic and cultural resource survey in unincorporated East Alameda County took place in 2005. The survey was produced as a first step to identifying the rapidly changing historic landscape of the region and to facilitate compliance with CEQA (Corbett 2005:23). The cumulative loss of individual farmhouses, barns, and other historic farming and ranching infrastructure in recent years was determined to be substantial. The survey helped to identify potentially significant and eligible historic properties based solely on visual appearance and aesthetics. The survey did not include any property specific research or any intensive studies.

It appears that the subject property, 4400 N. Livermore Ave., is listed as 4270 North Livermore Avenue on parcel 903-000-600-305 in the 2005 survey (Corbett 2005:39). It is listed with code “E MA” which means it features “multiple agricultural buildings” that “have integrity but is unlikely to be individually significant; a common example of a common type”. The survey estimated that the infrastructure on the property dates to 1940 (Corbett 2005 34-35; 39).

4.2 PREVIOUSLY RECORDED RESOURCES

The records search determined that no previously recorded cultural resources are located within the project’s APE, and no individually recorded resources are within 0.5 mile of the APE. A small portion of one resource, the Los Vaqueros/Upper Kellogg Creek Historic District, is located almost 0.5 mile to the northeast of the APE. This district is composed of at least 74 contributing elements, including landscaping and orchards, trash scatters, roads and trails, walls and fences, standing structures, dams, bedrock milling features, rock shelters, and habitation debris. None of these elements are located within 0.5 mile of the APE.

5.0 NATIVE AMERICAN COORDINATION

On July 18, 2018, HELIX requested that the NAHC conduct a search of their Sacred Lands File for the presence of Native American sacred sites or human remains in the vicinity of the proposed project site. A written response received from the NAHC on July 25, 2018 stated that the Sacred Lands File failed to indicate the presence of Native American cultural resources in the immediate project area.

On July 30, 2018, HELIX sent letters to the following six Native American contacts that were recommended by the NAHC as potential sources of information related to cultural resources in the vicinity of the project area:

- Rosemary Cambra, Chairperson, Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- Tony Cerda, Chairperson, Costanoan Rumsen Carmel Tribe
- Andrew Galvan, Ohlone Indian Tribe
- Katherine Erolinda Perez, Chairperson, North Valley Yokuts Tribe
- Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan Ohlone People
- Irenne Zwierlein, Chairperson, Amah Mutsun Tribal Band of Mission San Juan Bautista

The letters advised the tribes and specific individuals of the proposed project and requested information regarding cultural resources in the immediate area, as well as any feedback or concerns related to the proposed project. To date, one response has been received:

- Kanyon Coyote Woman Sayers-Roods responded on behalf of the Indian Canyon Mutsun Band of Costanoan Ohlone People on August 27, 2018. Ms. Sayers-Ropods wrote, “We are inquiring if you are familiar with this area and if it contains any culturally sensitive recorded sites. If there are any culturally sensitive sites within a quarter of a mile or if this site is near any waterways, we are expressing our concern about this project and wish to be consulted. If there is to be any earth movement in these areas, we recommend that a Native American Monitor and an Archaeologist be present on-site at all times any disruptive surveying or earth movement transpires.”

Correspondence related to Native American coordination is provided in Appendix A.

6.0 ARCHAEOLOGICAL SURVEY

Archaeological surveys of the central section and the western half of the northern section of the project area were completed on August 6 through 8, 2018, by HELIX archaeologists Clarus J. Backes, Jr., RPA, Kate Thomas, RPA, Katherine Eadie, and Shane Davis. Infill surveys were conducted on the eastern half of the northern section, the southeastern section, and the southwestern section of the project area on March 3 and 4, 2020 by HELIX archaeologists Clarus J. Backes, Jr., RPA and Jentin Joe. The surveys involved systematic investigation of the ground surface in 15-meter transects. During the surveys, the ground surface was examined for artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools, fire-affected rock, prehistoric ceramics), soil discoloration that might indicate the presence of a prehistoric cultural midden, soil depressions, and features indicative of the former presence of structures or buildings (e.g., standing exterior walls, postholes, foundations, wells, mines) or historic debris (e.g., metal, glass, ceramics). Ground disturbances such as gopher holes, burrows, cut banks, and arroyos were also visually inspected. A global positioning system (GPS) receiver and a topographic map were used to locate the project area boundaries and maintain survey accuracy.

6.1 NORTHERN SECTION OF THE PROJECT AREA

The northern section of the project area is generally flat cropland and slopes slightly uphill to the north (Figure 6). The soils in this section are compact, reddish-gray sandy clay loam with small to medium igneous (basalt, rhyolite, and granitic) pebbles and cobbles. A thin obsidian lag deposit is represented by

occasional small obsidian nodules (Apace tears). The area, which is harvested for hay production, is dominated by oats but also includes weedy non-crop species such as soft brome, Italian rye grass, pineapple weed, and other annual grasses and forbs. As such, survey visibility was fair to good, with approximately 75 percent of the ground surface visible. The unirrigated cropland functions in a similar fashion to adjacent non-native grasslands on the south side of Manning Road. The area appears to have been in agricultural use for nearly a century based on historical aerial imagery. No cultural materials were found in the northern section of the project area.

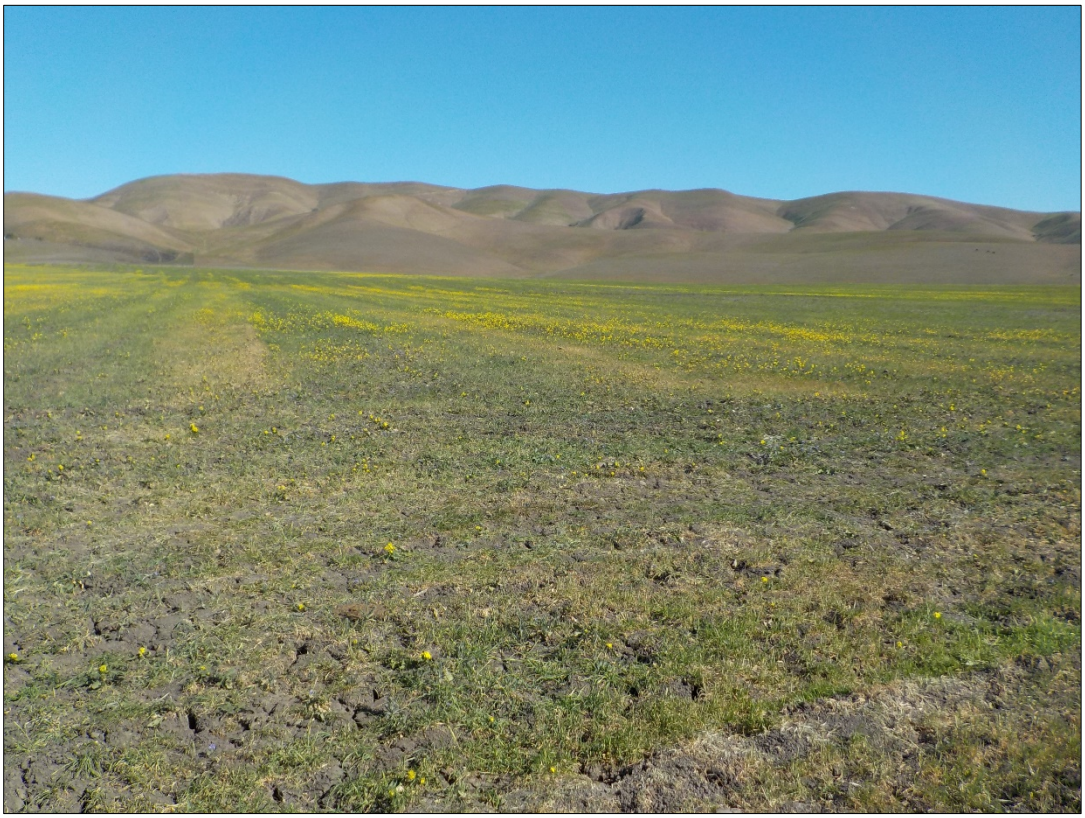


Figure 6. Northern section of the project area, looking north

6.2 CENTRAL SECTION OF THE PROJECT AREA

The central section of the project area primarily consists of grazed fields and field margins, with cattle actively grazing the area during surveys (Figure 7). Most of the area is dominated by wild oats, soft brome, yellow-star thistle, and ripgut brome. Other portions of this non-native grassland community are dominated by a mix of Italian rye grass, black mustard, medusahead, and soft brome. The soils in the central section of the project area are reddish-brown alluvial clay loam with small to medium igneous and metamorphic pebbles.

Cayetano Creek, an intermittent stream, enters the central section at the north and drains to the south. A separate branch of Cayetano Creek enters the stream near the central section's southern boundary. Within the project area, Cayetano Creek does not appear to be altered, rerouted or otherwise heavily disturbed by agricultural practices. The banks of this stream are steeply incised with a narrow stream channel. Cattle trails are present in the stream and along its banks, and the stream shows evidence of heavy grazing from cattle. At the far southeastern corner of the central section is a graveled or paved

staging area with farm equipment. This area is heavily disturbed and consists mostly of bare ground or landscaped vegetation.



Figure 7. Central section of the project area, looking north

Near the northwestern corner of the central section, just south of Manning Road, is a concrete slab foundation and debris (Figure 8). The foundation may be associated with a structure that appears on historic topographic maps dating back to the late 1800s, although its construction and general lack of weathering suggest that it may not be particularly old. Adjacent to the foundation is a large pile of lumber fragments and refuse that may represent a demolished structure. The foundation is currently occupied by a modern camping trailer, and modern livestock watering troughs with buried pipes are located in the immediate vicinity. No historic-era or prehistoric artifacts were found in the vicinity of the foundation or anywhere else in the central section of the project area.



Figure 8. Foundations and debris near the northeast corner of the central section, looking south

6.3 SOUTHERN SECTIONS OF THE PROJECT AREA

The small southern sections of the project area are both currently being used to grow hay (Figure 9). The soils in both areas are similar to those in the central section, although the southwestern section has larger igneous cobbles and occasional fragments of caliche. Survey visibility in this section was fair, with less than 50 percent of the ground surface visible. The southeastern section is a flat, plowed and planted hay field with few pebbles or cobbles. Due to the crop cover, visibility in this section was poor, with less than 25 percent of the ground surface visible. No cultural materials were found in the southeastern or southwestern sections of the project area.



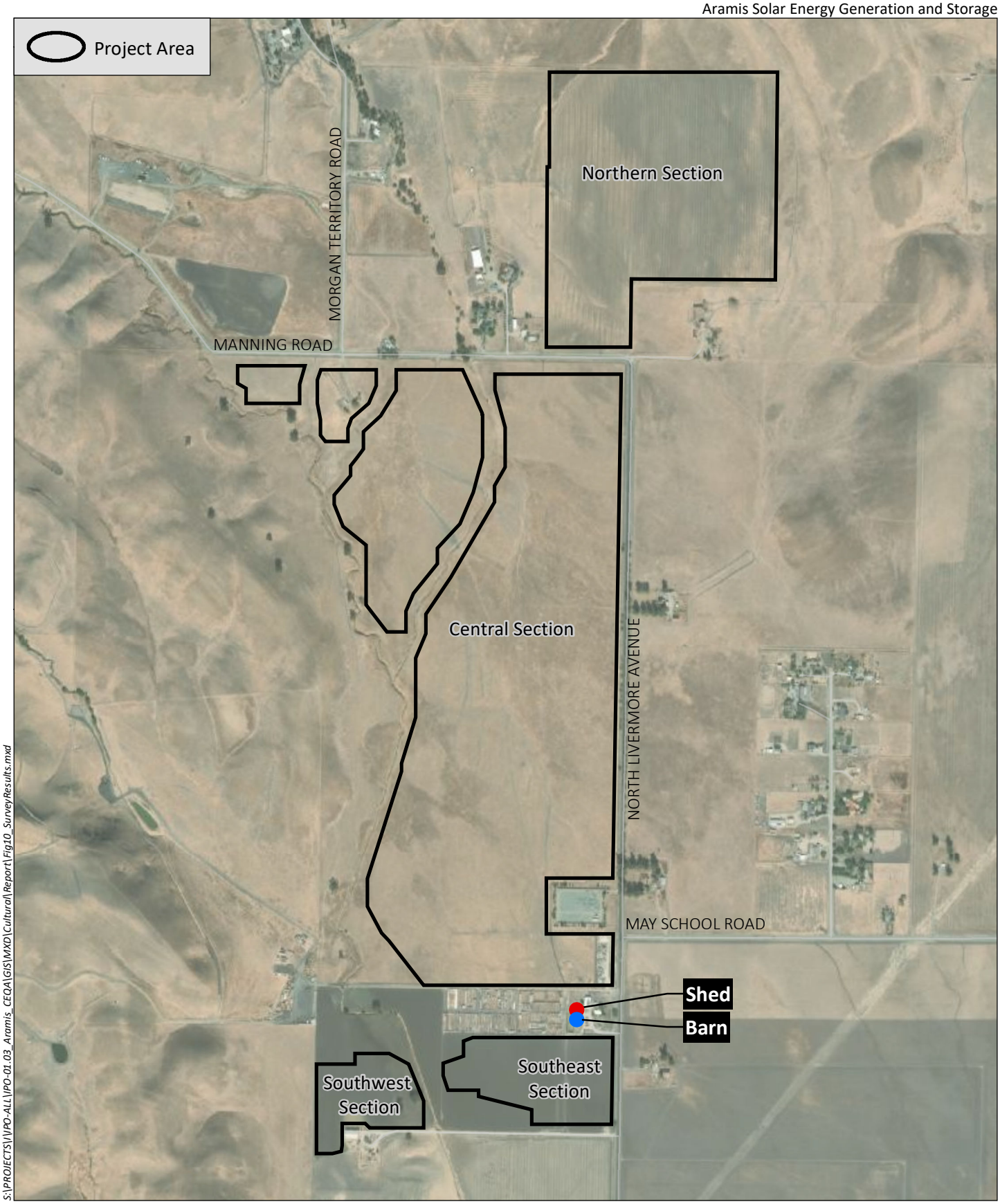
Figure 9. Southeastern section of the project area, looking north

7.0 BUILT-ENVIRONMENT ANALYSIS AND EVALUATION

Fieldwork for the built-environment analysis of the subject property (the Stanley Ranch at 4400 N. Livermore Avenue) was conducted on March 16, 2020 by HELIX architectural historian Annie McCausland. The fieldwork included collecting photo documentation, architectural descriptions, character defining feature identification, and integrity notes related to an historic-era barn and shed located on the property. HELIX has prepared a California Department of Parks and Recreation (DPR) site record for the Stanley Ranch that is provided in Appendix B.

7.1 RESOURCE DESCRIPTIONS

Stanley Ranch at 4400 N. Livermore Ave. (subject property) is located in a rural landscape of ranch properties within northeast Alameda County, north of the City of Livermore. An historic barn and shed are located on the 105-acre ranch with other contemporary infrastructure including a mobile home and a chicken farm (Figures 10, 11, and 12). The ranch currently produces beef cattle, horse-quality hay, straw, grain, and free-range eggs.



S:\PROJECTS\V\PO-ALL\PO-01_03_Aramis_CEQA\GIS\MXD\Cultural\Report\Fig10_SurveyResults.mxd

0 1,200 Feet

Source: Base Map Layers (Maxar 2018)

HELIX Environmental Planning

Survey Results

Figure 10



Figure 11. Stanley Ranch at 4400 N. Livermore Ave., looking north from the gravel driveway



Figure 12. Open grass ranch land adjacent to the barn, looking south

7.1.1 Barn

The barn's original function appears to have been as a cattle feed and hay barn but is currently used for storage. This post-and-beam three-portal crib barn is approximately 4,092.55 square feet with a rectangular footprint that partially rests on both concrete pier blocks and sill plates. The barn features a front gabled corrugated metal roof and lean-tos on the south and north elevations with corrugated metal shed roofs (Figures 13 and 14). The roof is supported on 2" x 6" rafters with 2" x 4" purlins. The exterior of the barn is clad with vertical 1" x 12" redwood boards on the east and south façades. The south lean-to retains its original openings (likely for cattle) and the north lean-to openings have been boarded up with plywood (Figures 15 and 16). The east façade features a large primary opening that looks to have been expanded at some point when the barn door was removed. The opening features an exposed hay rail with metal chain for lifting hay bales (Figure 14). Both lean-tos feature a sliding barn door and a cut square opening for natural light and ventilation on the east façade (Figures 15 and 17). The west façade features vertical wood board siding, possibly redwood, and a plywood barn door on the north end (Figure 18). The west façade also features a natural light and ventilation opening in the gable. A contemporary gutter system has been installed along the roofline of the barn on the south and east facades.

The barn's interior showcases its vernacular post-and-beam construction (Figures 19 and 20) Several support braces have been added throughout. It appears that the posts and beams may have been replaced over the decades because they are in relatively good condition and the color of the framing does not match the rest of the structure. Waist high wooden dividers separate the central hay bay and the bays within the lean-tos (likely cattle feeding bays) (Figure 20). Stabilization cables have also been installed.



Figure 13. Historic post-and-beam vernacular barn and shed east and south facades, looking northwest from the gravel driveway



Figure 14. Barn east façade, looking southwest. Notice the large expanded opening and the protruding hay rail from the front gable



Figure 15. Barn south façade with openings, possibly for cattle, looking north



Figure 16. Barn north and west façade, looking southeast. Notice the plywood siding on the north façade



Figure 17. Sliding barn door and light opening on the south lean-to east façade of barn, looking west



Figure 18. Barn west façade, looking southeast. Notice the plywood sliding barn door



Figure 19. Barn interior with post-and-beam construction and bay dividers, looking west



Figure 20. Barn interior, looking west

7.1.2 Shed

The shed's original function appears to have been either for hay storage or for vehicle and implement storage. The shed is currently used for vehicle and implement storage. The vernacular post-and-beam constructed shed is approximately 1,813 square feet and has a rectangular footprint supported by new concrete piers (Figure 21). The shed features a side gabled corrugated metal roof supported by rafters and purlins. The exterior is partially clad with horizontal 1" x 12" redwood siding, like the barn's east façade siding. The rest of the shed is clad with horizontal 1" x 6" boards, possibly redwood (Figures 21 and 22). The primary east façade includes five supporting posts with a new support beam above connected with metal brackets (Figure 21). The original support beam with mortices, possibly from an older building, rests above and is stabilized by the newer primary support beam (Figure 23). Some of the original posts have been removed to allow for storage of larger equipment. The posts and beams appear to be made of redwood. The interior of the shed is open for storage and does not include any architectural elements of note. A trailer was stationed against the west façade of the shed blocking the view of the west façade. The north façade was also not accessible during the survey.



Figure 21. Shed south and east façades, looking northwest



Figure 22. Shed south façade with 1” x 12” horizontal redwood siding on the lower half and 1” x 6” on the upper half, looking northwest



Figure 23. Interior of shed with its post-and-beam construction, looking west. Notice the primary support beam above with metal brackets. An older support beam with mortise rests above the newer primary support beam. This beam most likely comes from an older structure which is a common feature of vernacular ranching structures

7.2 HISTORIC CONTEXT

7.2.1 Stanley Ranch

George Chester Stanley was a Vermont native, born in 1840 to a farming family. He emigrated to California before the Civil War and found work on a farm near Fremont. In 1862, he began managing a mule team that carried supplies to mining camps in the Sierras. By 1866, Stanley left the mule team and opened up a butcher shop in Rancho San Jose and then another in Livermore. He secured a two-year contract to provide meat for the Central Pacific Railroad construction labor camps circa 1869. His brother John C. Stanley became his business partner, and they each purchased ranch land in Livermore Valley circa 1869. (Homan 2007:444-445; Thompson & West 1878). John C. Stanley's primary residence and ranch was located on Mines Road (Homan 2007:45; U.S. Census Bureau 1910).

The 1876 Alameda County Business Directory lists George C. Stanley as a farmer and a sheep raiser. He was listed as one of the largest landowners in Murray township with 936 acres (Alameda County 1876). George C. Stanley had purchased land within Rancho Las Positas Parcel B as shown in Figure 24 (Thompson & West 1878). His primary residence was located on 2nd Street in downtown Livermore as shown in Figure 25 (Thompson & West 1878).

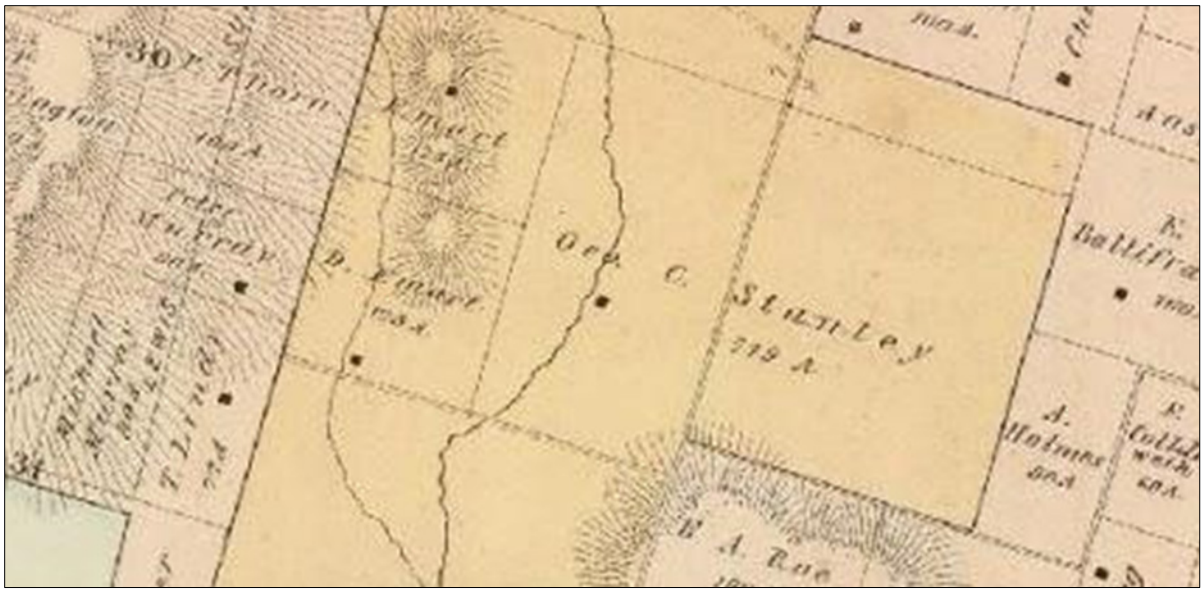


Figure 24. Portion of Alameda Co. 7. From the Thompson & West Atlas showing George C. Stanley's lands within Rancho Las Positas, 1878. Courtesy of the David Rumsey Collection (Thompson & West 1878)

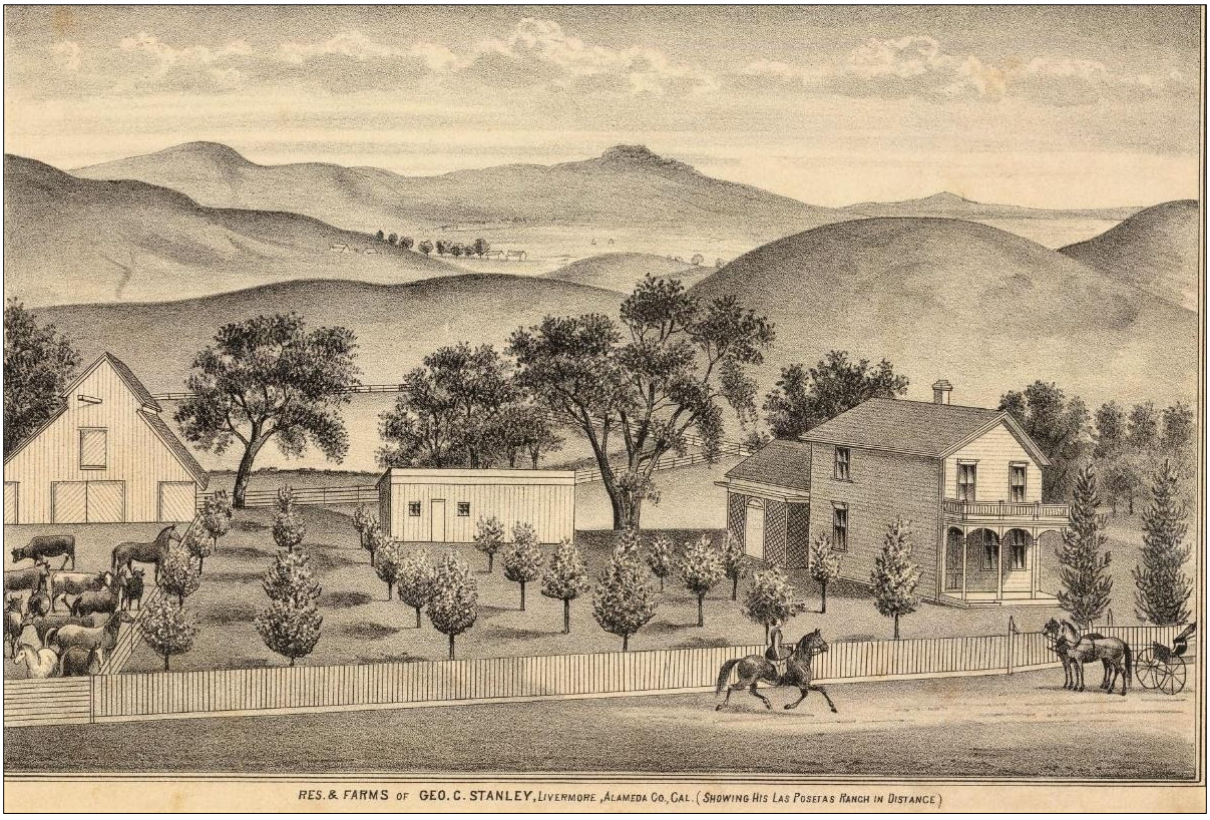


Figure 25. George C. Stanley residence and Las Positas Ranch in the background illustrated in the 1878 Thompson & West Atlas. Courtesy of the David Rumsey Collection (Thompson & West 1878)

In 1879 George's farm produced $11,000.00 in revenue including $250 in hay (U.S. Census Bureau 1880). In the 1880 Non-Population Schedule, the Stanley family's farmland, buildings, and fences were valued at $40,000. Their livestock were valued at $6,000, and farm implements were valued at $1,200 (U.S. Census Bureau 1880). By the mid-1880s, George had acquired a large portion of Parcel A of Rancho Las Positas, expanding his ranch (Figure 26). According to an article in the *Livermore Herald*, in 1881 George C. Stanley owned 600 acres of land used for grain production (*Livermore Herald* 1880). Based on the historic records available, it appears that the Stanley ranch historically produced grain and hay and raised livestock including cattle and sheep.

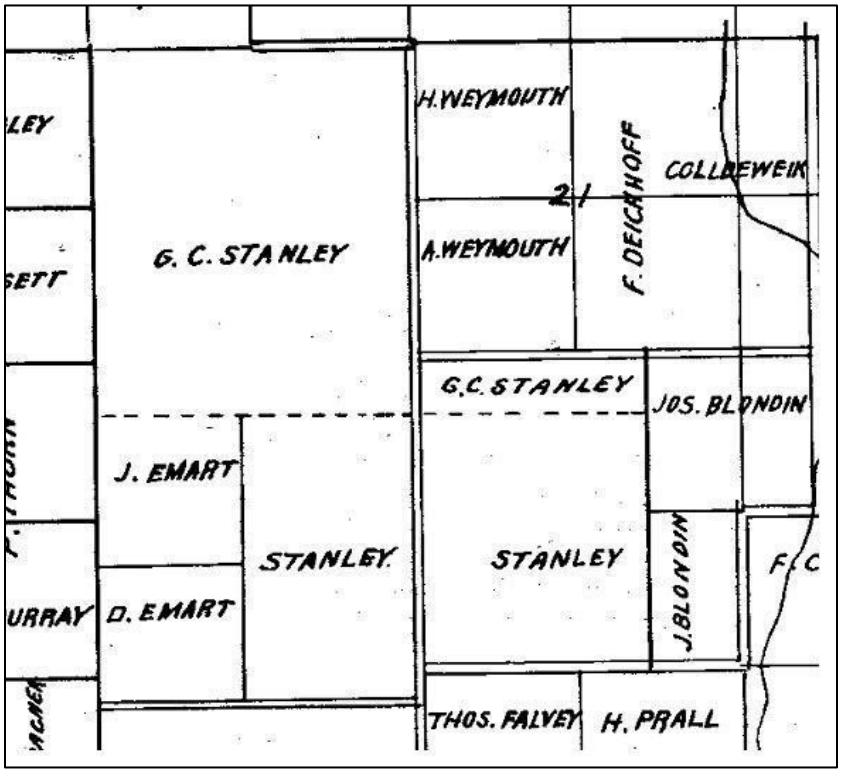


Figure 26. Stanley Ranch land within Rancho Las Positas, circa 1885. Courtesy of Alameda County (Alameda County c. 1885)

In 1885, George and John's brother, Joseph S. Stanley, moved to California from Vermont to help George with his ranch on Beck Road, now known as N. Livermore Ave. (Homan 2007:444-445). George also served as superintendent and part-owner of the Stanley and Bartlett Magnesia Mine in Chiles Valley. His mining investments led to his murder on May 29, 1900 when he was shot over a mining dispute. George's estate was divided up between his widow Emma Stanley and his two sons George R. and Leland C. Stanley (*Weekly Calistogian* 1900). George's brother Joseph S. continued working the ranch after George's death (Homan 2007:445).

By 1912, brothers Leland C. Stanley and George R. Stanley owned the Stanley ranch land within Rancho Las Positas Parcels A and B as shown in Figure 27. Leland C. Stanley's family and Joseph's son, John M. Stanley 's family continued to ranch on N. Livermore Ave. (Beck Road) throughout the twentieth century (U.S. Census Bureau 1910; 1920; 1930; 1940; State of California 1900-1968). The 1920's U.S. Census lists Leland C. Stanley and his wife and four children living on Beck Road (N. Livermore Ave.) and running a "general" farm. John M. Stanley and his family are also listed on Beck Road and running a "general" farm

(U.S. Census Bureau 1920). It is unclear which family worked the ranch at 4400 N. Livermore Ave. or if they worked this ranch property together.



Figure 27. Murray Township map illustrating that George C. Stanley's son, Leland C. Stanley, owned most of the Stanley ranch land within Rancho Las Positas by 1912. Courtesy of Alameda County (Haviland 1912)

7.2.2 4400 N. Livermore Ave. (Beck Road)

The subject property at 4400 N. Livermore Ave. is a portion of the historic Stanley Ranch as shown in Figures 24, 25, and 27. The 1878 map as shown in Figure 24 and the Stanley Ranch illustration in Plate 25 indicate that a building or a complex of buildings and structures was extant within George C. Stanley's ranch property in Rancho Las Positas Parcel B by 1878. It is unknown when the extant barn was constructed, although it appears to be sometime between 1878 and 1904 according to the historic records available. The earliest record confirming that a structure was extant within the subject property at 4400 N. Livermore Ave. is the 1906 Pleasanton topographic map as shown in Figure 28. The survey for the map was completed in 1904 (USGS 1906). The earliest aerial photograph available is from 1939 as shown in Figure 29. The photograph shows the barn and other accessory structures and possibly a dwelling which are no longer extant. It appears that these other accessory ranching structures and possibly a dwelling were demolished in the 1960s. The extant shed is not present in the 1939 aerial. The shed first appears in the 1958 aerial photograph as shown in Figure 30 and was constructed sometime between 1949 and 1958 by Leland E. Stanley, Leland C. Stanley's son (NETROnline 2020; Stanley 2020;

State of California). Between 1961 and 1980, three buildings/structures were added to the property including a mobile home in 1977 (USGS 1961; 1968; 1973; 1980; Stanley 1977). The addition of the mobile home is the only building record on file with Alameda County for 4400 N. Livermore Ave.

Leland C. Stanley passed away in 1959 and was survived by five children and eight grandchildren (*San Francisco Examiner* 1959). Leland E. Stanley passed away in 2003 (Social Security Administration 1935-2014). Richard Stanley, Leland E. Stanley's son, currently owns and manages the ranch.

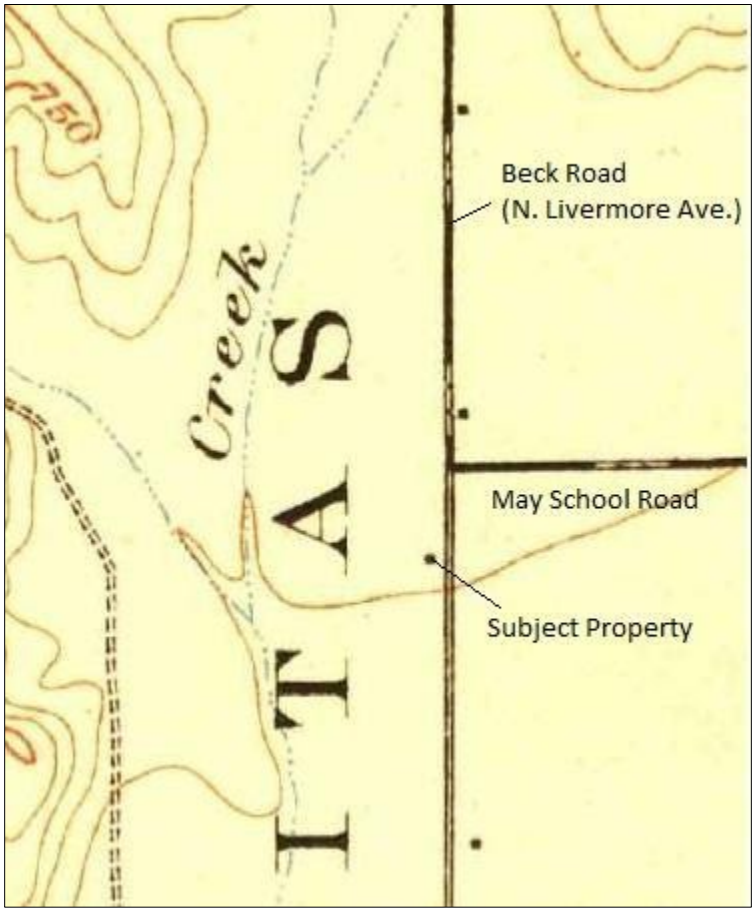


Figure 28. Portion of Pleasanton Quad Map published in 1906, surveyed in 1904. Courtesy of USGS (USGS 1906)

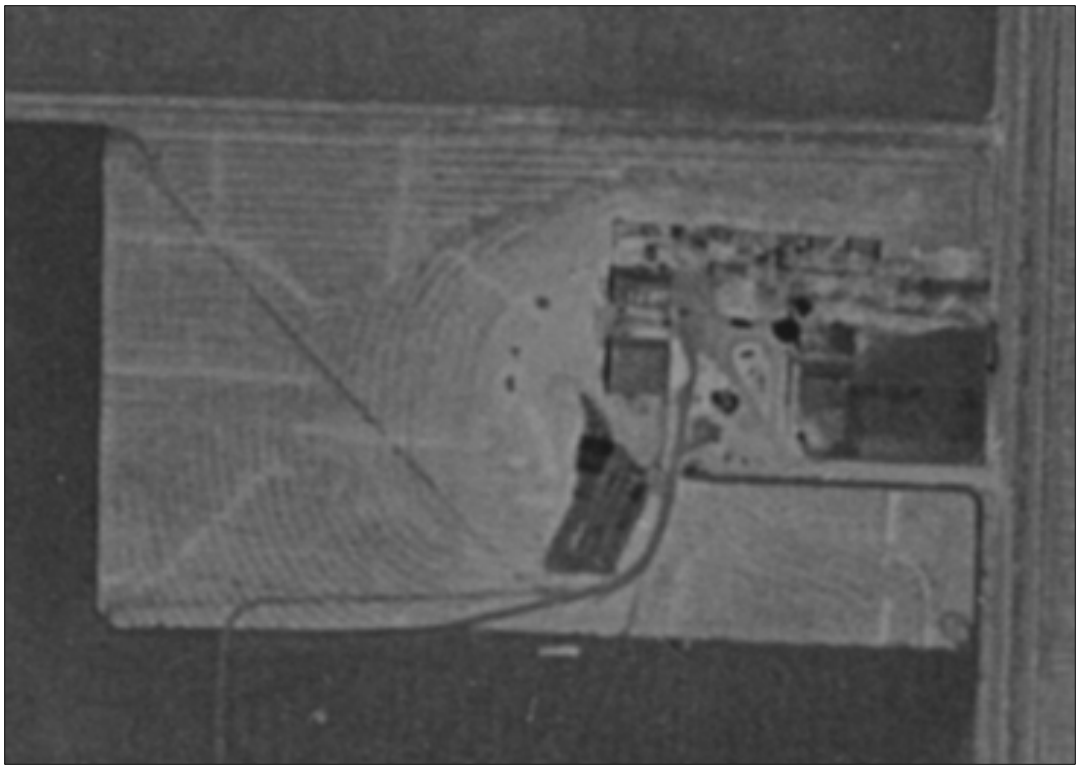


Figure 29. Aerial photograph of the subject property in 1939. Notice the barn is extant along with another structure that is no longer present. Courtesy of the University of California Santa Barbara Library (AAA 1939)



Figure 30. Aerial photograph of the subject property in 1958. Notice the shed is extant. Courtesy of the University of California Santa Barbara Library (ASCS 1958)

7.3 NRHP/CRHR EVALUATION

The subject property has functioned as a ranch from circa 1869 to the present (2020), supporting the agricultural pursuits of the Stanley family, including the cultivation of grain and hay as well as raising cattle, sheep, and horses. Since this is an historic ranch property, the *National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes* was utilized for this evaluation (NPS 1989). Each NRHP/CRHR criterion is addressed individually below, followed by a discussion of the property's historical integrity and character-defining features.

Criterion A/1. The subject property with its historic barn and shed is associated with the ranching history of Alameda County and Murray Township during the late nineteenth century to the present. The subject property once had other ranching accessory structures and buildings and possibly a farmhouse. The subject property does not exhibit a complete historic ranch complex and is not recommended to be a significant example of a ranching property in Murray Township as other complete ranching complexes exist (Corbett 2005). Ranching properties typically included a farmhouse, pumphouse, and other accessory ranching structures. Hagemann Ranch, an NRHP listed historic district in the City of Livermore is a good example of a complete historic ranch property (Brandi et al. 2007). Typically, the ranching family lived and worked on the same property. In the case of Stanley Ranch, it is unclear if there was a historic farmhouse once extant on the property. Based on the data provided in the *Historical and Cultural Resource Survey: East Alameda County*, the subject property with its historic barn and shed is not considered a significant example of a historic ranching property in Alameda County and Murray Township (Corbett 2005). The subject ranching property with its historic barn and shed is recommended not historically significant under Criterion A/1.

Criterion B/2. The subject property with an historic barn and shed are associated with the Stanley family who have been ranching on N. Livermore Ave. (Beck Road) since circa 1869. Intensive research on the family did not reveal any family members associated with the ranch; including George C. Stanley, Joseph S. Stanley, Leland C. Stanley, John M. Stanley, and Leland E. Stanley to be of historical significance at a national, state, or local level. The subject property with its historic barn and shed is not associated with any person(s) of historical significance, and it is not recommended historically significant under Criterion B/2.

Criterion C/3. The barn and shed embody the distinctive characteristics of vernacular post-and-beam ranch structures constructed within Murray Township during the late nineteenth to mid-twentieth centuries. The barn was constructed sometime between 1878 and 1904. The shed was constructed by rancher Leland E. Stanley between 1949 and 1958. The Stanley family continues to utilize the barn and shed for ranching activities to the present day (April 2020).

The illustrations and data provided in Thompson & West's *New Historical Atlas of Alameda County*, published in 1878, confirm that barns in Murray Township were characterized by moderately pitched gable roofs, flanking shed lean-tos, upper double doors, and sliding double front and side doors (Brandi et al. 2007). The typical two-story, gable and shed-roof barns depicted in the 1878 Thompson and West Atlas illustrations most likely derived from the "crib-and-shed" type barns of Tennessee. Composed of a central gable-roof flanked by shed-roofed lean-tos, the crib-and-shed barns disseminated westward through the Plains states, where they were modified to employ timber framing instead of log construction. In this guise, the "three portal crib barn" eventually infiltrated the valleys of the Pacific West, including the Willamette Valley of Oregon and the San Joaquin, Sacramento, Santa Clara and

Salinas Valleys of California, where the original prototype was gradually modified in response to local conditions and crops (Brandi et al. 2007).

In addition to lightweight and economical construction, California ranch buildings were often characterized by their flexibility and adaptability to new uses. In contrast to Eastern and Midwestern agricultural buildings, California ranch buildings generally lack heavy timber-framing, weather-tight construction or insulating materials which allowed them to be assembled and modified quickly. California ranch structures were typically designed without the aid of an architect. The Stanley Ranch barn and shed feature this regional approach to construction referred to as post-and-beam construction (Brandi et al. 2007).

The Stanley Ranch with its vernacular post-and-beam barn and shed is recommended historically significant under Criterion C/3 at the local level with a period of significance dating from 1869 to 1970, the historic active period of the ranch. According to National Park Service Guidelines, if the historic property is in continuous use, fifty years from the year of evaluation may be used as the closing date for the period of significance (NPS 1989:21).

Criterion D/4. This Criterion is most relevant for archaeological sites, but it can be applied to built-environment resources if further study has the potential to yield information that cannot be obtained from other sources. Historical information about vernacular post-and-beam construction and California barns and ranching structures is prevalent, and further study would not add any new information. The subject property, with its historic barn and shed, is recommended not significant under Criterion D/4.

Integrity. This section addresses whether the subject property retains sufficient integrity to convey its local historical significance under Criterion C/3. This evaluation follows the seven aspects of integrity described by the National Park Service: location, setting, association, materials, workmanship, design, and feeling (NPS 2002).

The barn and shed retain integrity of location because they appear to be in their original footprint. The barn and shed are located on a working ranch that features a few contemporary structures including a mobile home. The property is surrounded by open ranch land to the south, west, and north. N. Livermore Ave. (Beck Road) runs adjacent to the east just as it has since the mid-nineteenth century. Overall, the historic setting of the ranch property is retained despite the added contemporary structures. The barn and shed both appear to have been modified over the decades, but the modifications are utilitarian in nature including some in-kind replacement of siding and roof materials, and alterations to primary openings in order to improve the utility of the structures to suit contemporary needs. This is a characteristic of vernacular post-and-beam ranching infrastructure, and these modifications do not alter the integrity of the barn and shed's design, workmanship, and materials. In addition, the shed appears to feature repurposed materials from older ranching structures. This is evident through one of the beams that spans the east façade which has mortises cut in it. Mortise and tenon construction is an older method and is not found in any existing structures on site. The beam must have been repurposed from an older structure that is no longer extant adding to its vernacular aesthetic. The shed's south façade shows two types of siding, including redwood 1" x 12" possibly from the barn or another structure. These modifications do not diminish the shed and barn's association with vernacular ranching structures with post-and-beam construction. The barn and shed convey the feeling of historic vernacular post-and-beam ranch structures especially since they are still in use in the same location and ranch. In conclusion, the subject property with its historic barn and shed retains sufficient

integrity to convey its significance under Criterion C/3 at the local level with a period of significance from 1869 to 1970, the historic active period of the ranch.

Character-Defining Features. Character defining features of the barn include its three portal crib design, 1" x 12" and 1" x 6" redwood siding, protruding hay rail, ventilation openings, cattle openings on the south façade, interior waist-high bay dividers, and its vernacular post-and-beam construction.

The character defining features of the shed include its vernacular post-and-beam construction, 1" x 12" and 1" x 6" redwood siding, the mortised beam above the primary support beam, and its side gabled roof.

7.4 COUNTY LANDMARK

A nominated resource shall be added to the Alameda County Register as a County Landmark if the Board of Supervisors finds, after holding the hearings, that all of the requirements set forth below are satisfied:

1. The nominated resource meets one or more of the following criteria:

    a. It is associated with events that have made a significant contribution to the broad patterns of the history of the County, the region, the state or the nation;

        - The subject property is not recommended eligible under Criterion A for the same reason stated above in the NRHP/CRHR Criterion A/1 evaluation.

    b. It is associated with the lives of persons significant in the County's past;

        - The subject property is not recommended eligible under Criterion B for the same reason stated above in the NRHP/CRHR Criterion B/2 evaluation.

    c. It embodies the distinctive characteristics of a type, period or method of construction;

        - The subject property is recommended eligible under Criterion C for the same reason stated above in the NRHP/CRHR Criterion C/3 evaluation.

    d. It represents the work of an important creative individual or master;

        - It is unknown who constructed and designed the barn. The shed was constructed by Leland E. Stanley. Leland E. Stanley was a rancher and not known to be a master architect. The subject property is not recommended historically significant under Criterion D.

    e. It possesses high artistic values; or

        - The barn and shed do not possess high artistic values. Therefore, the property is not recommended historically significant under Criterion E.

    f. It has yielded, or may be likely to yield, information important in the prehistory or history of the County, the region, the state or the nation.

        - Historical information about vernacular post-and-beam construction and California barns and ranching structures is prevalent, and further study would not add any new

information. The subject property with its historic barn and shed is recommended not significant under Criterion F.

2. The nominated resource has integrity of location, design, setting, materials, workmanship, feeling and association. Integrity shall be judged with reference to the particular criterion or criteria specified in subparagraph 1.
    - The barn and shed retain sufficient integrity to convey their significance under Criterion C with a period of significance 1869 to 1970. Please refer to the integrity evaluation provided in the NRHP/CRHR evaluation for the detailed breakdown.

3. The nominated resource has significance historically or architecturally, and its designation as a landmark is reasonable, appropriate and necessary to promote, protect, and further the goals and purposes of this chapter.
    - The barn and shed are considered significant post-and-beam vernacular ranching structures and are eligible for landmark listing as demonstrated above in the County landmark evaluation under Criterion C.

4. The nominated resource has been evaluated by a qualified historical resources consultant who meets one or more of the Secretary of the Interior's professional qualifications standards or who are certified by the Register of Professional Archaeologists, and the evaluator has submitted documents that provide evidence of the resources historical or architectural significance.
    - The barn and shed were evaluated by Ms. Annie McCausland, an architectural historian who meets the Secretary of the Interior’s professional qualifications standards for architectural history.

7.5 STRUCTURE OF MERIT

A nominated resource shall be added to the Alameda County Register as a structure of merit if the Board of Supervisors finds, after holding hearings, that it satisfies one or more of the following criteria:

1. It represents in its location an established and familiar visual feature of the neighborhood, community or County; or

2. It materially benefits the historic, architectural or aesthetic character of the neighborhood or area; or

3. It is an example of a type of building that once was common but is now rare in its neighborhood, community or area; or

4. It is connected with a business or use which was once common but is now rare; or

5. It contributes to an understanding of the contextual significance of a neighborhood, community or area.

The subject property, with its historic barn and shed, is known as the Stanley Ranch. The ranch is an established and familiar feature of the neighborhood and local community. The barn and shed with their post-and-beam construction are rare examples of vernacular post-and-beam construction that

materially benefit the historic aesthetic character of the neighborhood which is a rural ranching community. The barn and shed are not connected to a business that is now uncommon. They do, however, add to the contextual significance of the neighborhood, community, and area which is known as a ranching community that feature a collection of historic ranch properties according to the Historical and Cultural Resource Survey: East Alameda County (Corbett 2005). The barn and shed are recommended to be listed as Alameda County Structures of Merit under criteria 1, 2, 3 and 5.

8.0 CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

8.1 CONCLUSIONS

8.1.1 Archaeological Resources

The records search determined that no previously recorded cultural resources are located within the project area boundaries, and no archaeological resources were encountered during the survey. Native American coordination did not provide information about any specific prehistoric resources in the area, although one Native American contact expressed concern that the area was sensitive for archaeological resources. Based on these findings, the project area has a low to moderate potential to contain buried archaeological resources.

8.1.2 Built-Environment Resources

This study found 4400 N. Livermore Ave. eligible for the NRHP, CRHR, and the local County register, and the barn and shed are considered historical resources under CEQA. The barn and shed footprints are outside of the project area and would be preserved in place. However, with the construction of the proposed solar energy generation and solar facility, the historic ranch, which has been used for oat and hay cultivation and livestock grazing, would no longer be open ranch land. The proposed project will indirectly impact these historical resources by disrupting the integrity of their setting and feeling, causing a potentially significant impact under CEQA.

8.2 MANAGEMENT RECOMMENDATIONS

8.2.1 Archaeological Recommendations

Subsurface construction activities such as trenching and grading associated with the project have the potential to damage or destroy previously undiscovered archaeological resources, resulting in a potentially significant impact. With implementation of the recommendations proposed below, potential impacts to previously undiscovered historical resources would be reduced to a less than significant level.

8.2.1.1 Worker Training Program

Prior to the initiation of construction or ground-disturbing activities, HELIX recommends that all construction personnel be trained in the protection of cultural resources, the recognition of buried cultural remains, and the notification procedures to be followed upon the discovery of archaeological materials, including Native American burials. The training should be presented by an archaeologist who

meets the Secretary of Interior's Standards for Prehistoric and Historic Archaeology and should include recognition of both prehistoric and historic resources. Personnel should be instructed that unauthorized collection or disturbance of artifacts or other cultural materials is illegal, and that violators will be subject to prosecution under the appropriate state and federal laws. Supervisors should also be briefed on the consequences of intentional or inadvertent damage to cultural resources.

8.2.1.2 Inadvertent Discoveries

In the event that cultural resources are exposed during ground-disturbing activities, construction activities (e.g., grading, grubbing, or vegetation clearing) should be halted in the immediate vicinity of the discovery. An archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards should then be retained to evaluate the find's significance under CEQA. If the discovery proves to be significant, additional work, such as data recovery excavation, may be warranted and should be discussed in consultation with the County.

8.2.1.3 Discovery of Human Remains

Although there is no evidence to suggest the presence of human remains in the project area, their discovery is always a possibility during project construction. If such an event did occur, the specific procedures outlined by the NAHC, in accordance with Section 7050.5 of the California Health and Safety Code and Section 5097.98 of the Public Resources Code, must be followed:

1. All excavation activities within 60 feet of the remains will immediately stop, and the area will be protected with flagging or by posting a monitor or construction worker to ensure that no additional disturbance occurs.

2. The project owner or their authorized representative will contact the County Coroner.

3. The coroner will have two working days to examine the remains after being notified in accordance with HSC 7050.5. If the coroner determines that the remains are Native American and are not subject to the coroner's authority, the coroner will notify NAHC of the discovery within 24 hours.

4. NAHC will immediately notify the Most Likely Descendant (MLD), who will have 48 hours after being granted access to the location of the remains to inspect them and make recommendations for their treatment. Work will be suspended in the area of the find until the City approves the proposed treatment of human remains.

8.2.2 Built-Environment Recommendations

The proposed project has the potential to cause indirect, significant impacts to the integrity of the setting and feeling of the Stanley Ranch. Historic American Buildings Survey (HABS) Level 1 documentation, which would include photographically documenting the historical resources within their historic agricultural setting prior to construction of the proposed project, is recommended to mitigate these impacts to a less than significant level.

9.0 REFERENCES

Agricultural Adjustment Administration (AAA). 1939. Alameda County, California, Flight C-5750, Frames 268-2; 268-3-; 268-4. Fairchild Aerial Surveys. Electronic document available at http://mil.library.ucsb.edu/ap_indexes/FrameFinder/, accessed February 18, 2020.

Agricultural Stabilization and Conservation Service (ASCS). 1958. Alameda County, California, Flight BUT-1958, Frame 2V-102. Cartwright Aerial Surveys Electronic document available at http://mil.library.ucsb.edu/ap_indexes/FrameFinder/, accessed April 2, 2020.

Alameda County. 1876. Business Directory of Murray Township. Alameda County Genealogy. Electronic document available at https://www.sfgenealogy.org/alameda/data/al1876.htm, accessed on March 26, 2020.

c.1885 Map of Murray Township. On file with Alameda County.

Alameda County Board of Supervisors. 2012. Ordinance 2012-5. Electronic document available at https://www.acgov.org/cda/planning/generalplans/documents/HPO_Signed.pdf, accessed April 10, 2020.

Arnold, Jeanne E., and Michael R. Walsh. 2010. *California's Ancient Past: From the Pacific to the Range of Light*. Society for American Archaeology Press, Washington D.C.

Brandi, Richard, et al. 2007. National Register of Historic Places Registration Form: Hagemann Ranch District. Electronic document available at https://npgallery.nps.gov/GetAsset/28f5b522-5773-496a-8785-e6ced05f4239, accessed March 28, 2020.

California Historical Society. c.1900. "Agricultural workers in Livermore, circa 1900." Electronic photograph available at https://digitallibrary.californiahistoricalsociety.org/islandora/object/chs:297, accessed April 10, 2020.

Cook, S. F. 1976. The Population of the California Indians, 1769-1970. University of California Press, Berkeley.

Corbett, Michael R. 2005. Historical and Cultural Resource Survey: East Alameda County. Alameda County Community Development Agency. Electronic document available at https://www.acgov.org/cda/planning/landuseprojects/documents/eastalameda.pdf, accessed April 2, 2020.

Dillon, Brian D. 2002. California Palaeoindians: Lack of Evidence, or Evidence of a Lack? In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, edited by W. J. Wallace and F. A. Riddell, pp. 111-128. University of California, Berkeley.

Fredrickson, David A. 1974. Cultural Diversity In Early Central California: A View from the North Coast Ranges. *Journal of California Anthropology* 1(1):41-53.

Harrington, J. P. 1942. Culture Element Distributions: 19, Central California Coast. *University of California Anthropological Records* 7:1-146.

Haviland, P.A. 1912. Murray Township, Alameda County. Map on file with Alameda County.

Homan, Anne. 2007. Historic Livermore, California: Illustrated, A-Z. Hardscratch Press, Walnut Creek, California.

Hughes, R.E. (editor). 1994. Toward a New Taxonomic Framework for Central California Archaeology: Essays by James A. Bennyhoff and David A. Fredrickson. Assembled and edited by Richard E. Hughes. Contributions of the University of California No. 52, Archaeological Research Facility, Berkeley, CA.

Levy, R. S. 1978. Costanoan. In California, edited by R. F. Heizer, pp. 485-495. Handbook of North American Indians Vol. 8. Smithsonian Institution, Washington D.C.

Lightfoot, Kent G. 1997. Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay. In *Archaeology of the California Coast during the Middle Holocene*, edited by Jon M. Erlandson and Michael Glassow, pp. 263-281. Cotsen Institute of Archaeology, University of California, Los Angeles.

Lillard, J.B., R.F. Heizer, and F. Fenenga. 1939. An Introduction to the Archaeology of Central California. Sacramento Junior College, Department of Anthropology, Bulletin 2. Sacramento.

Livermore Herald. 1880. "Local Brieflets." *Livermore Herald*, Volume 7, No. 27, May 27, 1880. Electronic document available at https://cdnc.ucr.edu/, accessed February 12, 2020.

Meyer, Jack and Jeffrey S. Rosenthal. 1997. *Archaeological and Geoarchaeological Investigations at Eight Prehistoric Sites in the Los Vaqueros Reservoir Area, Contra Costa County, California*. Contra Costa Water District.

Milliken, R., R. Fitzgerald, M. Hylkema, R. Groza, T. Origer, D. Bieling, A. Leventhal, R. Wiberg, A. Gottsfield, D. Gillette, V. Bellifemine, E. Strother, R. Cartier, and D. Fredrickson. 2007. Punctuated Culture Change in the San Francisco Bay Area. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T. L. Jones and K. A. Klar, pp. 99-124. AltaMira Press, New York.

National Park Service (NPS). 1989. National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes. Revised in 1999. U.S. Department of the Interior, National Park Service, Cultural Resources, National Register, History, and Education, Washington D.C.

2002. How to Apply the National Register Criteria for Evaluation. Revised. U.S. Department of the Interior, National Park Service, Cultural Resources, National Register, History, and Education, Washington D.C.

NETROnline. 2020. Historic Aerial Photographs. Electronic document available at https://www.historicaerials.com/, accessed April 2, 20202.

Patterson, Brandon and Alex DeGeorgey. 2014. The Influence of Trade on the Organization of Lithic Technology. *SCA Proceedings* 28:247-266.

Rosenthal, J. S., G. G. White and M. Q. Sutton. 2007. The Central Valley: A View from the Catbird's Seat. In *California Prehistory: Colonization, Culture, and Complexity*, edited by T. L. Jones and K. A. Klar, pp. 147-163. AltaMira Press, New York.

San Francisco Examiner. 1959. Funeral Notice for Leland C. Stanley on July 1, 1959. Electronic article available at Newspapers.com with subscription, accessed April 2, 2020.

Shoup, Laurence H., and Randall T. Milliken. 1999. *Inigo of Rancho Posolmi: the Life and Times of a Mission Indian*. Ballena Press, Novato, California.

Social Security Administration. 1935-2014. Social Security Death Index, Master File. Social Security Administration. Electronic document available at Ancestry.com, with subscription accessed April 2, 2020.

Stanley, Leland R. 1977. Application for Building Permit with Alameda County. On file with the Alameda County Planning Department.

Stanley, Richard. 2020. Oral discussion between Richard Stanley and Ms. McCausland during her site visit on March 16, 2020.

State of California. 1900-1969. Great Register of Voters. Sacramento, California: California State Library. Electronic document available at Ancestry.com, with subscription, accessed April 2, 2020.

Stevens, N. E., J. E. Eerkens, J. S. Rosenthal, R. Fitzgerald, J. E. Goodsell and J. Doty. 2009. Workaday Windmiller: Another Look at Early Horizon Lifeways in Central California. *SCA Proceedings* 23:1-8.

Thompson & West. 1878. New Historical Atlas of Alameda County. Thompson and West: Oakland, California. Official and historical atlas map of Alameda County, California. Electronic map available at http://www.davidrumsey.com/maps2812.html, accessed February 18, 2020.

U.S. Census Bureau. 1880. Murray Township, Alameda County. U.S. Federal Non-Population Schedule. Electronic document available at Ancestry.com, accessed February 18, 2020.

1910. Murray Township, Alameda County. U.S. Federal Census. Electronic document available at Ancestry.com with subscription, accessed February 18, 2020.

1920. Murray Township, Alameda County. U.S. Federal Census. Electronic document available at Ancestry.com with subscription, accessed February 18, 2020.

1930. Murray Township, Alameda County. U.S. Federal Census. Electronic document available at Ancestry.com with subscription, accessed February 18, 2020.

1940. Murray Township, Alameda County. U.S. Federal Census. Electronic document available at Ancestry.com with subscription, accessed February 18, 2020.

United States Geological Survey (USGS). 1906. Pleasanton, Calif., 1:24000. Denver, Colorado.

1961 Livermore, Calif., 1:24000. Denver, Colorado.
1968 Livermore, Calif., 1:24000. Denver, Colorado.
1973 Livermore, Calif., 1:24000. Denver, Colorado.
1980 Livermore, Calif., 1:24000. Denver, Colorado.

The Weekly Calistogian. 1900. Article on the estate of George C. Stanley published June 15, 1900. On file with the Livermore Heritage Guild and HELIX Environmental Planning, Inc.

Ziesing, Grace H. (ed.). 1997. *From Rancho to Reservoir: History and Archaeology of the Los Vaqueros Watershed, California*. Anthropological Studies Center, Sonoma State University Academic Foundation, Inc. Prepared for Contra Costa Water District, Concord, CA.

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Appendix A

Native American Correspondence

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STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
Environmental and Cultural Department
1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471

July 25, 2018

Clarus Backes

Helix EPI

Sent by Email: clarusb@helixepi.com

Re: IPO 01.03 Aramis Renewable Energy Project, Alameda County

Dear Mr. Backes,

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not preclude the presence of cultural resources in any project area. Other sources for cultural resources should also be contacted for information regarding known and/or recorded sites.

Enclosed is a list of Native Americans tribes who may have knowledge of cultural resources in the project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these tribes, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at 916-573-1033 or frank.lienert@nahc.ca.gov.

Sincerely,

Frank Lienert
Associate Governmental Program Analyst

Native American Heritage Commission
Native American Contacts
July 25, 2018

Coastanoan Rumsen Carmel Tribe
Tonv Cerda. Chairperson
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(909) 629-6081

Indian Canvon Mutsun Band of Costanoan
Ann Marie Savers. Chairperson
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(831) 637-4238

Amah MutsunTribal Band of Mission San Juan Bautista
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Rosemarv Cambra. Chairperson
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The Ohlone Indian Tribe
Andrew Galvan
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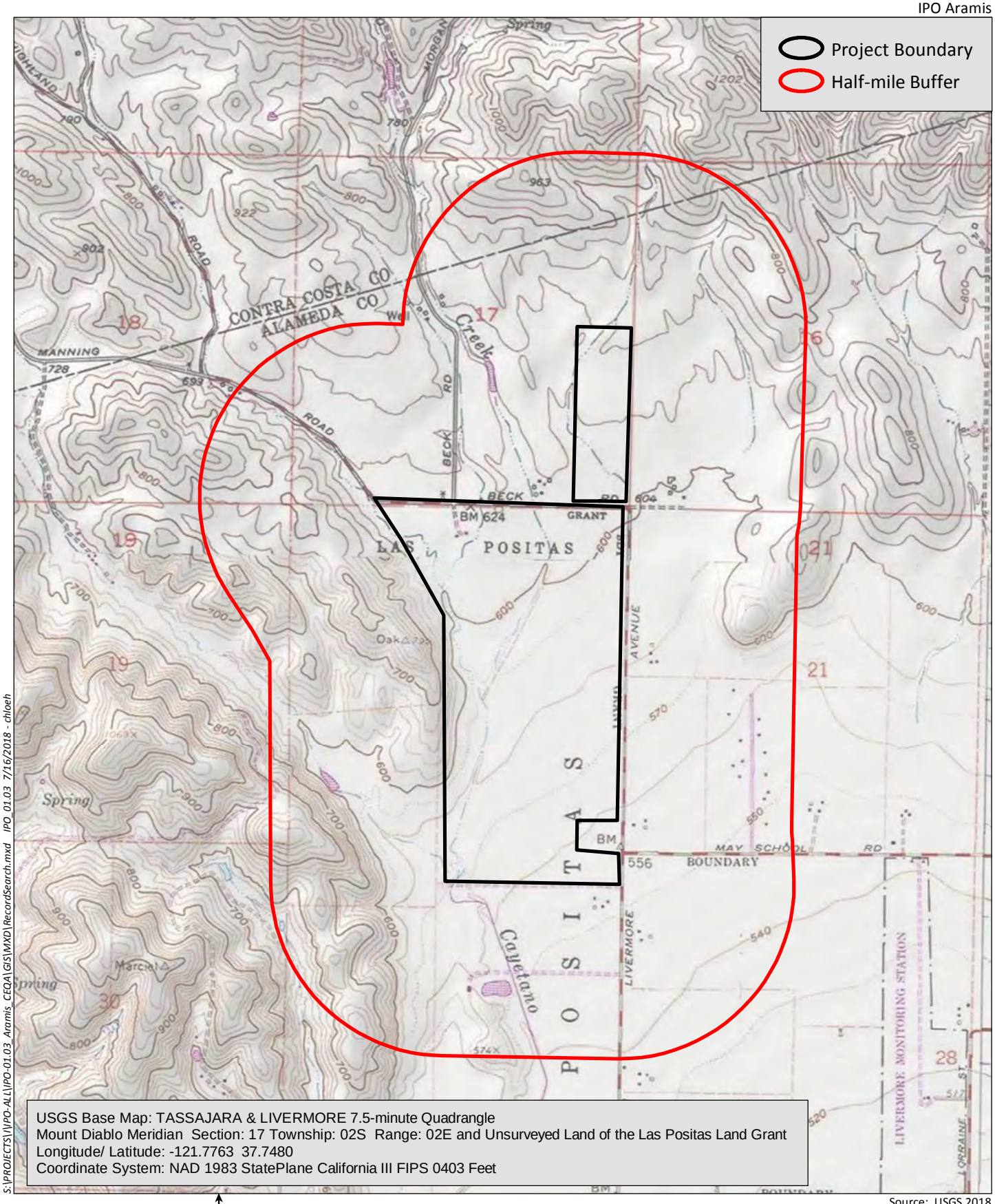
Fremont , CA 94539 — Bav Miwok
chochenyo@AOL.com — Plains Miwok
(510) 882-0527 Cell — Patwin
(510) 687-9393 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

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 American Tribes with regard to cultural resources assessments for the proposed IPO 01.03 Aramis Renewable Energy Project, Alameda County



USGS Base Map: TASSAJARA & LIVERMORE 7.5-minute Quadrangle
Mount Diablo Meridian Section: 17 Township: 02S Range: 02E and Unsurveyed Land of the Las Positas Land Grant
Longitude/ Latitude: -121.7763 37.7480
Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

0 2,000 Feet

Source: USGS 2018

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Half-mile Record Search Map

Exhibit A

HELIX Environmental Planning, Inc.
11 Natoma Street
Suite 155
Folsom, CA 9530
916.365.8700 **tel**
619.462.0552 **fax**
www.**helixepi**.com

July 30, 2018

Rosemary Cambra, Chairperson
Muwekma Ohlone Indian Tribe of the SF Bay Area
PO Box 360791
Milpitas CA 95036

Subject: Aramis Renewable Energy Project

Dear Chairperson Cambra,

HELIX Environmental Planning, Inc. (HELIX) has contracted with IP Aramis, LLC to provide a Phase I Cultural Resources Inventory in support of CEQA compliance for the proposed Aramis Renewable Energy Project (project) located in Alameda County, California. The Native American Heritage Commission has suggested we contact you for information regarding Native American resources in or near the project area.

IP Aramis, LLC, a subsidiary of Intersect Power LLC, proposes to construct and operate a renewable energy project capable of generating, storing, and dispatching clean energy on 402 acres located in unincorporated Alameda County near the community of North Livermore. The project would consist of a 100 megawatt (MW) solar photovoltaic facility that would interconnect to the public distribution system at Pacific Gas and Electric Company's (PG&E) Cayetano 230 kilovolt (kV) substation, located adjacent and interior to the project site. The proposed project would be located on portions of two privately-owned parcels (APNs 903-0006-001-02 [eastern 350 acres of a 523 acre parcel] and 903-0007-002-01 [52 acres]) located roughly 2.5 miles north of Livermore . The project footprint has been designed to avoid Cayetano Creek, which runs through portions of the southern parcel.

The Area of Potential Effects for the project measures approximately 402 acres. I have attached a topographical map depicting the project area. The legal description for the property is:

Tassajara, CA and Livermore, CA 7.5' Quadrangles
Section 17 of Township 02S, Range 02E, and an unsectioned portion of the Las Positas Land Grant.

If there are sensitive resources on or near the proposed project location that could be impacted by construction activities please advise us accordingly. If you have any information, questions, or concerns regarding the proposed project, please feel free to contact me directly at (916) 365-8700 or clarusb@helixepi.com.

Sincerely,

Clarus J. Backes Jr., M.A., RPA
Senior Archaeologist
HELIX Environmental Planning, Inc.

[Enclosure: as stated]

HELIX Environmental Planning, Inc.
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Suite 155
Folsom, CA 9530
916.365.8700 **tel**
619.462.0552 **fax**
www.**helixepi**.com

July 30, 2018

Tony Cerda
Chairman
Coastanoan Rumsen Carmel Tribe
244 E. 1st Street
Pomona, CA 91766

Subject: Aramis Renewable Energy Project

Dear Chairman Cerda,

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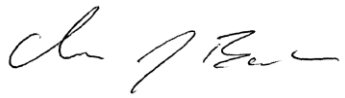
Sincerely,



Clarus J. Backes Jr., M.A., RPA
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HELIX Environmental Planning, Inc.

[Enclosure: as stated]

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July 30, 2018

Andrew Galvan
The Ohlone Indian Tribe
PO Box 3388
Fremont, CA 94539

Subject: Aramis Renewable Energy Project

Dear Mr. Galvan,

HELIX Environmental Planning, Inc. (HELIX) has contracted with IP Aramis, LLC to provide a Phase I Cultural Resources Inventory in support of CEQA compliance for the proposed Aramis Renewable Energy Project (project) located in Alameda County, California. The Native American Heritage Commission has suggested we contact you for information regarding Native American resources in or near the project area.

IP Aramis, LLC, a subsidiary of Intersect Power LLC, proposes to construct and operate a renewable energy project capable of generating, storing, and dispatching clean energy on 402 acres located in unincorporated Alameda County near the community of North Livermore. The project would consist of a 100 megawatt (MW) solar photovoltaic facility that would interconnect to the public distribution system at Pacific Gas and Electric Company's (PG&E) Cayetano 230 kilovolt (kV) substation, located adjacent and interior to the project site. The proposed project would be located on portions of two privately-owned parcels (APNs 903-0006-001-02 [eastern 350 acres of a 523 acre parcel] and 903-0007-002-01 [52 acres]) located roughly 2.5 miles north of Livermore . The project footprint has been designed to avoid Cayetano Creek, which runs through portions of the southern parcel.

The Area of Potential Effects for the project measures approximately 402 acres. I have attached a topographical map depicting the project area. The legal description for the property is:

Tassajara, CA and Livermore, CA 7.5' Quadrangles
Section 17 of Township 02S, Range 02E, and an unsectioned portion of the Las Positas Land Grant.

If there are sensitive resources on or near the proposed project location that could be impacted by construction activities please advise us accordingly. If you have any information, questions, or concerns regarding the proposed project, please feel free to contact me directly at (916) 365-8700 or clarusb@helixepi.com.

Sincerely,

Clarus J. Backes Jr., M.A., RPA
Senior Archaeologist
HELIX Environmental Planning, Inc.

[Enclosure: as stated]

HELIX Environmental Planning, Inc.
11 Natoma Street
Suite 155
Folsom, CA 9530
916.365.8700 **tel**
619.462.0552 **fax**
www.**helixepi**.com

July 30, 2018

Katherine Erolinda Perez
Chairperson
North Valley Yokuts Tribe
P.O. Box 717
Linden, CA 95236

Subject: Aramis Renewable Energy Project

Dear Chairperson Perez,

HELIX Environmental Planning, Inc. (HELIX) has contracted with IP Aramis, LLC to provide a Phase I Cultural Resources Inventory in support of CEQA compliance for the proposed Aramis Renewable Energy Project (project) located in Alameda County, California. The Native American Heritage Commission has suggested we contact you for information regarding Native American resources in or near the project area.

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www.**helixepi**.com

July 30, 2018

Ann Marie Sayers
Chairperson
Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, CA 95024

Subject: Aramis Renewable Energy Project

Dear Chairperson Sayers,

HELIX Environmental Planning, Inc. (HELIX) has contracted with IP Aramis, LLC to provide a Phase I Cultural Resources Inventory in support of CEQA compliance for the proposed Aramis Renewable Energy Project (project) located in Alameda County, California. The Native American Heritage Commission has suggested we contact you for information regarding Native American resources in or near the project area.

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Folsom, CA 9530
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619.462.0552 **fax**
www.**helixepi**.com

July 30, 2018

Irenne Zwierlein
Chairperson
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

Subject: Aramis Renewable Energy Project

Dear Chairperson Zwierlein,

HELIX Environmental Planning, Inc. (HELIX) has contracted with IP Aramis, LLC to provide a Phase I Cultural Resources Inventory in support of CEQA compliance for the proposed Aramis Renewable Energy Project (project) located in Alameda County, California. The Native American Heritage Commission has suggested we contact you for information regarding Native American resources in or near the project area.

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Sincerely,

Clarus J. Backes Jr., M.A., RPA
Senior Archaeologist
HELIX Environmental Planning, Inc.

[Enclosure: as stated]

From:	Kanyon Sayers-Roods
To:	Clarus Backes
Subject:	RE: Aramis Renewable Energy Project
Date:	Monday, August 27, 2018 11:50:53 AM

Dear Clarus J. Backes Jr.

I'm writing on behalf of the Indian Canyon Band of Costanoan Ohlone People to request that HELIX Environmental Planning records that we are responding to your letter dated July 30, 2018. We are inquiring if you are familiar with this area and of it containing any culturally sensitive recorded sites. If there are any culturally sensitive sites within a quarter of a mile or if this site is near any waterways, we are expressing our concern about this project and wish to be consulted. If there is to be any earth movement in these areas we recommend that a Native American Monitor and an Archaeologist be present on-site at all times any disruptive surveying or earth movement transpires.

Regards

KSR -Creative Director, Tribal Monitor

Kanyon CoyoteWoman Sayers-Roods

Indian Canyon Mutsun Band of Costanoan Ohlone People

408-673-0626
www.indiancanyonlife.org/ksr
http://about.me/kanyon.coyotewoman

Appendix B

Stanley Ranch Site Record

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State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code 3CS; 3S; 5S2

Other Listings
Review Code | Reviewer | Date

Page 1 **of** 19 **Resource Name or #:** 4400 N. Livermore Ave.

P1. Other Identifier: Stanley Ranch

*__P2. Location: a. County:__ Alameda ☐ **Not for Publication** ☒ **Unrestricted**
b. USGS 7.5′ Quad: Pleasanton, CA **Date** 1998 **T** 2 South **/R** 2 East **/ BM** Mount Diablo **Section:** Rancho Los Positas Parcel B
c. Address: 4400 North Livermore Avenue Livermore, CA 94551
d. UTM: NAD 83, Zone 10S; 608264 **mE /** 4177211 **mN**
e. Other Locational Data: APN 903-6-3-7

***P3a. Description:** Stanley Ranch at 4400 N. Livermore Ave. is located in a rural landscape of ranch properties within northeast Alameda County, north of the City of Livermore. A historic barn and shed are located on the 105-acre ranch with other contemporary infrastructure including a mobile home and a chicken farm. The ranch currently produces beef cattle, horse-quality hay, straw, grain, and free-range eggs. **Barn:** The barn's original function appears to have been as a cattle feed and hay barn. It is currently used for storage. This post and beam three-portal crib barn is approximately 4,092.55 square feet with a rectangular footprint that partially rests on both concrete pier blocks and sill plates. The barn features a front gabled corrugated metal roof and lean-tos on the south and north elevations with corrugated metal shed roofs. The roof is supported on 2"x 6" rafters with 2"x 4" purlins. The exterior of the barn is clad with vertical 1" x 12" redwood boards on the east and south façades. The south lean-to retains its original openings (likely for cattle) and the north lean-to openings have been boarded up with plywood.

***P3b. Resource Attributes:** HP33: Farm/Ranch

***P4. Resources Present:** ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

***P5a. Photograph**



C

P5b. Description of Photo: Historic post and beam vernacular barn and shed east and south facades, looking northwest from the gravel driveway.

***P6. Date Constructed/Age and Sources:** Barn: c.1878-1904; Shed c.1949 -1958
☐ Prehistoric ☒ Historic ☐ Both

***P7. Owner and Address:** Richard Stanley 4400 N. Livermore Ave. Livermore, California 94551

***P8. Recorded By:** Annie McCausland Helix Environmental Planning, Inc. 7578 El Cajon Blvd, La Mesa, CA 91942

***P9. Date Recorded:** March 16, 2020

***P10. Survey Type:** ☒ Intensive ☐ Reconnaissance ☐ Other
Describe:

***P11. Report Citation:** Backes, C., and A. McCausland 2020 *Cultural Resources Assessment Report for the Aramis Renewable Energy Project.* Prepared for IP Aramis, LLC, San Francisco. Prepared by HELIX Environmental Planning, Inc., Folsom, California.

***Attachments:**
☐ NONE ☒ Location Map ☒ Site/Sketch Map ☒ Continuation Sheet
☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record
☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record
☐ Photograph Record ☐ Other (list):

Description Continued:

The east façade features a large primary opening that looks to have been expanded at some point when the barn door was removed. The opening features an exposed hay rail with metal chain for lifting hay bales. Both lean-tos feature a sliding barn door and a cut square opening for natural light and ventilation on the east façade. The west façade features vertical wood board siding, possibly redwood, and a plywood barn door on the north end. The west façade also features a natural light and ventilation opening in the gable. A contemporary gutter system has been installed along the roofline of the barn on the south and east facades. The barn's interior showcases its vernacular post and beam construction. Several added support braces have been added throughout. It appears that the posts and beams could have been replaced over the decades considering they are in such good condition and the color of the framing does not match the rest of the structure. Waist high wooden dividers separate the central hay bay and the bays within the lean-tos (likely cattle feeding bays). Stabilization cables have also been installed. **Shed:** The shed's original function appears to have been either for hay storage or for vehicle and implement storage. The shed is currently used for implement and vehicle storage. The vernacular post and beam constructed shed is approximately 1,812.69 square feet and has a rectangular footprint supported by new concrete piers. The shed features a side gabled corrugated metal roof supported by rafters and purlins. The exterior is partially clad with horizontal 1"x 12" redwood siding, like the barn's east façade siding. The rest of the shed is clad with horizontal 1"x 6" boards, possibly redwood. The primary east façade includes five supporting posts with a new support beam above connected with metal brackets. The original support beam with mortices, possibly from an older building, rests above and is stabilized by the newer primary support beam. Some of the original posts have been removed to allow for storage of larger equipment. The posts and beams appear to be made of redwood. The interior of the shed is open for storage and does not include any architectural elements of note. A trailer was stationed against the west facade of the shed blocking the view of the west façade. The north façade was also not accessible during the survey.



P5b. Description of Photo: Barn east façade, looking southwest. Notice the large expanded opening and the protruding hay rail from the front gable.



P5b. Description of Photo: Barn south façade with openings, possibly for cattle, looking north.



P5b. Description of Photo: Sliding barn door and light opening on the south lean-to east façade of barn, looking west.



P5b. Description of Photo: East and north façade, looking southwest. The north façade was not visible due to the many items stored against it.



P5b. Description of Photo: Barn north and west façade, looking southeast. Notice the plywood siding on the north façade.



P5b. Description of Photo: Barn west façade, looking southeast. Notice the plywood sliding barn door.



P5b. Description of Photo: Barn interior with post and beam construction and bay dividers, looking west.



P5b. Description of Photo: Barn interior, looking west.



P5b. Description of Photo: Shed south and east façades, looking northwest.



P5b. Description of Photo: Shed south façade with 1”x12” horizontal redwood siding on the lower half and 1”x 6” on the upper half, looking northwest.



P5b. Description of Photo: Interior of shed with its post and beam construction, looking west. Notice the primary support beam above with metal brackets. An older support beam with mortise rests above the newer primary support beam. This beam most likely comes from an older structure which is a common feature of vernacular ranching structures.



P5b. Description of Photo: Stanley Ranch at 4400 N. Livermore Ave., looking north from the gravel driveway.



P5b. Description of Photo: Open grass ranch land adjacent to the barn, looking south.

B1. Historic Name: Stanley Ranch

B2. Common Name: Stanley Ranch

B3. Original Use: The barn was most likely a hay and cattle feed barn and the shed was used for storing hay or farm implements **B4. Present Use:** Currently the barn and shed are used for storage.

***B5. Architectural Style:** Vernacular Post and Beam

***B6. Construction History:** The construction date of the barn was sometime between c.1885 and 1904 (USGS 1906). The shed was constructed sometime between c.1949-1958 by rancher Leland E Stanley (Stanley 2020). Repairs appear to have been made to stabilize the barn and a modern drainage system has been installed. The primary opening of the barn has been widened and the original barn door on the central bay has been removed. The north façade of the barn has been clad with plywood and a plywood barn door has been added to the east façade. The barn's east and south façades both retain the original 1" x 12" redwood siding but the other facades are clad with what appears to be newer siding. On the shed, posts have been removed to allow the storage of larger equipment. A new support beam has been installed with modern bolts on the east façade to facilitate these larger openings. The shed has 1"x 12" horizontal redwood board siding on the lower half of the south façade and a mix of horizontal 1"x 6" and other size boards above it, suggesting a lot of the original siding has been replaced on the structure.

***B7. Moved?:** ☒ No ☐ Yes ☐ Unknown Date: Original Location:

***B8. Related Features:** Historically the Stanley Ranch included other properties on N. Livermore Ave. (Beck Road). It appears that two extant properties 3987 and 4157 N. Livermore Ave. are possibly associated with the Stanley Ranch.

B9. a. Architect: Leland E. Stanley designed the vernacular post and beam shed (Stanley 2020). It is unknown who designed the barn but the post and beam 3 portal crib barn type was common in Alameda County during the nineteenth and twentieth centuries (Brandi et al. 2007) **b. Builder:** Leland E. Stanley constructed the shed. It is unknown who constructed the barn.

***B10. Significance:** Theme: Vernacular post and beam construction / Area: Murray Township in northeast Alameda County / Period of Significance: 1869 to 1970 / Property Type: Ranch / Applicable Criteria: C/3

Historic Context:

Alameda County and Murray Township

The following historic context is largely based on the context provided in the *Historical and Cultural Resource Survey: East Alameda County* (Corbett 2005).

Following Mexico's independence from Spain in 1822, former Mission lands in Alta California were secularized and divided up into large ranchos. Beginning in 1839, Rancho de las Positas, Rancho Valle de San Jose, Rancho San Ramon, and Rancho Santa Rita were established as the result of land grants to Mexican citizens. Rancho de las Positas, which includes the study area, came into the control of Robert Livermore, an English Mexican Rancher (Corbett 2005:1). These Ranchos were largely unfenced allowing for large swaths of open grazing lands for cattle. Cattle were raised for their hides and tallow which were used to make leather and soap. These goods were exported to the eastern United States and Europe, making them the major export commodities of California until the Gold Rush. Vineyards, pear and olive orchards, grains, corn, and watermelon were also planted during the Mexican Rancho era (Corbett 2005:1-2). American-settlement in Alta California began in 1841 and greatly increased during the Gold Rush beginning in 1848. California became part of the United States in 1850 after the Mexican American War. Most Mexican ranchos were divided up, but Robert Livermore was able to retain control of Rancho Las Positas after the transition (Corbett 2005:2).

The large area now known as Murray Township was first included in Contra Costa County, one of the first counties designated in California under the United States. In 1953 Alameda County was formed and a large portion of Contra Costa County was ceded to the new County and deemed as Murray Township. Murray was the name of an earlier settler, Michael Murray. Murray Township was the largest and most eastern township in Alameda County. It bordered Contra Costa County to the north, San Joaquin County to the east, and Santa Clara County to the south.

Americans continued to homestead and establish farms in Murray Township in the mid and late nineteenth century. Growth increased after the establishment of the transcontinental Central Pacific Railroad in 1869 (Corbett 2005:2). The construction of the railroad to Murray Township helped establish the towns of Alisal (now Pleasanton) and Livermore (Corbett 2005:2).

By 1878 Murray Township had been surveyed under the U.S. township and range grid system as illustrated in the Thompson & West 1878 Atlas.

Between the 1880s and 1910s many changes affected farming and ranching operations in Murray Township. Long-term grain farming had depleted the nutrients in the soil. Along with increased domination by the beef industry in the Midwest, cattle ranching and hay production in Murray Township declined. Fruit production in Murray Township increased during this period. The advent of the refrigerated rail car allowed for the effective exportation of fruit to other markets. Improvements in automobile transportation allowed easier access to San Francisco markets which opened up agricultural options for fruit, veggies, poultry and dairy. Demand for fruit and vegetables also increased due to improved canning operations around the bay. Fruit and vegetable production required seasonal and experienced labor leading to an increase in hired workers and a decrease in family farming operations in Alameda County (Corbett 2005:7-8).

Until World War II Murray Township was primarily agricultural properties. Development occurred within Murray Township during and post-World War II. A U.S. Naval Auxiliary Air Field was established northwest of Livermore and Parks Air Force Base was created near Pleasanton. By 1953 the Lawrence Livermore Laboratory was established east of Livermore and the Vallecitos Atomic Laboratory was established in Vallecitos Valley. Interstate 680 was completed by 1967 and U.S. 50 became Interstate 580 by 1973. Housing subdivisions, shopping centers, office and industrial parks were also constructed within Murray Township during the mid and late twentieth century. With the lack of agricultural development after World War II, the increase in land prices, taxes, and labor wages, many farming families sold or leased their land to large scale commercial farmers (Corbett 2005:6;8).

Rancho Las Positas

Rancho Las Positas is located within the Murray Township and its land has been utilized as ranching and farmland since the mid-nineteenth century. Beginning in the 1860s wheat farming became prominent within Murray Township and Rancho Las Positas. Between 1865 and 1870 there were several farmers within Murray Township with over 1,000 acres of wheat crops each, some within multiple parcels. Smaller scale family ranches usually produced grain and a single-livestock type at the level where the family could manage the farm independently. Wheat was the most popular grain and was harvested using horse-drawn or steam powered threshing machines. Livestock included; sheep which grazed on the hills and were raised for meat as well as wool, cattle for meat, and horses for transportation and as draft animals. Hay was grown for feed with excess being sold in San Francisco (Corbett 2005:7).

Stanley Ranch

George Chester Stanley was a Vermont native, born in 1840 to a farming family. He emigrated to California before the Civil War and found work on a farm near Fremont, California. In 1862 he began managing a mule team that carried supplies to mining camps in the Sierras. By 1866 Stanley left the mule team and opened up a butcher shop in Rancho San Jose and then another in Livermore. He secured a two-year contract to provide meat for the Central Pacific Railroad construction labor camps circa 1869. His brother John C. Stanley became his business partner and they each purchased ranch land in Livermore Valley circa 1869. (Homan 2007:444-445; Thompson & West 1878). John C. Stanley's primary residence and ranch was located on Mines Road (Homan 2007:45; U.S. Census Bureau 1910). The 1876 Alameda County Business Directory lists George C. Stanley as a farmer and a sheep raiser. He was listed as one of the largest landowners in Murray township with 936 acres (Alameda County 1876). George C. Stanley had purchased land within Rancho Las Positas Parcel B (Thompson & West 1878). George C. Stanley's primary residence was located on 2nd Street in downtown Livermore (Thompson & West 1878).

In 1879 George's farm produced $11,000.00 in revenue including $250 in hay (U.S. Census Bureau 1880). In the 1880 Non-Population Schedule, the Stanley family's farmland, buildings, and fences were valued at $40,000. Their livestock were valued at $6,000, and farm implements were valued at $1,200 (U.S. Census Bureau 1880. By the mid-1880s George had acquired a large portion of Parcel A of Rancho Las Positas, expanding his ranch. In 1881 George C. Stanley owned 600 acres of land used for grain production according to an article in the *Livermore Herald* (*Livermore Herald* 1881).
Based on the historic records available it appears that the Stanley ranch historically produced grain and hay and raised livestock including cattle and sheep.

In 1885, George and John's brother Joseph S. Stanley moved to California from Vermont to help George with his ranch on Beck Road, now known as N. Livermore Ave. (Homan 2007:444-445). George also served as superintendent and part-owner of the Stanley and Bartlett Magnesia Mine in Chiles Valley. His mining investments led to his murder on May 29, 1900 when

he was shot over a mining dispute. George's estate was divided up between his widow Emma Stanley and his two sons George R. and Leland C. Stanley (*Weekly Calistogian* 1900). George's brother Joseph S. continued working the ranch after George's death (Homan 2007:445).

By 1912, brothers Leland C. Stanley and George R. Stanley owned the Stanley ranch land within Rancho Las Positas Parcels A and B. Leland C. Stanley's family and Joseph's son, John M. Stanley 's family continued to ranch on N. Livermore Ave. (Beck Road) throughout the twentieth century (U.S. Census Bureau 1910; 1920; 1930; 1940; State of California 1900-1968). The 1920's U.S Census lists Leland C. Stanley and his wife and four children living on Beck Road (N. Livermore Ave.) and running a "general" farm. John M. Stanley and his family are also listed on Beck Road and running a "general" farm (U.S. Census Bureau 1920). It is unclear which family worked the subject ranch at 4400 N. Livermore Ave. or if they worked this ranch property together.

4400 N. Livermore Ave. (Beck Road)
The subject property at 4400 N. Livermore Ave. is a portion of the historic Stanley Ranch. The 1878 map and the Stanley Ranch illustration demonstrates that a building or a complex of buildings and structures was extant within George C. Stanley's ranch property in Rancho Las Positas Parcel B by 1878. It is unknown when the subject extant barn was constructed however it appears to be sometime between 1878 and 1904 according to the historic records available. The earliest record confirming that a structure was extant within the subject property at 4400 N. Livermore Ave. is the 1906 Pleasanton topographic map. The survey for the map was completed in 1904 (USGS 1906). The earliest aerial photograph available is from 1939 (AAA 1939). The photograph shows the barn and other accessory structures and possibly a dwelling which are no longer extant. It appears that these other accessory ranching structures and possibly a dwelling were demolished in the 1960s. The subject shed is not extant in the 1939 aerial. The shed first appears in the 1958 aerial photograph (ASCS 1958). The shed was constructed sometime between 1949 and 1958 by Leland E. Stanley, Leland C. Stanley's son (NETROnline 2020; Stanley 2020; State of California 1900-1969). Between 1961 and 1980 three buildings/structures were added to the property including a mobile home in 1977 (USGS 1961; 1968; 1973; 1980; Stanley 1977). The addition of the mobile home is the only building record on file with Alameda County for 4400 N. Livermore Ave.

Leland C. Stanley passed away in 1959 and was survived by five children and eight grandchildren (*San Francisco Examiner* 1959). Leland E. Stanley passed away in 2003 (Social Security Administration 1935-2014). Richard Stanley, Leland E. Stanley's son, currently owns and manages the ranch.

NRHP/CRHR Evaluation
The subject property has functioned as a ranch from circa 1869 to the present (2020), supporting the agricultural pursuits of the Stanley family, including the cultivation of grain and hay as well as raising cattle, sheep, and horses. Since this is a historic ranch property, the *National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes* was utilized for this evaluation (NPS 1989)

A/1. The subject property with its historic barn and shed is associated with the ranching history of Alameda County and Murray Township during the late nineteenth century to the present. The subject property once had other ranching accessory structures and buildings and possibly a farmhouse. The subject property does not exhibit a complete historic ranch complex and is not recommended to be a significant example of a ranching property in Murray Township as other complete ranching complexes exist (Corbett 2005). Ranching properties typically included a farmhouse, pumphouse, and other accessory ranching structures. Hagemann Ranch, an NRHP listed historic district in the City of Livermore is a good example of a complete historic ranch property (Brandi et al. 2007). Typically, the ranching family lived and worked on the same property. In the case of Stanley Ranch, it is unclear if there was a historic farmhouse once extant on the property. Based on the data provided in the *Historical and Cultural Resource Survey: East Alameda County* the subject ranching property with its historic barn and shed is not considered a significant example of a historic ranching property in Alameda County and Murray Township (Corbett 2005). The subject ranching property with its historic barn and shed is recommended not historically significant under Criterion A/1.

B/2. The subject property with a historic barn and shed are associated with the Stanley family who have been ranching on N. Livermore Ave. (Beck Road) since circa 1869. Intensive research on the family did not reveal any family members associated with the ranch; including George C. Stanley, Joseph S. Stanley, Leland C. Stanley, John M. Stanley, and Leland E. Stanley to be of historical significance at a national, state, or local level. The subject property with its historic barn and shed is not associated with any person(s) of historical significance and it is not recommended historically significant under Criterion B/2.

C/3. The barn and shed embody the distinctive characteristics of vernacular post and beam ranch structures constructed within Murray Township during the late nineteenth to mid-twentieth centuries. The barn was constructed sometime between 1878 and 1904. The shed was constructed by rancher Leland E. Stanley between 1949 and 1958. The Stanley family continues to utilize the barn and shed for ranching activities to the present day (April 2020).

The illustrations and data provided in Thompson & West's *New Historical Atlas of Alameda County* published in 1878, confirm that barns in Murray Township were characterized by moderately pitched gable roofs, flanking shed lean-tos, upper double doors, and sliding double front and side doors (Brandi et al. 2007). The typical two-story, gable and shed-roof barns depicted in the 1878 Thompson and West Atlas illustrations most likely derived from the "crib-and-shed" type barns of Tennessee. Composed of a central gable-roof flanked by shed-roofed lean-tos, the crib-and-shed barns disseminated westward through the Plains states, where they were modified to employ timber framing instead of log construction. In this guise, the "three portal crib barn" eventually infiltrated the valleys of the Pacific West, including the Willamette Valley of Oregon and the San Joaquin, Sacramento, Santa Clara and Salinas Valleys of California, where the original prototype was gradually modified in response to local conditions and crops (Brandi et al. 2007).

In addition to lightweight and economical construction, California ranch buildings were often characterized by their flexibility and adaptability to new uses. In contrast to Eastern and Midwestern agricultural buildings, California ranch buildings generally lack heavy timber-framing, weather-tight construction or insulating materials which allowed them to be assembled and modified quickly. California ranch structures were typically designed without the aid of an architect. The Stanley Ranch barn and shed feature this regional approach to construction referred to as post-and-beam construction (Brandi et al. 2007). The Stanley Ranch with its vernacular post and beam barn and shed is recommended historically significant under Criterion C/3 at the local level with a period of significance dating from 1869 to 1970, the historic active period of the ranch. According to National Park Service Guidelines, if the historic property is in continuous use, fifty years from the year of evaluation may be used as the closing date for the period of significance (NPS 1989:21).

D/4. This Criterion is most relevant for archaeological sites, but it can be applied to built-environment resources if further study has the potential to yield information that cannot be obtained from other sources. Historical information about vernacular post and beam construction and California barns and ranching structures is prevalent, and further study would not add any new information. The subject property with its historic barn and shed is recommended not significant under Criterion D/4.

Integrity. This section addresses whether the subject property retains sufficient integrity to convey its local historical significance under Criterion C/3. This evaluation follows the seven aspects of integrity described by the National Park Service: location, setting, association, materials, workmanship, design, and feeling (NPS 2002).

The barn and shed retain integrity of **location** because they appear to be in their original footprint. The barn and shed are located on a working ranch that features a few contemporary structures including a mobile home. The property is surrounded by open ranch land to the south, west, and north. N. Livermore Ave. (Beck Road) runs adjacent to the east just as it has since the mid-nineteenth century. Overall, the historic **setting** of the ranch property is retained despite the added contemporary structures. The barn and shed both appear to have been modified over the decades but the modifications are utilitarian in nature including some in-kind replacement of siding and roof materials, and alterations to primary openings in order to improve the utility of the structures to suit contemporary needs. This is a characteristic of vernacular post and beam ranching infrastructure and these modifications do not alter the integrity of the barn and shed's **design**, **workmanship**, and **materials**. To further strengthen this argument, the shed appears to feature repurposed materials from older ranching structures. This is evident through one of the beams that spans the east facade which has mortises cut in it. Mortise and tenon construction is an older method and is not found in any existing structures on site. The beam must have been repurposed from an older structure that is no longer extant adding to its vernacular aesthetic. The shed's south facade shows two types of siding, including redwood 1"x12" possibly from the barn or another structure. These modifications do not diminish the shed and barn's **association** with vernacular ranching structures with post and beam construction. The barn and shed convey the **feeling** of historic vernacular post and beam ranch structures especially since they are still in use in the same location and ranch. In conclusion the subject property with its historic barn and shed retains sufficient integrity to convey its significance under Criterion C/3 at the local level with a period of significance from 1869 to 1970, the historic active period of the ranch.

Character defining features of the barn include its three portal crib design, 1"x 12" and 1" x 6" redwood siding, protruding hay rail, ventilation openings, cattle openings on the south façade, interior waist-high bay dividers, and its vernacular post and beam construction. The character defining features of he shed include its vernacular post and beam construction, 1"x12" and 1"x 6" redwood siding, the mortised beam above the primary support beam, and its side gabled roof.

Alameda County Register

A nominated resource shall be added to the Alameda County Register as a County Landmark if the Board of Supervisors finds, after holding the hearings, that all of the requirements set forth below are satisfied:

1. The nominated resource meets one or more of the following criteria:

A. It is associated with events that have made a significant contribution to the broad patterns of the history of the County, the region, the state or the nation;

The subject property is not recommended eligible under Criterion A for the same reason stated above in the NRHP/CRHR Criterion A/1 evaluation.

B. It is associated with the lives of persons significant in the County's past;

The subject property is not recommended eligible under Criterion B for the same reason stated above in the NRHP/CRHR Criterion B/2 evaluation.

C. It embodies the distinctive characteristics of a type, period or method of construction;

The subject property is recommended eligible under Criterion C for the same reason stated above in the NRHP/CRHR Criterion C/3 evaluation.

D. It represents the work of an important creative individual or master;

It is unknown who constructed and design the barn. The shed was constructed by Leland E. Stanley. Leland E. Stanley was a rancher and not known to be a master architect. The subject property is not recommended historically significant under Criterion D.

E. It possesses high artistic values;

The barn and shed do not possess high artistic values therefore the property is not recommended historically significant under Criterion E.

F. It has yielded, or may be likely to yield, information important in the prehistory or history of the County, the region, the state or the nation.

Historical information about vernacular post and beam construction and California barns and ranching structures is prevalent, and further study would not add any new information. The subject property with its historic barn and shed is recommended not significant under Criterion F.

2. The nominated resource has integrity of location, design, setting, materials, workmanship, feeling and association. Integrity shall be judged with reference to the particular criterion or criteria specified in subparagraph 1.;

The barn and shed retain sufficient integrity to convey their significance under Criterion C with a period of significance 1869 to 1970. Please refer to the integrity evaluation provided in the NRHP/CRHR evaluation for the detailed breakdown.

3. The nominated resource has significance historically or architecturally, and its designation as a landmark is reasonable, appropriate and necessary to promote, protect and further the goals and purposes of this chapter.

The barn and shed are considered significant post and beam vernacular ranching structures and are eligible for landmark listing as demonstrated above in the County landmark evaluation under Criterion C.

4. The nominated resource has been evaluated by a qualified historical resources consultant who meets one or more of the Secretary of the Interior's professional qualifications standards or who are certified by the Register of Professional Archaeologists, and the evaluator has submitted documents that provide evidence of the resources historical or architectural significance.

The barn and shed were evaluated by Ms. McCausland, an architectural historian who meets the Secretary of the Interior's professional qualifications standards for architectural history.

Structure of Merit
A nominated resource shall be added to the Alameda County Register as a structure of merit if the Board of Supervisors finds, after holding hearings, that it satisfies one or more of the following criteria:
1. It represents in its location an established and familiar visual feature of the neighborhood, community or County; or
2. It materially benefits the historic, architectural or aesthetic character of the neighborhood or area; or
3. It is an example of a type of building that once was common but is now rare in its neighborhood, community or area;
4. It is connected with a business or use which was once common but is now rare; or
5. It contributes to an understanding of the contextual significance of a neighborhood, community or area.

The subject property with its historic barn and shed is known as the Stanley Ranch. The ranch is an established and familiar feature of the neighborhood and local community. The barn and shed with their post and beam construction are rare examples of vernacular post and beam construction that materially benefit the historic aesthetic character of the neighborhood which is a rural ranching community. The barn and shed are not connected to a business that is now rare. They do however add to the contextual significance of the neighborhood, community, and area which is known as a ranching community that feature a collection of historic ranch properties according to the *Historical and Cultural Resource Survey: East Alameda County* (Corbett 2005). The barn and shed are recommended to be listed as Alameda County Structures of Merit under criteria 1, 2, 3 and 5.

B11. Additional Resource Attributes):

*B12. References:

Agricultural Adjustment Administration (AAA)
1939 Alameda County, California, Flight C-5750, Frames 268-2; 268-3-; 268-4. Fairchild Aerial Surveys. Electronic document available at http://mil.library.ucsb.edu/ap_indexes/FrameFinder/, accessed February 18, 2020.

Agricultural Stabilization and Conservation Service (ASCS)
1958 Alameda County, California, Flight BUT-1958, Frame 2V-102. Cartwright Aerial Surveys Electronic document available at http://mil.library.ucsb.edu/ap_indexes/FrameFinder/, accessed April 2, 2020.

Alameda County
1876 Business Directory of Murray Township. Alameda County Genealogy. Electronic document available at https://www.sfgenealogy.org/alameda/data/al1876.htm, accessed on March 26, 2020.

c.1885 Map of Murray Township. On file with Alameda County.

Alameda County Board of Supervisors
2012 Ordinance 2012-5. Electronic document available at https://www.acgov.org/cda/planning/generalplans/documents/HPO_Signed.pdf, accessed April 10, 2020.

Brandi, Richard, et al.
2007 *National Register of Historic Places Registration Form: Hagemann Ranch District*. Electronic document available at https://npgallery.nps.gov/GetAsset/28f5b522-5773-496a-8785-e6ced05f4239, accessed March 28, 2020.

California Historical Society
c.1900 "Agricultural workers in Livermore, circa 1900." Electronic photograph available at, https://digitallibrary.californiahistoricalsociety.org/islandora/object/chs:297, accessed April 10, 2020.

Corbett, Michael R.
2005 *Historical and Cultural Resource Survey: East Alameda County*. Alameda County Community Development Agency. Electronic document available at https://www.acgov.org/cda/planning/landuseprojects/documents/eastalameda.pdf, accessed April 2, 2020.

Haviland, P.A.
1912 Murray Township, Alameda County. Map on file with Alameda County.

Homan, Anne
2007 *Historic Livermore, California: Illustrated, A-Z.* Hardscratch Press, Walnut Creek, California.

National Park Service (NPS)
1989 *National Register Bulletin: Guidelines for Evaluating and Documenting Rural Historic Landscapes*. Revised in 1999. U.S. Department of the Interior, National Park Service, Cultural Resources, National Register, History, and Education, Washington D.C.
2002 *How to Apply the National Register Criteria for Evaluation*. Revised. U.S. Department of the Interior, National Park Service, Cultural Resources, National Register, History, and Education, Washington D.C.

NETROnline
2020 Historic Aerial Photographs. Electronic document available at https://www.historicaerials.com/, accessed April 2, 20202.

San Francisco Examiner
1959 Funeral Notice for Leland C. Stanley on July 1, 1959. Electronic article available at Newspapers.com with subscription, accessed April 2, 2020.

Social Security Administration
1935-2014 Social Security Death Index, Master File. Social Security Administration. Electronic document available at Ancestry.com, with subscription accessed April 2, 2020.

Stanley, Leland R.
1977 Application for Building Permit with Alameda County. On file with the Alameda County Planning Department.

Stanley, Richard
2020 Oral discussion between Richard Stanley and Ms. McCausland during her site visit on March 16, 2020.

State of California
1900-1969 Great Register of Voters. Sacramento, California: California State Library. Electronic document available at Ancestry.com, with subscription accessed April 2, 2020.

Thompson & West
1878 *New Historical Atlas of Alameda County*. Thompson and West: Oakland, California. Official and historical atlas map of Alameda County, California. Electronic map available at http://www.davidrumsey.com/maps2812.html, accessed February 18, 2020.

U.S. Census Bureau
1880 Murray Township, Alameda County. U.S Federal Non-Population Schedule. Electronic document available at, Ancestry.com., accessed February 18, 2020.
1910 Murray Township, Alameda County. U.S Federal Census. Electronic document available at, Ancestry.com with subscription, accessed February 18, 2020.

U.S. Census Bureau
1920 Murray Township, Alameda County. U.S Federal Census. Electronic document available at, Ancestry.com with subscription, accessed February 18, 2020.
1930 Murray Township, Alameda County. U.S Federal Census. Electronic document available at, Ancestry.com with subscription, accessed February 18, 2020.
1940 Murray Township, Alameda County. U.S Federal Census. Electronic document available at, Ancestry.com with subscription, accessed February 18, 2020.

United Sates Geological Survey (USGS)
1906 Pleasanton, Calif., 1:24000. Denver, Colorado.
1961 Livermore, Calif., 1:24000. Denver, Colorado.
1968 Livermore, Calif., 1:24000. Denver, Colorado.
1973 Livermore, Calif., 1:24000. Denver, Colorado.
1980 Livermore, Calif., 1:24000. Denver, Colorado.

The Weekly Calistogian
1900 Article on the estate of George C. Stanley published June 15, 1900. On file with the Livermore Heritage Guild and HELIX Environmental Planning, Inc.

B13. Remarks:

***B14. Evaluator:** Annie McCausland, M.A.
Helix Environmental Planning, Inc. 7578 El Cajon Blvd, La Mesa, CA 91942
Date of Evaluation: March 2020

This space reserved for official comments.

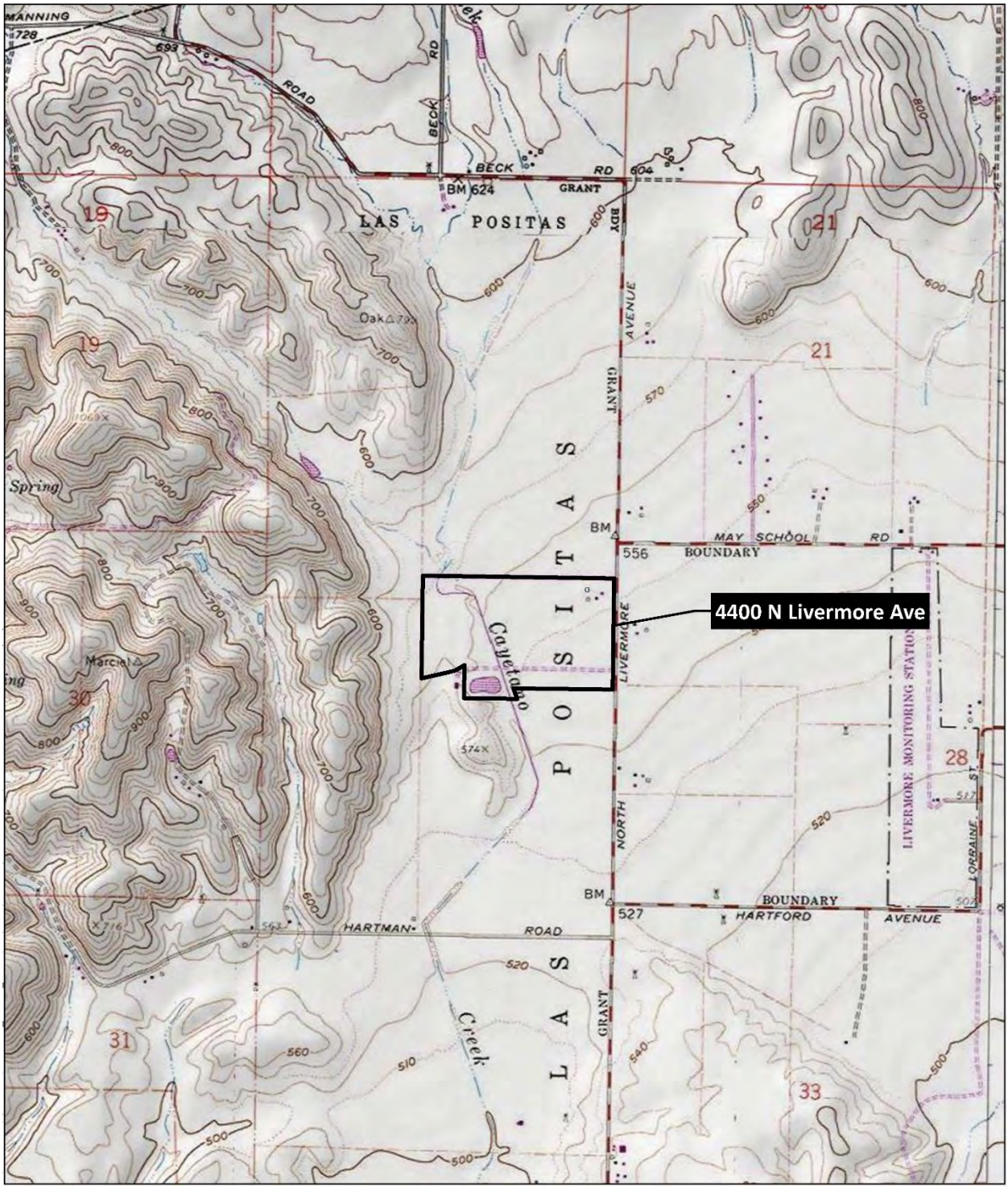
State of California ▯ Natural Resources Agency Primary #
DEPARTMENT OF PARKS AND RECREATION HRI#

LOCATION MAP

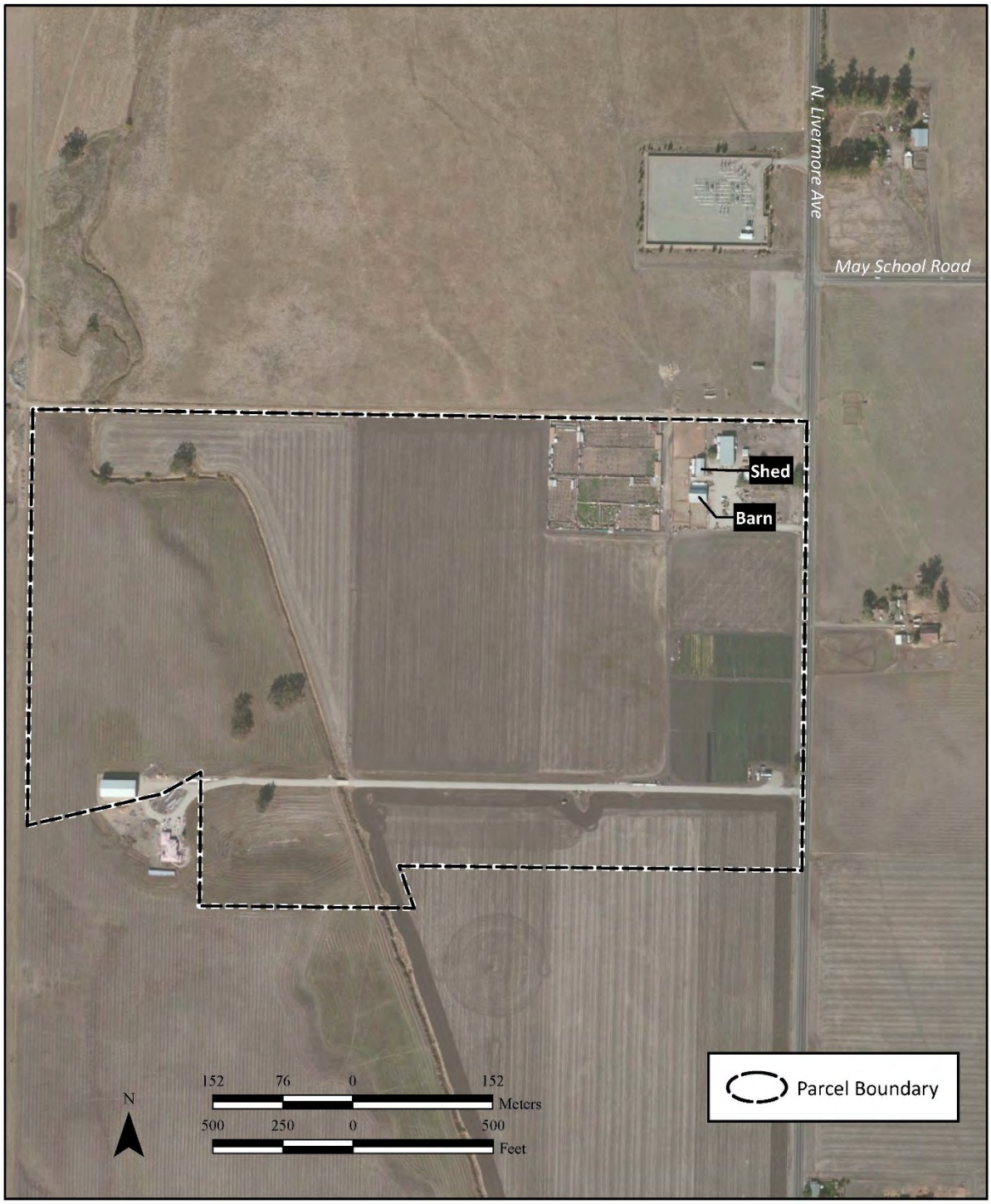
Trinomial

 ***Resource Name or #** (Assigned by recorder) 4400 N. Livermore Ave.

***Map Name:** Livermore ***Scale:** 1:24,000 ***Date of map:** 1980



***Drawn by:** Daniel Van Essen ***Date of map:** April 13, 2020




N. Livermore Ave
Shed
Barn
N
30 15 0 30
Meters
100 50 0 100
Feet
Parcel Boundary

Appendix G

Water Supply Assessment and Hydrology Study



Aramis Solar Energy Generation and Storage Project

Water Supply Assessment

prepared for
Intersect Power
9450 SW Gemini Drive PMB #68743
Beaverton, OR 97008-7105
Marisa Mitchell, Principal

prepared by
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September 2020

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Appendix A DWR Guidebook for Implementation of Senate Bill 610

Acronyms and Abbreviations

AFY	acre-feet per year
AC	alternating current
CEQA	California Environmental Quality Act
DC	direct current
DI	deionization
DWR	California Department of Water Resources
gpm	gallons per minute
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
kV	kilovolt
PV	photovoltaic
mg/L	milligrams per liter
MW	megawatts
MV	medium voltage
NMP	Nutrient Management Plan
O&M	operations and maintenance
PV	photovoltaic
RO	reverse osmosis
RWMG	Regional Water Management Group
SB	Senate Bill
SGMA	Sustainable Groundwater Management Act
SMP	Salt Management Plan
TDS	total dissolved solids
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment

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1 Introduction

In 2001, California adopted Senate Bill (SB) 610 and SB 221, amending California Water Code to require that certain types of development projects provide detailed assessments of water supply availability and reliability to city and county decision-makers prior to project approval. These Water Supply Assessments (WSAs) identify water supply for an identified project over a 20-year projection under varying climactic (drought) conditions. The primary purpose of these requirements is to promote collaborative planning between local water supply and land use decisions.

SB 610 was not originally clear on whether renewable energy developments are subject to SB 610 and require the preparation of a WSA. SB 267 was signed into law on October 8, 2011, amending California's Water Law to revise the definition of "project" specified in SB 610. Under SB 267, wind and photovoltaic (PV) projects that consumed less than 75 acre-feet per year (AFY) of water were not considered to be a "project" under SB 610; subsequently, a WSA would not be required for this type of project. The renewable energy exclusions provided by SB 267 expired in January 2017. Since the language of SB 610 remains unclear on whether renewable energy projects meet the definition of a "project," this WSA takes a conservative approach and considers renewable energy projects to be subject to the requirements of SB 610.

Water requirements associated with the Aramis Solar Energy Generation and Storage Project ("project") are described in Section 2.3, *Project Water Demands*. The project would source water from either an on- or off-site well in the Livermore Valley Groundwater Basin, or through a local water purveyor. Potential water sources for the project are evaluated in Section 4 of this WSA.

In accordance with California Water Code, a WSA must examine the availability of an identified water supply under normal-year (no drought), single-dry-year (limited drought), and multiple-dry-year (extended drought) conditions, over a 20-year projection. The WSA must account for the projected water demand of the project in addition to other existing and planned future uses of the identified water supply, including agricultural and manufacturing uses, to the extent information is available. A common lack of data for groundwater usage and replenishment rates often makes it difficult to estimate baseline conditions regarding water supply availability; therefore, where data is not available to make quantitative estimates of water supply, reasonable assumptions are made based on available information and data.

The steps followed to ensure compliance of this WSA with California Water Code are described in Attachment A (California Department of Water Resources [DWR] Guidebook for Implementation of SB 610 and SB 221).

2 Project and Property Description

2.1 Location and Setting

The project site is located in the northeast area of unincorporated Alameda County, approximately 2.5 miles north of Livermore, surrounded by low hills of the South Coastal Range to the west, north, and east. Please refer to Figure 1 for the project's geographic location, Figure 2 for the project's location in relation to the groundwater basin, and Figure 3 for the project's location in relation to the water district service area boundaries. In addition, Figure 4 shows the configuration of each of the development areas comprising the project site, as well as the applicable land use designation and zoning for each; as shown and discussed further below, the project development area is zoned for large-parcel agriculture or resource management, with an Agricultural District overlay.

The project site is bound by Manning Road to the north, North Livermore Avenue to the east, and a private driveway to the south. The western project site boundary generally follows the natural topography of Cayetano Creek and the adjacent hills. The project site is comprised of portions of four privately-owned noncontiguous parcels, identified below by their respective County Assessor's Parcel Numbers (APNs) and size in acres:

- APN 903-0006-001-02: 536 acres (of which 150 acres of undevelopable area will be subdivided out of the parcel as part of the project);
- APN 903-0007-002-01: 50 acres;
- APN 903-0006-003-07: 101 acres; and
- APN 902-0001-005-00: 60 acres.

As listed above, the four separate parcels which provide the project site total 747 acres in cumulative size. With implementation of the proposed project, APN 903-0006-001-02 will be subdivided to remove 150 acres of undevelopable land on steep slopes; after this subdivision, the parcels contributing to the project site will total 597 acres in size. These parcels are within Sections 16 and 17 of Township 02 South, Range 02 East and un-surveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" United States Geological Survey 7.5-minute quadrangles.

Figure 1 Project Site

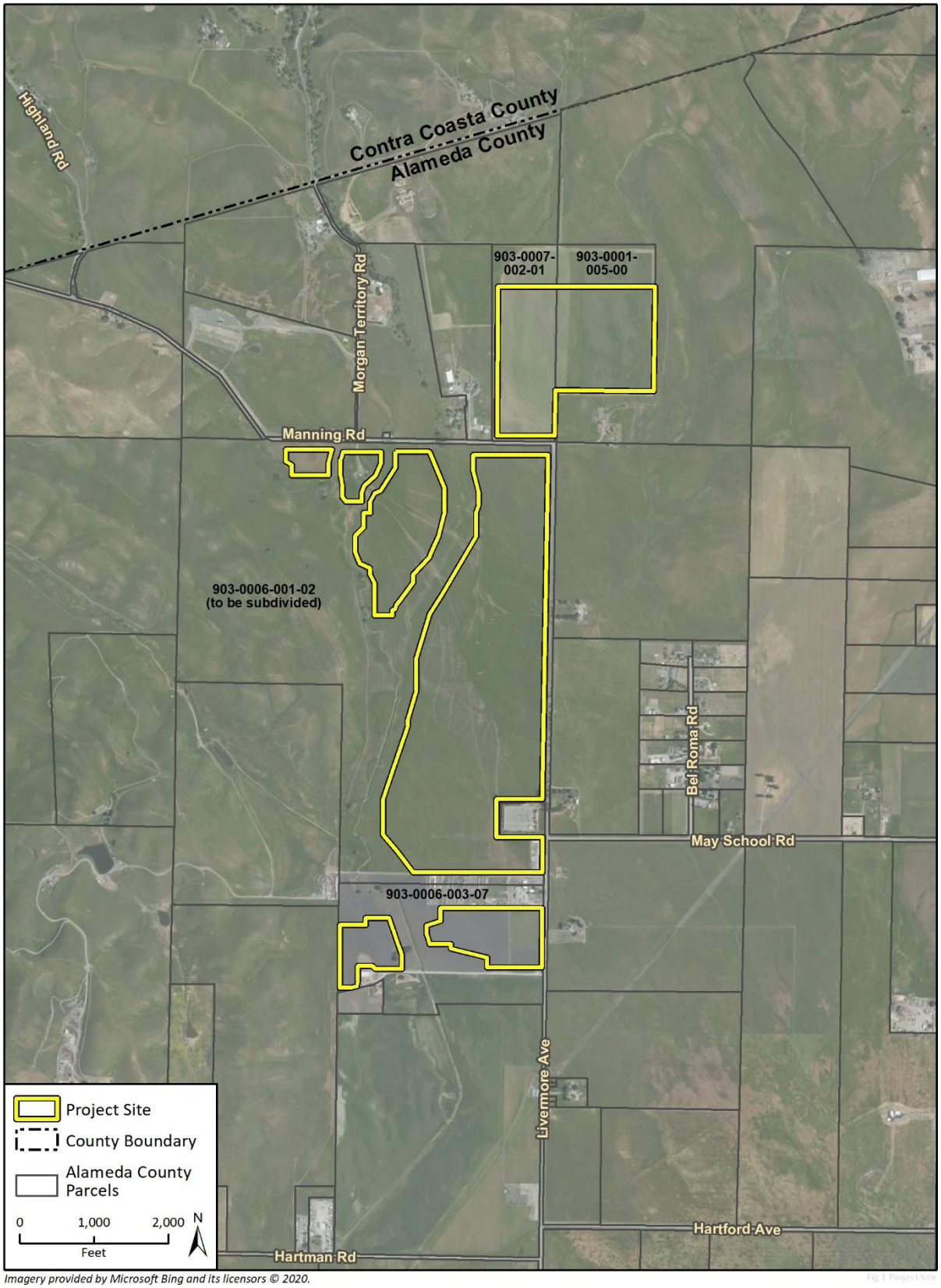

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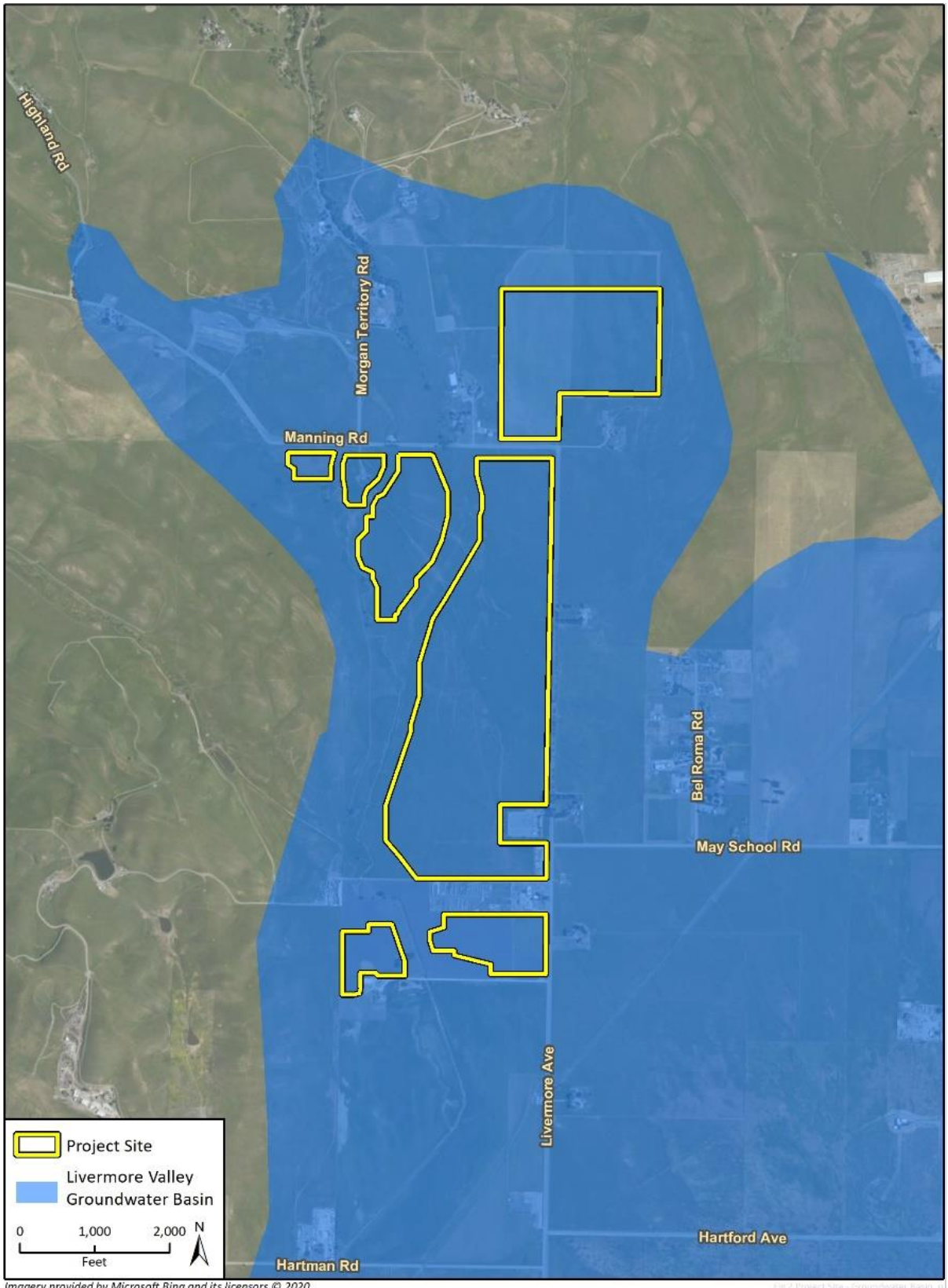
Figure 2 Groundwater Basins



Imagery provided by Microsoft Bing and its licensors © 2020.
Groundwater Basin data provided by California Department of Water Resources, 2020.

Figure 3 Water Districts

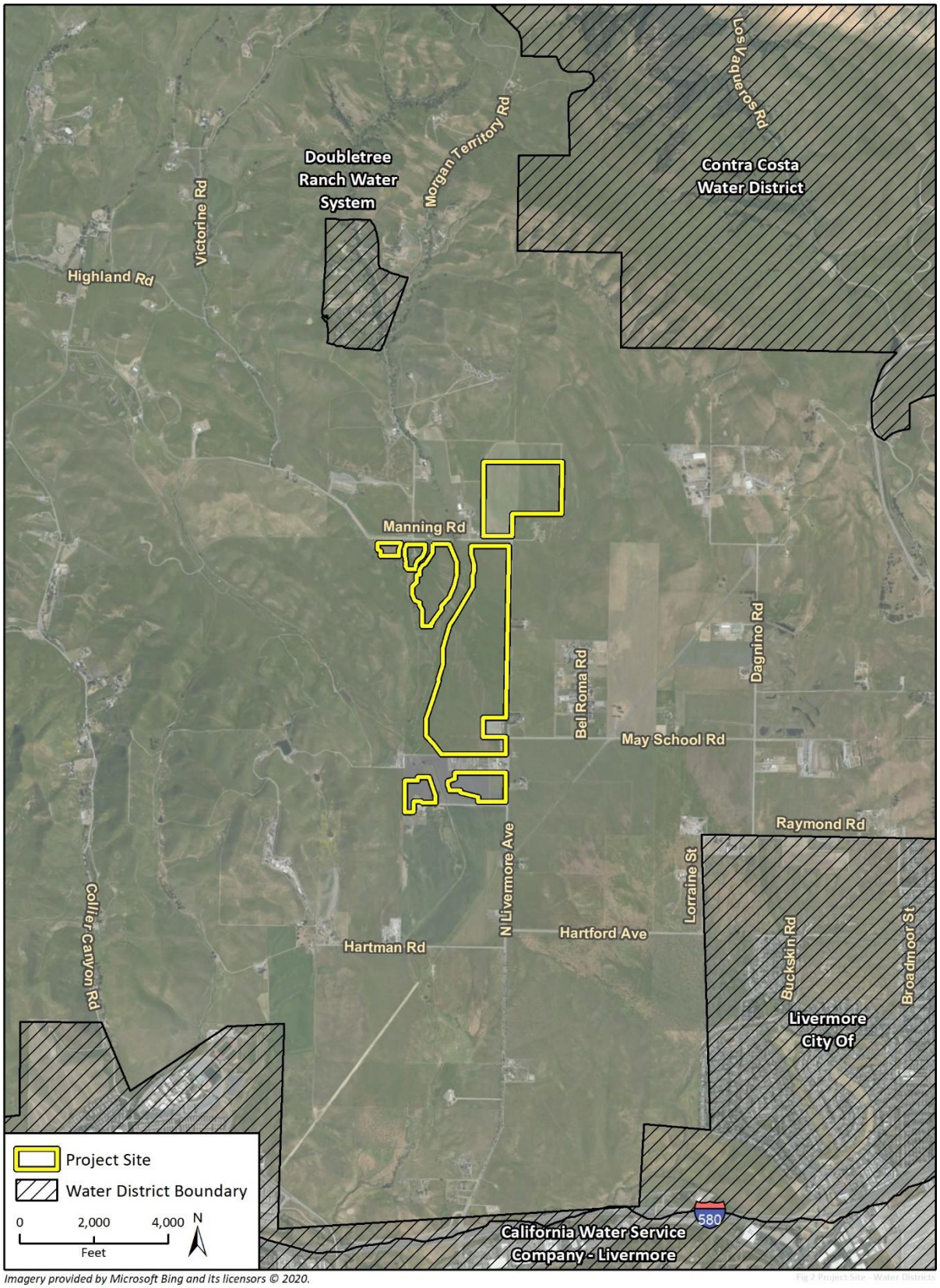


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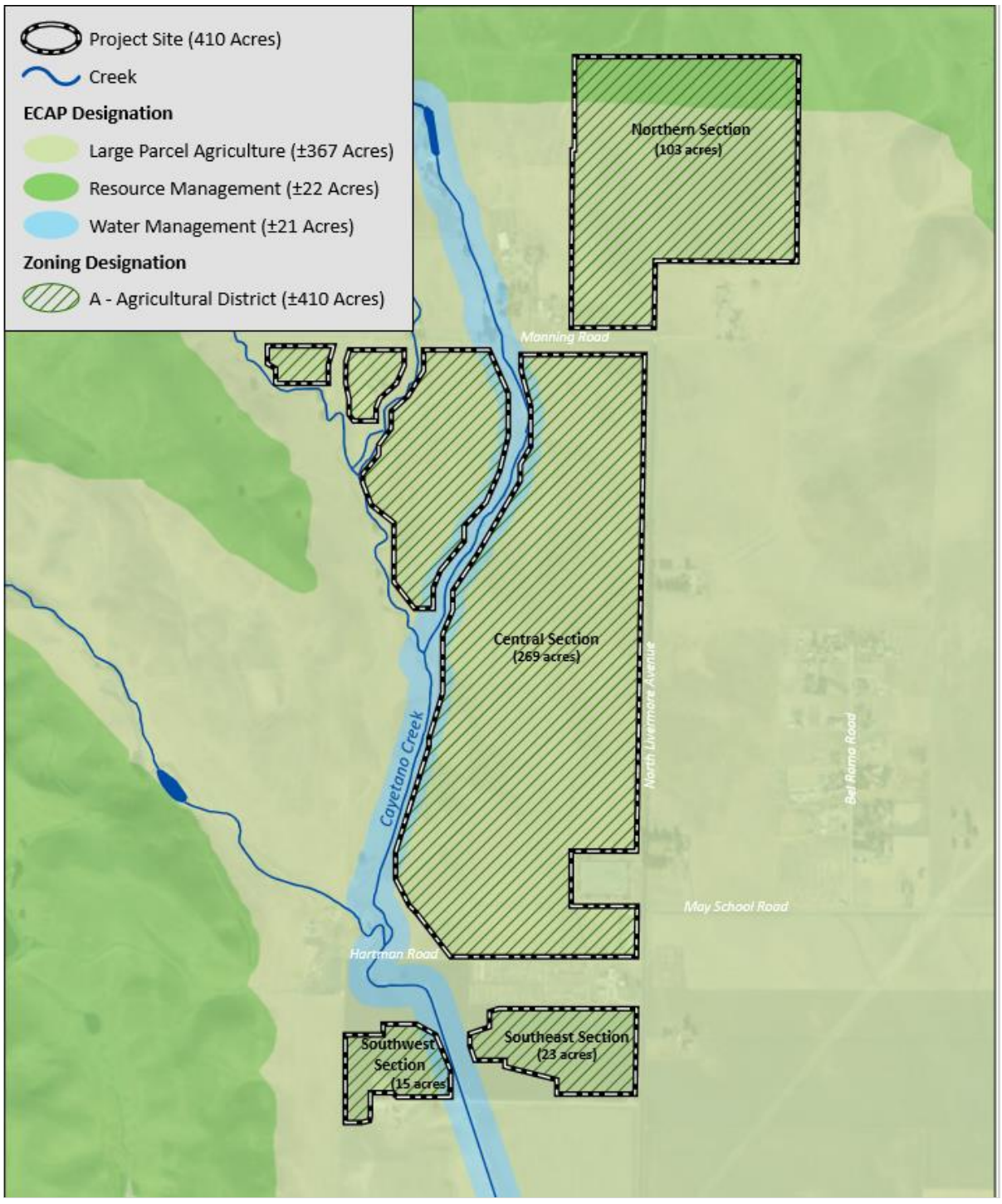
Figure 4 Land Use/Zoning Designation



For planning purposes, four development areas have been identified within the project site. These areas, listed below, do not follow the legal boundaries of the four parcels on which the site is located; rather, the boundaries of these development areas were determined based upon where the project features would be situated, avoiding areas that will be maintained in undeveloped state,

such as habitat and stream areas. Accordingly, the project's development area totals 410 acres in size, and is comprised of the four development areas listed below and shown on Figure 1:

- Northern Section (103 acres);
- Central Section (269 acres);
- Southeastern Section (23 acres); and
- Southwestern Section (15 acres).

As discussed above, the four development areas which comprise the project site total 410 acres in size, which is a smaller area than the collective size of the parcels that provide the development area; please see Section 2.2.1 for further discussion of the subdivision.

Figure 4 shows the proposed project's 410-acre development area is zoned for large-parcel agricultural or resource management, with an Agricultural District overlay.

The project site largely overlies the Livermore Valley Groundwater Basin, which is managed by the Zone 7 Water Agency, a wholesale water agency in Alameda County. The water purveyors shown on Figure 3 receive their water supply from Zone 7; the service territory for Zone 7 covers the project site and surrounding area not otherwise covered by water districts shown on Figure 3. The Livermore Valley Groundwater Basin and Zone 7 Water Agency are described below, to provide a background of the region's water supply sources and primary local purveyor. Water supply for the proposed project would be sourced from the underlying groundwater basin, and/or purchased from a local water purveyor and trucked to the site, as discussed in Section 4, *Impact Analysis.*

2.1.1 Livermore Valley Groundwater Basin

The proposed project site and development area overlies the Livermore Valley Groundwater Basin, as shown on Figure 2. The Livermore Valley Groundwater Basin is not adjudicated, and is managed by the Zone 7 Water Agency, which is the designated exclusive Groundwater Sustainability Agency (GSA) in accordance with the Sustainable Groundwater Management Act (SGMA) of 2014. SGMA establishes a framework for local groundwater management and requires local agencies to bring overdrafted basins into balanced levels of pumping and recharge. The DWR uses the California Statewide Groundwater Elevation Model Priority List to rank groundwater basins across the state according to priority levels of High, Medium, Low, or Very Low, and SGMA specifies deadlines for completion of Groundwater Sustainability Plans (GSPs) in order of basin priority. DWR identifies the Livermore Valley Groundwater Basin as a Medium-Priority basin (DWR 2020). In accordance with SGMA, as the GSA for the Livermore Valley Groundwater Basin, Zone 7 is required to prepare a GSP, or an Alternative Plan that is determined by the DWR to meet SGMA's requirements for a GSP, which is a detailed framework for how groundwater basins will reach long-term sustainability. In 2016, Zone 7 adopted an Alternative Plan for the Livermore Valley Groundwater Basin which was approved by the DWR as functionally equivalent to a GSP. Zone 7 is currently preparing a 2022 update to the Alternative Plan. (Zone 7 2016a; Zone 7 2016b)

The Livermore Valley Groundwater Basin spans approximately 69,600 acres (109 square miles) of surface area and underlies portions of Alameda and Contra Costa Counties. The Livermore-Amador Valley, which provides the setting for the Livermore Valley Groundwater Basin, lies about 40 miles east of San Francisco and 30 miles southwest of Stockton within a structural trough of the Diablo Range. The Livermore Valley Groundwater Basin extends from the Pleasanton Ridge east to the Altamont Hills (about 14 miles) and from the Livermore Upland north to the Orinda Upland (about

three miles). Additional information on this groundwater basin, as reported in DWR's Bulletin 118, is provided below. (DWR 2004)

Water Bearing Formations. The entire floor of the Livermore Valley and portions of the upland areas on all sides of the valley overlie groundwater-bearing materials. The materials are continental deposits from alluvial fans, outwash plains, and lakes. They include valley-fill materials, the Livermore Formation, and the Tassajara Formation. Under most conditions, the valley-fill and Livermore sediments yield adequate to large quantities of groundwater to all types of wells. The quality of water produced from these formations ranges from poor to excellent, with most waters in the good to excellent range (DWR 2004).

Restrictive Structures. Within the Livermore Valley groundwater basin, faults are the major structural features known to have marked effect on the movement of groundwater. Faults in this region tend to act as barriers to the lateral movement of groundwater. The resulting groundwater levels stand higher on the up-gradient side. The Livermore, Pleasanton and Parks faults act as such barriers, dividing the Quaternary Alluvium into five groundwater subbasins (DWR 2004).

Water Quality. The character of groundwater quality in the Livermore Valley Groundwater Basin is generally sodium cation in the northern extent of the basin, magnesium-sodium as the dominant cation in the western part of the basin near Pleasanton, and magnesium along the eastern portion of the basin beneath Livermore. Nearly the entire basin has bicarbonate as the dominant anion. Total Dissolved Solids (TDS) concentrations range from 300 milligrams per liter (mg/L) to 550 mg/L with an average of 450 mg/L based on analyses from 27 municipal wells (DWR 2004).

Boron is generally the dominant source of groundwater quality impairment in the Livermore Valley Groundwater Basin. Some areas have boron concentrations exceeding 2 mg/L (16 wells of approximately 137 wells sampled in 1982). Boron is generally highest in shallow wells because of marine sediments adjacent to the basin. The most extensive elevated boron concentrations occur in the northeast part of the basin (DWR 2004).

Groundwater Budget. The Zone 7 Water Agency, as part of the Alameda County Flood Control and Water Conservation District, has maintained an annual hydrologic inventory of supply and demand since 1974. The inventory describes the balance between groundwater supply and demand. Under average hydrologic conditions, the groundwater budget is essentially in balance. Groundwater budget inflow components include natural recharge of 10,000 acre-feet (AF), artificial recharge of 10,900 AF, applied water recharge of 1,740 AF, and subsurface inflow of 1,000 AF. Groundwater budget outflow components include urban extraction of 10,290 AF, agricultural extraction of 190 AF, other extraction and evaporation associated with gravel mining operations of 12,620 AF, and subsurface outflow of 540 acre-feet (DWR 2004).

2.1.2 Zone 7 Water Agency

The project site is located within the service territory and management area of the Zone 7 Water Agency, also referred to as "Zone 7". Zone 7 is a division of the Alameda County Flood Control and Water Conservation District and is the primary water wholesaler for the Livermore-Amador Valley. Zone 7 supplies imported treated surface water to four agencies in Alameda County: California Water Service Company – Livermore District; Dublin San Ramon Services District; City of Livermore; and City of Pleasanton. Additionally, Zone 7 owns and maintains approximately 37 miles of local flood control channels, equating to about a third of the Livermore-Amador Valley's flood control system. Zone 7 manages and supplies both imported and local groundwater to its service area. The agency imports raw surface water from the State Water Project (SWP) through the South Bay

Aqueduct (SBA) for treatment, storage, and distribution, as well as for groundwater recharge purposes to improve local groundwater conditions (Zone 7 2015). Additionally, Zone 7 operates 10 municipal supply wells for groundwater access which are distributed throughout the basin. Zone 7 also supplies untreated water for local industry and agriculture (Zone 7 2005).

The SWP is the nation's largest state-built water and power development and conveyance system. The SWP includes approximately 700 miles of aqueduct and conveyance facilities, supplying water to more than 27 million people in northern California, the Bay Area, the San Joaquin Valley, and the central coast and southern portions of California (DWR 2020). Zone 7 receives both direct deliveries and Table A water supplies from the SWP. The SWP is contracted to deliver a maximum of approximately 4.2 million AFY of Table A water to a total of 29 contracting agencies. Table A water is a reference to the amount of water listed in "Table A" of the contract between the SWP and its contractors, which represents the maximum amount of water a contractor may request each year. Zone 7 has an allocation for purchasing up to 80,619 AFY of Table A water from the SWP (DWR 2013). When water supplies are limited, such as during extended drought, SWP deliveries can be curtailed, and water is allocated based on a percentage of full contractual Table A amounts. Zone 7 prepares for single- and multiple-dry year scenarios by storing water imported from the SWP in the Livermore Valley Groundwater Basin through groundwater banking programs (Zone 7 2020b).

Zone 7 is one of Alameda County Flood Control and Water Conservation District's active zones and is therefore included in the County's 2015 Urban Water Management Plan (UWMP). As assessed herein, the project's water supply would either be pumped from the local groundwater basin, or purchased from Zone 7 via one of the four agencies served by Zone 7 (California Water Service Company – Livermore District, Dublin San Ramon Services District, City of Livermore, and City of Pleasanton). For the purposes of this WSA, it is assumed that any water purchased from a local purveyor for the project would be sourced through Zone 7, and therefore this WSA assesses the water supply reliability of the Zone 7 Water Agency as a whole, and does not assess each of the four water purveyors that sources its supply through Zone 7 (and could potentially deliver the project's water supply).

2.2 Description of Project

The proposed project includes a utility-scale solar energy generation and battery energy storage system and a parcel subdivision. The solar facility would generate 100 megawatts (MW) of PV power on approximately 410 developable acres of privately-owned land in unincorporated Alameda County in the North Livermore area (see Figure 1). The project would provide solar power to utility customers by interconnecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E) existing Cayetano 230 kilovolt (kV) substation located adjacent and interior to the project site. The project would serve East Bay Community Energy, Clean Power San Francisco, and/or PG&E customers by providing local generation capacity under a long-term contract. The Applicant proposes to construct, own, and operate the project, and will secure Conditional Use Permits from Alameda County, along with permits from other relevant agencies as required by law.

2.2.1 Project Components

Primary project components, which are discussed in detail in the following section, include the following: parcel subdivision, solar PV system, project substation and gen-ties, energy storage, support facilities and concomitant agricultural uses.

2.2.1.1 Parcel Subdivision

APN 903-0006-001-02 is currently a 536-acre parcel. Approximately 150 acres of the parcel are steeply sloped, and this area is proposed to be subdivided to legally separate it from the real property affiliated with the proposed project development. Four development areas have been identified within the project site totaling approximately 410 acres in size. The four development areas are smaller than the parcels within which they are located, and do not follow the APN boundaries of the four legal parcels that comprise the project site. As noted, the development area for the proposed project is limited to 410 acres, which are comprised of four development areas shown on Figure 1 through Figure 4

2.2.1.2 Solar Photovoltaic System

The project's individual PV modules would be arranged in rows onto a single-axis tracker racking system, which would in turn be affixed to steel piles. Each row (or array) would track the sun during the day, from east to west, to optimize power generation of the facility. The arrays would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a medium voltage (MV) of 34.5 kV (or lower suitable voltage) to match the collection system voltage. The power output from the inverter station would be conveyed to the on-site substation via collection cables. Medium-voltage lines would be buried for a majority of their length, but would emerge above-ground and be mounted on up to two overhead wooden utility poles on either side of Manning Avenue and up to 10 additional wooden poles to cross Cayetano Creek and its tributaries, to cross an access driveway, and where a connection to the substation must be overhead.

In order to maintain efficiency of the PV panels, they would be cleaned of accumulated dust and debris annually. Operational water demands associated with operation and maintenance of the PV panels are described in Section 2.3.2.

2.2.1.3 Project Substation and Gen-Ties

The project substation would provide the necessary circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure. The substation would step up the MV collected energy to the interconnection voltage via one or more step up transformers. The substation would meter and project the energy pursuant to the Interconnection Agreement and Power Purchase Agreement(s) with the utility and off-taker(s), respectively. The substation would occupy an approximately 5,000-square-foot area in a 0.9-acre dedicated area.

From the substation(s), power would be transmitted to the existing PG&E Cayetano Substation via overhead and/or underground generation-transmission (gen-tie) line(s). The northern section of the project site (north of Manning Road) would be electrically connected to the central section via medium-voltage distribution lines. Medium voltage distribution line would be routed either overhead or underground.

No water demand is associated with operation of the substation and gen-ties.

2.2.1.4 Energy Storage

A five-acre battery storage system would be located on site adjacent to the west of the PG&E Cayetano Substation (See Figure 3-1). The battery storage system would be designed to accept between 75 and 100 MW of system charging, and subsequently dispatch stored electricity during times of peak demand. The system would either be housed in electrical containers or in up to four 100-foot by 180-foot buildings. Various sizes and numbers of electrical enclosures would be used depending on the final battery vendor selected. Up to 50 large electrical enclosures or up to 1,000 small electrical enclosures would be clustered to make up the battery storage system. Low-voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer.

No water demand is associated with operation of energy storage.

2.2.1.5 Support Facilities

Support facilities for the proposed project include: an operations and maintenance (O&M) building with electrical controls; project entrances and internal driveways; fences, lighting and signage. Each of these support facility components is described below.

O&M Building and Electrical Controls

The project would include the construction and maintenance of one O&M building, with a footprint measuring approximately 400 square feet (approximately 20 feet by 20 feet and 15 feet high at its tallest point). The building would accommodate up to four permanent operation and maintenance staff. The building would be plumbed. Water would be stored in a tank and filled on an as-needed basis. Waste would be held in a tank system and removed routinely.

In addition, the O&M building would include a meteorological station which would collect site-specific weather data. A fiber optic telecommunications line required by the interconnecting utility would be integrated with the gen-tie line. An electrical control enclosure would be included on site for the operations electrician to monitor and manage the system.

Water demands associated with the O&M building are described in Section 2.3.2.

Project Entrances and Internal Driveways

Access to the project site would be provided via all-weather, rocked driveway aprons at four access points along North Manning Road, two access points along North Livermore Avenue and one access point along Hartman Road as shown on the site plan. The project entrances would be designed and constructed in accordance with the Alameda County Improvement Standards.

Internal access roads and narrower pathways within the fence line would provide access for routine maintenance of the system. The primary internal access roads would be designed by a licensed civil engineer to ensure all-weather access by emergency response vehicles, including large fire apparatus. Pending final geotechnical and hydrological evaluations, the primary access roads would be designed to be 16 feet wide and constructed with up to 8 inches of aggregate base or simply compacted soil if soil stability conditions allow. Banked corners and periodic three-point turnaround locations would ensure that large fire trucks may navigate the site safely. The narrower, inter-array pathways would be constructed of compacted dirt and be accessible by smaller maintenance vehicles.

No water demand is associated with project entrances and internal driveways.

Fences, Lighting, Signage

The project components would be enclosed by security fencing. The fencing would be seven feet high. The fence would be set back from the property line at least 50 feet. Locked gates at the project entrances would control ingress/egress.

Shielded, downward directional security lighting would be located at the control enclosure and O&M building for emergency repairs. Night lighting would not be required except during scheduled maintenance periods and emergency repairs.

Signage would be limited to what is required by the interconnecting utility and County and would conform to County guidelines.

No water demand is associated with fencing, lighting, and signage.

2.2.1.6 Concomitant Agricultural Uses

The project applicant would maintain a majority of the site in limited agricultural operation for the duration of the life of the solar facility in a concomitant, or naturally accompanying, manner. Solar facilities have a minimal development footprint, which allows for concomitant sheep grazing. Because the solar panels (modules) are installed on a system of racks, the ground below the modules remains undeveloped. Additional areas within the project site include grassy areas between the rows and undeveloped portions of the site that will remain as open space for the life of the project. The undeveloped areas would be available for sheep grazing and may be intermittently grazed or left fallow. Pollinator-friendly plant species would be used in landscaping and seed mixes to promote honeybee forage.

Water demands associated with the concomitant agricultural uses are described in Section 2.3.2.

2.2.2 Construction

The duration of project construction would be approximately nine months. Project construction activities would consist of site preparation, installation of interconnection facilities and battery storage system, cable installation, pile and skid installation, tracker and module installation, and lastly, site cleanup. Project construction would be completed in four phases, including Phase 1 site preparation (30 days), Phase 2 PV installation (150 days), Phase 3 electrical and gen-tie installation (75 days), and Phase 4 general construction operations, site clean-up and restoration (175 days). Phase 4 spans the entire construction duration. It is anticipated that the construction of Phases 2, 3, and 4 would overlap for approximately 10 weeks duration. Work for all phases would be conducted Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. All construction staging areas would be located within the development footprint of the solar facility. Water demands associated with construction are described in Section 2.3.1.

2.2.3 Operation and Maintenance

The solar facility is anticipated to have an operating life of 50 years (please see Section 2.3.2, *Operational Water Assumptions,* and Section 3.6, *Are There Sufficient Supplies to Serve the Project Over the Next 20 Years?*). This lifespan is 30 years longer than the 20-year projection required by California Water Code (as amended by SB 610) to be considered in a WSA. However, for the purposes of full disclosure and to provide a conservative analysis, this WSA presents all anticipated

water demands of the project over the entirety of its anticipated lifespan, including for the final decommissioning or repowering phase.

During the O&M phase, the proposed project would passively generate power during daylight hours seven days per week, 365 days per year. The facility would be tested, maintained, and inspected daily by a remotely dispatched staff of approximately four technicians. The energy storage system would store and dispatch power during both daylight and non-daylight hours as required by grid operators year-round. Regular O&M activities include:

- Solar module washing (once per year)
- Vegetation, weed, and pest management (as needed)
- Agricultural use of the site (sheep grazing - continuous)
- Security (continuous)
- Responding to automated electronic alerts based on monitored data, including actual versus expected tolerances for system output and other key performance metrics (continuous)
- Occasional equipment repair and replacement (as needed)
- Communicating with customers, transmission system operators, and other entities involved in facility operations (as needed)

While daily monitoring of the site would occur remotely, up to four staff could be on the site at a time for as needed facility maintenance and repairs. Once per year, up to 12 workers could be on site to support annual module washing activities. As discussed further below, in Section 2.3.2, solar module washing would include the use of an on-site water truck and high-pressure washer to clean dust accumulated on the solar modules. It is conservatively assumed that an on-site water treatment system would also be implemented to treat locally-sourced groundwater for panel-washing purposes during the O&M period.

The project operations would promote continued agricultural use of the project site, through both sheep grazing and apiary activities, in portions of the site where such uses are compatible with the proposed solar operations. Continued agricultural use of the site would be limited to sheep grazing and apiary uses, and would not include irrigated agriculture. The project site's vegetative cover would generally be kept low to prevent shading of solar panels, minimize buildup of combustible fuel loads which would result in a fire hazard, and to facilitate emergency and maintenance vehicle access. This would be accomplished by using low-growing vegetation species on the site and maintaining vegetation with grazing during the growing season (January through May). Mechanical methods for vegetation management such as mowing, trimming, and hoeing would be implemented as needed to complement the effects of grazing. The project would not include irrigation.

Water demands associated with project O&M are described in Section 2.3.2.

2.2.4 Decommissioning or Repowering

Once the functional operating life of the project is over, the facility would either be decommissioned to remove project components and restore the site, or it would be repowered to continue providing solar energy generation and storage. Project decommissioning would occur in accordance with the expiration of the Conditional Use Permit and would involve the removal of above-grade facilities, buried electrical conduit, and all concrete foundations in accordance with a Decommissioning Plan. Equipment would be repurposed off-site, recycled, or disposed of in a

landfill as appropriate. It is anticipated that repowering would also require ground-disturbing activities to replace or upgrade project components that were not otherwise replaced or upgraded as part of regular O&M for the project.

If repowering is pursued instead of decommissioning, the facility owner would be required to obtain current permits and approvals for the project, including renewed analysis under the California Environmental Quality Act (CEQA). As described above, the project's operational lifespan is anticipated to be 50 years; it is realistically assumed that resource permits will be updated as needed over the lifetime of the project.

Water demands associated with repowering or decommissioning are described in Section 2.3.3.

2.3 Project Water Demands

The proposed project's water demands include temporary construction activities and long-term O&M activities, as well as temporary decommissioning or repowering activities. For the purposes of this WSA, it is assumed the project's water supply will be obtained from on-site groundwater wells in the Livermore Valley Groundwater Basin, and/or water purchased from an off-site water purveyor and trucked to the project site. As described in Section 2.1.2, *Zone 7 Water Agency*, for the purposes of this WSA, it is assumed that any water purchased from a local purveyor for use on the project site would be sourced through Zone 7, as the primary wholesale water distributer for this portion of Alameda County.

Table 1 details the project's estimated water demands during the construction, O&M, and decommissioning/repowering phases. A suite of assumptions were developed to inform the estimates provided in Table 1; these assumptions are detailed in notes at the end of the table, and in Sections 2.3.1 through 2.3.3. As discussed below, in order to identify and characterize all potential water supply impacts of the project, and provide a reasonable assessment of water supply availability and reliability, conservative assumptions were applied to each of the project's water-demanding activities.

Table 1 Project Water Demands

Project Phase (Duration of Phase)	Water Demand Annual (AFY)	Water Demand Total (acre-feet)
Construction (9 months [0.75 year])	**43.95[1]**	**42.00**
Dust Suppression	42.00	42.00
Operation & Maintenance (50 years)[2]	**12.85**	**642.50**
Panel Washing[3]	5.00	250.00
Panel Washing Concentrate[4]	5.00	250.00
Fire Suppression (stored on site for emergency response)[5]	0.04	2.00
Water for Livestock Grazing[6]	2.75	137.50
O&M Building	0.06	3.00
Decommissioning or Repowering (6 months [0.5 year])[7]	**45.93[8]**	**42.00**
Dust Suppression	42.00	42.00
Total Demand	**Not Applicable**	**726.50**

Amortized Demand[9]	***13.97***	***AFY***

[1] Annual Construction Water: The construction period is limited to nine months, during which the project's full construction water demand of 42 acre-feet would occur. This equates to approximately 4.7 acre-feet per month during the nine-month construction period (42 acre-feet / nine months = 4.7 acre-feet per month). In order to quantify realistic water demands on an annual basis, this table shows annual water demand associated with the first year of the project, which consists of nine months of construction plus three months of operation and maintenance (0.65 acre-feet per month). Accordingly, the project's annual water demand for the year during which construction would occur is approximately 43.95 acre-feet.

[2] O&M Project Phase: The project applicant anticipates the project's operational lifetime being 50 years, which is 30 years longer than the 20-year projection required by California Water Code (as amended by SB 610) to be considered in a WSA. However, for the purposes of full disclosure and to provide a conservative analysis, this table presents all anticipated water demands of the project over the entirety of its anticipated lifespan of 50 years. In addition, the project applicant has determined that operational water demands for the project would be approximately 5 AFY; this estimate has been expanded as described below, in order to provide a conservative analysis for the purposes of the WSA, and to address present uncertainty regarding the ultimate source of water for the project (local groundwater that may be high in TDS content, and/or imported surface water).

[3] Panel Washing: An industry standard assumption of 0.05 acre-foot of water per MW of solar power generation was applied to the project. The project would generate up to 100 MW of solar energy; accordingly, panel washing would require approximately 5 acre-feet per washing, which is consistent with the operational water demand identified by the project applicant.

[4] Panel Washing Concentrate: The brine discharge water stream produced as a byproduct of the desalination and deionization process. It is conservatively assumed that the recovery rate for a treatment system is 50 percent, such that in order to produce 5 acre-feet of clean/treated water for use in panel washing, 10 acre-feet would need to be pumped from the groundwater basin. This factor is included in potential water demands of the project in order to account for uncertainty in the water source to be used for the project; if groundwater is used as the sole water source for the project, as opposed to surface water purchased from a local purveyor, or a combination of groundwater and imported surface water, it is possible that TDS concentrations in the groundwater would require treatment. Therefore, this analysis conservatively accounts for the water demands associated with the waste stream from a treatment system. Please see Section 2.3.2 under "Solar PV Panel Washing" for further discussion.

[5] Fire Suppression: Consistent with requirements of similar solar projects and adjusted for the size of the project, a standard of 0.04 AFY was applied to the project.

[6] Water for Livestock Grazing: An industry standard assumption of two sheep per acre and three gallons per sheep was applied to the project (Wikes 2016; Schoenian 2008). Please see Section 2.3.2, under "Water for Livestock Grazing" for further discussion of these assumptions regarding water for livestock grazing.

[7] Decommissioning Water: The project's decommissioning or repowering period is estimated to require approximately six months. If the project is repowered rather than being decommissioned, it is assumed that additional CEQA review and permitting would be conducted at that time, and all water demands associated with operating the project after repowering would be assessed at that time, in a new or updated WSA. Therefore, for the purposes of this analysis, potential water demands associated with operating the project after repowering are not quantified (which will include a new WSA or comparable analysis at that time). Due to the project's lifetime being anticipated at 50 years, it would be highly speculative to characterize water supply or reliability conditions at this time.

[8] Decommissioning Annual Projection: Similar to the annual construction water calculation, the decommissioning or repowering period is limited to six months, during which the project's full construction water demand of 42 acre-feet would occur. This equates to approximately 7 acre-feet per month during the six-month construction period (42 acre-feet / 6 months = 7 acre-feet per month). In order to quantify realistic water demands on an annual basis, this table shows annual water demand associated with the last year of the project, which consists of six months of decommissioning or repowering (water demand of 7 acre-feet per month) plus six months of operation and maintenance (0.65 acre-feet per month). Accordingly, the project's annual water demand for the year during which decommissioning or repowering would occur is approximately 45.93 AFY.

[9] Amortized Demand: This is the project's total estimated water demand averaged over all phases of the project, accounting for 52 years to capture construction and decommissioning or repowering, in addition to 50 years of operation and maintenance. Accordingly, the project's amortized water demand is approximately 13.97 AFY.

AFY= acre-feet per year

MW= megawatt

As shown in Table 1, the project's amortized annual water demand is 13.97 AFY, based upon the suite of conservative assumptions listed in footnotes to the table. The amortized water demand is the project's average annual water demand over all project phases, accounting for the construction and decommissioning/repowering phases, as well as the 50-year O&M phase. The amortized water demand is often considered a useful tool in assessing long-term water supply availability, particularly for long projections such as the proposed project's 50-year lifespan. However, for the purposes of this WSA, water supply availability is considered both for each phase's anticipated annual demand, as well as the project's cumulative total demand.

Water demands associated with each project phase are discussed in detail in Sections 2.3.1 through 2.3.3. Water supplies that would be used to meet the project's water demands are discussed in Section 4, *Water Supply Reliability Analysis.*

2.3.1 Construction Water Assumptions

As shown in Table 1, during the project's construction period of approximately nine months, the project would use approximately 42 acre-feet of water for dust suppression. In order to provide annual water demand projections, Table 1 shows the project's water demand during the first full year of the project, which includes nine month of construction plus three months of O&M, assuming the project is charged and operational immediately upon the completion of construction. Construction water uses would primarily be for dust suppression.

The following conservative assumptions were developed for the purposes of this WSA:

- Water supply for project construction would be pumped from on- or off-site groundwater well(s) within the Livermore Valley Groundwater Basin, or it would be purchased from Zone 7 or one of the four purveyors that receive imported surface water supply from Zone 7 (California Water Service Company – Livermore District, Dublin San Ramon Services District, City of Livermore, and City of Pleasanton);
- If construction water is pumped from an off-site groundwater well, it is assumed such a well would source water from the Livermore Valley Groundwater Basin;
- Drinking water for construction personnel would be provided as bottled water, and would be delivered to the project site via truck;
- Restroom facilities would be provided as portable units to be serviced by licensed providers, and would not require an on-site water source;
- Construction water uses would not require an on-site water quality treatment system, as high TDS concentrations in the local groundwater do not adversely affect the water's effectiveness in use for on-site dust suppression; and
- Construction water demands do not include water for concrete production, because it is assumed that concrete for project features such as but not limited to the footings for solar PV modules would be purchased from a local retailer that would provide pre-mixed concrete, and the retailer would therefore be responsible for ensuring the water supply availability for production of their product.

2.3.2 Operational Water Assumptions

During the project's 50-year O&M period, water demands include annual washing of the solar PV panels to maintain efficiency, potential wastewater associated with water treatment, potential on-site emergency fire suppression storage water, operation of the project's O&M building, and water provided in on-site troughs for sheep grazing. The applicant has determined the project operational water demand would be up to 5 AFY of water, which is consistent with water demands associated with similar solar power developments in similar environments, and is the water demand used to inform the CEQA analysis provided in the project's Environmental Impact Report, which this WSA is provided as an appendix to. For the purposes of this WSA, additional assumptions were developed to provide a conservative analysis respective to the long-term water supply availability and reliability for the project. Based upon these additional assumptions, which are detailed below as

well as in the notes to Table 1 this WSA conservatively assesses an operational water demand of up to 12.85 AFY.

Solar PV Panel Washing

In order to maintain energy production efficiency of the PV solar panels, they will be washed with water once per year, to clean accumulated dust from the panel surfaces. This typically requires the wash water to have low concentrations of TDS, or total dissolved solids, so that salts in the wash water aren't deposited on the panel surfaces, which would in turn decrease efficiency of the panels. As discussed throughout this analysis, it is assumed the project's water would be sourced from on- or off-site groundwater wells, or via imported surface water purchased from a local purveyor. In order to address this uncertainty in the project's water source, and to provide a conservative analysis for the purposes of this WSA, it is assumed that the project's water supply will need to be treated to lower TDS concentration prior to use as panel washing water. It is further assumed that the treatment method employed would be an on-site combined reverse osmosis (RO) and deionization (DI) system.

Industrial RO systems typically run between 50 and 85 percent recovery, depending on the feed water characteristics and other design considerations (PureTec Industrial Water 2019). Recovery is the amount of water permeated per unit time, typically measured in gallons per minute (gpm) and expressed as a percentage of the source water flow rate. In other words, an 85 percent recovery rate means that 85 percent of the amount of water fed into a system is produced as treated water, and 15 percent is produced as concentrate for disposal. Source water that has higher concentrations of water quality constituents results in lower recovery rates from a RO/DI system. In order to provide a conservative analysis for the purposes of this WSA, it is assumed that a potential RO/DI system would have a recovery rate of approximately 50 percent. As such, for every 100 gallons of source water that enters the system, 50 gallons would exit the system as low-TDS wash water, and 50 gallons would exit the system as a concentrated brine for off-site transport to an approved waste disposal facility.

The solar PV panel washing analysis relies on an assumed water demand rate of 0.05 acre-feet of water per year per MW, based on other utility-scale solar PV projects in California (Sandia National Laboratories 2013). As discussed in Section 2.2, *Description of Project*, the project is anticipated to produce up to 100 MW. Therefore, operational requirements for solar PV panel washing would be approximately 5 AFY. In addition, based on the conservative 50 percent recovery rate for on-site water treatment, the project's operational water demand has been expanded to capture a potential treatment system, should water treatment become necessary for the project. As noted following Table 1, above, the potential for water treatment is included in this WSA analysis to account for the present uncertainty regarding the project's water source, and to address the potential for the project receiving its full water supply from local groundwater, as opposed to imported surface water or a combination of groundwater and surface water. Accordingly, water demand for panel washing would be approximately 10 AFY, which includes 5 AFY for the wash water plus 5 AFY for wastewater produced by a potential RO/DI system[1].

O&M of the project would require up to approximately 10 AFY of water for panel washing and potential water treatment.

[1] Assuming a 50 percent recovery rate for water treatment, 10 acre-feet of raw water would need to enter the treatment system, so that 5 acre-feet (50 percent of 10 acre-feet) of clean (treated) water will be produced for use in panel washing operations.

Fire Suppression

For the purposes of this WSA, it is conservatively anticipated that the Alameda County Fire Department may recommend as a condition of approval of the project that a supply of emergency fire suppression water is stored on the project site for as needed use. In order to capture that water in this analysis, the CEQA analyses for other recent solar energy developments were reviewed, and it was determined that approximately 28.7 gallons/acre is a typical quantity of fire suppression water stored on site for emergency purposes. Accordingly, this factor was applied to the project's proposed 410 acres of development area, for an estimated total 0.04 acre-feet of fire suppression water that would be stored on the project site for emergency uses as needed. Additionally, although it is unlikely the entire amount of fire suppression water stored on site would actually be needed for fire suppression on an annual basis, for the purposes of this analysis it is conservatively assumed the full amount of fire suppression water would be replaced annually. Therefore, this WSA assumes that O&M phase water demands include 0.04 AFY of water for fire suppression, as a safety precaution. Excess water may also be used for dust suppression during project operation and maintenance activities.

Water for Livestock Grazing

The project site would be used for sheep grazing during O&M of the project, to maintain on site vegetation and provide for continued agricultural uses of the site. It is not known at this time whether the sheep owner(s) would provide water for grazing, or if the project applicant would provide water for grazing. Therefore, for the purposes of this WSA, it is conservatively assumed that the project applicant would fill water troughs on the project site, using the same water source(s) as used for other project components, for watering of the sheep.

The amount of water required to support sheep grazing depends upon the number of sheep present on site. The number of sheep that can be supported by any given parcel varies depending upon the rate and type of precipitation and the quality of local soils; however, a general rule of thumb is that one acre of land can support two grazing sheep (Wikes 2016). Assuming two sheep per acre, across the proposed project's 410 acres of development area, the project site could potentially support up to 820 sheep. This is a highly conservative estimate, as the number of sheep per acre does not account for the land being cohabitated by sheep and solar; in actuality, the number of sheep that may be supported by the project site after the proposed project is operational will be lower than 820. Nevertheless, 820 sheep are used as the maximum population for the purposes of this WSA, to provide a conservative analysis that captures all potential water demands of the project.

Sheep typically require two to three gallons of water per day per head (Schoenian 2008). Conservatively assuming that the project site would support 820 head of sheep, and each head would require three gallons of water per day, operational water demand of the project for sheep watering would be approximately 2,460 gallons per day, or 2.75 AFY.

The project does not propose irrigation and would not require any water for irrigation.

O&M Building

The project includes one O&M building sized approximately 20 feet by 20 feet. The adjusted water demand factor for a commercial land use type from Dublin San Ramon Service District, a nearby water district in Alameda County, is 0.14 gallon per day per square foot (Dublin San Ramon Services District 2016). The O&M building totals approximately 400 square feet. Accordingly, annual water demand associated with the O&M building is estimated to be approximately 56 gallons per day,

which equates to approximately 0.06 AFY. During project operation, sanitary waste produced at the O&M building would be held in a tank system and regularly removed and transported via truck to an approved off-site disposal facility.

2.3.3 Decommissioning or Repowering Water Assumptions

Water would be required for dust control during decommissioning or repowering activities. For the purposes of this WSA, it is broadly assumed that water demands would be comparable between the decommissioning/repowering phase and the construction phase, and that such water demands would primarily be associated with dust abatement. As such, it is assumed that approximately 42 acre-feet of water would be required during the project's decommissioning/ repowering phase. As mentioned previously, the decommissioning or repowering phase would occur over approximately six months. Similar to the calculation of construction-period water demands as discussed above in Section 2.3.1, in order to be conservative for the purposes of this analysis, and to provide an estimate of maximum annual water demand for the year during which decommissioning or repowering would occur, it is assumed that during the project's decommissioning/repowering year, decommissioning/repowering activities would account for six months, and operation and maintenance activities would account for six months. Accordingly, during the project's final year, approximately 45.93 acre-feet of water would be required for O&M and decommissioning or repowering. Please see Section 2.3.1, *Construction Water Assumptions,* for additional assumptions applied to the project's water demands for decommissioning/repowering.

3 Senate Bill 610 Applicability

This regulatory setting discussion is specific to the assessment of water supply availability, as required by SB 610 which became effective in 2002 and amended California Water Code to require detailed analysis of water supply availability for certain types of development projects. The primary purpose of SB 610 is to improve the linkage between water and land use planning by ensuring greater communication between water providers and local planning agencies, and guaranteeing land use decisions for certain large development projects are fully informed as to whether sufficient water supplies are available to meet project demands. SB 610 requires the preparation of a WSA for a project that is subject to CEQA and meets certain requirements, each of which is discussed below.

California Water Code, as amended by SB 610, requires a WSA address the following questions:

- Is there a public water system that will service the proposed project? (see Section 3.3)
- Is there a current Urban Water Management Plan that accounts for the project demand? (see Section 3.4)
- Is groundwater a component of the supplies for the project? (see Section 3.5)
- Are there sufficient supplies to serve the project over the next twenty years? (see Section 3.6)

The primary question to be answered in a WSA is:

> *Will the total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection meet the projected water demand of the proposed project, in addition to existing and planned future uses of the identified water supplies, including agricultural and manufacturing uses?*

The following sections address the SB 610 WSA questions as they relate to the project.

3.1 Is the Proposed Project Subject to CEQA?

California Water Code Section 10910(a) states any city or county that determines a project, as defined in Section 10912, is subject to CEQA must prepare a WSA. Projects requiring an issuance of a discretionary permit by a public agency, projects undertaken by a public agency, and projects funded by a public agency are subject to CEQA.

The project requires issuance of discretionary permits, consisting of a Conditional Use Permit and parcel subdivision from Alameda County. Therefore, the project is subject to CEQA.

3.2 Is the Proposed Project a "Project" Under SB 610?

California Water Code, as amended by SB 610, states any proposed action that meets the definition of "project" under SB 610 is required to prepare a WSA to demonstrate whether sufficient water supplies are available to meet requirements of the project under normal and drought conditions. Water Code Section 10912 defines a "project" as any one of six different development types with certain water use requirements. Each identified development type and associated water requirements is addressed below.

3.2.1 Residential Development

A proposed residential development of more than 500 dwelling units is defined as a "project" under SB 610.

The project is not a residential development.

3.2.2 Shopping Center or Business Establishment

A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space is defined as a "project" under SB 610.

The project is not a shopping center or business establishment.

3.2.3 Commercial Office Building

A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space is defined as a "project" under SB 610.

The project is not a commercial office building.

3.2.4 Hotel or Motel

A proposed hotel or motel, or both, having more than 500 rooms is defined as a "project" under SB 610.

The project is not a hotel or motel.

3.2.5 Industrial, Manufacturing, or Processing Plant or Industrial Park

A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area is defined as a "project" under SB 610.

The project is not a manufacturing plant, processing plant, or industrial park. However, it is an industrial facility occupying more than 40 acres and therefore this analysis conservatively determined the project to be considered a "project" under Water Code Section 10912. Therefore, this WSA has been prepared to satisfy the requirements of SB 610.

3.3 Is There a Public Water System that Will Serve the Proposed Project?

California Water Code Section 10912 defines a "public water system" as a system that has 3,000 or more service connections and provides piped water to the public for human consumption. The project would source water from an on- or off-site groundwater well pumping from the Livermore Valley Groundwater Basin, and/or imported surface water purchased from the Zone 7 Water Agency as the County of Alameda's wholesaler of State Water Project water for the project area.

There is not a public water system that will serve the project.

3.4 Is There a Current UWMP that Accounts for the Project Demand?

California's urban water suppliers prepare UWMPs to support long-term resource planning and ensure adequate water supplies. Every urban water supplier that either delivers more than 3,000 AFY of water annually or serves more than 3,000 connections is required to assess the reliability of its water sources over a 20-year period under normal, single-dry, and multiple-dry year scenarios. UWMPs must be updated and submitted to DWR every five years for review and approval (DWR 2016).

Zone 7 has a current UWMP in place. The project would transition the project site from the agricultural land uses that were planned for in the UWMP, to solar/commercial uses, which are generally less water intensive than agricultural uses. As a result, water demand for the project site is likely over-estimated in the current (2015) UWMP, when the planned water demands for agricultural land uses are compared to the proposed water demands for solar development.

3.5 Is Groundwater a Component of the Supplies for the Project?

The project's water demands may be met in part or in full by groundwater produced from the underlying Livermore Valley Groundwater Basin.

3.6 Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?

The sufficiency of water supplies identified as potential sources to serve the project is assessed in Section 4.2, *Water Analysis*. The information and analysis provided in this WSA support the conclusion that there are sufficient water supplies available in the project area to meet the needs of the project over the next 20 years (the assessment period required per SB 610 for a WSA). Conclusions associated with the sufficiency of available water supplies are discussed in Section 5, *Conclusions*.

4 Water Supply Reliability Analysis

This section provides analysis of the availability and reliability of all potential water supply sources that may be used to meet the water demands of the proposed project, including groundwater pumped from the Livermore Valley Groundwater Basin and imported surface water purchased from Zone 7 through one of the four local water purveyors that receive imported surface water supply from Zone 7 (California Water Service Company – Livermore District, Dublin San Ramon Services District, City of Livermore, and City of Pleasanton). Background information is provided in Section 2.1, *Location and Water Supply Setting.*

4.1 Conjunctive Use Management

This section collectively addresses the management of local groundwater resources in the Livermore Valley Groundwater Basin, and the management of imported surface water provided through Zone 7, rather than providing a separate analysis of each resource. This is an appropriate approach for this WSA, because groundwater and surface water resources in the project area are conjunctively managed, meaning that they are managed together toward the purpose of long-term water supply reliability. This includes groundwater banking programs that facilitate the storage of excess water during surplus years, for pumping and use during dry years when imported surface water supplies are typically curtailed. The following sections provide discussion of these management efforts as they relate to water supply reliability.

4.1.1 Groundwater Management Plan

Groundwater Management Plans (GWMPs) were initially required to be developed and submitted to DWR under legislation including Assembly Bill 359, Assembly Bill 3030, and SB 1938. The Livermore-Amador Valley Groundwater Basin GWMP was developed in 2005 to compile and document all of Zone 7's current groundwater management policies and programs in a single document and to satisfy the requirements set forth in the California Groundwater Management Planning Act (Water Code Sections 10750, et seq.). The GWMP provides a detailed description of Zone 7's groundwater management practices and a description of the regulatory setting that involves a GWMP. In addition, the GWMP contains the Zone 7 management plan elements, which involve the GWMP goals, basin management objectives, and stakeholder involvement. A large portion of the document addresses monitoring programs and protocols related to groundwater and conjunctive use of regional water supplies, ranging from groundwater level monitoring to recharge monitoring to groundwater quality monitoring to climatological monitoring to surface water flow and surface water quality monitoring.

With adoption of SGMA in 2014, GWMP requirements were largely replaced by GSPs, discussed in detail below. Per SGMA, no new GWMPs were adopted in Medium- or High-priority basins after January 1, 2015, and existing GWMPs remain in effect until GSPs are adopted in their place (for Medium- or High-priority basins). The Livermore Valley Groundwater Basin is designated as Medium-priority basin, and is therefore subject to SGMA requirements for implementation of a GSP. Because a GWMP was already in place for the Livermore Valley Groundwater Basin at the time of SGMA codification in 2014, Zone 7, as the SGMA GSP for this groundwater basin, applied to the DWR for approval of the GWMP as functionally equivalent to a GSP. The DWR provided this approval, and Zone 7 adopted the GWMP as a SGMA Alternative Plan, discussed below.

4.1.2 Alternative Groundwater Sustainability Plan

In September 2014, California Governor Jerry Brown signed a three-bill package known as SGMA into law. SGMA establishes a framework for local groundwater management and requires local agencies to bring overdrafted basins into balanced levels of pumping and recharge. The California Statewide Groundwater Elevation Model Priority List ranks groundwater basins across the state with assessment rankings of High, Medium, Low, or Very Low. DWR identifies the Livermore Valley Groundwater Basin as a Medium-Priority groundwater basin; and as such is required to prepare either a GSP or an Alternative Plan. Such an Alternative Plan must cover the entire groundwater basin, be functionally equivalent to a GSP, and demonstrate that the entire basin has been operating within its sustainable yield for at least 10 years, where "sustainable yield" is defined by SGMA as the maximum quantity of water (calculated over a base period representative of long-term conditions in the basin and including any temporary surplus) that can be withdrawn annually from a groundwater supply without causing an undesirable result.

Acting as the exclusive GSA for the Livermore Valley Groundwater Basin, Zone 7 has prepared and implemented a SGMA Alternative Plan for the Livermore Valley Groundwater Basin, providing compliance with SGMA and GSP requirements.

4.1.3 Salt and Nutrient Management Plans

The 2004 Salt Management Plan (SMP) includes a cooperative effort to address the increase in TDS observed in some portions of the groundwater basin, and the 2015 Nutrient Management Plan (NMP) was developed as an addendum to the SMP. Together, the NMP and SMP fulfill requirements of a joint Master Water Recycling Permit and the General Water Reuse Order adopted by the San Francisco Bay Regional Water Quality Control Board (RWQCB), and are consistent with the provisions of the State's Recycled Water Policy. Implementation of the SMP and NMP involves ongoing monitoring of nitrate in groundwater and coordination with land use agencies to manage nitrogen loading to the basin. The SMP and NMP also require coordination with Alameda County Environmental Health for development of a Local Agency Management Program for on-site wastewater treatment systems that addresses certain high-nitrate areas.

Salt and nutrient management in the local groundwater basin is essential to long-term water supply reliability, as the usability of any given water supply is determined by its quality. Groundwater banking programs help to manage TDS loading in the basin, for example by diluting higher-TDS areas with injection of surplus surface water supplies.

4.1.4 Urban Water Management Plan

The California Urban Water Planning Act requires urban water suppliers that have 3,000 or more service connections or supply 3,000 or more acre-feet of water per year to develop an UWMP, which is submitted to DWR for review and approval every five years. The UWMP is required to describe and evaluate water deliveries and uses, water supply sources, efficient water uses, demand management measures and water shortage contingency planning. Zone 7 maintains an UWMP for its jurisdiction; the current UWMP was adopted in 2015 and is currently being updated.

Projections for future deliveries of SWP water are provided in the UWMP based on DWR's 2015 update of the State Water Project Delivery Capability Report (DCR), a biennial report to assist SWP contractors and local planners in assessing the near and long-term availability of supplies from the SWP. In the 2015 DCR, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2015 UWMPs. The 2015 DCR includes DWR's estimates of

SWP water supply availability under both current and future conditions. Long-term water demand and supply projections from the UWMP are discussed in Section 4.2.

4.2 Water Availability Projections

SB 610 requires that a WSA include the consideration of water supply availability under varying climatic (drought) conditions, including normal [water] year, single-dry year, and multiple-dry year scenarios. The conjunctive use planning information discussed above was used to inform this analysis of supply reliability, which includes review of the ongoing and planned management activities for each water supply source, in addition to analysis of long-range supply reliability projections as applicable to the proposed project. As discussed, the project's water supply may be sourced from an on- or off-site groundwater well in the Livermore Valley Groundwater Basin, or it may be sourced as imported surface water purchased through Zone 7.

As discussed above, there are multiple active groundwater management efforts in place in the Livermore Valley Groundwater Basin, including the GWMP, the SGMA Alternative Plan, and the SMP and NMP. In addition, Zone 7 actively conducts and contributes to groundwater banking operations, both in the Livermore Valley Groundwater Basin, and in groundwater banks in Kern County, as noted below in Table 3 and Table 4. Zone 7 primarily uses groundwater to supplement imported SWP surface water supply during drought years, or to meet the area's water supply needs when the SBA, which conveys SWP water to the region, is out of service due to maintenance or in response to emergency conditions. However, Zone 7's primary purpose in groundwater pumping is typically to contribute to the agency's artificial recharge programs, which store excess surface water supplies in the subsurface during surplus years, for use during dry years. Under the SMP, Zone 7 also conducts strategic groundwater pumping during normal water years, targeting areas of high TDS concentration to help reduce salt loading.

Water supply reliability in the project area is provided via Zone 7's diversified water supply portfolio, which includes local groundwater resources, imported SWP supply, and active groundwater banking programs. This section presents a series of tables with supply availability projections, which are used to inform this WSA's conclusion presented in Section 5. Table 2 illustrates Zone 7's projected extraction values from the Livermore Valley Groundwater Basin through the year 2035, which is the maximum projection range of the current (2015) UWMP.

Table 2 Actual and Projected Artificial Recharge and Groundwater Extraction for 2015-2035 during Normal Water Years

	Actual	Projected: Normal Years	Projected: Normal Years	Projected: Normal Years	Projected: Normal Years	Projected: Normal Years
Amount (Acre-Feet)	2015	2020	2025	2030	2035	2040
Artificial Recharge	4,230	9,200	9,200	9,200	9,200	9,200
Groundwater Extraction	2,056	9,200	9,200	9,200	9,200	9,200

Units in acre-feet per year

Source: Zone 7 2016

As shown in the table above, Zone 7 plans to recharge 9,200 AFY on average to the Livermore Valley Groundwater Basin through the year 2035. This rate of artificial recharge allows Zone 7 to pump an equivalent of 9,200 AFY on average from the Livermore Valley Groundwater Basin. Water supply availability projections for Zone 7 are more quantifiable than for the Livermore Valley Groundwater Basin, because there is more data available for imported surface water supplies than for groundwater supplies, which are largely unmonitored with the exception of artificial recharge operations. Table 3 illustrates Zone 7's current water demand.

Table 3 Zone 7 Current Water Demands

Water Supply	Additional Description	Level of Treatment When Delivered	2015 Actual (Acre-Feet) Volume	
Sales to other agencies	Retailer Demand	Drinking Water	23,500	
Agricultural Irrigation	Untreated Water Demand	Raw Water	5,600	
Retail demand for use by agencies that are primarily wholesalers with a small volume of retail sales	Direct Retail Demand	Drinking Water	300	
Groundwater Recharge	Local Groundwater Basin	Raw Water	4,100	
Other	Kern County Groundwater Banking Program	Raw Water	-	
Other	Surface Water Storage – SWP Carryover or Other Storage	Raw Water	14,000	
Losses	Transmission System	Drinking Water	2,000	
Total				**49,500**

Units in acre-feet per year
Source: Zone 7 Water Agency 2016

As shown above in Table 3, about 18,100 acre-feet of water supply is used for groundwater recharge activities, which includes groundwater recharge to the underlying Livermore Valley Groundwater Basin (4,100 AFY), storage in the SWP system as carryover[2] in San Luis Reservoir (14,000 AFY), storage in groundwater banks in Kern County, and storage of local water in Lake Del Valle. The table above indicates that approximately 5,600 acre-feet of water supply is used for agricultural irrigation. The project site is designated and zoned for agriculture, as shown on Figure 4, and the water demand projections shown in Table 4**.** account for agricultural uses within Zone 7's service territory, which includes agricultural use of the project site. Because solar energy development is generally less water intensive that agriculture, the water demands forecast for agriculture on the project site are likely greater that the actual water demands associated with the project's solar energy development.

2 "Carryover" refers to the right to an unused portion of an annual Production Right or a right to Imported Water Return Flows in a year after the year in which the right was originally available.

Table 4 and Table 5 outline Zone 7's projected demands and supplies, respectively, through the year 2035, which is the maximum projection range provided in the 2015 UWMP. SB 610 requires that a WSA consider water supply availability over a 20-year projection, which is longer than the range available in the current (2015) UWMP. However, SB 610 also allows that the analysis provided in a WSA is based upon the best available information. For the purposes of this analysis, the 2015 UWMP provides the best available information to make informed conclusions about water supply availability for the project. Reasonable assumptions are discussed in Section 5, regarding water supply availability projections for years beyond the 2035 projections in the UWMP, as well as the project's anticipated operational lifespan of 50 years, which is longer than any currently available water supply availability and reliability projections.

Table 4 Zone 7 Projected Water Demands

Use Type	Additional Description	Projected Water Demands (Acre-Feet) 2020	Projected Water Demands (Acre-Feet) 2025	Projected Water Demands (Acre-Feet) 2030	Projected Water Demands (Acre-Feet) 2035
Sales to other agencies	Retailer Demand	41,300	44,700	46,600	47,600
Agricultural Irrigation	Untreated Water Demand	6,200	6,600	7,800	8,300
Retail demand for use by agencies that are primarily wholesalers with a small volume of retail sales	Direct Retail Demand	300	300	300	300
Groundwater Recharge	Local Groundwater Basin	9,200	9,200	9,200	9,200
Other	Kern County Groundwater Banking Programs	0	300	7,300	9,000
Other	Surface Water Storage – SWP Carryover or Other Storage	10,000	10,000	10,000	10,000
Losses	Transmission System	2,100	2,200	2,300	2,400
Losses	Storage Losses	3,000	4,000	6,000	6,000
Total		**72,100**	**77,300**	**89,500**	**92,800**

Units in acre-feet per year
Source: Zone 7 Water Agency 2016

As shown above, Zone 7's existing water demands are projected to increase by approximately 29 percent through the year 2035. During that time, agricultural water uses are projected to increase from 6,200 AFY to 8,300 AFY, resulting in a total increase of 2,100 acre-feet for agricultural uses over the next 15 years. During this same timeframe, water demands for groundwater recharge are projected to stay constant at 9,200 AFY; this is likely because groundwater banking is a manual process that involves injecting excess supplies into the subsurface during wet years, when surplus supply is available, for use during drought years, when imported surface supplies are often curtailed. Drought year conditions are addressed in the tables below.

Table 5 provides an overview of all water supplies projected to be available to Zone 7 during a normal water year, through the year 2035.

Table 5 Zone 7 Available Supply – SWP Table A Water

Water Supply	Supply Notes	2020 Reasonably Available Volume (AFY)	2025 Reasonably Available Volume (AFY)	2030 Reasonably Available Volume (AFY)	2035 Reasonably Available Volume (AFY)
Purchased or Imported Water	State Water Project (Existing Conveyance – Early Long-Term	50,000	50,000	50,000	50,000
Purchased or Imported Water	Yuba Accord	145	145	N/A	N/A
Purchased or Imported Water	Byron Bethany Irrigation District	2,000	2,000	2,000	2,000
Purchased or Imported Water	California Water Fix	n/a	n/a	8,000	8,000
Surface Water	Arroyo Valle	7,300	7,300	10,300	10,300
Other New Water Supplies	Per WSE Update, could include desalination and/or potable use	n/a	10,000	10,000	10,000
Supply from Storage	Groundwater	9,200	9,200	9,200	9,200
Supply from Storage	State Water Project – Carryover	10,000	10,000	10,000	10,000
Total		**78,645**	**88,645**	**99,500**	**99,500**

Source: Zone 7 Water Agency 2016

As shown in the table above, the SWP is the main source of Zone 7's water supplies; see the first four rows, for "Purchased or Imported Water", as well as the last row which show carryover SWP water. Currently, the supplies derived from the SWP represent nearly 80 percent of Zone 7's supplies. The UWMP accounts for climate change impacts based on 2025 emission levels and a projected sea level rise of 15 centimeters; therefore, external factors such as climate change

impacts have been incorporated into Zone 7's water supply planning efforts. In addition, although the available supply projections account for groundwater stored via recharge and banking programs, they do not account for the overall sustainable yield of the Livermore Valley Groundwater Basin, as that is managed through implementation of the SGMA Alternative Plan, which was developed to provide sustainable groundwater conditions throughout the basin.

The supply projections provided above indicate that the amount of water available to Zone 7 during a normal water year is projected increase by approximately 27 percent through the year 2035. In comparison with Table 6, which shows water demands increasing by approximately 29 percent through the year 2035, this indicates that projected supplies increase by slightly less than projected demands increase. However, the total amount of projected demand (92,800 acre-feet in 2035) remains lower than the total amount of projected supply (99,500 acre-feet in 2035), indicating a projected surplus in available water supply during a normal water year. Varying climatic conditions are addressed below in Table 6, which summarizes Zone 7's supply and demand projections under single-dry and multiple-dry years in addition to normal water year conditions.

Table 6 Zone 7 Projected Supplies and Demand

		2020	2025	2030	2035
Normal Year					
Supply Totals		78,645	88,645	99,500	99,500
Demand Totals		72,100	77,300	89,500	92,800
Difference		**6,545**	**11,345**	**10,000**	**6,700**
Single Dry Year					
Supply Totals		67,676	81,676	88,200	88,200
Demand Totals		42,400	45,700	48,500	49,800
Difference		**25,276**	**35,976**	**39,700**	**38,400**
Multiple Dry Years					
First Year	Supply Totals	67,626	77,626	76,950	76,950
	Demand Totals	48,000	52,100	56,000	58,300
	Difference	**19,626**	**25,526**	**20,950**	**18,650**
Second Year	Supply Totals	61,396	71,396	70,720	70,720
	Demand Totals	48,700	53,00	56,600	58,400
	Difference	**12,696**	**18,386**	**14,120**	**12,320**
Third Year	Supply Totals	64,626	74,626	73,950	73,950
	Demand Totals	49,900	53,800	57,000	58,600
	Difference	**14,726**	**20,826**	**16,950**	**15,350**

Units in acre-feet per year
Source: Zone 7 Water Agency 2016

Table 6 shows that under all considered drought scenarios, including normal water year, single-dry water year, and multiple-dry year conditions, the projected water supply available to Zone 7 exceeds the projected demands. These projections do not account for potential voluntary and mandatory water conservation savings. In addition, these projections do not account for

implementation of the SGMA Alternative Plan for the Livermore Valley Groundwater Basin, which will provide additional and continued water supply reliability for the region. The implications of these projections on water supply availability for the proposed project are discussed below in Section 5, Conclusions.

5 Conclusions

In accordance with California Water Code, as amended by SB 610, this WSA identifies and characterizes all known and potential water demands of the project, in comparison to the water supplies available to the project over a 20-year projection, with consideration to varying drought conditions and ongoing long-term supply management activities. Water supplies considered for the purposes of this WSA include groundwater pumped from the Livermore Valley Groundwater Basin via an on- or off-site groundwater well, surface water imported to the project area and distributed via the Zone 7 Water Agency, and local groundwater banking operations that receive surplus water supplies during wet years and provide supply reliability during dry years.

The project's amortized annual water demand is 13.97 AFY; this is the project's total maximum water demand averaged over all phases of the project, accounting for 52 years to capture construction and decommissioning or repowering occurring during years that O&M activities also may occur, in addition to 50 full years of project O&M. During a normal O&M year for the project, water demands would include a minimum of 5 AFY for panel washing activities, to maintain maximum efficiency of the project's technology. In order to provide a conservative analysis of water supply availability and reliability, this WSA considers a maximum operational water demand of up to 12.85 AFY, which accounts for factors including a possible need to treat water for high TDS concentrations before it is used for panel washing, and accounts for the option of storing a supply of emergency fire suppression water on site.

Long-term water supply availability projections provided in the Zone 7 2015 UWMP were reviewed and assessed in this WSA, in comparison to the anticipated water demands of the project. As discussed in Section 4, *Water Supply Reliability Analysis*, Zone 7's UWMP projects a surplus water supply under all considered drought scenarios, including normal-year, single-dry year, and multiple-dry year conditions. This is likely due to Zone 7's diversified water supply portfolio consisting of local groundwater recharge and banking efforts as well as imported surface water supplies, in addition to other proactive management efforts including salt and nutrient management of the local groundwater resources, to maximize their potential for future use. Consistent with ongoing activities, it is anticipated that Zone 7 will respond to anticipated dry-year water shortages by pumping banked groundwater that is actively managed for this purpose, and by implementing management actions including but not limited to conservation actions.

The water supply planning efforts discussed above, including Zone 7's UWMP, rely upon General Plan land use designations and zoning, in order to predict water demands based upon known and anticipated land uses. In this case, the project site is designated and zoned for agriculture (see Figure 4), and although agriculture would continue to occur on the project site in the form of sheep grazing and apiary uses, the site's primary land use after project implementation will be solar energy development, which is generally less water intensive than agricultural land uses. Therefore, with implementation of the proposed project, the actual water demands that will occur on the project site will likely be lower than planned for this site in the UWMP for the area. This suggests that the water demands that will occur on the project site with implantation of the project are accounted for in the supply availability projections provided in the UWMP.

As discussed throughout this WSA, the operational lifetime of the proposed project is anticipated to be up to 50 years, which is 30 years longer than the 20-year projection required in a WSA. Further, the water supply analysis in Zone 7's 2015 UWMP projects water availability through the year 2035,

which only provides a 15-year projection from the time of preparation of this WSA, in late 2020. However, SB 610 acknowledges that there is commonly a lack of consistent, reliable information on water supply availability, and SB 610 therefore allows for use of the "best available" data sources in WSA analyses. This WSA does not attempt to quantify water supply availability beyond the projections provided through 2035 in Zone 7's 2015 UWMP, because doing so would be highly speculative, and would not be based on actual data. Rather, conclusions are based upon the surplus availability projections discussed above, the ongoing and active management of the Livermore Valley Groundwater Basin, and the diverse water supply portfolio of the Zone 7 Water Agency.

This WSA concludes that sufficient water supply is available to meet the project's maximum potential water demands over a 20-year projection, and that water supply is reliable under normal-year, single-dry-year, and multiple-dry-year conditions. This conclusion is based upon conservative water demand factors assumed for the proposed project, and allows for the project's use of local groundwater pumped from the underlying Livermore Valley Groundwater Basin, which is managed by Zone 7 in accordance with SGMA, and/or the project's use of imported surface water purchased from Zone 7 or from one of the four local water purveyors that receive their imported surface water supply through Zone 7 (California Water Service Company – Livermore District, Dublin San Ramon Services District, City of Livermore, and City of Pleasanton). Although regional water shortages may occur during the project's lifetime, such conditions may occur regardless of the proposed project, and are accounted for in UWMP supply availability projections.

6 References

Department of Water Resources (DWR). 2004. California's Groundwater Bulletin 118: San Francisco Hydrologic Region. Livermore Valley Groundwater Basin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/2_010_LivermoreValley.pdf. Accessed August 25, 2020.

_____. 2013. Notice to State Water Project Contractors. March 22, 2013

_____. 2020. SGMA Basin Prioritization Dashboard. Available: https://gis.water.ca.gov/app/bp-dashboard/final/. Accessed August 28, 2020.

Dublin San Ramon Services District. 2016. Water System Master Plan.

PurTec Industrial Water. 2019. What is Reverse Osmosis? Available: https://puretecwater.com/reverse-osmosis/what-is-reverse-osmosis#recovery. Accessed August 16, 2019.

Sandia National Laboratories. 2013. Water Use and Supply Concerns for Utility-Scale Solar Projects in the Southwestern United States. Geoffrey T. Klise, Vincent C. Tidwell, Marissa D. Reno, Barbara D. Moreland, Katie M. Zemlick, Jordan Macknick. July 2013. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.490.1952&rep=rep1&type=pdf

Shoenian, Susan. 2008. Maryland Small Ruminant Page. General guidelines for feeding sheep and goats. Available: https://www.sheepandgoat.com/genguidefeed Accessed August 28, 2020.

Zone 7 Water Agency. 2004. Salt Management Plan. Available: http://www.zone7water.com/library/groundwater/36-public/content/158-salt-management-plan-2004. Accessed August 28, 2020.

_____. 2005. Groundwater Management Plan. Available: http://www.zone7water.com/images/pdf_docs/groundwater/gw-mgmt-plan_2005.pdf. Accessed August 28, 2020.

_____. 2015. Nutrient Management Plan Livermore Valley Groundwater Basin. July 2015.

_____. 2016a. Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin. December 16, 2061.

_____. 2016b. Urban Water Management Plan. Available: http://www.zone7water.com/images/pdf_docs/water_supply/2-4-16_draft-uwmp-w-appdcs.pdf. Accessed August 28, 2020.

_____. 2020. About Us - Service Area. Available: https://www.zone7water.com/about-us/service-area. Accessed August 28, 2020.

_____. 2020b. Groundwater Basin. Available: http://www.zone7water.com/component/content/article?id=49:groundwater-basin. Accessed August 28, 2020.

Wilkes, Stephany. 2016. 5 Questions to Ask Before Keeping Sheep. Available: https://www.hobbyfarms.com/5-questions-to-ask-before-keeping-sheep-3/#:~:text=A%20general%20rule%20of%20thumb,may%20not%20support%20even%20one. Accessed August 28, 2020.

Appendix A

DWR Guidebook for Implementation of Senate Bill 610

The Water Supply Assessment (WSA) for the proposed Aramis Solar Energy Generation and Storage Project (project) was prepared using guidance contained in the California Department of Water Resources' (DWR) Guidebook for Implementation of Senate Bill (SB) 610 and SB 221 of 2001 (DWR Guidebook). The California DWR prepared the Guidebook to assist water suppliers in preparation of the water assessments and the written verification of water supply availability required by SB 610 and SB 221; the DWR has no regulatory or permitting approval authority concerning water assessments or verifications of sufficient water supply, and provides the Guidebook purely as an assistance tool (DWR 2003). The following table provides a detailed description of how the DWR Guidebook was used in preparing the project's WSA.

Table A-1 Aramis Solar Energy Project WSA - Consistency with DWR Guidelines

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 1 (page 2). Does SB 610 or SB 221 apply to the proposed development?	Is the Project subject to SB 610? Is the Project subject to CEQA (Water Code §10910(a))? If yes, continue.	WSA Section 3.1 Yes, the project subject to CEQA.
	Is it a "project" as defined by Water Code §10912(a) or (b)? If yes, to comply with SB 610 go to Section 2, page 4.	WSA Section 3.2 Yes, the project is considered to meet the definition of "project" per Water Code §10912(a) or (b).
	Is the project subject to SB 221? Does the tentative map include a "subdivision" as defined by Government Code §66473.7(a)(1)? If no, stop.	No, the project does not include a "subdivision;" SB 221 does not apply to the project, and no further action relevant to SB 221 is required.
Section 2 (page 4). Who will prepare the SB 610 analysis?	Is there a public water system ("water supplier") for the project (Water Code § 10910(b))? If no, go to Section 3, page 6.	WSA Section 3.3 No, there is no public water system for the project.
Section 3 (page 6). Has an assessment already been prepared that includes this project?	Has this project already been the subject of an assessment (Water Code §10910(h))? If no, go to Section 4, page 8.	No, the project has not been the subject of an assessment.
Section 4 (page 8). Is there a current Urban Water Management Plan?	Is there an adopted urban water management plan (UWMP) (Water Code §10910(c))? If yes, continue. If yes, information from the UWMP related to the proposed water demand for the project may also be used for carrying out Section 5, Steps 1 and 2, and Section 7; proceed to Section 5, page 10 of the Guidelines.	WSA Section 3.4 Zone 7 Water Agency, the water wholesaler that provides water to the project area, has an adopted UWMP. Information from the UWMP was used for this WSA.
	Is the projected water demand for the project accounted for in the most recent UWMP (Water Code §10910(c)(2))? If no, go to Section 5, page 10.	WSA Section 3.4 Zone 7 Water Agency's current UWMP generally accounts for the project's water demands by assuming the project site would be used for agriculture, which is generally more water intensive than solar energy development.

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 5 (page 10). What information should be included in an assessment?	Step One (page 13). Documenting wholesale water supplies.	Zone 7 Water Agency, the water wholesaler that provides water to the project area, has an adopted UWMP. Information from the UWMP was used for this WSA.
	Step Two (page 17). Documenting Supply if Groundwater is a Source*.	The project's water demands may be met with groundwater supplies from the Livermore Valley Groundwater Basin.
	Specify if a groundwater management plan or any other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.	WSA Section 4.1 There is the Livermore Valley Basin Groundwater Management Plan, the Salt Management Plan and Nutrient Management Plan, and Alternative Groundwater Sustainability Plan for the Livermore Valley Groundwater Basin that assessed conditions in the Livermore Valley Groundwater Basin and were used to inform the WSA.
	The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Ground Water, or from some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer, variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).	WSA Sections 2.1 and 4.1 provide description of the groundwater basin characteristics using available resources, including DWR Bulletin 118.
	In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision.	The project is not located in an adjudicated groundwater basin.
	The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management), at the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or subbasin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.	WSA Section 4.1.2 discusses groundwater level trends.
	If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or program	The evaluation does not indicate an overdraft due to existing groundwater extraction.

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
	designed to eliminate the long term overdraft condition.	
	If water supplier wells are plotted on a map, or are available from a geographic information system, the amount of water extracted by the water supplier for the past five years can be obtained from the Department of Health Services, Office of Drinking Water and Environmental Management.	Water pumping for the project would not initiate until the onset of construction activities; site-specific historical records are not available.
	Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR.	Section 4.2 addresses available historical groundwater pumping data for the Zone 7 Water Agency.
	Analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.	WSA Sections 4.1 and 4.2 discuss location, amount, and sufficiency of groundwater supplies from the Livermore Valley Groundwater Basin.
	Step 3 (page 21). Documenting project demand (Project Demand Analysis).	WSA Section 2.3 Construction of the project would require up to approximately 42 acre-feet of water. Operational water demands, which include water used for fire suppression, solar PV panel washing and concentrate, livestock grazing, and operation of the proposed O&M building, would total approximately 12.85 AFY. In addition, decommission or repowering of the project would require up to approximately 42 acre-feet of water.
	Step 4 (page 26). Documenting dry year(s) supply.	WSA Section 4.2 discusses water supply reliability including during dry year scenarios.
	Step 5 (page 31). Documenting dry year(s) demand.	WSA Section 4.2 discusses water supply reliability including during dry year scenarios.
Section 6 (page 33). Is the projected water supply sufficient or insufficient for the proposed project?		WSA Section 4 summarizes why the identified water supply/supplies are considered sufficient for the project.
Section 7 (page 35). If the projected supply is determined to be insufficient.	Does the assessment conclude that supply is “sufficient”? If no, continue.	WSA Section 5 It is reasonably anticipated that sufficient water supplies are available for the project.
Section 8 (page 38). Final SB 610 assessment actions by lead agencies.	The lead agency shall review the WSA and must decide whether additional water supply information is needed	The WSA for the project will be included as part of the Draft EIR for the project. Per SB 610, the lead

Guidelines Section Number and Title (DWR 2003)	Guidelines Direction	Relevant WSA Section and Response
	for its consideration of the proposed project. The lead agency "shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses."	agency will approve or disapprove a project based on a number of factors, including but not limited to the water supply assessment.

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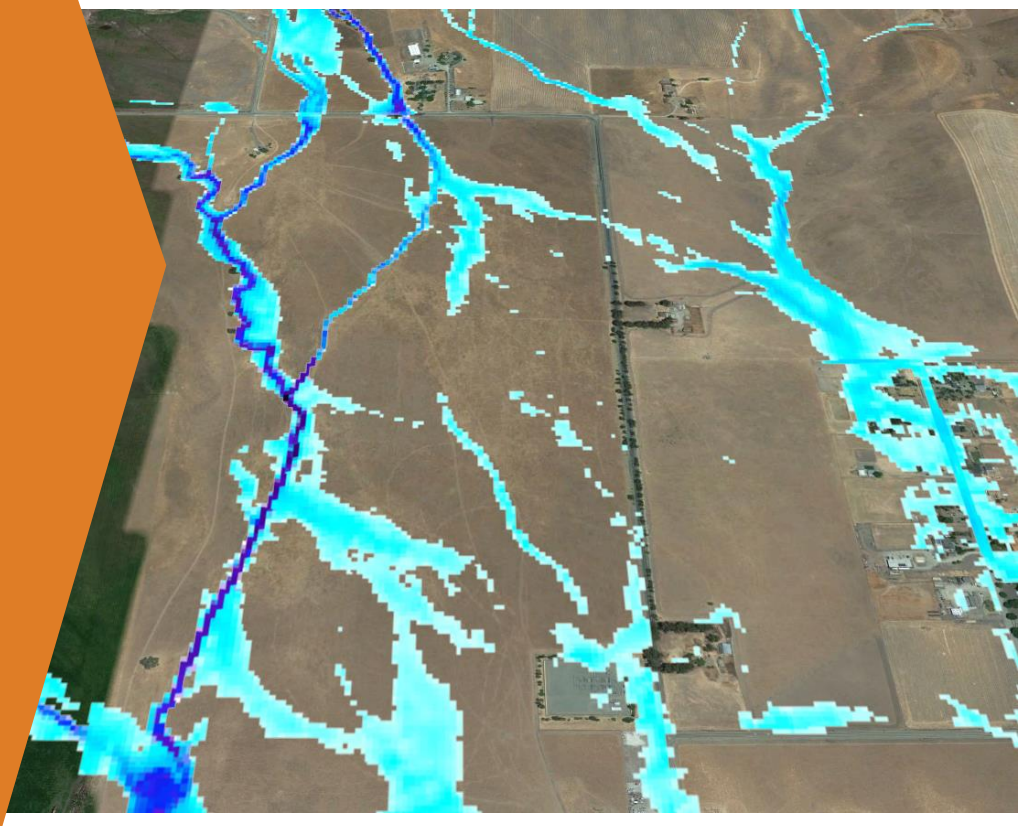
Preliminary Hydrology Study

Aramis Solar Project

Alameda County, CA

April 2020



Prepared For: Intersect Power, Inc.

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Westwood

Preliminary Hydrology Study for

Aramis Solar Project

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Project Number: 0014542.00
Date: 08/02/2018
Updated: 01/30/2020
Updated: 04/28/2020

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APPENDICES

Appendix A: Atlas 14 Rainfall Data
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OVERVIEW

The purpose of the study is to describe the hydrology of the proposed Aramis Solar Project ("the project") and any impacts that the hydrology may play in the design of the solar array and for use in Alameda County permitting.

The project covers approximately 540 acres of land in Alameda County, CA, approximately 2.5 miles north of the city of Livermore, CA. (Exhibit 1). At the time of this report, the project consists approximately 258 acres of solar panels, access roads, and associated infrastructure, although the layout is not finalized.

With the project being located within Alameda County, the stormwater requirements for Alameda County were researched and applicable regulations described in the Clean Water Program will need to be followed.

The project site generally slopes to the southeast. The watershed area encompasses ~12.8 square miles and includes an area starting primarily to the north of the project. The project area is on a generally flat area just downslope of a series of ridges to the north and west.

FEMA has completed a study to determine flood hazard for the selected location. The project area is covered by panels 06001C0332G, 06001C0331G and 06001C0170G. The project has some areas that are FEMA flood hazards (Exhibit 2).

The hydrologic modeling in this report was created using FLO-2D modeling software. Because of the complex and distributary nature of flow paths upstream and through the project site, FLO-2D hydrologic/hydraulic modeling software was utilized to determine flow depths and velocities throughout the site.

Overall, the analysis shows low water depths and velocities (Exhibits 6 and 7) across the majority of the site. During a 100 year storm the flood depths across the majority of the project area are less than 2 feet with velocities less than 2 foot/second. Areas with higher flood depths and velocities exists and are generally located along or near defined flow paths. The current site layout avoids all areas of high flow and FEMA floodplains. See Exhibits 6 and 7 for areas within the project with higher flood depths and velocities. Based on experience on other similar projects, the site is suitable for the planned development.

DATA SOURCES

The models and methods for this project utilize a combination of public and private data as shown in Table 1.

Table 1: Data Sources

Data Type	Format	Source	Use
Elevation	3-Meter Digital Elevation Model (DEM)	USGS Data Gateway	Offsite FLO-2D Model Elevations
Elevation	Aramis_Surface and Aerial.dwg	Intersect Power	Onsite FLO-2D Model Elevations
Crop Data	Shapefile	USDA 2013 Crop Data Layer	Landcover
Soils	Shapefile	USGS SSURGO Dataset	Curve Numbers
Precipitation	PDF File	NOAA Atlas 14 Website	Design storms
HUC-12 Drainage Boundary	Shapefile	USGS	Define Model Extents
Site Boundary	Shapefile	Terra-Gen, LLC	Define Model Extents
2015 Aerial Photography	ArcGIS Map Service	USDA FSA	Reference

PROJECT HYDROLOGY

The 540 acre project area is located in western California, approximately 2.5 miles north of the city of Livermore. The project site is located on a generally flat area just downslope of a series of ridges to the north and west. The area was modeled using a watershed area of ~12.8 square miles and includes the areas with ridges to the north and west of the project. The project area generally slopes to the southeast. The potential hydrologic issues in this general landscape are flooding and erosive velocities.

FLO-2D MODELING

FLO-2D is a physical process model that routes rainfall runoff and flood hydrographs over flow surfaces or in channels using the dynamic wave approximation to the momentum equation. FLO-2D offers advantages over 1-D models and unit hydrograph methods by allowing for breakout flows and visualization of flows across a potential site. This is particularly useful on a moderately and steeply sloped distributed area such as the project site. The primary inputs are a DTM (elevation data), curve numbers and precipitation. A grid system is set up within the FLO-2D software in which the FLO-2D grid cells were optimized at 30'. Major culverts impacting the site were modeled based on aerial imagery provided by Google Earth.

Precipitation data was downloaded from NOAA Atlas 14 (Appendix A) for a 24 hour, 100 year rain event. The 100 year rain depth was 5.53". By using the 100-year rainfall event for design purposes, it allows for the best initial analysis in order to determine the worst areas of flooding and erosion.

The elevation data input into the FLO-2D model was 1-foot contours for onsite elevations and 3-meter USGS Data Gateway Digital Elevation for offsite elevations. These surfaces were combined and incorporated into the DTM using the export to xyz file function in Global Mapper. These XYZ files are read directly into FLO-2D.

USDA-NRCS SSURGO soil data provides soil types within the project boundary and full coverage of the contributing watershed. Soils in the area are primarily classified as hydrologic groups C & D (Exhibit 3). Land cover was obtained from the USDA 2013 Crop Data Layer. Exhibit 4 displays the Land Cover Classes for the entire watershed. The majority of land in this area is assumed to be prairie/pasture with smaller portions consisting of forest, shrubland or cultivated land. Curve numbers were applied to each grid cell in the FLO-2D model (Exhibit 5). The majority of the project area has a curve number between 70 and 79. Areas with a higher curve number will have more runoff and areas with a lower curve number will have less runoff. This is based on the type of soils, "A" soils have the highest infiltration rates and "D" soils have the lowest infiltration rates.

RESULTS AND DESIGN INFORMATION

Overall, the analysis shows that the channels on the site convey most of the flow from a 100-year event with small breakout flows causing low water depths and velocities (Exhibits 6 and 7) across the majority of the site. The project area is located in a valley downslope of a series of ridges, which could cause localized flooding on a large portion of the project area. The FLO-2D results indicate that during a 100 year storm the flood depths across the majority of the project area are less than 2 feet with velocities less than 2 foot/second. See Exhibits 6 and 7 for areas within the project with higher flood depths and velocities.

The channel running along the western boundary of the central parcel shows breakout flows during the 100-year event. HECRAS 1-D modeling was utilized to confirm that while the channel can hold the 100-year flow rate the possibility of these breakout flows should be considered likely during large storm events.

In order for the elevation sources to line up properly at the match line a blending process was used. Overall the blending was successful at merging the two sources together with the exception of the southern flown elevation boundary (Exhibit 6A). Along this line the blending was extensive and not entirely successful in accurately representing flow conditions. For example, the ponding is likely larger in surface area than if would be otherwise. It is likely that the bulk of the blending effects on flow characteristics do not occur within the project boundary with the exception of the slight tail in the southwest corner of the southern project parcel. Flood depths and velocities within the highlighted box on exhibit 6A should not be considered accurate enough for design purposes.

FEMA has completed a study to determine flood hazard for the selected location. The project area is covered by panels 06001C0332G, 06001C0331G and 06001C0170G. The project has some areas that are FEMA flood hazards (Exhibit 2).

Based on experience on other similar projects, the overall site is suitable for the planned development by avoiding areas of high flood depths and velocities.

NEXT STEPS

1. Design stormwater facilities to meet Alameda County Requirements
2. Facilities to be elevated 1’ above the higher of the 100-year peak flood elevation.
3. Crossing types (low water crossing or culvert) should be determined for each crossing location as determined based on field conditions.

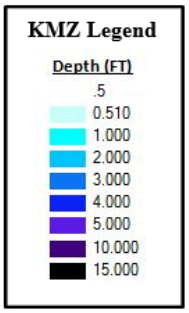
Included Output Files:

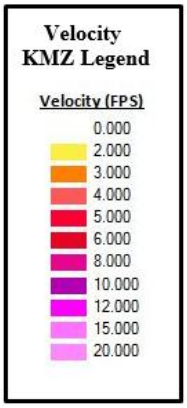
1. Shapefile of Flow Depth
   2020-04-27_Aramis_PrelimFlowDepthatCell_100yr.shp
   Attribute "ID" = Grid Cell Number
   Attribute "VAR" = Max Flow Depth (Feet)

2. KMZ of Flow Depth
   2020-04-27_Aramis_PrelimFlowDepth_100yr.kmz
   Overlay in Google Earth for graphical representation.

3. Shapefile of Velocity
   2020-04-27_Aramis_PrelimVelocityatCell_100yr.shp
   Attribute "ID" = Grid Cell Number
   Attribute "VAR" = Velocity (FPS)

4. KMZ of Velocity
   2020-04-27_Aramis_PrelimVelocity_100yr.kmz
   Overlay in Google Earth for graphical representation





REFERENCES

National Engineering Handbook, Part 630 Hydrology. Chapter 9 Hydrologic Soil-Cover Complexes. USDA. NRCS. 210-VI-NEH, July 2004

Data Gateway 10m DEM, Elevation data, Accessed May 2018, https://gdg.sc.egov.usda.gov/GDGOrder.aspx

Web soil survey. Retrieved May 2018, from https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

NOAA, & Service, N. W. AHPS Precipitation analysis. Retrieved May 2018, from http://water.weather.gov/precip/download.php

USGS. USGS water resources: About USGS water resources. Retrieved May 2018, from https://water.usgs.gov/GIS/huc.html

USDA 2013 Crop Data Layer, Landcover data, retrieved May 2018, from https://www.nass.usda.gov/Research_and_Science/Cropland/SARS1a.php

Federal Emergency Management Agency. Flood Insurance Study. Retrieved May 2018, from https://map1.msc.fema.gov/data/06/S/PDF/06113CV000B.pdf?LOC=fc0d8798e71ccaee964a114b63b3bfc3

Exhibits

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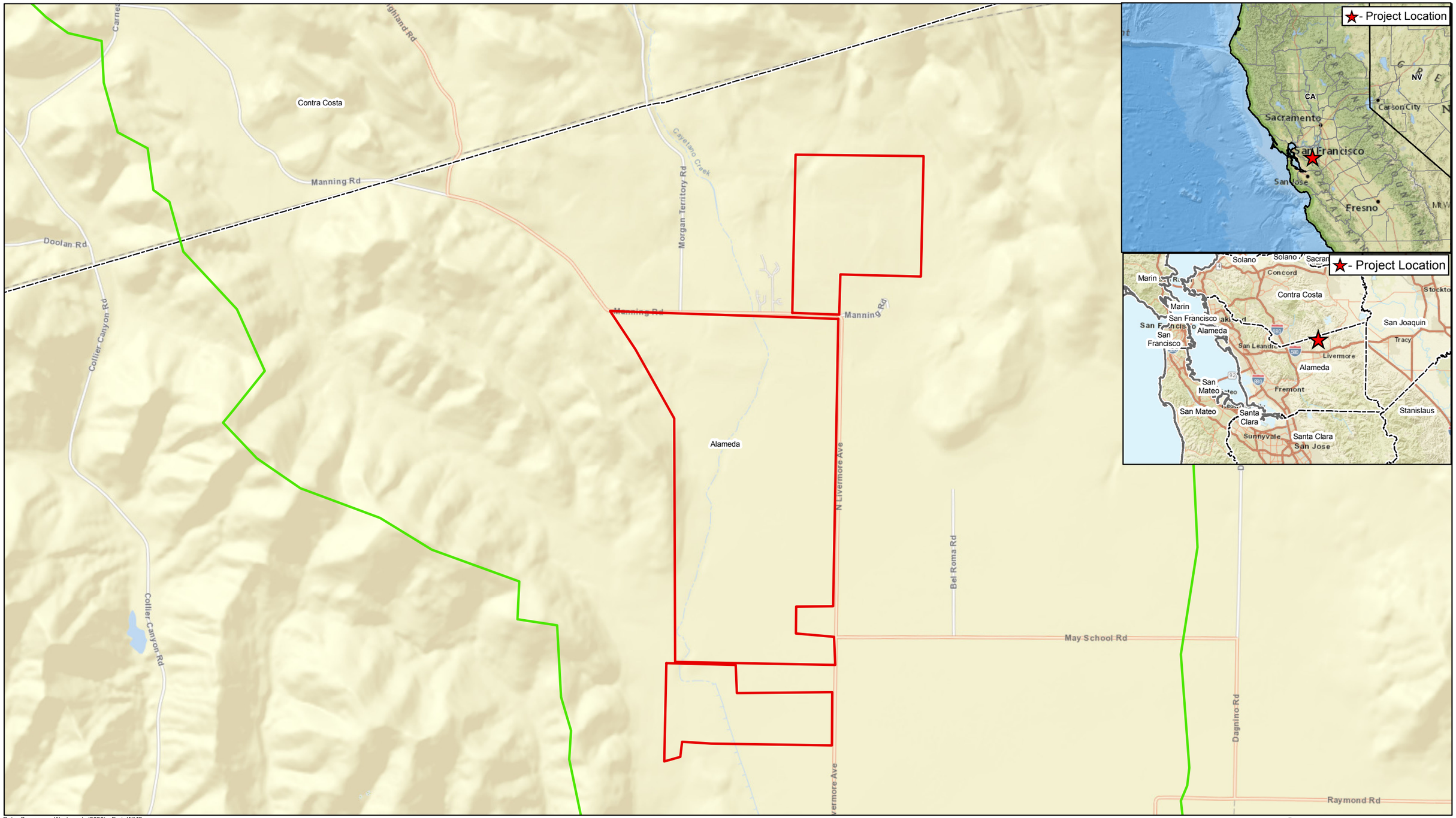

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary

N

0 Feet 1,500

Aramis Solar Project

Alameda County, California

Exhibit 1: Location Map

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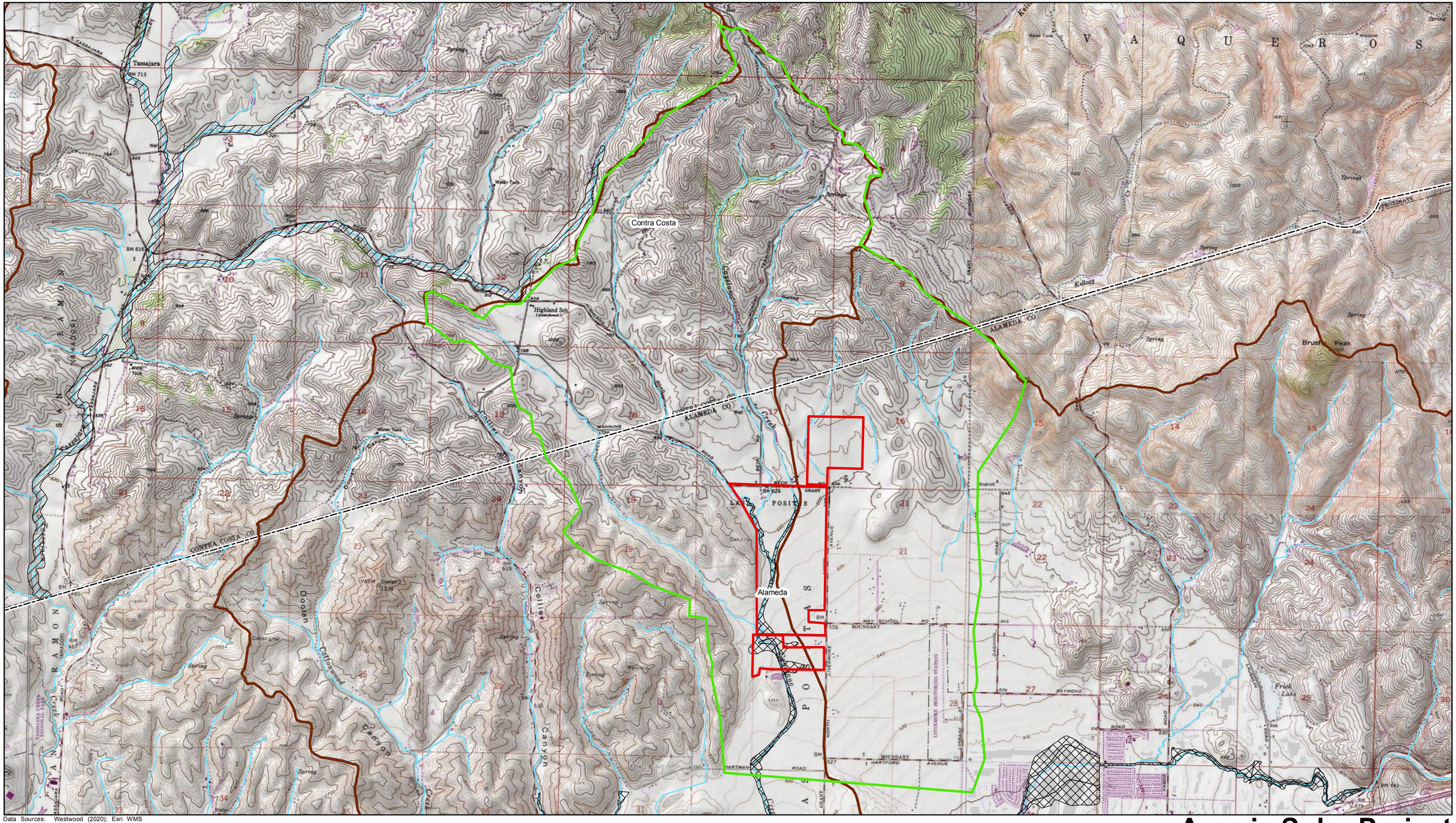

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary
- HUC12 Boundary
- NHD Flowline
- FEMA Zone A
- FEMA Zone AE

N

0 Feet 3,500

Aramis Solar Project

Alameda County, California

Exhibit 2: Base Hydrology Map

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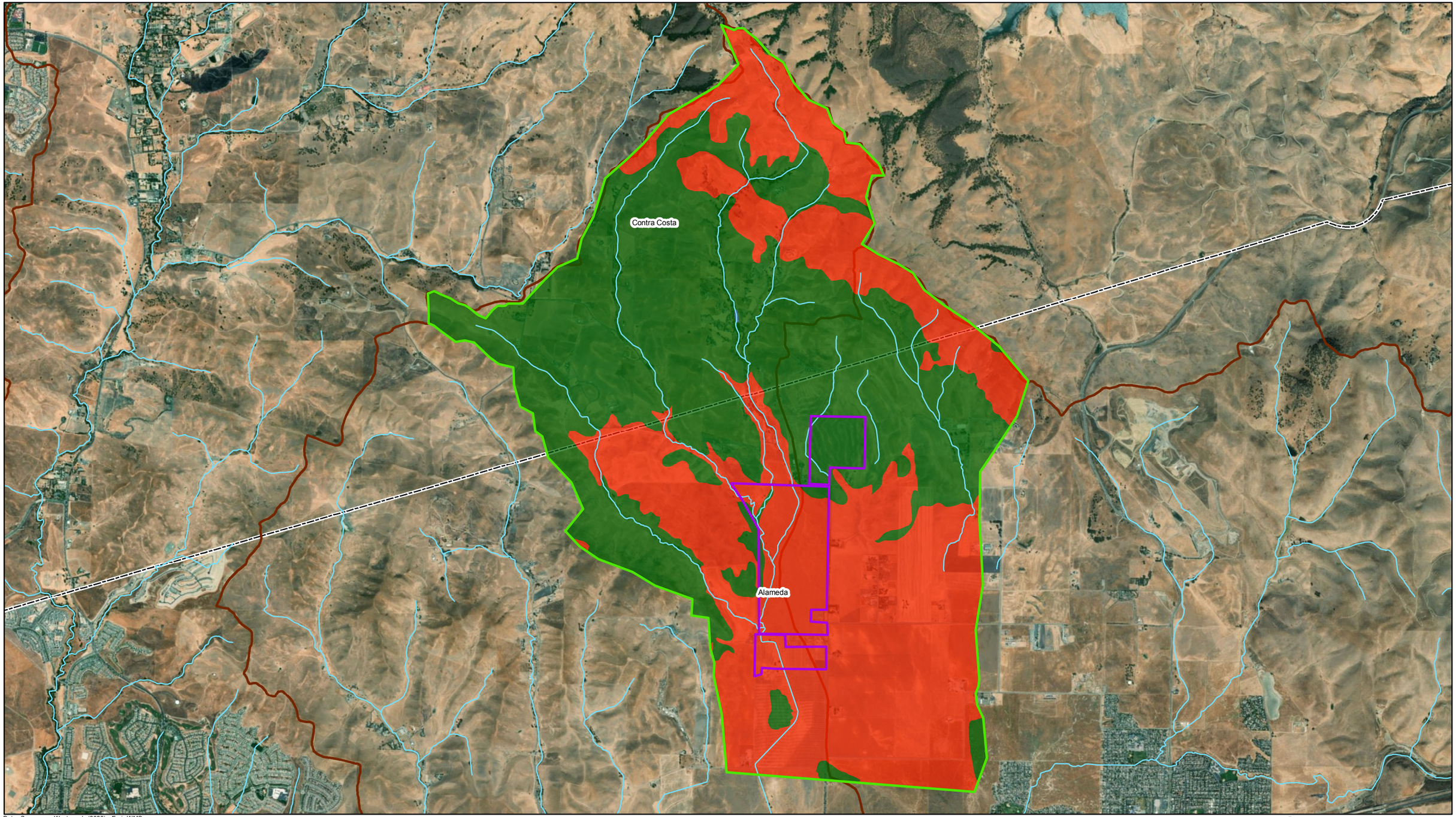

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary
- HUC12 Boundary
- NHD Flowline

Hydrological Soils Group

- D
- C
- W

N

0 Feet 3,500

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Alameda County, California

Exhibit 3: Hydrologic Soils Map

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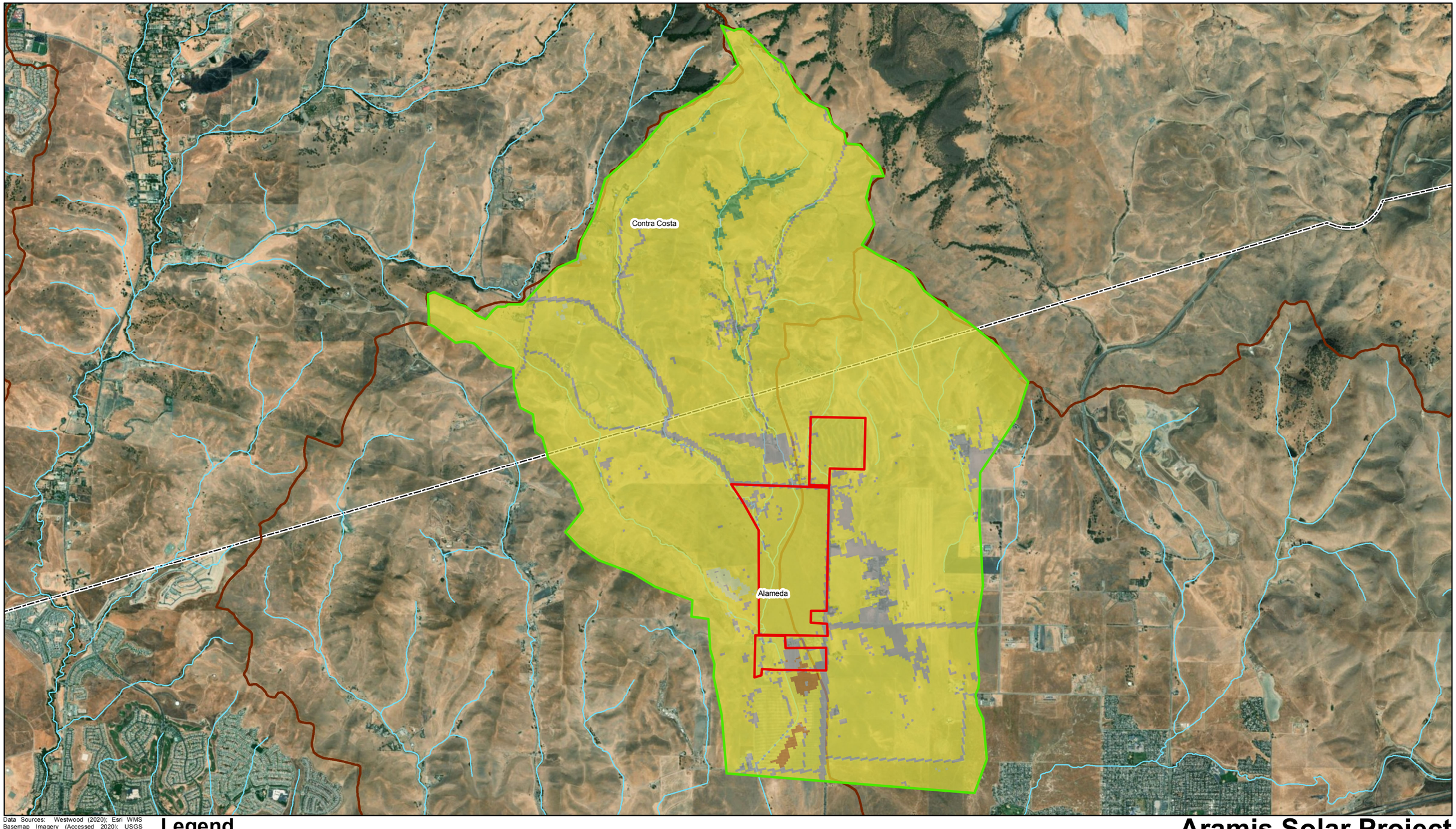

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary
- HUC12 Boundary
- NHD Flowline

Landcover

- Cultivated
- Developed
- Forested
- Prairie/Pasture
- Shrubland

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N

0 3,500 Feet

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Alameda County, California

Exhibit 4: Landcover Map

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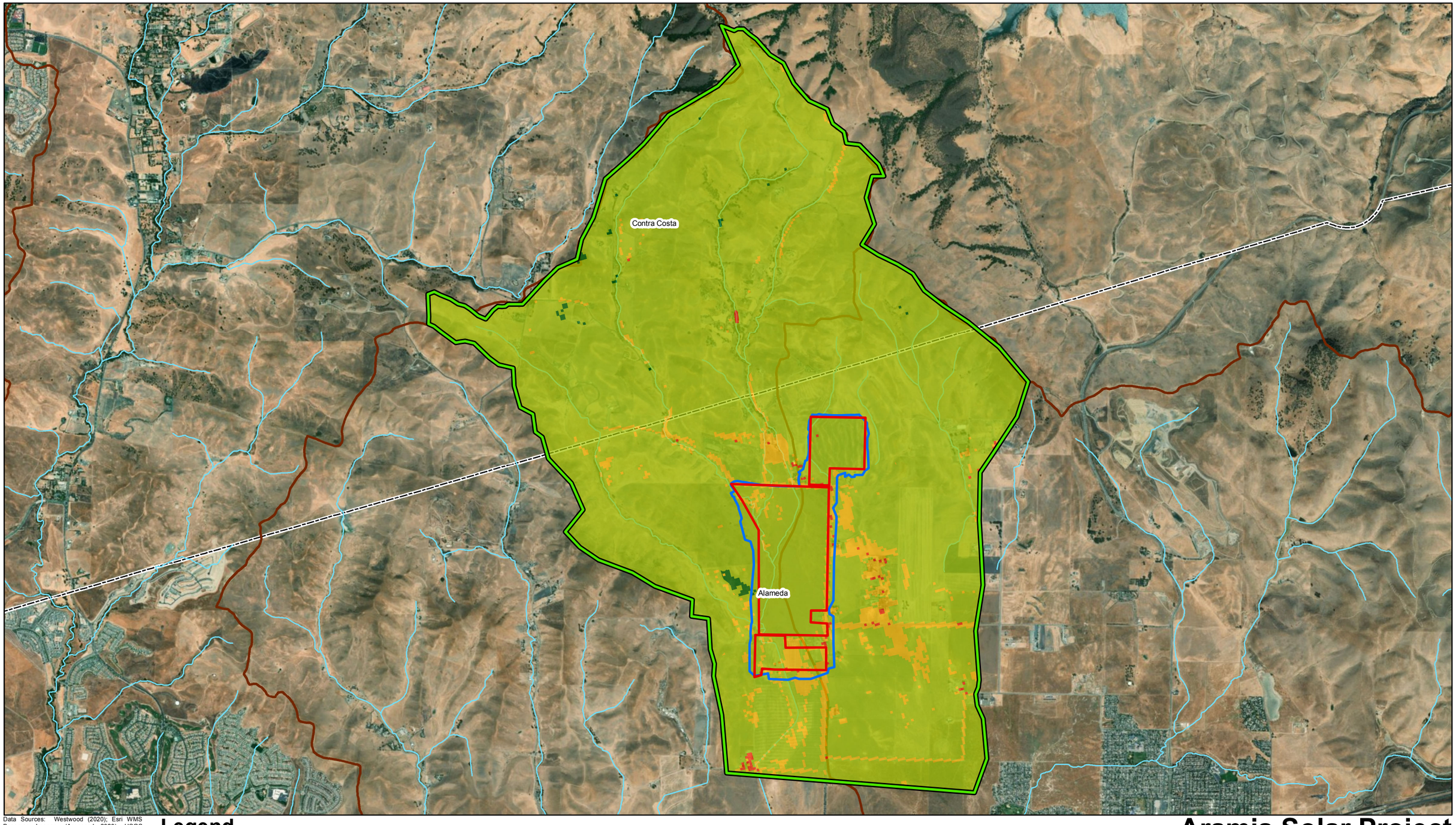

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary
- HUC12 Boundary
- NHD Flowline
- 1-foot Contour Extents
- 3-meter DEM Extents

Curve Number

- 60-69
- 70-79
- 80-89
- 90-99

N

0 — 3,500 Feet

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Alameda County, California

Exhibit 5: Curve Number and Topographic Extents Map

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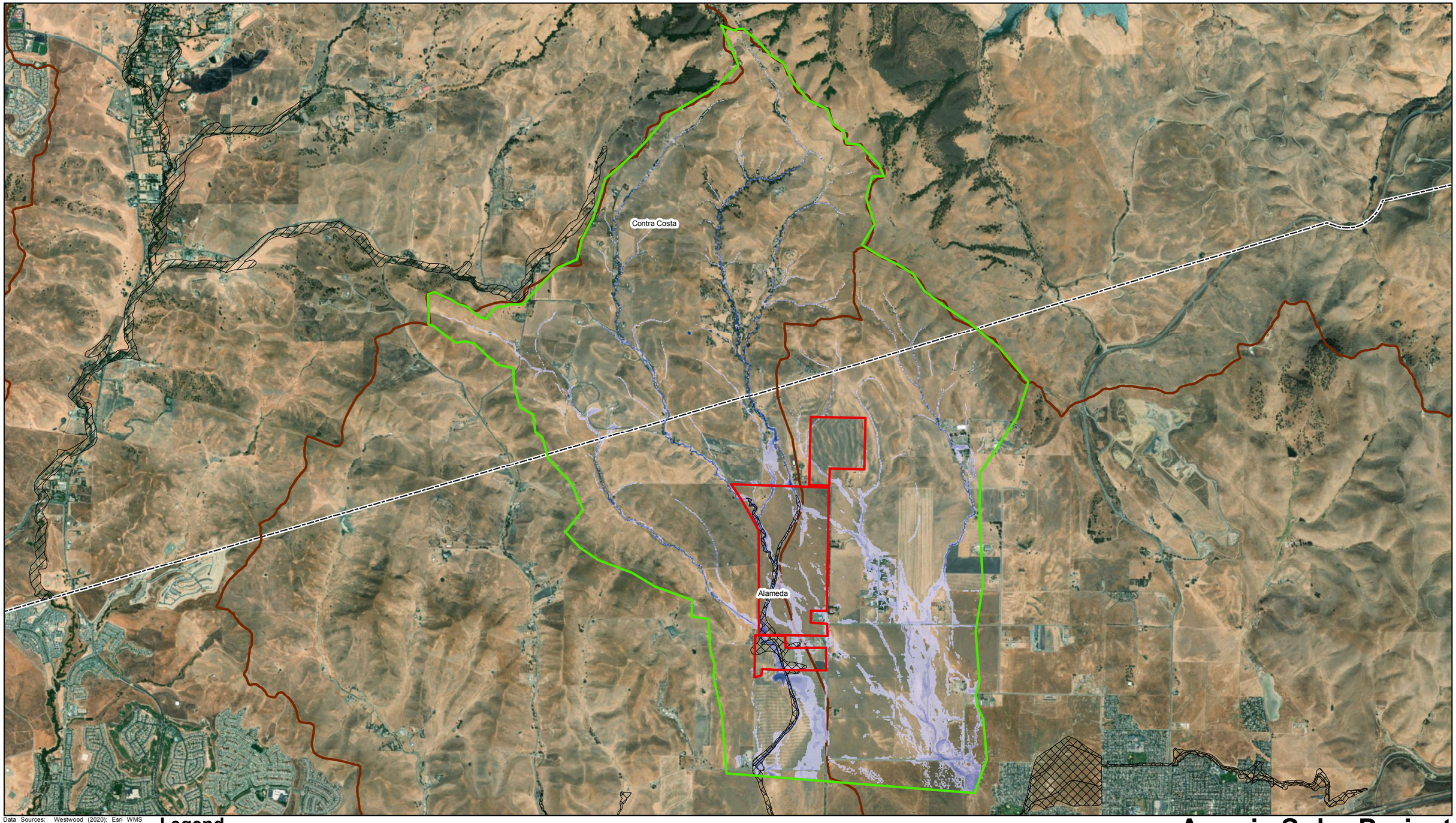

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- Project Boundary
- FLO-2D Boundary
- County Boundary
- HUC12 Boundary
- FEMA Zone A
- FEMA Zone AE

Max Flow Depth (ft)

0.50 - 1.00 | 1.01 - 1.50 | 1.51 - 2.00 | 2.01 - 2.50 | 2.51 - 3.00 | 3.01 - 4.00 | 4.01 - 6.00 | 6.01+

N

0 Feet 3,500

Aramis Solar Project

Alameda County, California

Exhibit 6: 100-Year Max Water Depth Map

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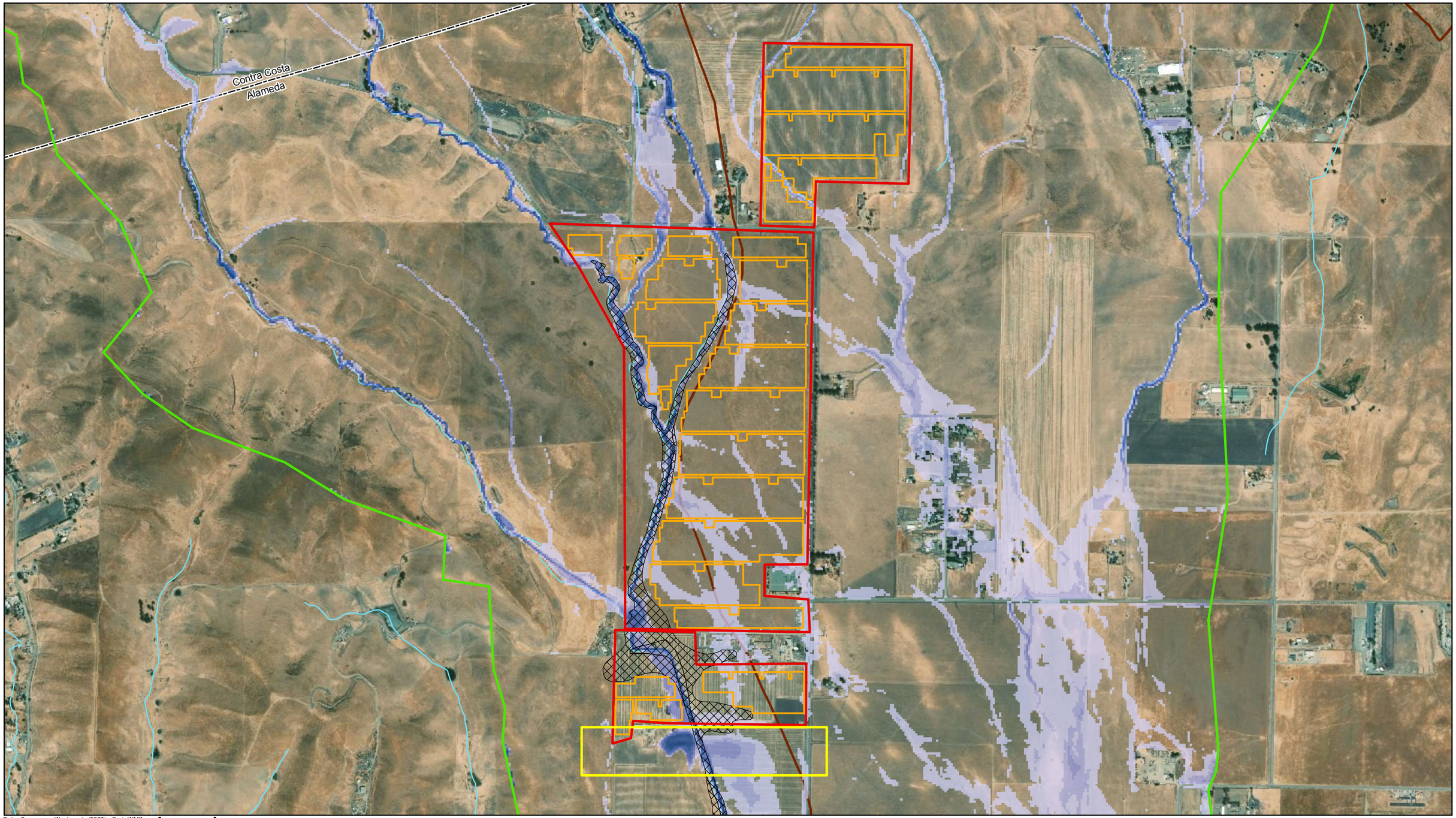

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- County Boundary
- Project Boundary
- County Boundary
- FLO-2D Boundary
- Array Outline
- Large Elevation Blend Area
- FEMA Zone A
- FEMA Zone AE
- HUC12 Boundary
- NHD Flowline

Max Flow Depth (ft)

0.50 - 1.00 | 1.01 - 1.50 | 1.51 - 2.00 | 2.01 - 2.50 | 2.51 - 3.00 | 3.01 - 4.00 | 4.01 - 6.00 | 6.01+

N

0 Feet 1,300

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Westwood Professional Services, Inc.

Aramis Solar Project

Alameda County, California

Exhibit 6A: 100-Year Max Flood Depth Project Area Map

April 28, 2020

Map Document: N:\00114542.00\GIS\Hydro Exhibits\2020-04-28 Flown Onsite exhibits 6-7\2020-04-28_AramisSolar_EX6A_100YearMaxDepthZOOM.mxd mmhealy 4/28/2020 1:13:06 PM

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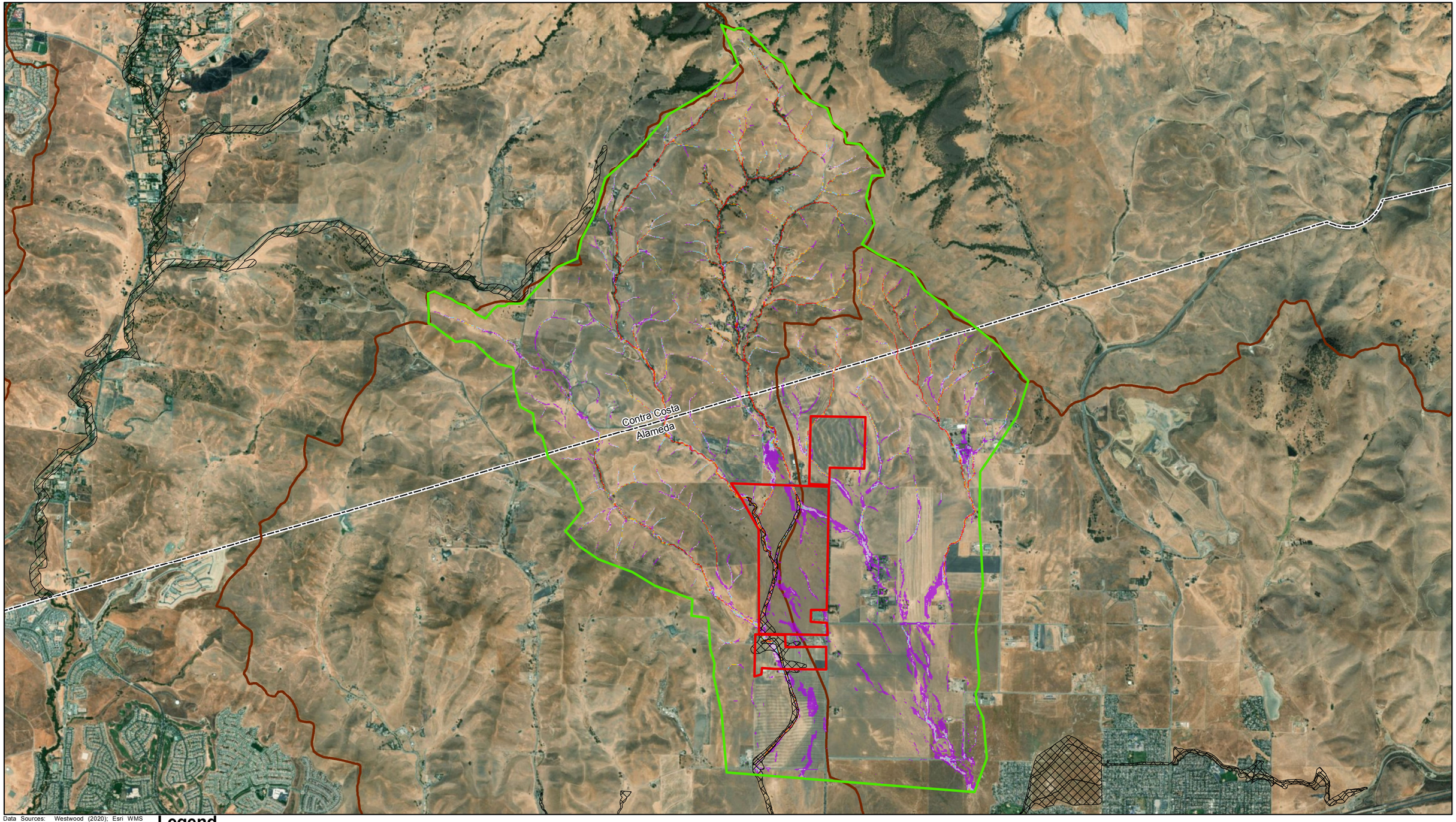

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- County Boundary
- Project Boundary
- County Boundary
- FLO-2D Boundary
- FEMA Zone A
- FEMA Zone AE
- HUC12 Boundary

Peak Velocity (fps)

1.00 - 1.50 | 1.51 - 2.00 | 2.01 - 2.50 | 2.51 - 3.00 | 3.01 - 4.00 | 4.01+

N

0 — 3,500 Feet

Aramis Solar Project

Alameda County, California

Exhibit 7: 100-Year Peak Velocity Map

April 28, 2020

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Map Document: N:\0014542.00\GIS\Hydro Exhibits\2020-04-28 Flown Onsite exhibits 6-7\2020-04-28_AramisSolar_EXT_100YearPeakVelocity.mxd mmhealy 4/28/2020 1:38:39 PM

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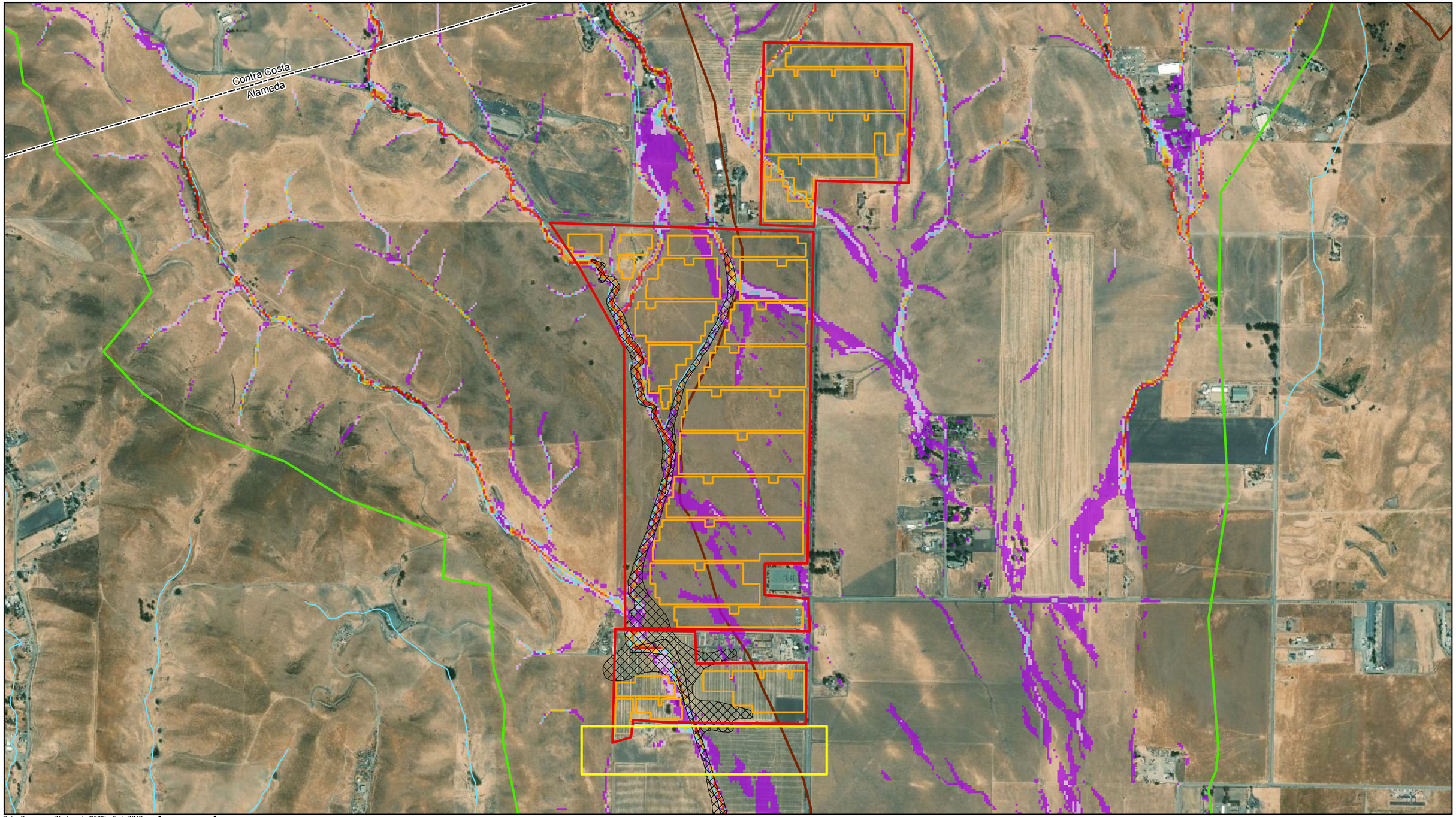

Data Sources: Westwood (2020); Esri WMS Basemap Imagery (Accessed 2020); USGS (2020); FEMA (2020); USDA (2020)

Legend

- County Boundary
- Project Boundary
- County Boundary
- FLO-2D Boundary
- Array Outline
- Large Elevation Blend Area
- FEMA Zone A
- FEMA Zone AE
- HUC12 Boundary
- NHD Flowline

Peak Velocity (fps)

1.00 - 1.50 | 1.51 - 2.00 | 2.01 - 2.50 | 2.51 - 3.00 | 3.01 - 4.00 | 4.01+

N

0 Feet 1,300

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Aramis Solar Project

Alameda County, California

Exhibit 7A: 100-Year Peak Velocity Project Area Map

April 28, 2020

Map Document: N:\0014542.00\GIS\Hydro Exhibits\2020-04-28 Flown Onsite exhibits 6-7\2020-04-28_AramisSolar_EX7A_100YearPeakVelocityZOOM.mxd mmhealy 4/28/2020 1:25:05 PM

Appendix A

Atlas 14 Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Livermore, California, USA*
Latitude: 37.7664°, Longitude: -121.7815°
Elevation: 721.43 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.114 (0.103-0.127)	0.141 (0.128-0.158)	0.179 (0.161-0.201)	0.211 (0.188-0.240)	0.257 (0.218-0.306)	0.295 (0.243-0.361)	0.335 (0.267-0.425)	0.378 (0.290-0.499)	0.441 (0.319-0.616)	0.493 (0.341-0.721)
10-min	0.164 (0.148-0.182)	0.203 (0.183-0.226)	0.256 (0.231-0.288)	0.303 (0.269-0.343)	0.369 (0.313-0.439)	0.422 (0.348-0.518)	0.480 (0.382-0.609)	0.542 (0.415-0.715)	0.632 (0.457-0.882)	0.707 (0.488-1.03)
15-min	0.198 (0.179-0.220)	0.245 (0.222-0.274)	0.310 (0.279-0.348)	0.366 (0.326-0.415)	0.446 (0.378-0.531)	0.511 (0.421-0.626)	0.580 (0.462-0.736)	0.656 (0.502-0.865)	0.764 (0.553-1.07)	0.855 (0.590-1.25)
30-min	0.270 (0.245-0.301)	0.335 (0.303-0.374)	0.423 (0.381-0.475)	0.500 (0.445-0.567)	0.609 (0.517-0.724)	0.697 (0.575-0.855)	0.792 (0.631-1.00)	0.895 (0.686-1.18)	1.04 (0.755-1.46)	1.17 (0.806-1.71)
60-min	0.382 (0.346-0.426)	0.474 (0.429-0.529)	0.600 (0.540-0.672)	0.708 (0.630-0.803)	0.862 (0.732-1.03)	0.988 (0.814-1.21)	1.12 (0.893-1.42)	1.27 (0.971-1.67)	1.48 (1.07-2.06)	1.65 (1.14-2.42)
2-hr	0.556 (0.504-0.620)	0.684 (0.619-0.764)	0.861 (0.776-0.965)	1.01 (0.901-1.15)	1.23 (1.04-1.46)	1.40 (1.16-1.72)	1.59 (1.27-2.02)	1.80 (1.38-2.37)	2.09 (1.51-2.91)	2.33 (1.61-3.41)
3-hr	0.695 (0.630-0.775)	0.855 (0.773-0.955)	1.08 (0.969-1.21)	1.26 (1.13-1.43)	1.53 (1.30-1.83)	1.75 (1.44-2.15)	1.98 (1.58-2.52)	2.24 (1.71-2.95)	2.60 (1.88-3.63)	2.90 (2.00-4.24)
6-hr	0.967 (0.876-1.08)	1.20 (1.09-1.34)	1.52 (1.37-1.70)	1.79 (1.59-2.03)	2.17 (1.84-2.58)	2.48 (2.04-3.04)	2.81 (2.24-3.56)	3.16 (2.42-4.17)	3.66 (2.65-5.11)	4.07 (2.81-5.96)
12-hr	1.25 (1.14-1.40)	1.60 (1.45-1.79)	2.07 (1.87-2.32)	2.46 (2.19-2.80)	3.01 (2.56-3.59)	3.45 (2.84-4.23)	3.91 (3.11-4.96)	4.39 (3.36-5.79)	5.07 (3.67-7.08)	5.62 (3.88-8.22)
24-hr	1.66 (1.54-1.84)	2.19 (2.02-2.42)	2.89 (2.66-3.20)	3.46 (3.17-3.86)	4.26 (3.79-4.89)	4.88 (4.26-5.71)	5.53 (4.73-6.59)	6.20 (5.18-7.58)	7.14 (5.75-9.04)	7.88 (6.17-10.3)
2-day	2.12 (1.96-2.34)	2.77 (2.56-3.07)	3.63 (3.34-4.03)	4.34 (3.97-4.85)	5.32 (4.72-6.10)	6.07 (5.30-7.10)	6.85 (5.86-8.18)	7.67 (6.40-9.37)	8.78 (7.08-11.1)	9.67 (7.57-12.6)
3-day	2.42 (2.24-2.68)	3.15 (2.91-3.48)	4.10 (3.78-4.55)	4.89 (4.47-5.45)	5.96 (5.30-6.84)	6.80 (5.94-7.94)	7.66 (6.55-9.13)	8.55 (7.14-10.4)	9.77 (7.88-12.4)	10.7 (8.40-14.0)
4-day	2.70 (2.49-2.98)	3.48 (3.21-3.85)	4.51 (4.15-5.00)	5.36 (4.90-5.98)	6.52 (5.79-7.48)	7.42 (6.48-8.67)	8.34 (7.14-9.95)	9.30 (7.77-11.4)	10.6 (8.56-13.4)	11.7 (9.12-15.2)
7-day	3.35 (3.10-3.71)	4.27 (3.94-4.72)	5.47 (5.03-6.06)	6.45 (5.89-7.20)	7.79 (6.93-8.95)	8.84 (7.72-10.3)	9.92 (8.48-11.8)	11.0 (9.22-13.5)	12.6 (10.1-15.9)	13.8 (10.8-18.0)
10-day	3.77 (3.48-4.17)	4.77 (4.40-5.27)	6.06 (5.58-6.72)	7.12 (6.51-7.94)	8.56 (7.61-9.82)	9.68 (8.45-11.3)	10.8 (9.26-12.9)	12.0 (10.0-14.7)	13.7 (11.0-17.3)	15.0 (11.7-19.5)
20-day	4.97 (4.59-5.49)	6.25 (5.77-6.92)	7.88 (7.25-8.73)	9.17 (8.39-10.2)	10.9 (9.68-12.5)	12.2 (10.6-14.2)	13.5 (11.5-16.1)	14.8 (12.4-18.1)	16.6 (13.4-21.0)	18.0 (14.1-23.5)
30-day	5.99 (5.54-6.62)	7.54 (6.96-8.34)	9.46 (8.71-10.5)	10.9 (10.0-12.2)	12.9 (11.4-14.8)	14.3 (12.5-16.7)	15.7 (13.4-18.7)	17.1 (14.3-20.9)	19.0 (15.3-24.0)	20.4 (16.0-26.6)
45-day	7.39 (6.82-8.16)	9.31 (8.59-10.3)	11.6 (10.7-12.9)	13.4 (12.2-14.9)	15.6 (13.8-17.9)	17.1 (15.0-20.0)	18.7 (16.0-22.3)	20.1 (16.8-24.6)	22.1 (17.8-27.9)	23.5 (18.4-30.6)
60-day	8.80 (8.13-9.72)	11.1 (10.2-12.3)	13.8 (12.7-15.3)	15.8 (14.4-17.6)	18.2 (16.2-20.9)	20.0 (17.4-23.3)	21.6 (18.4-25.7)	23.1 (19.3-28.2)	25.1 (20.2-31.7)	26.5 (20.7-34.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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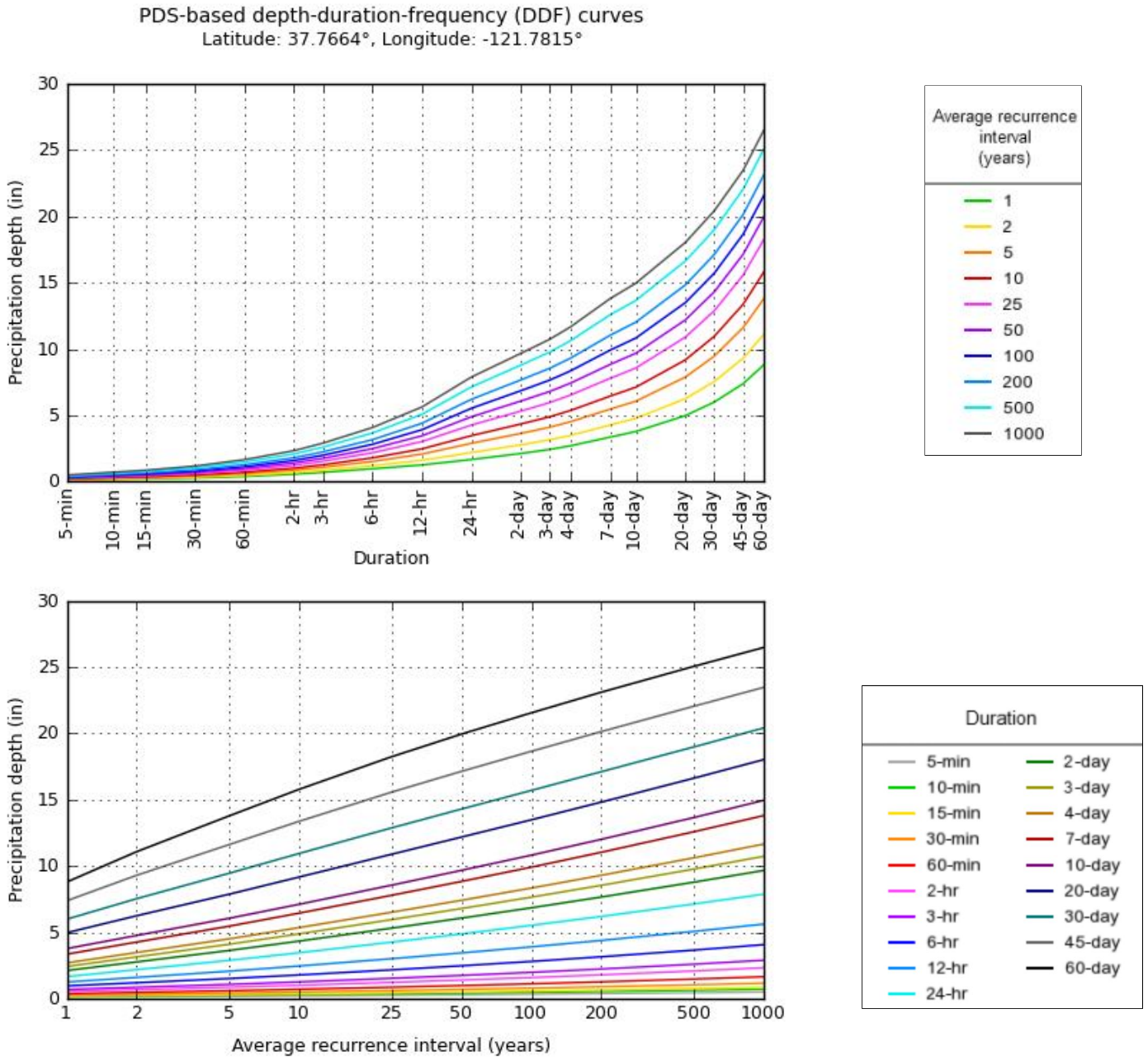
PF graphical



NOAA Atlas 14, Volume 6, Version 2

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Maps & aerials

Small scale terrain

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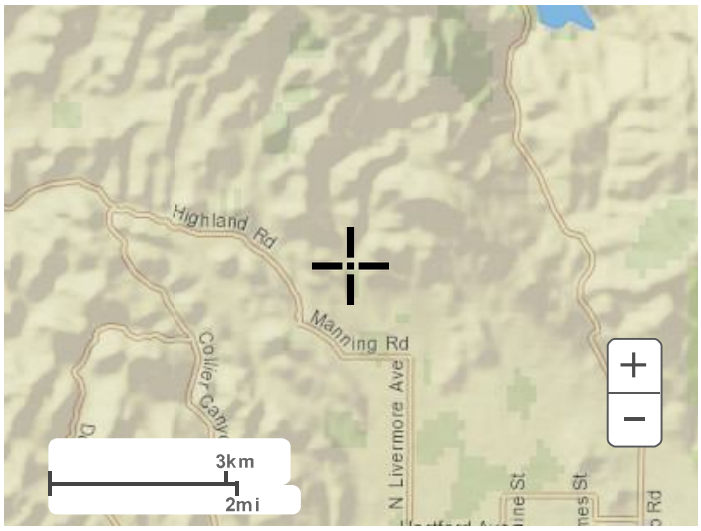
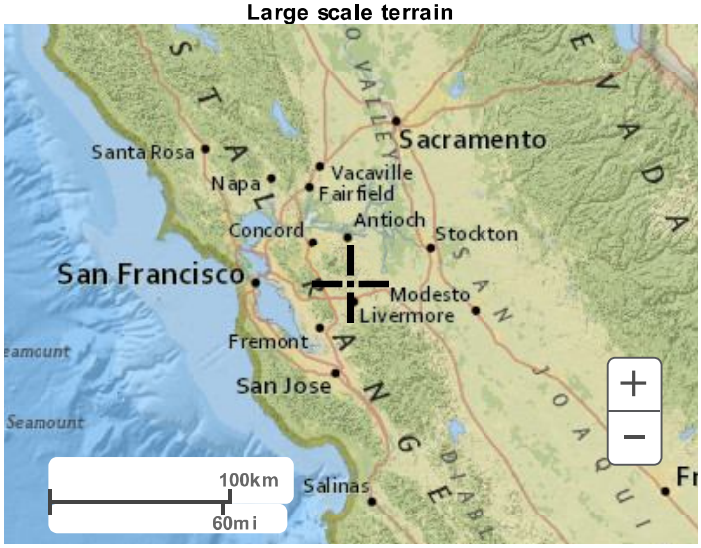
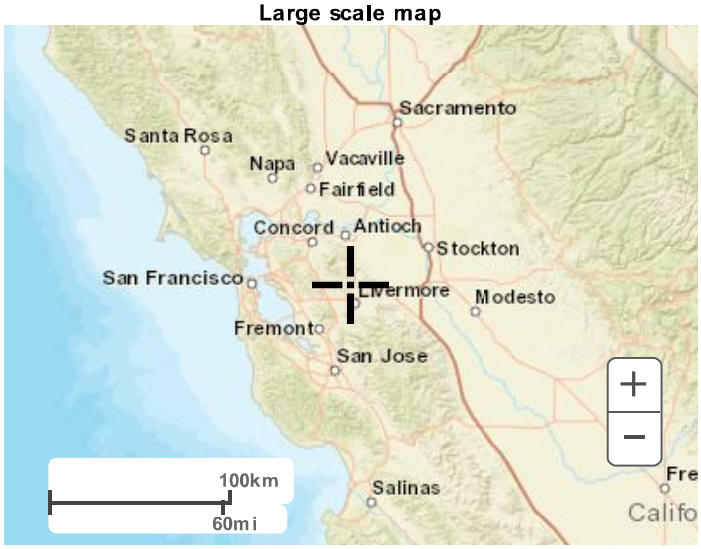


Large scale terrain



Large scale map



Large scale aerial

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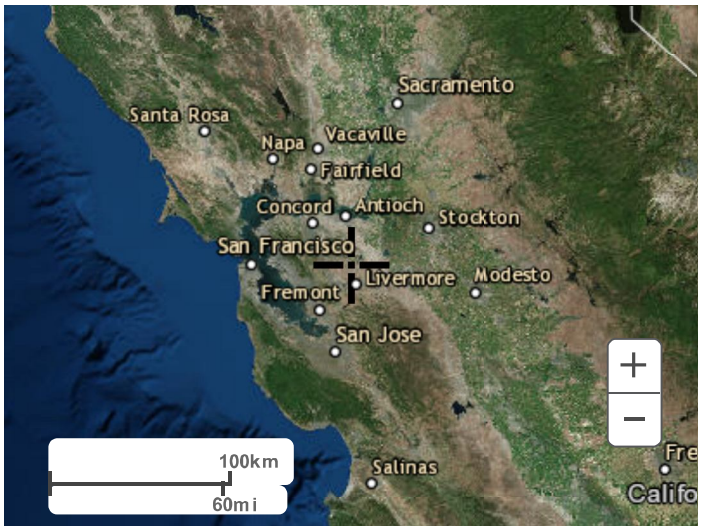

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Appendix B

Curve Number Table

Table 1. Standard Curve Numbers

Class	Value	Classification Description [NLCD 2006]	Curve Number				
			Soil Type*				
			A	B	C	D	W
Water	11	Open Water - areas of open water, generally with less than 25% cover of vegetation or soil.	98	98	98	98	100
	12	Perennial Ice/Snow - areas characterized by a perennial cover of ice and/or snow, generally greater than 25% of total cover.	98	98	98	98	100
Developed	21	Developed, Open Space - areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	46	65	77	82	100
	22	Developed, Low Intensity - areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.	61	75	83	87	100
	23	Developed, Medium Intensity – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.	77	85	90	95	100
	24	Developed High Intensity -highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.	89	92	94	95	100
Barren	31	Barren Land (Rock/Sand/Clay) - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.	77	86	91	94	100
Forest	41	Deciduous Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.	43	55	70	77	100
	42	Evergreen Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.	43	55	70	77	100
	43	Mixed Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.	43	55	70	77	100
Shrubland	51	Dwarf Scrub - Alaska only areas dominated by shrubs less than 20 centimeters tall with shrub canopy typically greater than 20% of total vegetation. This type is often co-associated with grasses, sedges, herbs, and non-vascular vegetation.	43	48	65	73	100
	52	Shrub/Scrub - areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.	43	48	65	73	100
Herbaceous	71	Grassland/Herbaceous - areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.	43	58	71	78	100
	72	Sedge/Herbaceous - Alaska only areas dominated by sedges and forbs, generally greater than 80% of total vegetation. This type can occur with significant other grasses or other grass like plants, and includes sedge tundra, and sedge tussock tundra.	43	58	71	78	100
	73	Lichens - Alaska only areas dominated by fruticose or foliose lichens generally greater than 80% of total vegetation.	43	48	65	73	100
	74	Moss - Alaska only areas dominated by mosses, generally greater than 80% of total vegetation.	43	48	65	73	100
Planted/Cultivated	81	Pasture/Hay – areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.	43	58	71	78	100
	82	Cultivated Crops – areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.	67	78	85	89	100
	83	Small Grains	63	75	83	87	100
Wetlands	91	Woody Wetlands - areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	45	66	77	83	100
	92	Emergent Herbaceous Wetlands - Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	45	66	77	83	100

*A/D, B/D and C/D soils lumped as D soils, W denotes water

**Curve Numbers for NLCD Codes 41-81 have been increased from 30 to 43 as many of these areas are partially grazed Woods-grass combination.

Appendix C
FEMA Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 10. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

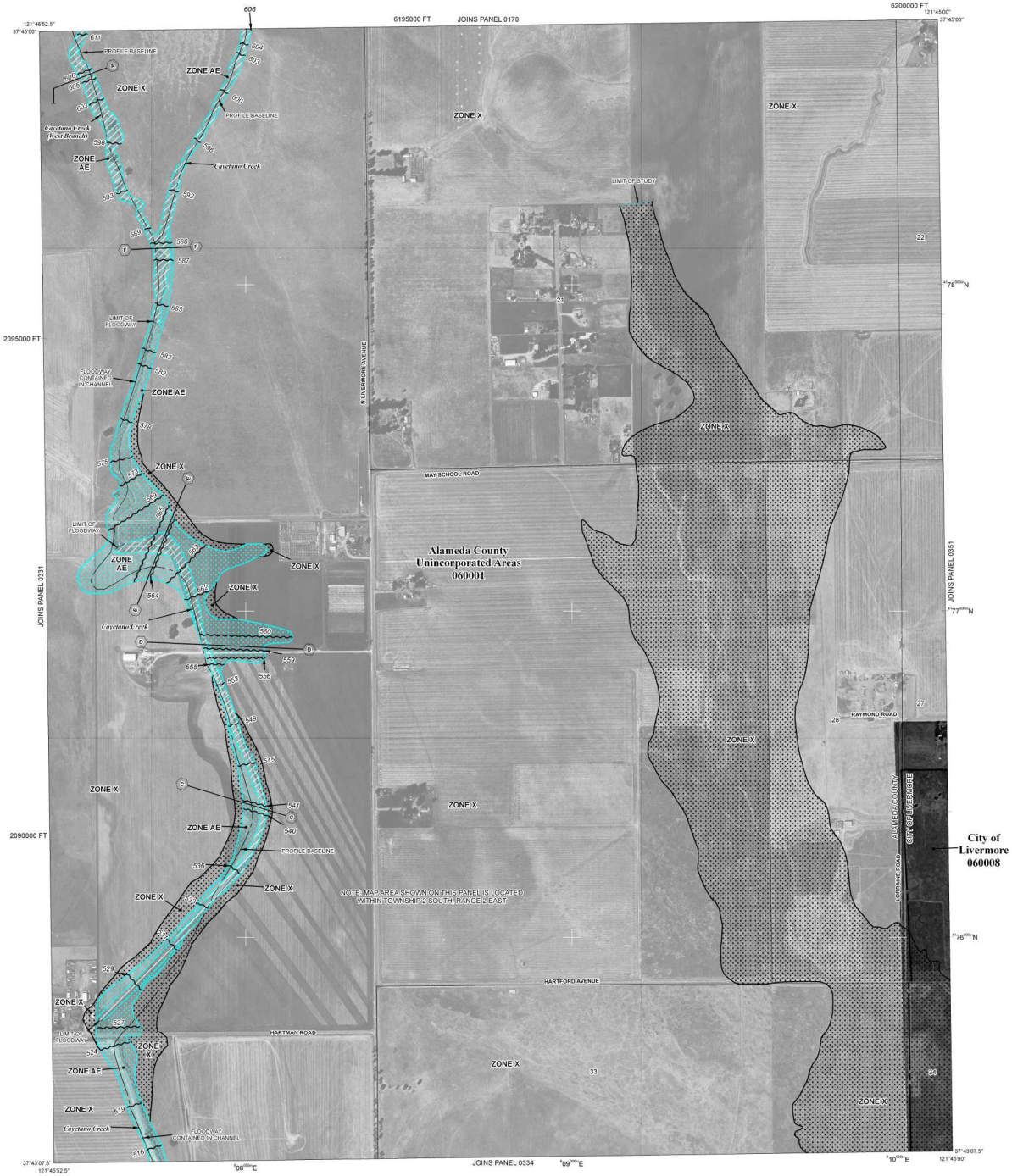
Base map information shown on this FIRM was derived from multiple sources. Within the City of Livermore, base map information was derived from digital orthophotos provided by the City of Livermore Engineering Department. This information was produced at scales of 1:1,200 and 1:2,400 with 1-foot pixel resolution from photography dated May 7, 2001. Within the City of San Leandro, base map information was derived from digital orthophotos provided by the City of San Leandro Information Services Department. This information was produced at a scale of 1:2,400 with 1-foot pixel resolution from photography dated April 19, 2003. Additional information was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1991 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
B — B	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4376000 N	1000-meter Universal Transverse Mercator grid values, zone 10N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 3, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0332G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 332 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMEDA COUNTY	060001	0332	G
LIVERMORE, CITY OF	060008	0332	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06001C0332G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 10. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Within the City of Livermore, base map information was derived from digital orthophotos provided by the City of Livermore Engineering Department. This information was produced at scales of 1:1,200 and 1:2,400 with 1-foot pixel resolution from photography dated May 7, 2001. Within the City of San Leandro, base map information was derived from digital orthophotos provided by the City of San Leandro Information Services Department. This information was produced at a scale of 1:2,400 with 1-foot pixel resolution from photography dated April 19, 2003. Additional information was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1991 or later.

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Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- D — D — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
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- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

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August 3, 2009

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NAD83

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0331G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 331 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMEDA COUNTY	060001	0331	G

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MAP NUMBER
06001C0331G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

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	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
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(EL. 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
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600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone III (FIPSZONE 0403), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 3, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0170G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 170 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMEDA COUNTY	060001	0170	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06001C0170G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

Appendix H

Acoustical Analysis Report

HELIX Environmental Planning

Aramis Solar Energy Generation and Storage Project

Acoustical Analysis Report

September 2020 | IPO-01.03

Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

Aramis Solar Energy Generation and Storage Project

Acoustical Analysis Report

Prepared for:

Alameda County Planning Department
224 West Winton Avenue
Hayward, CA 94544

Prepared by:

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

September 2020 | IPO-01.03

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ACRONYMS AND ABBREVIATIONS

ac	alternating current
ADT	average daily trips
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
APN	Assessor's Parcel Number
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
County	Alameda County
CPSF	Clean Power San Francisco
CUP	Conditional Use Permit
dB	decibel
dBA	A-weighted decibel
dc	direct current
EBCE	East Bay Community Energy
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
I-580	Interstate 580
in/sec	inches per second
kHz	kilohertz
kV	kilovolt
L_{DN}	Day-Night sound level
L_{EQ}	time-averaged noise level
L_{MAX}	root mean squared maximum noise level
mPa	micro Pascal
MV	medium voltage
MW	megawatts
NSLU	noise sensitive land use
O&M	operation and maintenance
PG&E	Pacific Gas and Electric Company
PPV	peak particle velocity
PV	photovoltaic

ACRONYMS AND ABBREVIATIONS (cont.)

RCNM	Roadway Construction Noise Model
rpm	revolutions per minute
SF	square feet/foot
SPL	sound pressure level
STC	Sound Transmission Class
S_{WL}	Sound Power Level
TIS	Transportation Impact Study
TNM	Traffic Noise Model
USDOT	U.S. Department of Transportation

EXECUTIVE SUMMARY

This report presents an assessment of potential noise and vibration impacts during the construction, operation, and decommissioning of the proposed Aramis Solar Energy Generation and Storage Project (project). The project would construct a photovoltaic (PV) solar energy generation and storage facility with a capacity of 100 megawatts (MW) on approximately 410 acres in unincorporated Alameda County. Analysis within this report addresses the relevant issues listed in Section XIII, Noise, of Appendix G of the California Environmental Quality Act (CEQA) Guidelines.

Project construction would generate noise from the use of off-road construction equipment. Mitigation measure NOI-1 would restrict construction activity to the hours between 7:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 8:00 a.m. and 5:00 p.m. on Saturday and Sunday. With implementation of the mitigation measure restricting the hours of noise generating activities, temporary project construction noise would be exempt from the County Noise Ordinance exterior noise standards. Construction would result in traffic noise from workers commuting to and from the project site and from trucks hauling material to and from the project site. The increase in ambient noise levels from project construction traffic on road segments in the project vicinity would not exceed the 3 dBA Day Night sound level (L_{DN}) threshold which represents the increase that is generally perceptible to humans in most outdoor environments. Construction noise impacts would be less than significant with mitigation incorporated.

Long-term on-site operational noise from equipment maintenance, PV panel washing, and vegetation management would not result in higher off-road equipment noise levels or longer activity duration than noise from off-road equipment currently used for agriculture and vegetation management on the project site and in the project vicinity. Noise from the project's substation electrical equipment would not exceed the County standard of 60 dBA for transformers and associated equipment in electrical substations, measured at the nearest NSLU. Noise from the project's inverter stations and energy storage buildings would not exceed the County daytime standard of 50 dBA or nighttime standard of 45 dBA. Project operational traffic would result in an increase in ambient noise levels along roads in the project vicinity of approximately 0.1 dBA L_{DN}, significantly below the 3 dBA L_{DN} threshold. Operational noise impacts would be less than significant.

The use of off-road equipment during project construction, including impact pile drivers and vibratory rollers, and the use of off-road equipment during operational maintenance activity would not result in groundborne vibration levels at the closest residential structure above the Federal Transit Administration (FTA) thresholds for risk of architectural damage to non-engineered wood and masonry structures. Groundborne vibration impacts would be less than significant.

The closest airport or airstrip to the project site is the Livermore Executive Airport, approximately 3.2 miles southwest. The project is not within the Livermore Executive Airport influence area or within any of the designated airport noise compatibility zones. The project would not expose people residing or working in the project area to excessive noise levels from airport operations.

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1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report analyzes potential noise and vibration impacts associated with the proposed Aramis Solar Energy Generation and Storage Project (project). The analysis includes a description of existing conditions in the project vicinity, an assessment of potential impacts associated with project construction, and an evaluation of project operational noise impacts. Analysis within this report addresses the relevant issues listed in Section XIII, Noise, of Appendix G of the California Environmental Quality Act (CEQA) Guidelines.

1.2 PROJECT LOCATION

The approximately 410-acre project site is located in the northeast area of unincorporated Alameda County, approximately 2.5 miles north of the City of Livermore. The project site is bounded by Manning Road to the north, North Livermore Avenue to the east, and a private driveway to the south. The western project site boundary generally follows the natural topography of Cayetano Creek and the adjacent hills. The project site comprises portions of four privately-owned parcels – Assessor's Parcel Numbers (APNs) 903-0006-001-02, 903-0007-002-01, 903-0006-003-07, and 902-0001-005-00. The project site consists of four noncontiguous development areas that are split into the following sections: the northern section, measuring approximately 103 acres; the central section, measuring approximately 269 acres; the southeastern section, measuring approximately 23 acres; and the southwestern section, measuring approximately 15 acres. The project site is within Sections 16 and 17 of Township 02 South, Range 02 East and unsurveyed land of the Las Positas Land Grant, Mount Diablo Base and Meridian. The project site is located within the "Tassajara, CA" and "Livermore, CA" U.S. Geologic Survey 7.5-minute quadrangles (see Figure 1, *Regional Location*, and Figure 2, *Aerial Map*).

1.3 PROJECT DESCRIPTION

The project is proposed by IP Aramis, LLC (a subsidiary of Intersect Power, LLC). The project applicant has applied to the Alameda County Community Development Agency for a Conditional Use Permit (CUP) from Alameda County to construct, operate, and maintain a solar photovoltaic (PV) and electric storage facility for at least 50 years and a Parcel Subdivision of APN 903-0006-001-02 to modify the eastern boundary of legal parcel of the proposed solar facility and create a distinct parcel. The solar facility would generate a 100 megawatts (MW) of PV power on approximately 410 acres. The project would provide solar power to utility customers by interconnecting to the nearby electricity grid at Pacific Gas and Electric Company's (PG&E) existing Cayetano 230 kilovolt (kV) substation located adjacent and interior to the project site. The project would serve East Bay Community Energy (EBCE), Clean Power San Francisco (CPSF), and/or PG&E customers by providing local generation capacity under a long-term contract.

The project would include individual PV modules arranged in rows onto single-axis tracker racking systems, which would in turn be affixed to steel piles. Each row (or array) would track the sun during the day, from east to west, to optimize power generation of the facility. The arrays would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility, where the electricity would be converted from direct current (DC) to alternating current (AC). The system would then step up the voltage of the electricity to a

medium voltage (MV) of 34.5 kV (or lower suitable voltage) to match the collection system voltage. The power output from the inverter station would be conveyed to the on-site substation via collection cables. Medium-voltage lines would be buried for a majority of their length but would emerge above-ground and be mounted on up to two overhead wooden utility poles on either side of Manning Avenue and up to 10 additional wooden poles to cross Cayetano Creek and its tributaries, to cross an access driveway, and where a connection to the substation must be overhead.

The project substation would provide the circuit breakers, switches, protection relays, and other necessary equipment to reliably and safely protect the electrical infrastructure. The substation would step up the MV collected energy to the interconnection voltage via one or more step up transformers. The substation would occupy an approximately 5,000-square-foot area in a 0.9-acre dedicated area and would be located adjacent to the north of the PG&E Cayetano substation, allowing the gen-tie to be either overhead or underground. The substation would be set back from North Livermore Avenue by at least 250 feet. Overhead lines would be constructed on either tubular steel poles or wood H-frames and may be constructed to be single-circuit or double-circuit.

A battery storage system would be located on-site adjacent to the west of the PG&E Cayetano substation. The battery storage system would be designed to accept between 75 and 100 MW of system charging, and subsequently dispatch stored electricity during times of peak demand. The system would either be housed in electrical containers or in up to four 100-foot by 180-foot buildings. Various sizes and numbers of electrical enclosures would be used depending on the final battery vendor selected. Up to 50 large electrical enclosures or up to 1,000 small electrical enclosures would be clustered together to make up the battery storage system. Battery buildings or containers would have foundations with a cumulative floor area of 3 acres or less. Low voltage wiring from battery enclosures would be underground and converted as a bi-directional inverter station and transformed at the shared transformer.

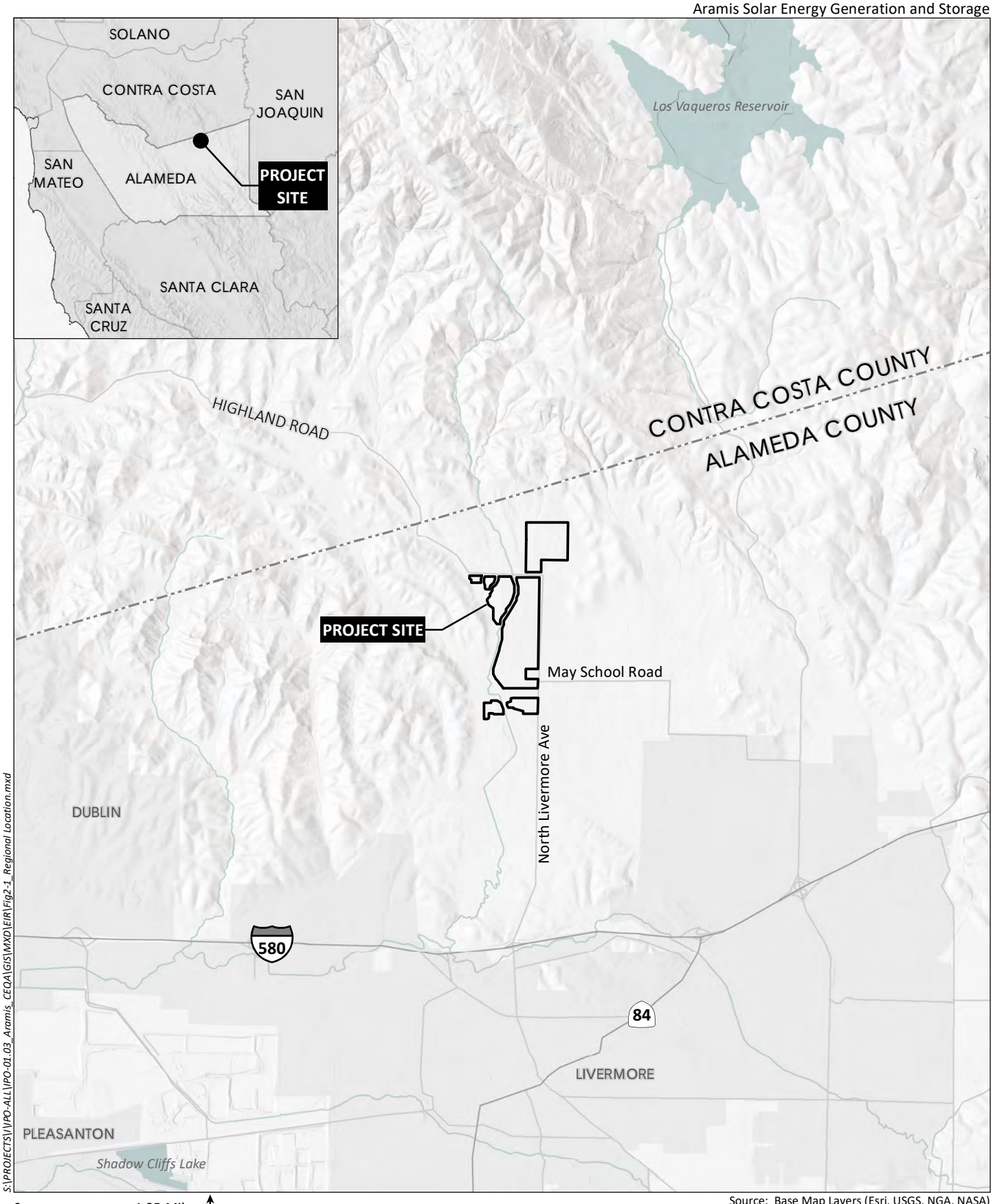
An approximately 400-square-foot operation and maintenance (O&M) building located near the project substation would be used to accommodate up to four permanent O&M staff. Water for the O&M building would be stored in a tank and filled on an as-needed basis. Wastewater would be held in a tank system and removed routinely (see Figure 3, *Site Plan*).

Long-term operation of the project would involve monitoring of the site remotely and up to four permanent staff on the site at a time for ongoing facility maintenance and repairs. Up to 12 workers could be on site once annually for module washing. The project would promote continued agricultural use of the project site. The proposed program for concomitant agricultural land uses during operation of the solar facility would be outlined in an Agricultural Management Plan prepared for the project and could include livestock grazing and commercial beekeeping operations.

1.4 NOISE, SOUND LEVEL AND VIBRATION DESCRIPTORS AND TERMINOLOGY

1.4.1 Descriptors

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an



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0 1.25 Miles

Source: Base Map Layers (Esri, USGS, NGA, NASA)

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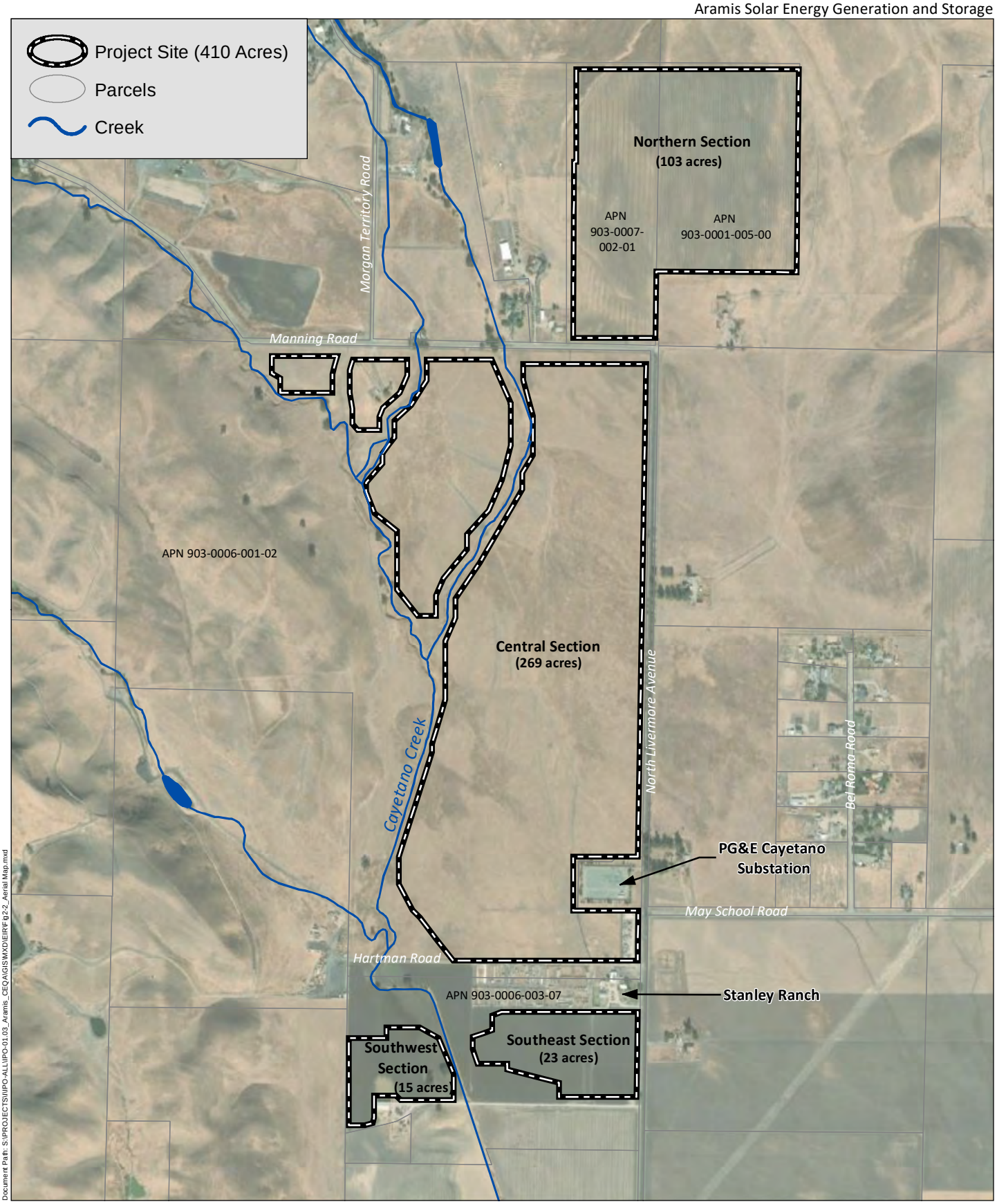
Regional Location

Figure 1



Source: Base Map Layers (DigitalGlobe 2018)

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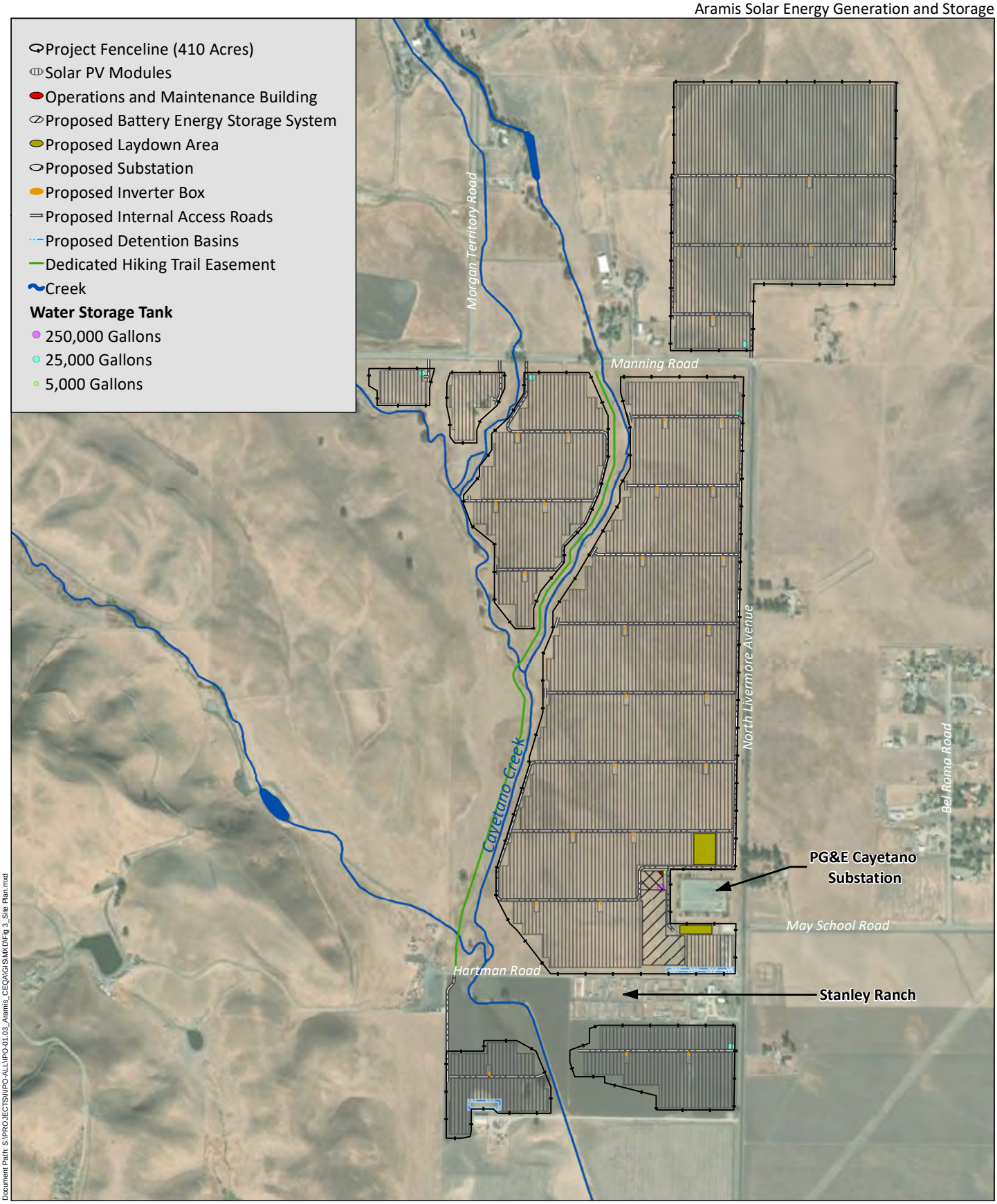
Aerial Map

Figure 2



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Source: Base Map Layers (DigitalGlobe 2018)

HELIX Environmental Planning

Site Plan

Figure 3

added 5 dBA weighting, and noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting. This is similar to the Day Night sound level (L_{DN}), which is a 24-hour average with an added 10 dBA weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL or L_{DN} are always based on dBA. The maximum sound level (L_{MAX}) is the root mean squared (RMS) maximum level during a measurement period or noise event. This is different from "peak", which is the maximum level of the raw noise source. The minimum sound level (L_{MIN}) is the RMS minimum level during a measurement period. These metrics are used to express noise levels for both measurement and municipal regulations, as well as for land use guidelines and enforcement of noise ordinances.

1.4.2 Terminology

1.4.2.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Sound Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this wide range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA. The threshold of hearing for the human ear is about 0 dBA, which corresponds to 20 mPa.

Because decibels are logarithmic units, SPL cannot be added or subtracted through standard arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than from one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dBA—rather, they would combine to produce 73 dBA. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dBA louder than one source.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dBA changes in sound levels, when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dBA are generally not perceptible. It is widely accepted, however, that people begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dBA increase is generally perceived as a distinctly noticeable increase, and a 10-dBA increase is generally perceived as a doubling of loudness.

No known studies have directly correlated the ability of a healthy human ear to discern specific levels of change in traffic noise over a 24-hour period. Many ordinances, however, specify a change of 3 CNEL or L_{DN} as the significant impact threshold. This is based on the concept of a doubling in noise energy resulting in a 3-dBA change in noise, which is the amount of change in noise necessary for the increase to be perceptible to the average healthy human ear.

1.4.2.2 Groundborne Vibration Metrics

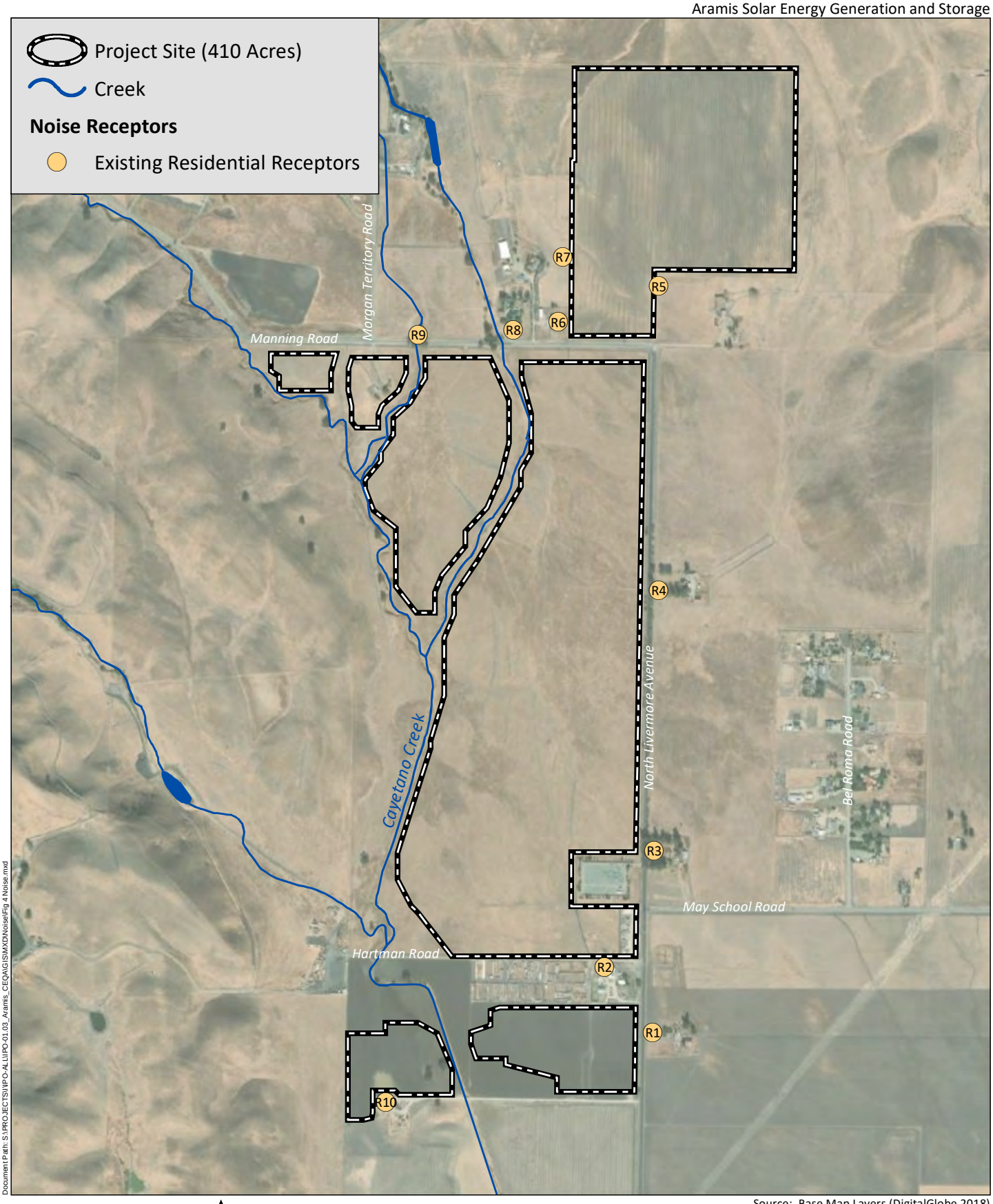
Groundborne vibration consists of rapidly fluctuating motions or waves transmitted through the ground with an average motion of zero. Sources of groundborne vibrations include natural phenomena and anthropogenic causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions). Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the RMS velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. For the purposes of this analysis, a PPV descriptor with units of inches per second (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints. Generally, a PPV of less than 0.08 in/sec does not produce perceptible vibration. At 0.12 PPV in/sec is the level at which there is a risk of architectural damage (e.g., cracking of plaster) to historical buildings and other vibration-sensitive structures and the level at which continuous vibration may become noticeable to building occupants. A level of 0.20 PPV in/sec is commonly used as a threshold for risk of architectural damage to non-engineered timber and masonry buildings (FTA 2018).

1.5 NOISE AND VIBRATION SENSITIVE LAND USES

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, including residences, hospitals, schools, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. Noise receptors are individual locations that may be affected by noise. The closest existing sensitive receptors to the project site are rural single-family homes with the closest residential building located approximately 60 feet from the project site. Figure 4, *Receptor Locations*, shows the property line location closest to future project noise sources for the closest existing residences around the project site. There are no schools, hospitals, or daycare facilities within 1 mile of the project site.

1.6 REGULATORY FRAMEWORK

The project site is located in an unincorporated area of Alameda County. Regulatory requirements related to environmental noise are typically promulgated at the local level. However, federal and State agencies provide standards and guidelines to local jurisdictions. Noise standards for Alameda County, along with the State CEQA Guidelines, were considered in the noise assessment.



Source: Base Map Layers (DigitalGlobe 2018)

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Receptor Locations

Figure 4

1.6.1 Federal Guidelines

1.6.1.1 U.S. Environmental Protection Agency Recommendations

The USEPA provides guidance in Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety (NTIS 550\9-74-004, EPA, Washington, D.C., March 1974), which is commonly referenced as the "Levels Document." The Levels Document establishes a L_{DN} of 55 dBA as the requisite level, with an adequate margin of safety for areas of outdoor uses, including residential and recreational areas. This document does not constitute USEPA regulations or standards but identifies safe levels of environmental noise exposure without consideration of costs for achieving these levels or other potentially relevant considerations. It is intended to "provide State and local governments as well as the Federal government and the private sector with an informational point of departure for the purpose of decision-making." The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues and therefore should not be construed as standards or regulations.

1.6.2 California Noise Control Act

The California Noise Control Act is a section within the California Health and Safety Code that describes excessive noise as a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

1.6.3 Alameda County General Plan and East County Area Plan

The Alameda County General Pan Noise Element does not contain policies or standards for acceptable noise levels. The East County Area Plan contains one policy pertaining to acceptable noise levels and applicable to the project (Alameda County 2000):

- Policy 288: The County shall endeavor to maintain acceptable noise levels throughout East County.

1.6.4 Alameda County Noise Ordinance

The Alameda County Code Chapter 6.60, *Noise*, contains ordinances to control unnecessary, excessive and annoying noise in the county. The following sections would be applicable to the project (Alameda County 2020):

6.60.040 - Exterior noise level standards.

A. It is unlawful for any person at any location within the unincorporated area of the county to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single- or multiple-family residential, school, hospital, church, public library or commercial

properties situated in either the incorporated or unincorporated area to exceed the noise level standards as set forth in Table 6.60.040A [shown in this report as Table 1].

Table 1
ALAMEDA COUNTY NOISE LEVEL STANDARDS

Receiving Land Use — Single- Or Multiple-Family Residential, School, Hospital, Church or Public Library Properties Noise Level Standards, dBA			
Category	**Cumulative Number of Minutes in any one-hour time period**	**Daytime 7 a.m. to 10 p.m.**	**Nighttime 10 p.m. to 7 a.m.**
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Source: Alameda County Code Table 6.60.040A

B. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted so as to equal said ambient noise level.

E. Notwithstanding the noise level standards set forth in this section, the noise level standard applicable to the emission of sound from transformers, regulators, or associated equipment in electrical substations shall be 60 dBA.

6.60.070 - Special provisions or exceptions.

E. Construction. The provisions of this chapter shall not apply to noise sources associated with construction, provided said activities do not take place before 7 a.m. or after 7 p.m. on any day except Saturday or Sunday, or before eight a.m. or after five p.m. on Saturday or Sunday.

2.0 ENVIRONMENTAL SETTING

2.1 SURROUNDING LAND USES

Land uses north, south, east of the northern section, and west of the project site include row crop cultivation, cattle grazing, rural residential housing, agricultural outbuildings, small-scale ground-mounted solar systems, and open space. An approximately 59-acre solar PV facility is proposed by SunWalker Energy, Livermore Community Solar Farm, east of the central section of the project site and northeast of the intersection of North Livermore Avenue and May School Road. The existing PG&E Cayetano substation is located west of the terminus of May School Road at North Livermore Avenue. The project site surrounds the existing substation to the north, west, and south. Refer to Figure 2 for an aerial image of the project site and surrounding land uses.

2.2 EXISTING NOISE ENVIRONMENT

The project site is located in a rural agricultural area of the County and is generally undeveloped. The site is currently used for oat and hay cultivation and cattle grazing. Noise sources in the project vicinity

include seasonal agricultural equipment use for crop cultivation, traffic on North Livermore Avenue and other County roads, and electrical equipment [e.g., transformers] in the existing PG&E Cayetano substation.

3.0 ANALYSIS, METHODOLOGY, AND ASSUMPTIONS

3.1 METHODOLOGY

3.1.1 Noise Modeling Software

Modeling of the exterior noise environment for this report was accomplished using the computer noise model Computer Aided Noise Abatement (CadnaA) version 2017. CadnaA is a model-based computer program developed by *DataKustik* for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project-related information, such as noise source data, barriers, structures, and topography to create a detailed CadnaA model, and uses the most up-to-date calculation standards to predict outdoor noise impacts. The noise models used in this analysis were developed from Computer Aided Design (CAD) plans provided by the project applicant. Input variables included electrical equipment and building air conditioning system reference noise levels.

Modeling of the exterior transportation noise environment for this report was accomplished using the Traffic Noise Model (TNM) version 2.5. The TNM was released in February 2004 by the U.S. Department of Transportation (USDOT) and calculates the daytime average hourly L_{EQ} from three-dimensional model inputs and traffic data (USDOT 2004). The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic; when peak-hour traffic data is limited, peak-hour traffic volumes can be estimated based on the assumption that 10 percent of the average daily traffic would occur during a peak hour. The model-calculated one-hour L_{EQ} noise output is the equivalent to the L_{DN} (Caltrans 2013).

Project construction noise was analyzed using the Roadway Construction Noise Model (RCNM; USDOT 2008), which utilizes measured and estimated of sound levels from standard construction equipment.

3.2 ASSUMPTIONS

3.2.1 Construction

Project construction would be completed in four phases: Phase 1 site preparation (30 days), Phase 2 photovoltaic installation (150 days), Phase 3 electrical and gen-tie installation (75 days), and Phase 4 general construction operations, site clean-up and restoration (175 days). Phases 2 and 3 would occur concurrently and Phase 4 would span the entire construction duration (concurrent with Phases 1, 2, and 3). Phase 3 includes building construction and architectural coatings for the O&M and energy storage buildings.

3.2.1.1 Off-road Equipment

Construction would require the use of equipment throughout the site. Construction activities would use a variety of construction equipment including, but not limited to graders, dozers, loaders/backhoes, trenchers, cranes, forklifts, water trucks, vibratory rollers, and piledrivers.

The most likely source of vibration during project construction would be pile drivers (used to install the PV panel rack system) and vibratory rollers (used to achieve soil and gravel compaction as part of building foundation and access road construction.

3.2.1.2 Construction Traffic

Project construction activities would result in vehicles traveling to and from the project site including worker commute vehicles and trucks hauling the project electrical equipment, construction materials, and water. The project construction traffic was analyzed in the *Aramis Solar Energy Generation and Storage Project Transportation Impact Study* (TIS). The maximum worker commute trips would be 1,500 daily trips and 375 peak hour trips. The maximum truck haul trips would be 121 daily trips and 14 peak hour trips (CHS 2020). In addition, up to 30 truck trips per day (3 trips during the peak hour) may be required to haul water to the project site for dust suppression. The project construction traffic trip distribution would be 90 percent on North Livermore Avenue between the project site and Interstate 580 (I-580) and 10 percent on Manning Road between to project site and Morgan Territory Road (CHS 2020). The TIS includes intersection traffic counts for the I-580/North Livermore Avenue interchange and for Manning Road/Morgan Territory Road taken in February 2020. For the purpose of traffic noise modeling, existing traffic was assumed to consist of a typical mix of vehicle types for California rural roads: 96 percent autos and light trucks; 3 percent medium trucks; and 1 percent heavy trucks.

3.2.2 Operation

3.2.2.1 Vehicular Traffic

While daily monitoring of the site would occur remotely, up to four permanent staff could be on the site at a time for ongoing facility maintenance and repairs. Up to 12 workers could be on the site once annually for module washing. To model the most conservative (highest) daily operational traffic noise, 12 workers were assumed be on the site each day with the same trip assumptions as the construction traffic: two commute trips per employee per day and two off-site trips per employee per day for a total of 48 maximum daily trips and 12 peak hour trips. The off-site employee trips include up to 4 truck trips per day to haul water to the project site. Operational trip distribution was assumed to be the same as the construction trip distribution analyzed in the TIS: 90 percent on North Livermore Avenue between the project site and I-580, and 10 percent on Manning Road between the project site and Morgan Territory Road.

3.2.2.2 Electrical Equipment

Tracking Systems

Each row of PV panels would be equipped with a small electric motor and hydraulic or gear system to allow the panels to track the sun from east to west through the day. Typical one-axis tracking systems rotate the row of panels between 3 and 5 degrees approximately every 15 minutes during daylight. Each

tracking movement would take a few seconds. Once or twice per day, a longer movement of 30 seconds to one minute would occur to place the panels in the stow position or to move the panels in preparation for sunrise. Noise from the tracking systems is anticipated to be significantly lower than, and not discernable from, the inverter and transformer noise, described below, and is not included in the operational noise modeling.

String Inverter Stations

The operational noise modeling assumed that string inverter stations would be dispersed through the project at 29 sites within the PV modules (see Figure 3). Specifications for the project's inverter stations had not been developed at the time of this analysis. The project applicant provided specifications for a typical system that could be used: each PV power conditioning system (string inverter station) would convert up to 4,200 kW of DC power collected from the PV panels to AC power and step up the voltage to 34.5 kV for transmissions to the project substation. The power conditioning system would include inverters housed in an electrical enclosure with cooling fans, a step-up transformer, and associated electrical connection and control panels. The system specifications indicate a maximum sound level of 75 dBA at 3 feet for the inverter enclosure. The power conditioning system specifications do not indicate sound levels for the transformer. The National Electrical Manufacturers Association (NEMA) standards publication for transformers, regulators, and reactors provides maximum audible sound level specifications. For a liquid immersed 4,200 kilo volt-amps (kVA) transformer with auxiliary cooling (pump and heat exchanger/fan), the highest average sound power level would be 69 dBA (NEMA 2000). Noise from the string inverter stations would only occur during daylight hours when the PV panels are generating electricity.

Substation

The project substation would require one or more transformers to step up the 34.5 kV power from the string inverter stations to the 230 kV power required for tie-in to the existing PG&E Cayetano substation. Specifications for the project's substation transformer had not been developed at the time of this analysis. Noise levels for the substation were modeled assuming one transformer with a capacity of 150,000 kVA (150 percent of the project's PV generation capacity). Per the NEMA standards, for a liquid immersed 150,000 kVA transformer with second stage auxiliary cooling (pump and heat exchanger/fan), the highest average sound power level would be 87 dBA (NEMA 2000). The substation would also include protective switches (e.g., circuit breakers) which can produce impulsive noise (very short noise events). Protective switching devices would only activate in emergency situations (e.g., power surges) and are not included as noise sources in the modeling.

Energy Storage

Specification for the project's energy storage buildings had not been developed at the time of this analysis. Is was assumed that the energy storage buildings would have ventilation/cooling fans to circulate air through the battery rooms. Each of the four buildings was assumed to have six ventilation fans mounted on the exterior walls. This analysis assumes each fan would have a ventilation capacity of approximately 5,000 cubic feet per minute, using a 5-horsepower motor turning a 20-inch fan at approximately 1,100 revolutions per minute. Based on data from Greenheck Fan Corporation, each fan would have an overall outlet noise sound power level of 91 dBA. The manufacturer's noise data is provided below in Table 2, *Ventilation Fan Outdoor Sound Power*. The manufacturer's data sheets are

included in Appendix B. Energy storage building ventilation fans were assumed to operate in steady state 24 hours per day.

Table 2
VENTILATION FAN OUTDOOR SOUND POWER

Noise Levels in Decibels[1] (dB) Measured at Octave Frequencies								Overall Noise Level in A-weighted Scale (dBA)[1]
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
91	87	83	78	77	71	66	61	92

Source: Greencheck Double Width Centrifugal Fan Catalog Supplement (see Appendix B)
Hz = hertz; kHz = kilohertz
[1] Sound Power Levels (S_{WL})

Control equipment rooms within the energy storage buildings could require temperature control through the use of air conditioning systems. Specific air conditioning planning information for the project including the area of conditioned space, unit types, and locations was not available at the time of the analysis. To be conservative by analyzing the highest potential noise, one-third of each energy storage building was assumed to be conditioned and the air conditioning system was assumed to be mounted at ground level outside of each energy storage building without any sound enclosure. Standard air conditioning planning assumes one ton of air conditioning for every 350 SF of conditioned space (American Society of Heating, Refrigeration, and Air Conditioning Engineers [ASHRAE] 2012). Based on 6,000 SF of conditioned space, one 20-ton unit would be required for each energy storage building. This analysis assumes a 20-ton Carrier Centurion Model 50PG24 with a sound rating of 84.9 dBA sound power. This unit produces noise levels of 52 dBA L_{EQ} at 50 feet. The manufacturer's noise data is provided below in Table 3, *Carrier 50PG24 Outdoor Sound Power*. The manufacturer's data sheets are included in Appendix B. Air conditioning systems were assumed to operate in steady state during the daytime and for 30 minutes out of each hour during the nighttime.

Table 3
CARRIER 50PG24 OUTDOOR SOUND POWER

Noise Levels in Decibels[1] (dB) Measured at Octave Frequencies							Overall Noise Level in A-weighted Scale (dBA)[1]
125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
90.0	86.3	83.6	82.9	80.3	74.9	71.4	84.9

Source: Carrier 50PG03-28 Product Data (see Appendix B)
Hz = hertz; kHz = kilohertz
[1] Sound Power Levels (S_{WL})

3.3 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The following significance thresholds are based on Section XIII, Noise, of Appendix G of the State CEQA Guidelines. A significant impact is identified if the project would result in any of the following:

(1) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(2) Generation of excessive groundborne vibration or groundborne noise levels; and

(3) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The significance of noise and vibration levels, or the increase in noise levels as a result of the project, are based on the following standards from the County Code or other agencies:

- **Temporary Construction Noise**: The County Code, (Section 6.60.070), specifies that construction activities are exempt from the provisions in the Alameda County Noise Control Ordinance if they are limited to the hours between 7:00 a.m. to 7:00 p.m., Monday through Friday, and between 8:00 a.m. to 5:00 p.m. on Saturdays.

- **Traffic Noise:** For traffic-related noise, impacts would be considered significant if implementation of the project would result in an increase of the existing ambient noise levels by 5 dBA or more, where the existing ambient level is less than 60 dBA L_{DN}; or an increase of the existing ambient noise level by 3 dBA or more, where the existing ambient level is 60 dBA L_{DN} or more.

- **Permanent Operational Noise:** Noise generated by the project substation electrical equipment (e.g., transformers) would be significant if the level would exceed the County Code (Section 6.60.040 [E]) standard of 60 dBA for transformers, regulators, or associated equipment in electrical substations, measured at the receiving residential property. Assuming that the string inverter stations and energy storage building cooling/ventilation systems would operate for 30 or more minute in at least one hour per day, the noise generated by the string inverter stations and energy storage building cooling/ventilation systems would be significant if their combined noise would exceed the County Code (Section 6.040[A], Table 6.60.040A, Category 1) standard of 50 dBA L_{EQ} during daytime hours (7:00 a.m. to 10:00 p.m.) or 45 dBA LEQ during nighttime hours (10:00 p.m. to 7:00 a.m.), measured at the receiving residential property line.

- **Construction Groundborne Vibration:** The County has not adopted thresholds for determining the significance of groundborne vibrations. The Federal Transit Administration (FTA) has guidelines and recommendations for ground-borne vibration thresholds for damage to structures based on the age and/or construction type of the structures near construction activity. Per the FTA, a ground-borne vibration level of 0.2 inch-per-second PPV would be considered the damage threshold criterion for non-engineered timber and masonry buildings and a ground-borne vibration level of 0.12 inch-per-second PPV would be considered the damage threshold criterion for buildings extremely susceptible to vibration damage (e.g., historical structures; FTA 2018). This analysis assumes a conservative threshold of 0.2 inch-per-second.

4.0 IMPACTS

4.1 ISSUE 1: TEMPORARY OR PERMANENT INCREASE IN NOISE LEVELS

4.1.1 Construction Noise

Construction activities would result in noise from the use of heavy construction equipment on the project site, from heavy trucks hauling electrical equipment, construction materials and water to the site, and from worker and vendor vehicles traveling to and from the site.

4.1.1.1 Off-Road Equipment Noise

The County Code, (Section 6.60.070), specifies that construction activities are exempt from the provisions in the County Noise Control Ordinance if they are limited to the hours between 7:00 a.m. to 7:00 p.m., Monday through Friday, and between 8:00 a.m. to 5:00 p.m. on Saturdays.

The most substantial noise increases from construction activities that may affect nearby residences would occur during earth moving operations for installation of access roads and equipment pads. Construction equipment noise would be temporary and sporadic and would not be concentrated near residential property lines for extended periods. During these operations it is anticipated that a grader, dozer, and frontend loader could all be operating simultaneously within 50 feet of a residential property line. The combined total noise of all equipment at the residential property line would be 83.4 dBA L_{EQ}, above the 45 dBA to 70 dBA standard (depending on time of day and cumulative minutes per hour for the noise) for exterior noise received by residential land uses. The output from the construction noise model is included in Appendix A to this report. Provided that construction activity conforms to the hourly restrictions within the County Noise Control Ordinance, noise level limits would not apply. However, if noise generating construction activities would occur outside of the allowable times, impacts would be potentially significant. Mitigation measure NOI-1 would restrict the hours of construction activity to those specified in the County ordinance. Implementation of mitigation measure NOI-1 would reduce potential construction off-road equipment noise impacts to a less than significant level.

4.1.1.2 On-Road Construction Traffic Noise

Noise levels at residential properties located along the project's proposed construction traffic routes were estimated using the TNM, described in Section 3.1. As discussed in Section 3.2., 90 percent of construction traffic would utilize North Livermore Avenue between the project site and I-580 and 10 percent of the construction traffic would utilize Manning Road north of the project. The closest residence to the construction traffic affected road segments centerlines would be 30 feet from North Livermore Avenue (approximately 1,600 feet south of the project site), and 35 feet from Manning Road (approximately 160 feet north of the project site). The predicted traffic noise level for the project affected road segments is shown in Table 4, *Construction Traffic Noise*.

Table 4
CONSTRUCTION TRAFFIC NOISE

Roadway Segment	Distance to Nearest NSLU (feet)[1]	NSLU Type	dBA L_{DN} at Nearest NSLU[2]		
			Existing	2011 + Project	Change in L_{DN}
North Livermore Avenue					
Project Site to westbound I-580	30	SF	69.8	71.8	+2.0
Manning Road					
Project Site to Morgan Territory Road	35	SF	65.9	66.5	+0.6

Source: TNM 2.5; CHS 2020
I-580 = Interstate 580; MF = SF = Single-Family Residential.
[1] Distance measured from roadway centerline.
[2] Noise level assuming all traffic at the posted speed limit of 50 miles per hour.

As shown in Table 4, existing noise levels at all roadway segments at the closest residences already exceed 60 dBA L_{DN} without the project. With the project construction traffic included, the maximum increase in noise levels be 2.0 dBA L_{DN} and would not exceed 3 dBA L_{DN} along any roadway segment. In addition, project construction traffic would be temporary and would cease once the project is operational. Therefore, project construction traffic noise would not result in the generation of a substantial temporary increase in ambient noise levels in the vicinity of the project and the impact would be less than significant.

4.1.1.3 Mitigation Measures

NOI-1 **Construction Hourly Limits.** Prior to issuance of any project Grading Permit or Building Permit, the County shall confirm that the Grading Plan, Building Plans, and construction specifications stipulate that the following construction noise mitigation measures shall be implemented for all project construction activity:

- Restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 7:00 a.m. to 7:00 p.m., Monday through Friday, and between 8:00 a.m. to 5:00 p.m. on Saturdays, Sundays and County recognized public holidays; and

- Post a publicly visible sign at the primary project construction entrance listing the permitted construction days and hours, complaint procedures and who to notify in the event of a problem. The sign shall also include a listing of telephone numbers to be used during regular construction hours and off-hours to contact both the County and the construction contractor regarding noise complaints.

- If construction activities occur outside of the specified hours, noise levels shall be subject to the limits listed in Table 6.60.040A of the Alameda County Noise Control Ordinance.

4.1.1.4 Significance After Mitigation

Implementation of mitigation measure NOI-1 would reduce potential construction noise impacts to a less than significant level.

4.1.2 Decommissioning and Site Reclamation Noise

The solar facility is anticipated to have an operating life of at least 50 years. Once the operating life of the facility is over, it would be either repowered or decommissioned. If repowering were to be pursued, it would require the facility owner to obtain all required permit approvals. Project decommissioning would occur in accordance with the expiration or termination of the CUP and would involve the removal of above-grade facilities, buried electrical conduit, and all concrete foundations in accordance with a Decommissioning Plan. Equipment would be repurposed off-site, recycled, or disposed of in a landfill as appropriate.

Decommissioning is anticipated to take approximately six months to complete and would occur in 2073 or later. Decommissioning would be completed in three phases: Phase 1 would involve shutting down the systems and removing hazardous materials and wiring; Phase 2 would include removing the PV modules, inverters, substation(s), switching station, and energy storage system; Phase 3 would include removing site fencing and driveways and the final soils reclamation process. Decommissioning and reclamation activities are anticipated to require approximately 200 workers, generating 800 maximum daily worker trips and 40 daily truck trips.

Because it is anticipated that the intensity of project decommissioning and reclamation activities would be similar to or less than project construction activities, the resulting off-road equipment traffic noise for decommissioning would be assumed to be similar to or less than that resulting from project construction. As discussed in Section 4.1.1.2, above, construction traffic noise levels would not result in a significant increase in ambient noise levels and noise for off-road equipment use would be exempt from the noise standards in the County Noise Control Ordinance. Therefore, project decommissioning and reclamation noise would not result in a temporary increase in ambient noise levels in excess of standards and the impact would be less than significant.

4.1.3 Operational Noise

4.1.3.1 Maintenance Noise

Operational sources of noise for the project would include periodic equipment maintenance, PV panel washing, and vegetation management that could require the use of off-road equipment including all-terrain vehicles, small tractors, portable generators, and portable water trailers with a pump. These periodic operational activities would occur for a few days per year and equipment use would be sporadic and would move throughout the project site. In addition, the use off-road equipment for maintenance is not anticipated to exceed the noise level of equipment currently used for agriculture and vegetation management (based on use intensity or duration) on the project site and in the project vicinity.

4.1.3.2 Stationary Source Noise

The project's electrical equipment and building HVAC system noise was modeled as described in Section 3.2, above. The results of the project substation electrical equipment noise modeling for each of the modeled receptor locations is shown in Table 5, *Operational Substation Noise*. The results of the project string inverter station and energy storage building noise modeling (combined noise of all sources) is shown in Table 6, *Operational Inverter Station and Energy Storage Noise*. See Figure 4 for modeled receptor locations.

Table 5
OPERATIONAL SUBSTATION NOISE

Receiver	Receiver Type	Noise Level (dBA L_{EQ})		
		Estimated Noise	Standard[1]	Exceed Standards?
R1	Rural Residential	43.4	60	No
R2	Rural Residential	48.3	60	No
R3	Rural Residential	55.3	60	No
R4	Rural Residential	39.9	60	No
R5	Rural Residential	30.1	60	No
R6	Rural Residential	30.9	60	No
R7	Rural Residential	29.6	60	No
R8	Rural Residential	31.4	60	No
R9	Rural Residential	30.7	60	No
R10	Rural Residential	28.1	60	No

Source: CadnaA version 2019

[1] 60 dBA L_{EQ} exterior noise standard for transformers and associated electrical substation equipment per County Noise Ordinance Section 6.60.040 (E).

Table 6
OPERATIONAL INVERTER STATION AND ENERGY STORAGE NOISE

Receiver	Receiver Type	Noise Level (dBA L_{EQ})				
		Daytime (7 a.m. to 10 p.m.)		Nighttime (10 p.m. to 7 a.m.)		Exceed Standards?
		Estimated Noise	Standard[1]	Estimated Noise	Standard	
R1	Rural Residential	40.4	50	34.8	45	No
R2	Rural Residential	43.9	50	42.3	45	No
R3	Rural Residential	42.0	50	39.7	45	No
R4	Rural Residential	43.4	50	26.1	45	No
R5	Rural Residential	43.7	50	19.0	45	No
R6	Rural Residential	42.4	50	18.8	45	No
R7	Rural Residential	41.2	50	17.9	45	No
R8	Rural Residential	40.9	50	20.0	45	No
R9	Rural Residential	39.5	50	19.6	45	No
R10	Rural Residential	41.4	50	29.9	45	No

Source: CadnaA version 2019; County Noise Ordinance Sections 6.60.040 (E)

[1] 50 dBA L_{EQ} daytime and 45 dBA L_{EQ} exterior noise standard per County Noise Ordinance Table 6.60.040A for 30 minutes or more cumulative minutes of noise in any one hour.

As shown in Table 5, the maximum noise level from the project substation electrical equipment, measured at the closest residential property line, would be 55.3 dBA and would not exceed the County Noise Ordinance standard of 60 dBA for transformers and associated equipment in electrical substations. As shown in Table 6, the maximum combined noise level from the project's inverter stations and energy storage buildings, measured at the closest residential property line, would be 43.9 dBA during the daytime and 42.3 dBA during the nighttime. These noise levels would not exceed the County Noise Ordinance standard of 50 dBA and 45 dBA, respectively. Therefore, the project's operational stationarity source noise would not result in a permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance and the impact would be less than significant.

4.1.3.3 Transportation Noise

Noise levels at residential properties located along the project-affected road segments were estimated using TNM and the anticipated maximum 12 peak hourly operational trips, as discussed in Section 3.2. 90 percent of project traffic would utilize North Livermore Avenue between the project site and I-580 and 10 percent of the project traffic would utilize Manning Road. The closest NSLU to the project traffic affected road segments centerlines would be 30 feet from North Livermore Avenue (approximately 1,600 feet south of the project site), and 35 feet from Manning Road (approximately 160 feet north of the project site). The predicted traffic noise level for the project affected road segments is shown in Table 7, *Operational Traffic Noise*.

Table 7
OPERATIONAL TRAFFIC NOISE

Roadway Segment	Distance to Nearest NSLU (feet)[1]	NSLU Type	dBA L_{DN} at Nearest NSLU[2]		
			Existing	2011 + Project	Change in L_{DN}
North Livermore Avenue					
Project Site to westbound I-580	30	SF	69.8	69.9	+0.1
Manning Road					
Project Site to Morgan Territory Road	35	SF	65.9	65.9	+0.0

Source: TNM 2.5

I-580 = Interstate 580; MF = SF = Single-Family Residential.

[1] Distance measured from roadway centerline.

[2] Noise level assuming all traffic at the posted speed limit of 50 miles per hour.

As shown in Table 7, existing noise levels at all roadway segments at the closest NSLUs already exceed 60 L_{DN} without the project. With the project traffic included, the maximum increase in noise levels would be 0.1 dBA L_{DN} and would not exceed 3 dBA L_{DN} along any roadway segment. Therefore, project operational traffic noise would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project and the impact would be less than significant.

4.2 ISSUE 2: EXCESSIVE VIBRATION

4.2.1 Construction Vibration

During construction, the largest potential source of vibration during project construction would be an impact pile driver used to install PV panel rack support piers. The largest impact pile drivers could result in vibrations as high as 1.518 inches per second PPV at a distance of 25 feet (FTA 2018). The closest vibration sensitive land use to potential pile driving activity would be approximately 125 feet from the nearest PV panel location (a residence west of the project site, north of Manning Road). A 1.518 inches per second PPV vibration level would equal approximately 0.14 inches per second PPV at a distance of 125 feet.[1] This would be lower than the 0.2-inches per second PPV FTA threshold for non-engineered wood and masonry structures. The Cultural Resources report for the project identified two structures, a barn and a shed on the Stanley Ranch south of the Cayetano substation, eligible for list as historical buildings (HELIX 2020). Potential pile driving activity could occur approximately 190 feet north of the eligible shed, A 0.644 inches per second PPV vibration level would equal approximately 0.07 inches per

[1] Equipment PPV = Reference PPV * $(25/D)^n$ (in/sec), where Reference PPV is PPV at 25 feet, D is distance from equipment to the receiver in feet, and n = 1.5 (the value related to the attenuation rate through typical soil); formula from FTA 2018.

second PPV at a distance of 190 feet. This would be lower than the 0.12-inches per second PPV FTA threshold for buildings extremely susceptible to vibration damage.

Another potential source of vibration during project construction activities would be a vibratory roller, which may be used as close at 75 feet of the nearest off-site residence (a residence west of the project site, north of Manning Road). A vibratory roller could create vibrations as high as 0.210 inches per second PPV at a distance of 25 feet (FTA 2018). A 0.210 inches per second PPV vibration level would equal approximately 0.04 inches per second PPV at a distance of 75 feet.[1] This would be lower than the 0.2 inches per second PPV FTA threshold for risk of architectural damage to non-engineered wood and masonry structures.

Therefore, although vibrations from pile driving and vibratory rollers may be perceptible to nearby receptors, temporary groundborne vibration impacts associated with project construction would be less than significant.

4.2.2 Operational Vibration

Long-term operation of the project would require the use of equipment and vehicles for periodic equipment maintenance, PV panel washing, and vegetation management. The largest potential source of vibration from off-road equipment used during project operation activities would be a loaded water truck, which could be used within 75 feet of the nearest off-site residence. A loaded heavy truck operating off-road could create vibrations as high as 0.076 inches per second PPV at a distance of 25 feet (FTA 2018). A 0.076 inches per second PPV vibration level would equal approximately 0.01 inches per second PPV at a distance of 75 feet.[1] This would be substantially lower than the 0.2 inches per second PPV FTA threshold for risk of architectural damage non-engineered wood and masonry structures. Therefore, groundborne vibration impacts associated with project operational use of water trucks or other off-road equipment would be less than significant.

4.3 ISSUE 3: AIRPORT NOISE EXPOSURE

The closest airport or airstrip to the project site is the Livermore Executive Airport, approximately 3.2 miles southwest. The project is not within the Livermore Executive Airport influence area or within any of the designated airport noise compatibility zones (Alameda County 2012). Therefore, the project would not expose people residing or working in the project area to excessive noise levels from airport operations and the impact would be less than significant.

4.4 ISSUE 4: CUMULATIVE NOISE IMPACTS

The project, in combination with past present and reasonably foreseeable project could result in cumulative noise impacts. For cumulative noise issues, the only identified cumulative projects would be the proposed Livermore Community Solar Farm project, located across North Livermore Avenue from the project site, and the proposed Oasis Fund Livermore Grow Facility, located adjacent to the northern section of the project site on Morgan Territory Road.

4.4.1 Cumulative Construction Noise

Noise from construction activities at the Livermore Community Solar Farm and Oasis Fund Livermore Grow Facility projects could overlap with project construction activities. As discussed above, noise from

construction equipment that occurs between the hours of 7:00 a.m. and 7:00 p. between 7:00 a.m. to 7:00 p.m., Monday through Friday, or between 8:00 a.m. to 5:00 p.m. on Saturdays would be exempt from the County Noise Ordinance exterior noise level standard. These restrictions would apply to construction of all the cumulative projects. Mitigation measure NOI-1 requires the proposed project's noise generating construction activities to be limited to those hours or be subject to the specified exterior noise limits. Therefore, noise from project off-road construction equipment would result in a less than cumulatively considerable impact with mitigation incorporated.

According to the Livermore Community Solar Farm Project Draft Environmental Impact Report, the maximum peak hour construction traffic on North Livermore Avenue would be 25 worker vehicles and 2 trucks (Placeworks 2020). According to the Initial Study/Mitigated Negative Declaration air quality analysis for the proposed Oasis Fund Livermore Grow Facility, the maximum peak hour construction traffic on North Livermore Avenue would be 23 worker trips and 1 truck trip (Raney 2019). The noise level resulting from the existing traffic plus the maximum potential combined construction traffic for the two cumulative projects and the proposed project was modeled using the TNM, as described in Section 3.1. The results of the cumulative construction traffic noise modeling are shown in Table 8, *Cumulative Construction Traffic Noise*.

Table 8
CUMULATIVE CONSTRUCTION TRAFFIC NOISE

Roadway Segment	Distance to Nearest NSLU (feet)[1]	NSLU Type	dBA L_{DN} at Nearest NSLU[2]		
			Cumulative	Cumulative + Project	Change in L_{DN}
North Livermore Avenue					
Project Site to westbound I-580	30	SF	70.2	72.1	+2.1

Source: TNM 2.5; CHS 2020; Placeworks 2020; Raney 2019
I-580 = Interstate 580; MF = SF = Single-Family Residential.
[1] Distance measured from roadway centerline.
[2] Noise level assuming all traffic at the posted speed limit of 50 miles per hour.

As shown in Table 8, with the project construction traffic included, the maximum increase in cumulative noise levels be 2.1 dBA LDN and would not exceed 3 dBA LDN. In addition, project construction traffic would be temporary and would cease once the project is operational. Therefore, the noise from project construction traffic would result in a less than cumulatively considerable impact.

4.4.2 Cumulative Operational Noise

Noise from the electrical equipment (e.g., transformers, inverters) from the project, the Livermore Community Solar Farm project, and the existing PG&E Cayetano substation could contribute cumulatively to ambient noise levels in the project vicinity. However, each electrical equipment noise source would be required to meet the County Noise Ordinance exterior noise level standard of 60 dBA L_{EQ} for transformers and associated substation electrical equipment. The proposed project substation transformer would be located at least 500 feet from the existing Cayetano substation transformer and at least 800 feet from the proposed Livermore Community Solar Farm project transformers and inverters. With adherence to the County Noise Ordinance exterior noise standards, in combination with the anticipated distances between the proposed and existing electrical equipment, the contribution of operational noise from the project's electrical equipment to the existing noise environment would not be cumulatively

As discussed in Section 3.2, the project would generate 12 peak hour operational vehicle trips (11 on North Livermore Avenue). The proposed Livermore Community Solar Farm project is anticipated to generate a maximum of 10 daily peak hour operational trips (Placeworks 2020), and the Oasis Fund Livermore Grow Facility project is anticipated to generate a maximum of 11 peak hour operational trips (Raney 2019). The noise level resulting from the existing traffic plus the maximum potential combined operational traffic for the two cumulative projects and the proposed project was modeled using the TNM, as described in Section 3.1. The results of the cumulative operational traffic noise modeling are shown in Table 9, *Cumulative Operational Traffic Noise*.

Table 9
CUMULATIVE OPERATIONAL TRAFFIC NOISE

Roadway Segment	Distance to Nearest NSLU (feet)[1]	NSLU Type	dBA L_{DN} at Nearest NSLU[2]		
			Cumulative	Cumulative + Project	Change in L_{DN}
North Livermore Avenue					
Project Site to westbound I-580	30	SF	70.0	70.0	+0.0

Source: TNM 2.5; CHS 2020; Placeworks 2020; Raney 2019
I-580 = Interstate 580; MF = SF = Single-Family Residential.
[1] Distance measured from roadway centerline.
[2] Noise level assuming all traffic at the posted speed limit of 50 miles per hour.

As shown in Table 9, with the project operational traffic included, there would be no discernable increase in cumulative traffic noise levels. Therefore, the operational trips from the proposed project would not generate a perceptible increase in traffic noise in the project vicinity, over the traffic noise levels from existing traffic plus traffic from the Livermore Community Solar Farm project and the Oasis Fund Livermore Grow Facility project. The noise from project operational traffic would result in a less than cumulatively considerable impact.

5.0 LIST OF PREPARERS

Martin Rolph	Noise Specialist
Charles Terry	Principal Acoustician
Joanne M. Dramko, AICP	Principal Technical Specialist, QA/QC
Lesley Owning	Project Manager

6.0 REFERENCES

Alameda, County of. 2020. Code of Ordinances. Online content updated on July 7, 2020. Available at: https://library.municode.com/ca/alameda_county/codes/code_of_ordinances.

2012. Livermore Executive Airport – Airport Land Use Compatibility Plan. Available at: https://www.acgov.org/cda/planning/generalplans/documents/LVK_ALUCP_082012_FULL.pdf.

2000. East County Area Plan. Available at: https://www.acgov.org/cda/planning/generalplans/documents/EastCountyAreaPlancombined.pdf.

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). 2012. ASHRAE Handbook.

California Department of Transportation (Caltrans). 2013. Technical Noise Supplement (TeNS) to the Traffic Noise Protocol. September. Available at: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

CHS Consulting Group (CHS). 2020. Aramis Solar Energy Generation and Storage Project Transportation Impact Study. April.

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

HELIX Environmental Planning (HELIX). 2020. Aramis Solar Energy Generation and Storage Project Cultural Resources Assessment Report. September.

National Electrical Manufacturers Association (NEMA). 2000. NEMA Standards Publication No. TR 1-1993 (R2000), Transformers, Regulators and Reactors.

Placeworks. 2020. Livermore Community Solar Farm Draft EIR, State Clearinghouse Number: 2018092012. March.

Raney Planning & Management, Inc. 2019. Oasis Fund Livermore Grow Facility Initial Study/Mitigated Negative Declaration. PLN2019-00258. December.

U.S. Department of Transportation (USDOT). 2008. Roadway Construction Noise Model. Available at: https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/index.cfm.

2004. Traffic Noise Model Version 2.5. Available at: https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/.

Appendix A

Construction Noise Modeling Outputs

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CadnaA Noise Source Input

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Inverter 1	I1	Lw (c)							81.1				81.1	81.1	
Transformer 1	T1	Lw							69.0				69.0	69.0	
Transformer 2	T2	Lw							87.0				87.0	87.0	
Fan1	Fan1	Lw			91.0	87.0	83.0	78.0	77.0	71.0	66.0	61.0	81.6	93.2	
AC1	AC1	Lw				90.0	86.3	83.6	82.9	80.3	74.9	71.4	87.6	93.0	

CadnaA Substation Noise Output

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
R1		R1	43.4	43.4	0.0	0.0		x	Total	1.52	r	608401.78	4177083.95	1.52
R2		R2	48.3	48.3	0.0	0.0		x	Total	1.52	r	608243.24	4177273.29	1.52
R3		R3	55.3	55.3	0.0	0.0		x	Total	1.52	r	608396.86	4177572.08	1.52
R4		R4	39.9	39.9	0.0	0.0		x	Total	1.52	r	608390.83	4178385.21	1.52
R5		R5	30.1	30.1	0.0	0.0		x	Total	1.52	r	608370.99	4179256.78	1.52
R6		R6	30.9	30.9	0.0	0.0		x	Total	1.52	r	608118.52	4179151.07	1.52
R7		R7	29.6	29.6	0.0	0.0		x	Total	1.52	r	608115.84	4179294.60	1.52
R8		R8	31.4	31.4	0.0	0.0		x	Total	1.52	r	607955.39	4179069.62	1.52
R9		R9	30.7	30.7	0.0	0.0		x	Total	1.52	r	607688.81	4179058.96	1.52
R10		R10	28.1	28.1	0.0	0.0		x	Total	1.52	r	607680.48	4176862.65	1.52

CadnaA Inverter and Energy Storage Noise Output

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
R1		R1	40.4	34.8	0.0	0.0		x	Total	1.52	r	608401.78	4177083.95	1.52
R2		R2	43.9	42.3	0.0	0.0		x	Total	1.52	r	608243.24	4177273.29	1.52
R3		R3	42.0	39.7	0.0	0.0		x	Total	1.52	r	608396.86	4177572.08	1.52
R4		R4	43.4	26.1	0.0	0.0		x	Total	1.52	r	608390.83	4178385.21	1.52
R5		R5	43.7	19.0	0.0	0.0		x	Total	1.52	r	608370.99	4179256.78	1.52
R6		R6	42.4	18.8	0.0	0.0		x	Total	1.52	r	608118.52	4179151.07	1.52
R7		R7	41.2	17.9	0.0	0.0		x	Total	1.52	r	608115.84	4179294.60	1.52
R8		R8	40.9	20.0	0.0	0.0		x	Total	1.52	r	607955.39	4179069.62	1.52
R9		R9	39.5	19.6	0.0	0.0		x	Total	1.52	r	607688.81	4179058.96	1.52
R10		R10	41.4	29.9	0.0	0.0		x	Total	1.52	r	607680.48	4176862.65	1.52

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Appendix B

Equipment Manufacturer Data Sheets

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TMEIC Corporation
Office: 1325 Electric Rd, Roanoke, VA 24018 USA
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Example Technical Specification

Universal Power Conditioner System
PV / ESS Inverter

(Preliminary - Under Development)

TMEIC

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1. PURPOSE, STANDARDS, AND SCOPE

1.1. Statement of Purpose

TMEIC will provide broad-based customer support including post sales application support and commissioning services. The equipment described in the specification below is intended to be used as a Grid-Connected Photovoltaic Inverter System for a photovoltaic generation power plant.

1.2. General Scope

This specification will cover the design, fabrication, commissioning, and supply of the following equipment:

Equipment	Description
Inverter Unit	4200kW/4200kVA (5x 840kW units, maximum output at 25°C)
MV/LV 3-phase Transformer (MV TR) - Liquid-Filled MTR Pad mounted	3360/4200kVA, 630V - 34.5kV
PV Skid	Outdoor type

1.3. Documentation

All submittals will be in electronic form and will include:

- Final Specification
- Test Reports
- Instruction Manual
- Installation Manual
- Schematic Diagrams
- Outline Drawing

1.4. Packaging, Transportation and Storage

The equipment may be divided into several sections for protection during transportation when necessary. The equipment will be properly packaged for the respective mode of transportation. Customer is responsible for disposal of packaging materials. Special notations such as “Fragile”, “This side Up”, “Center of Gravity, “Weight”, etc.. when necessary, will be clearly labeled on each package. Manufacturer’s recommendations for storage should be followed upon receipt.

1.5. Product Testing

Testing will be carried out at the manufacturer’s facility for each piece of equipment. Test reports of major equipment will be submitted.

1.6. Maintenance Contract

Performing scheduled inspections and maintenance will improve the reliability of the equipment and prolong its service life. It is recommended that periodical inspections and maintenance be performed by specialists of the service representative. Such maintenance is not included in this scope and can be quoted separately. The warranty is dependent upon performing periodical inspections and maintenance as per the manufacturer’s manual.

1.7. Commissioning

The equipment presented in this specification will require authorized startup & commissioning services by TMEIC.

The commissioning scope includes but is not limited to the following:

- De-energized checks including proper installation of equipment, torque mark verification, and proper electrical connections between major equipment.
- Energized checks including software updates, verification of set-points and IP addresses, and proper operation of communications and equipment.
- Commissioning tests will be performed per TMEIC Commissioning Checklist

Note: Testing of grid protection relay is not included. Post-shipping tests of the MV Transformer, such as NETA tests, are not included and can be quoted separately.

The commissioning scope and price are based on the following conditions:

- The pre-commissioning checklist must be filled out and returned to the TMEIC project manager at least two weeks before resources will be scheduled to mobilize to site.
- DC voltage and polarity from array inputs inside the DC recombiner box have been verified and documented by others.
- Back feed is available upon arrival of TMEIC technicians.
- De-energized and energized checks will be completed during the same trip.
- Inverters will be available for commissioning continuously.
- Conditions outside of the TMEIC technician's control which result in delay may be subject to extra charge. Conditions could include, but not limited to: Waiting time for grid connection, bad weather to clear out, other related equipment required for PV inverter commissioning to be installed.
- Technicians will not travel with commissioning spares; critical spares will be available either via client stock on hand, or via TMEIC customer support process.
- Brief operations and maintenance overview can be provided immediately following the conclusion of commissioning to available onsite personnel. This is not a formal O&M training class. TMEIC offers regularly scheduled formal classroom and hands-on training. Schedule, curriculum, and pricing can be found at https://www.tmeic.com/customer-support/commissioning-training-field-service.

Any deviation from these conditions will result in extra charges in accordance with TMEIC's published rate sheet during the time that the work is completed. See TMEIC Terms and Conditions for additional information.

Added Services Technical advisory services for supervision of equipment installation and post commissioning services can be quoted but are not within the scope of TMEIC commissioning services.

1.8. Dispatch of TMEIC Engineers

Except for the purpose of implementing the repair under the warranty set forth in 3.3.5, the dispatch of TMEIC engineers for any service whatsoever will be made under a separate agreement offering the buyer to pay additional fees for services.

1.9. Rules & Standards

IEEE 1547	IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems.
UL1741-SA	Inverter, Converter, Controllers and Interconnection System Equipment for Power Systems.
NEC 2017 / NFPA 70	National Electric Code 2017
IEEE 1547.1	IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.
IEC 62109-1	Safety of power conversion equipment for use in photovoltaic power systems-Part 1: General Requirements
IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 2: particular requirements for inverters
IEC 62933-5-1:2017	Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid-integrated EES systems - General specification
IEC 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 61727	Photovoltaic (PV) systems - Characteristics of the utility interface
IEC 62116	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
BDEW TR3, TR4	

1.10. Dimensional Units

All bolts, nuts and screws will conform to the Metric Thread of ISO (International Organization for Standardization**.**
All manufacturing and design of the equipment will conform to the metric system standards.

1.11. Site Conditions

Grounding System

The inverter must be negatively grounded providing a grounding resistance of less than 5 ohms.

Installation and Operation Environment

When installing or operating the inverter and related devices, ensure that the installation and operation environment complies with Table 1. Failing to observe these standards may result in deterioration of the insulation, causing short life and malfunctions. Before installation, measure and evaluate the environment of the installing location. The inverter must be protected from marine environments and must be sealed from corrosive gas and salty air in accordance with Table1. The warranty is dependent upon meeting the environmental conditions.

Table 1. Inverter installation and operation environment guidelines

No.	Item	Environment Standard
1	Installation location	Outdoors
2	Full power ambient temperature range	-25 ~ 25DegC
	Operational Ambient temperature	-25 ~ 60DegC (10% power reduction from 25-50C, 100% power reduction from 50-60C)
3	Relative humidity	The relative humidity must be held between 5 and 95%. There must be no condensation due to temperature change.
4	Altitude	Up to 2000 meters above sea level.
5	Air pressure	The air pressure must be maintained in the range 860 to 1060 hPa. (pending)
6	Vibration and mechanical shock (pending)	Vibrations in the installation environment must have frequencies lower than 10 Hz, or higher than 20 Hz. For vibrations less than 10 Hz, the resulting acceleration must not exceed 0.5G. For vibrations between 20 Hz and 50Hz, the resulting acceleration must not exceed 0.5G. For vibrations between 50Hz and 100Hz, the total amplitude must not exceed 0.1 mm.
7	Dust	Dust in the air where the inverter is installed must not exceed normal atmospheric dust levels. In particular, that dust must not include electrically conductive particles, oils or fats, or organic materials such as silicone.
8	Flammability	There should be no flammable or explosive gas present.
9	Corrosive factors	Inverter should be installed in an environment rated less than C4 corrosive factor for Steel, Zinc, and Copper as defined by ISO 9266.

2. DETAILS OF EQUIPMENT SUPPLIED [Base Bid]

2.1. PCS Circuit and Common Features

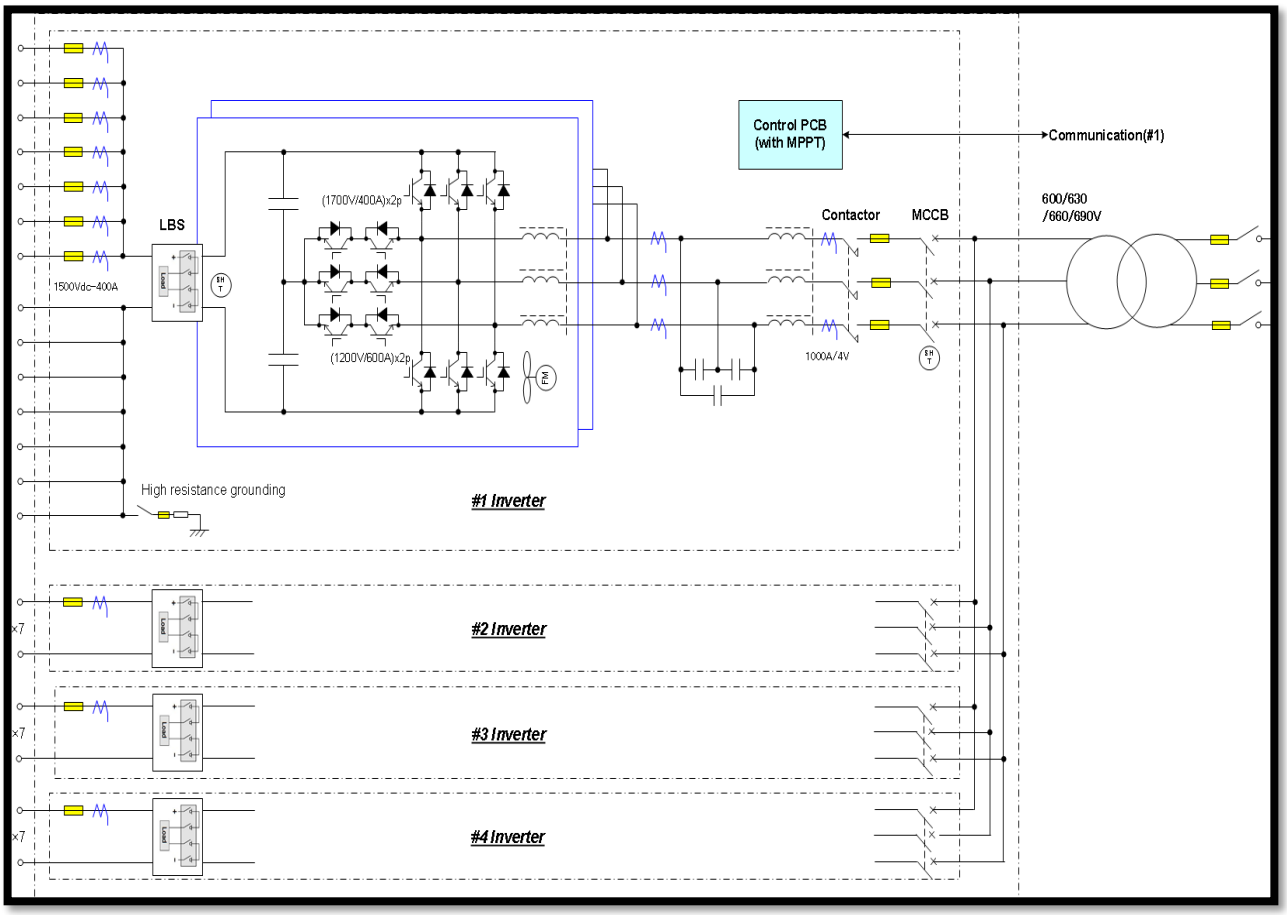


Figure 2.1: Circuit diagram of 4 PCS coupled

Benefits and Features:

1. Stackable Power Blocks: 800kW-4600kW
2. Modular Design
3. Each UPCS (PV or ESS) has independent:
   a. Operation, Control System, Cooling System
   b. Isolation on DC (Load Break Switch) and AC (MCCB and Contactor)
   c. DC inputs (PV 8 inputs per block, ESS 1 input per block)
   d. Individual MPPT tracking
4. For PV-PCS, Negative Grounding with CTs on each input.
5. For ESS-PCS, the system shall also include the Pre-Charge Circuit, which is connected to the DC battery side.

840kW Inverter Unit

Main Circuit Type

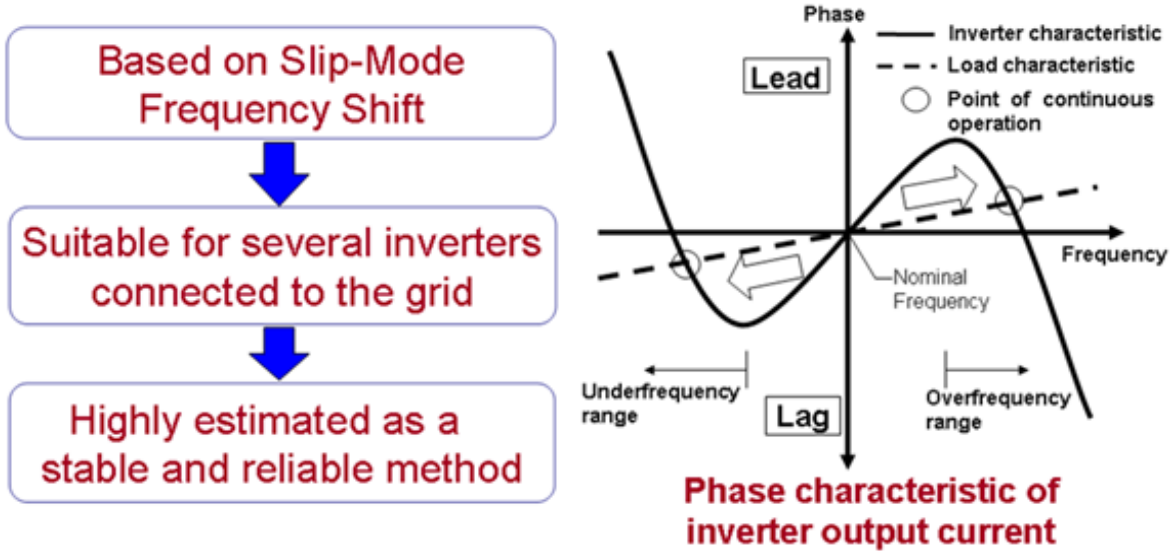
Conversion method	Voltage source inverter with instantaneous current control
Switching method	Pulse Width Modulation (PWM) control
Inverter configuration	Three-phase bridge
Isolation method	External Transformer is required to isolate inverter
Cooling method	Forced Air cooling

Grid Connection Features

(1) **Anti-islanding protection**
The objective of this system feature is to detect the islanding condition and drive the system to a stable operating condition.

(2) **Reactive Power Control**
Reactive power can be injected to the grid according to the grid voltage through the TMEIC Power Plant Controller. The TMEIC Power Plant Controller will communicate with each inverter via a communication port, in a Modbus protocol.

(3) **Active Power Limit**
Site wide active power can be controlled via TMEIC's Power Plant Controller.

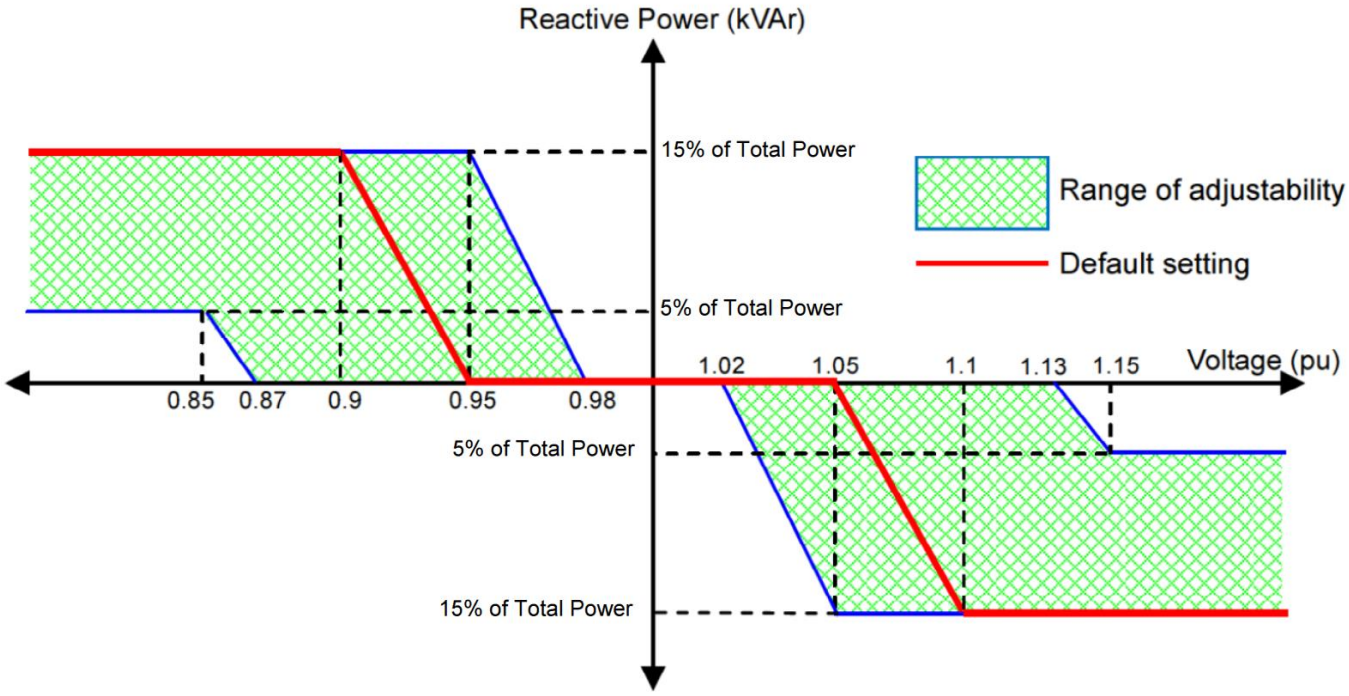


Patented (Japanese patent number 2796035)

Grid Support Functionality (1741-SA smart features)

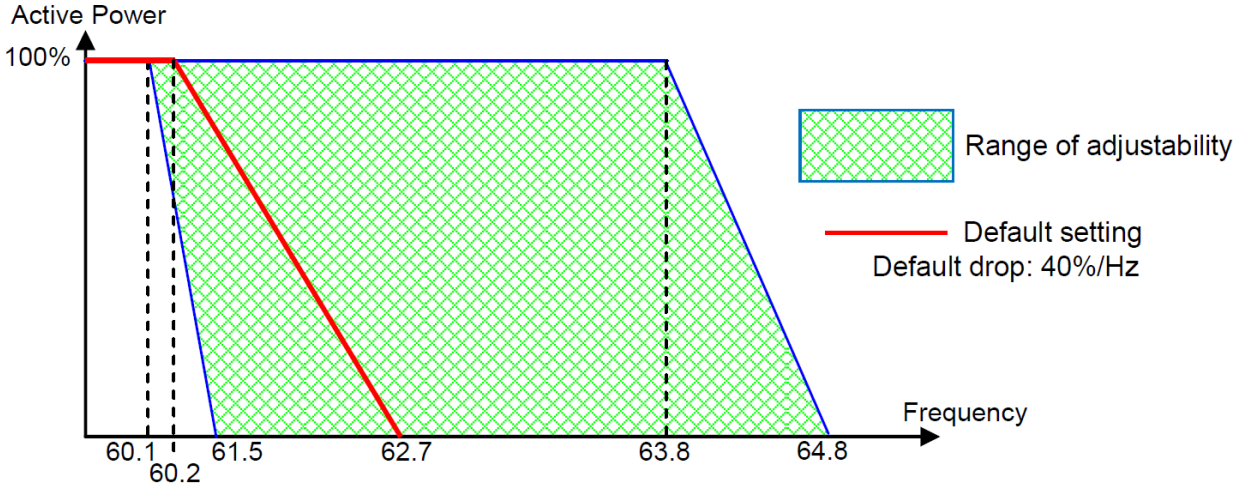
(1) Volt-Var

This function operates under reactive power priority, which means that the inverter will derate for active power instead of reactive power when the maximum kVA rating of MVA is reached.



(2) Frequency – Watt

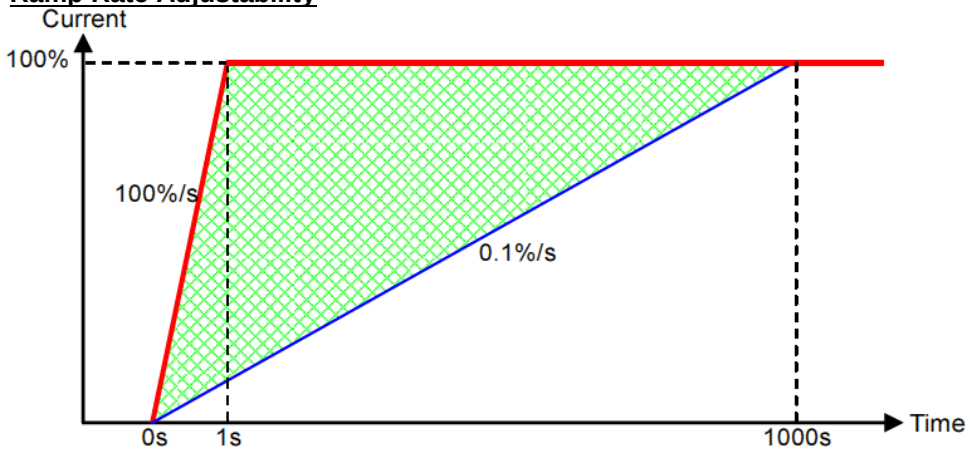
This function will ramp the output power down as frequency increases. Range of adjustability is TBD.



(3) Dynamic VAR Compensation

Inverter capable of injecting reactive current during low voltage ride through events. Capability shall be in line with limits set forth in BDEW TR3, TR4.

(4) Ramp Rate Adjustability



Range of adjustability: 100%/s to 0.1%/s

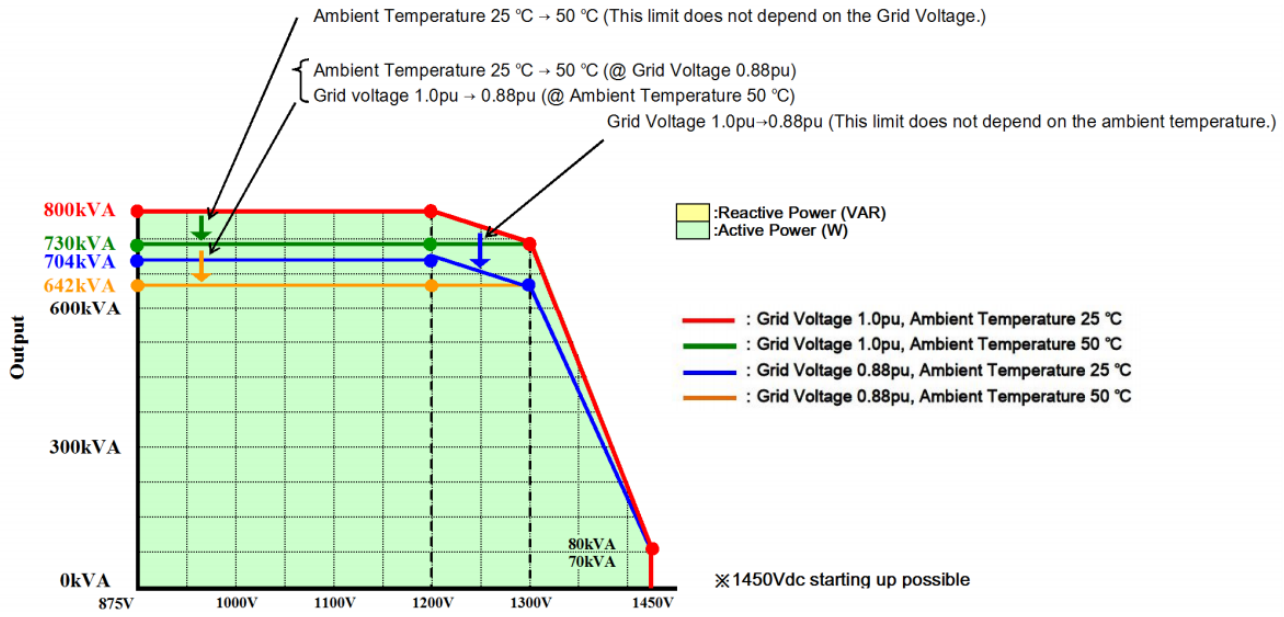
Range of adjustability Default setting: 100%/s

Normal and soft-start ramp rate are under the same settings. They cannot be programmed independently.

Temperature Derate Curve

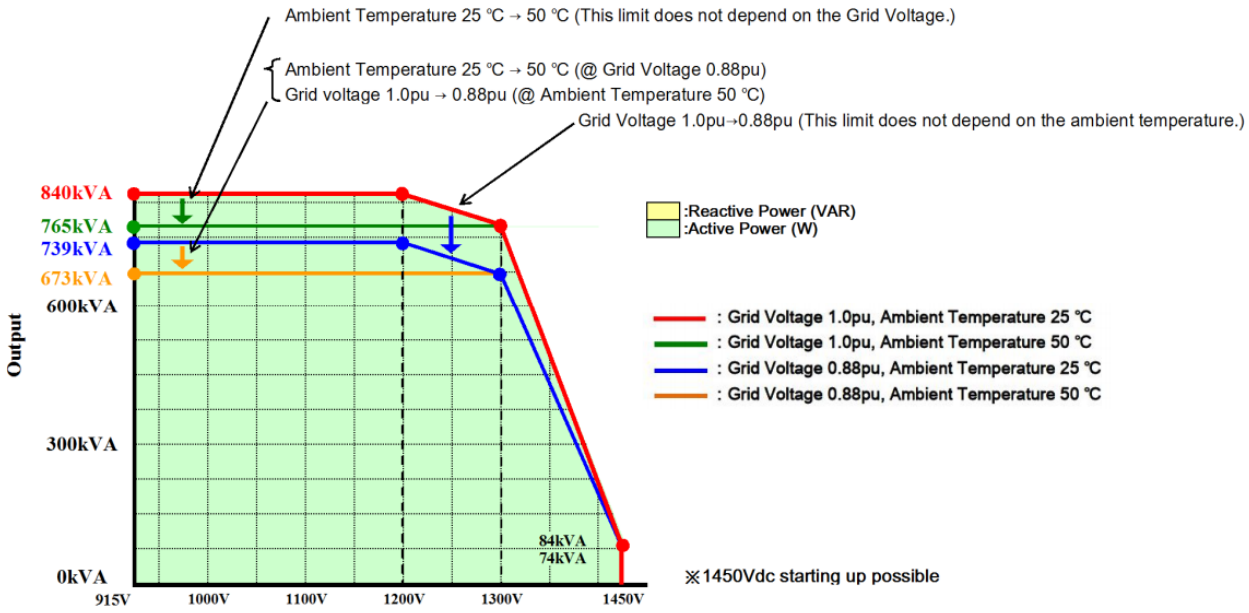
The curves below define the inverter de-rate characteristics at different ambient and grid voltage conditions.

PVU-L0800GR Derating curve



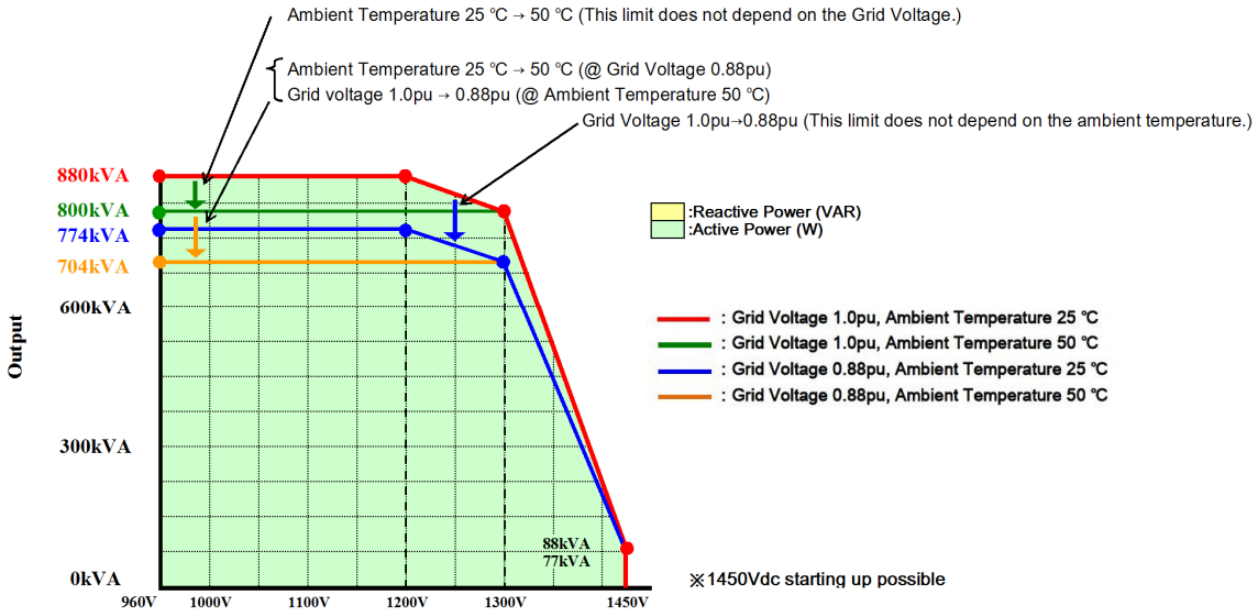
Derating curve of 800kW Inverter(600Vac)

PVU-L0840GR Derating curve



Derating curve of 840kW Inverter(630Vac)

PVU-L0880GR Derating curve



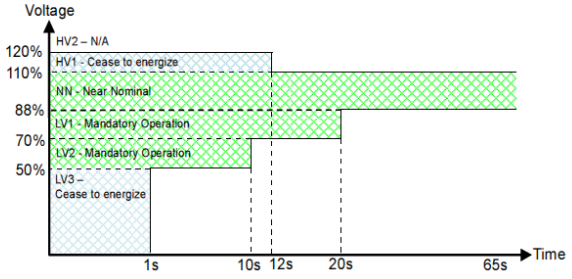
Derating curve of 880kW Inverter(660Vac)

LVRT and FRT Functionality

Fault Ride through Capabilities for Universal PCS with Rule 21 for illustration. The inverter is capable of more than what is shown below.

Voltage

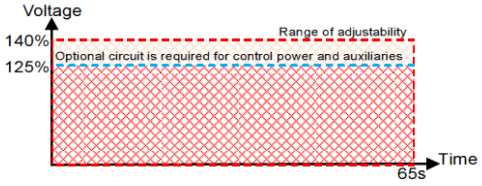
Rule 21



Name		Description	Default setting	
			% of nominal	trip time
OVR	OVR4	Grid overvoltage detection level 4	120%	-
	OVR3	Grid overvoltage detection level 3	110%	12s
	OVR2	Grid overvoltage detection level 2	110%	12s
	UVR1	Grid overvoltage detection level 1	110%	12s
UVR	UVR1	Grid undervoltage detection level 1	88%	20s
	UVR2	Grid undervoltage detection level 2	70%	10s
	UVR3	Grid undervoltage detection level 3	50%	1s
	UVR4	Grid undervoltage detection level 4	50%	1s
Cease to energize		Cease to energize for overvoltage	110%	-
		Cease to energize for undervoltage	50%	-

*Inverter will provide Dynamic Var Compensation as per BDEW TR3 and TR4, as well as the elimination of momentary cessation of current.

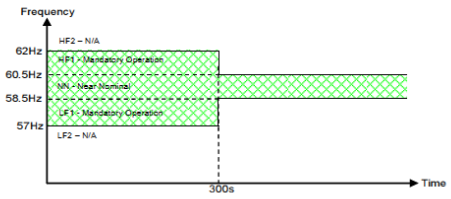
Range of Adjustability



Remarks:
1) For voltage settings over 125%, an optional circuit is required for the control power supply.
2) The inverter is not set to supply reactive power during the fault above the settings prior to the fault.
3) For overvoltage events, there may be an impact on power quality when the DC voltage is close to the minimu
4) Current may be not perfectly sinusoidal for some asymmetrical faults.

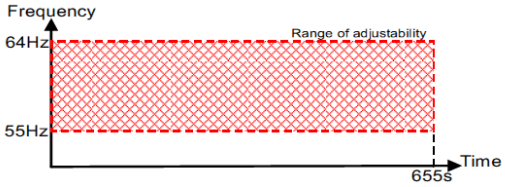
Frequency

Rule 21



Name		Description	Default setting	
			Frequency	Trip time
OFR	OFR3	Grid over-frequency detection level 3	62Hz	-
	OFR2	Grid over-frequency detection level 2	60.5Hz	300s
	UFR1	Grid over-frequency detection level 1	60.5Hz	300s
UFR	UFR1	Grid under-frequency detection level 1	58.5Hz	300s
	UFR2	Grid under-frequency detection level 2	58.5Hz	300s
	UFR3	Grid under-frequency detection level 3	58.5Hz	300s
	UFR4	Grid under-frequency detection level 4	58.5Hz	300s
	UFR5	Grid under-frequency detection level 5	57Hz	-

Range of adjustability



Remarks:
1) Maximum continuous operation is 64Hz for UL1741-SA compliant inverters and 63Hz for other models

Structural Specification

(1) General Construction of Equipment		TBD
(2) Inverter Cabinet Dimensions (Height X Width X Depth)		: 1950mm X 1150mm X 1150mm
(3) Weight		: TBD
(4) Paint	Outside general surface	: Sand White
	Inside surface	: Sand White
	Base	: Sand White
(5) Input/output interface	DC input	: Bottom Cable Entry
	AC output	: Output on back/side of the inverter
	Control Wire	: TBD
	Grounding Wire	: TBD

2.2. PV-PCS

Control Method for PV-PCS

DC side control functions	Maximum Power Point Tracking (MPPT) control
Grid side control functions	Active power control, reactive power control, Voltage Control Mode*
Operation	Auto start/stop (soft-start at startup)
Other functions	Output power limiter. (If the capacity of solar power exceeds the generation capacity of the Inverter, the Inverter limits the output power)

*Voltage Control Mode is available via TMEIC Power Plant Controller integration.

Electrical Ratings of PV-PCS

Item	Specification			
Rated AC Voltage	600VAC	630VAC	660VAC	690VAC
Rated Power@25℃	800kW	840kW	880kW	920kW
Rated Power @50℃	730kW	765kW	800kW	840kW
MPPT Range	875-1300VDC	915-1300VDC	960-1300VDC	1005–1300VDC
Rated Frequency	50/60 Hz			
Maximum Efficiency	98.5%			
CEC Efficiency	98.5%			
Inverter Dimensions (Tentative)	1100 X 1900 X 1100 mm (W X H X D)			
Weight (tentative)	<1000kgs			
Enclosure Rating	NEMA 3R			
Installation	Outdoor			
AC Protection	MCCB and Fuse			
DC Protection	Fuses			
Communication	Modbus TCP			
DC Inputs	Maximum 8 per Inverter Each input rating is a maximum of 400A			
Harmonic Distortion of AC Current	≦3% THD (At rated power)			
Standard Control Power Supply	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)			
Maximum Line Up	Maximum Line up of a total of 6 panels			
Noise Level	75dBA at 1 meter			
Short Circuit Ratio	Above 2.0 (Below 2.0, TMEIC will do simulations and confirm)			
Short Circuit Withstand Current	AC Side– 65kA DC Side – 100kA (20ms)			
Cooling Method	Independent Forced Air Cooling with no Air Filters			

* Maximum output power rating is de-rated by input DC voltage, output AC voltage and temperature condition.
** Transition from constant DC voltage mode to MPPT mode occurs 10V before minimum MPPT range for each respective o.
*** Rated output power and power factor variation range is only for rated voltage condition.

Protective Functions

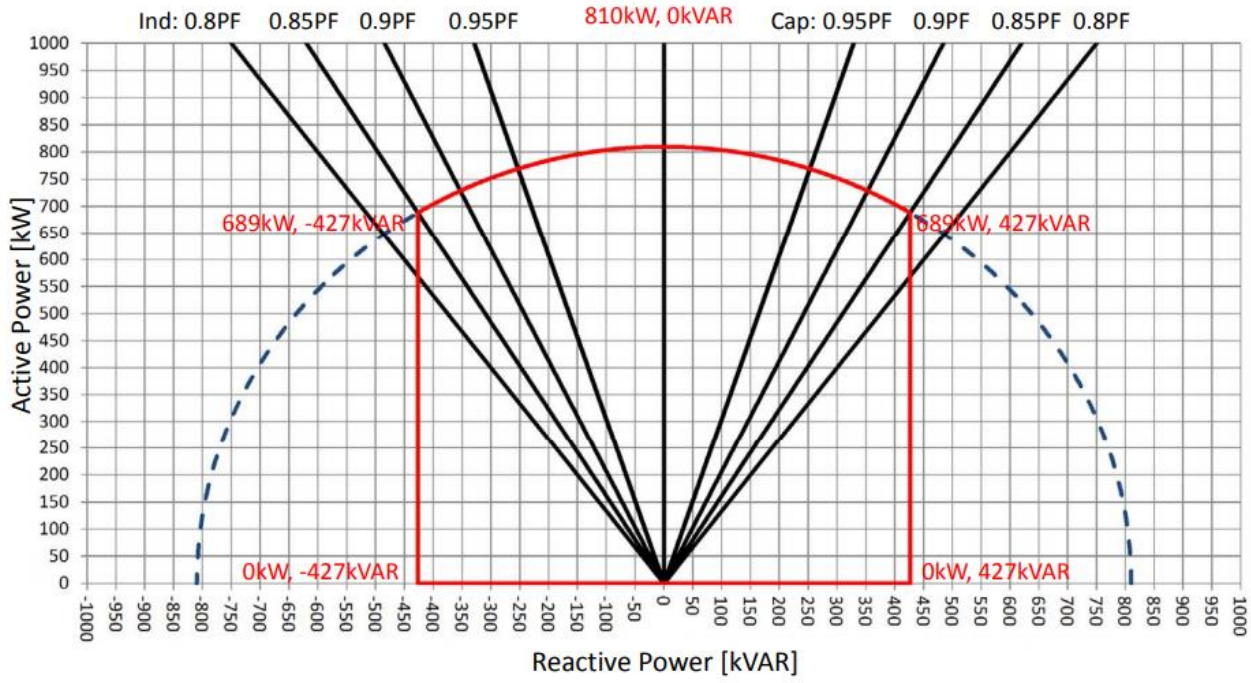
Input (DC) side	Ground Fault, DC Reverse Current, Over Voltage, Over Current
Grid (AC) side	Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over current

Protective Devices

Input (DC) side	Surge protective device: IN=10kA/UCpv=1500V
Grid (AC) side	Surge protective device: IN=15kA/AC690V

Power Factor Control

The D-Curve depicted below shows the Ninja PF characteristics. The inverter offers a power factor range from +/- 0.85; the example PQ curve below is shown with derated power at 35C ambient temperature. PF characteristics will be de-rated according to the change of AC voltage, DC voltage, and ambient temperature.



* Operation area will be curtailed by input DC voltage, output AC voltage.

PQ curve for PVU-L0840GR (35°C)

2.3 ESS-PCS

Control Method of ESS-PCS

DC side control functions	DC Voltage will depend on the State of Charge of Battery
Grid side control functions	Active power control, reactive power control, Voltage Control Mode*
Operation	Dependent on the command from an external controller

Electrical Ratings of ESS-PCS

Item	Specification		
Rated AC Voltage	480VAC	600VAC	630VAC
Rated Power@25℃	630 kW	800 kW	840 kW
Rated Power @50℃	570kW	730 kW	765 kW
MPPT Range	710-1300 VDC	875-1300 VDC	915-1300VDC
Rated Frequency	50/60 Hz		
Maximum Efficiency	98.5%		
CEC Efficiency	98.5%		
Inverter Dimensions (Tentative)	1100 X 1900 X 1100 mm (W X H X D)		
Weight (tentative)	<1000kgs		
Enclosure Rating	IP 55/ NEMA 3R		
Installation	Outdoor		
AC Protection	MCCB and Fuse		
DC Protection	Fuses		
Communication	Modbus TCP		
DC Inputs	1 per Inverter		
Harmonic Distortion of AC Current	≦3% THD (At rated power)		
Standard Control Power Supply	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)		
Maximum Line Up	Maximum Line up of a total of 6 panels		
Noise Level	75dBA at 1 meter		
Short Circuit Ratio	Above 2.0 (Below 2.0, TMEIC will do simulations and confirm)		
Short Circuit Withstand Current	AC Side– 65kA DC Side – 100kA (20ms)		
Cooling Method	Independent Forced air cooling with no Air Filters		

* Maximum output power rating is de-rated by input DC voltage, output AC voltage and temperature condition.
** Transition from constant DC voltage mode to MPPT mode occurs 10V before minimum MPPT range for each respective o.
*** Rated output power and power factor variation range is only for rated voltage condition.

Protective Functions

Input (DC) side	Ground Fault, DC Reverse Current, Over Voltage, Over Current
Grid (AC) side	Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over current

Protective Devices

Input (DC) side	Surge protective device: IN=10kA/UCpv=1500V
Grid (AC) side	Surge protective device: IN=15kA/AC690V

Power Factor Control

The D-Curve depicted below shows the 840kW Outdoor ESS-PCS PF characteristics. The inverter offers a power factor range from +/-0.8 at full rated power with 1pu grid voltage, nominal DC voltage and 25C ambient temperature. PF characterisitics will be de-rated according to the change of AC voltage, DC voltage, and ambient temperature.

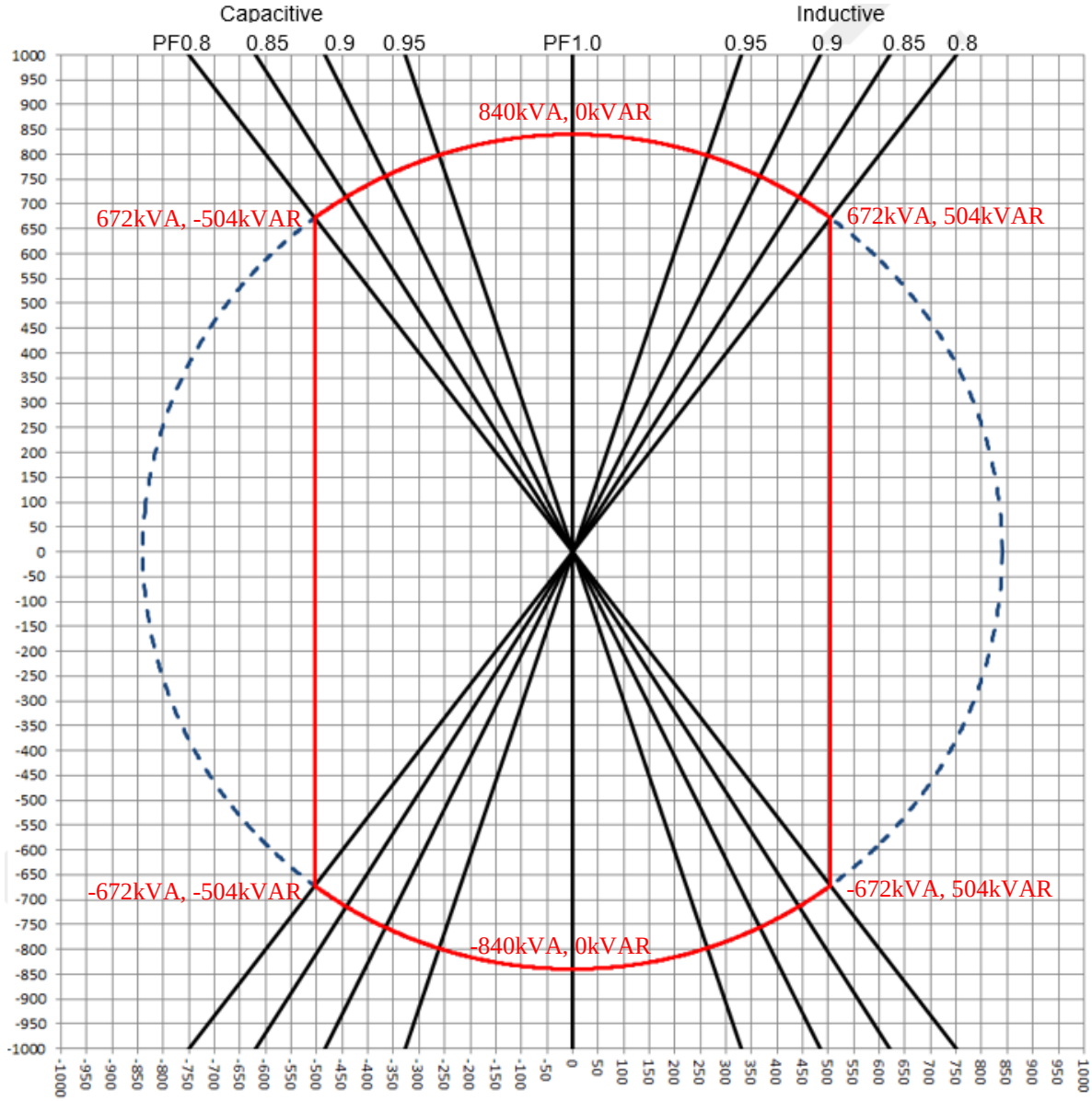


Figure 5.2: P-Q Curve of ESS-PCS @ 25°C, 630Vac(Grid Voltage= 1p.u.), Nominal Vdc

2.4 System Line Up and Configuration

The Universal PCS can operate as an ESS-PCS, a PV-PCS and a hybrid that consists of PV-PCS and ESS-PCS on a common low Voltage AC same bus. When the system is a PV-PCS only or an ESS-PCS only, units are placed in parallel to form an Inverter System of consisting of the following rating:

Table 2.4.1: PV Only @25℃

Panel Rating	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
920kW	690VAC	920 kW	1840 kW	2760 kW	3680 kW	4600 kW	5520 kW
880kW	660VAC	880 kW	1760 kW	2640 kW	3520 kW	4400 kW	5280 kW
840kW	630VAC	840 kW	1680 kW	2520 kW	3360 kW	4200 kW	5040 kW
800kW	600VAC	800 kW	1600 kW	2400 kW	3200 kW	4000 kW	4800 kW

Table 2.4.2: PV Only @35℃

Panel Rating	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
920kW	690VAC	888 kW	1776 kW	2664 kW	3552 kW	4440 kW	5328 kW
880kW	660VAC	848 kW	1696 kW	2544 kW	3392 kW	4240 kW	5088 kW
840kW	630VAC	810 kW	1620 kW	2430 kW	3240 kW	4050 kW	4860 kW
800kW	600VAC	772 kW	1544 kW	2316 kW	3088 kW	3860 kW	4632 kW

Table 2.4.3: PV Only @40℃

Panel Rating	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
920kW	690VAC	872 kW	1744 kW	2616 kW	3488 kW	4360 kW	5232 kW
880kW	660VAC	832 kW	1664 kW	2496 kW	3328 kW	4160 kW	4992 kW
840kW	630VAC	795 kW	1590 kW	2385 kW	3180 kW	3975 kW	4770 kW
800kW	600VAC	758 kW	1516 kW	2274 kW	3032 kW	3790 kW	4548 kW

Table 2.4.4: PV Only @50℃

Panel Rating	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
920kW	690VAC	840 kW	1680 kW	2520 kW	3360 kW	4200 kW	5040 kW
880kW	660VAC	800 kW	1600 kW	2400 kW	3200 kW	4000 kW	4800 kW
840kW	630VAC	765 kW	1530 kW	2295 kW	3060 kW	3825 kW	4590 kW
800kW	600VAC	730 kW	1460 kW	2190 kW	2920 kW	3650 kW	4380 kW

Table 2.4.5: ESS Only @25℃

Panel Ration	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
840kW	630VAC	840 kW	1680 kW	2520 kW	3360 kW	4200 kW	5040 kW
800kW	600VAC	800 kW	1600 kW	2400 kW	3200 kW	4000 kW	4800 kW
630kW	480VAC	630 kW	1260 kW	1890 kW	2520 kW	3150 kW	3780 kW

Table 2.4.6: ESS Only @35℃

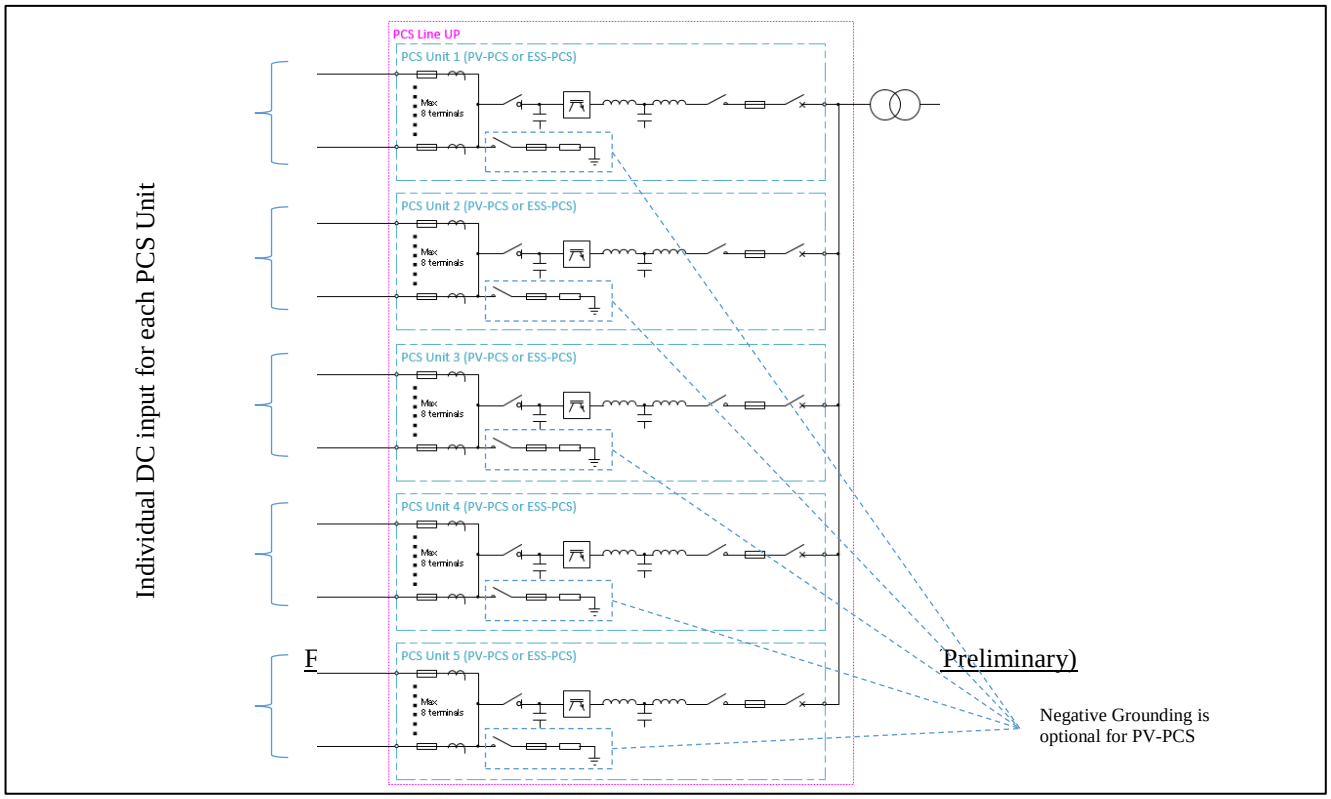
Panel Ration	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
840kW	630VAC	810 kW	1620 kW	2430 kW	3240 kW	4050 kW	4860 kW
800kW	600VAC	772 kW	1544 kW	2316 kW	3088 kW	3860 kW	4632 kW
630kW	480VAC	606 kW	1212 kW	1818 kW	2424 kW	3030 kW	3636 kW

Table 2.4.7: ESS Only @40℃

Panel Ration	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
840kW	630VAC	795 kW	1590 kW	2385 kW	3180 kW	3975 kW	4770 kW
800kW	600VAC	758 kW	1516 kW	2274 kW	3032 kW	3790 kW	4548 kW
630kW	480VAC	594 kW	1188 kW	1782 kW	2376 kW	2970 kW	3564 kW

Table 2.4.8: ESS Only @50℃

Panel Ration	AC Voltage	1 PCS	2PCS	3PCS	4PCS	5PCS	6 PCS
840kW	630VAC	765 kW	1530 kW	2295 kW	3060 kW	3825 kW	4590 kW
800kW	600VAC	730 kW	1460 kW	2190 kW	2920 kW	3650 kW	4380 kW
630kW	480VAC	570 kW	1140 kW	1710 kW	2280 kW	2850 kW	3420 kW


PCS Line UP
PCS Unit 1 (PV-PCS or ESS-PCS)
PCS Unit 2 (PV-PCS or ESS-PCS)
PCS Unit 3 (PV-PCS or ESS-PCS)
PCS Unit 4 (PV-PCS or ESS-PCS)
PCS Unit 5 (PV-PCS or ESS-PCS)
Max 8 terminals
Individual DC input for each PCS Unit
Preliminary)
Negative Grounding is optional for PV-PCS

2.5 System Line Up with Hybrid System of PV and ESS

In a hybrid system, the Line UP consists of both the PV-PCS and the ESS-PCS in the same system. In such a system, typically TMEIC proposes to have one ESS system per line up. In this case the system shall consist of five Inverters and one Energy storage Inverter. The transformer is rated as per the PV inverters only. The system reduces the overall losses and improves the roundtrip efficiency of the system.

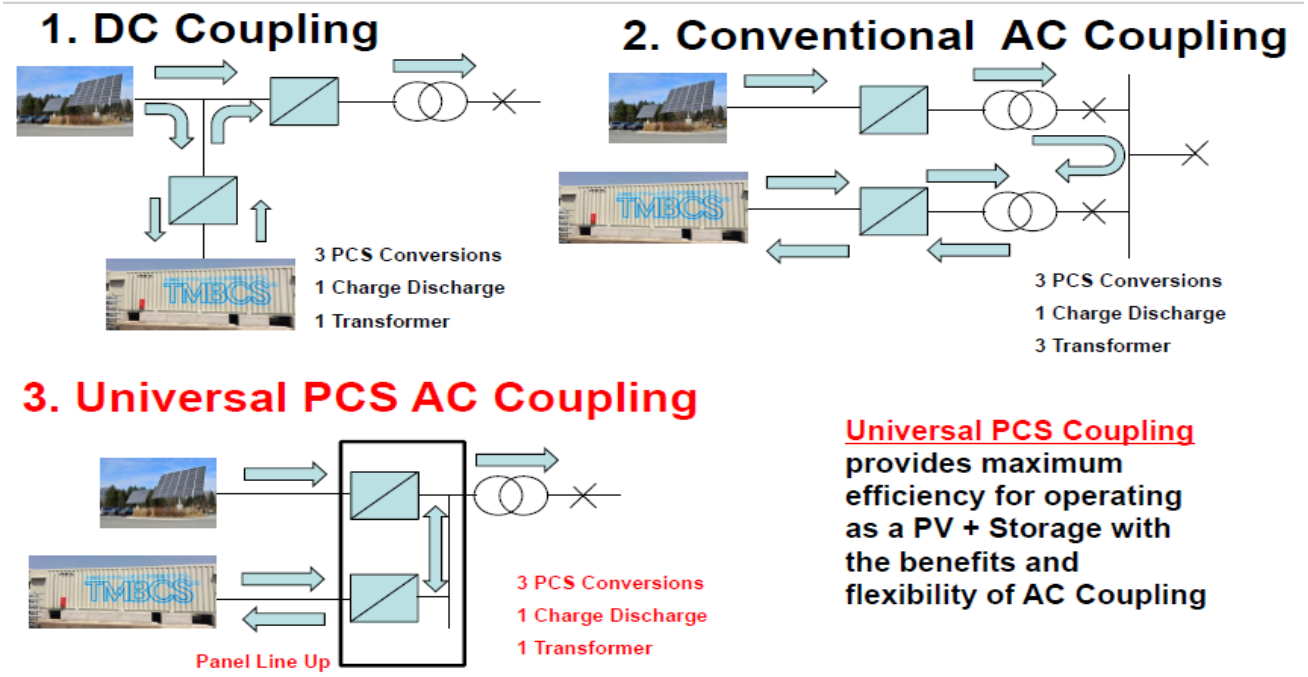


Figure 2.5.2 Comparisons of DC Coupling/Conventional AC Coupling/Universal PCS AC Coupling

The step up transformer rating depends on the requirement of the system and application. The limitation of the step up transformer is based on 5 PCS Units/ transformer; however with adequate control to ensure that excess power from the PV is stored in the ESS the line can be increased.

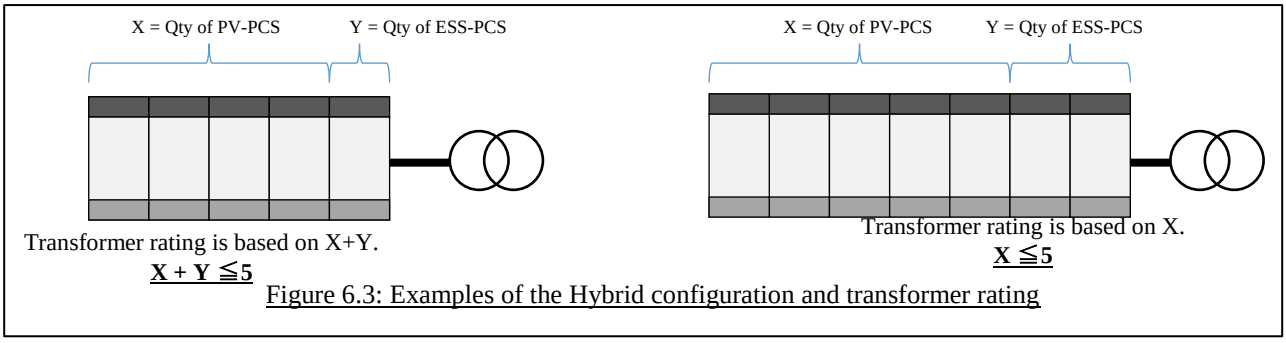


Figure 6.3: Examples of the Hybrid configuration and transformer rating

3. BILL OF MATERIAL (Per PCS)

3.1. A. Inverter

5 x 840kW/840kVA Universal PCS inverter units will be installed, per skid.

3.1. B. Integration

Generic System configuration is shown in Figure 1. The equipment described below will be installed on the

Engineering	Package integration engineering for 4.2MW Skid.
Control Circuit and Communication Wiring	Control circuit and communication wiring for TMEIC supplied equipment are included.
Auxiliary Power	No Auxiliary Equipment is included in this quote. Example configurations: 10kVA 3-phase transformer with 208/120V panelboard and 7 breakers 40kVA 3-phase transformer with 480V and 208/120V panelboards, 7 breakers each
Canopy Shade Structure	Not included
Customer Furnished Equipment (CFE)	SCADA, DAS and site data controller should be provided by others. Wiring and Installation of customer supplied equipment is not included in the base price. Optional pricing can be provided with additional information on CFE equipment. FO cables and tracker motor wiring are also not included.
Stairs and Safety Railings	If the skid(s) are to be mounted on piers requiring stairs and safety railings, the stairs and safety railings are not part of this quote and will be supplied by others.
Stamped Drawings	PE stamped drawings may be included, if required.
Back-up Power Requirement	This quote does not include any backup power provision (UPS or Generator). If this is required, it will be quoted separately. This can also affect the length of the skid and overall skid pricing.

Note: The skid dimensions are approximately 29'L x 4'W. Customer is to provide other means for additional maintenance space if required to meet any code or county specific requirements.

3.1. C. MV 3-Phase Transformer for 5 x 840kW/840kVA Inverter Lineup

Item	Specifications (customized for project)
kVA	3360kVA / 4200kVA
Special Application	Two-Winding
Temperature Rise	65 degree rise at 30C ambient, 40C maximum ambient temperature
Cooling Class	ONAF (actively cooled) (ONAN / KNAN / KNAF also available)
Frequency	60 Hz
Duty Cycle	Designed for step-up operation
Insulating fluid	Mineral Oil (biodegradable fluids available)
Elevation	Designed for operation at 1000 m (3300 ft.) above sea level
Sound Level	NEMA TR1 Standard
High Voltage	34500 Delta Volts, 150 kV BIL (available in other voltages/configurations)
Electrostatic Shield	Electrostatic Shield between Primary & Secondary Windings. Ground Shield Bushing
kV Class	35 kV
High Voltage Configuration	Dead Front, Loop Feed
High Voltage Bushings	600 amp Cooper dead break one-piece bushings (Qty: 6)
Neutral Bushings	250 amp 2 hole spade bushing
Load-break Switching	15-38 kV, 2 Position switch
Switch Cover	Padlock cover over Switch (Outside of Cabinet)
Overcurrent Protection	Internal Cartridge in Series with Parallel oil-immersed partial range current limiting fuse x 6
Expulsion Fuses	Internal Expulsion (ABB pro-link) x 3
Low Voltage	630 Ungrounded Wye Volts, 30 kV BIL (available in other configurations)
kV Class (LV)	1.2 kV
Low Voltage Bushings	Integral aluminum 8-hole spade bushings (Qty: 3)
Bushing Supports	Standard LV Bushing Support Assembly
Cabinet hardware	Penta-head cabinet door bolts
Coatings	Touch-up paint (Qty: 2)
Taps	2 - 2.5% taps above and 2 - 2.5% taps below nominal
Certifications	UL Listed (UL logo on nameplate), ANSI C57
Notifications	Shock and Arc Flash Warning Decal
Gauges & Fittings	Liquid level gauge with Alarm Contact, Thermometer, dial-type with Alarm Contact, Pressure/vacuum gauge with Alarm Contact, Schrader valve, Pressure relief device, 50 SCFM, Drain valve with sampler (1”) located outside of cabinet, with cover Oil Fill Plug
Tank accessories	IEEE standard two-hole ground pads (Qty: 3), Nitrogen Blanket
Special Feature	Load break switch located outside cabinet on HV side padlocked door, Padlock cover over drain valve

3.1. D. Factory Tests

The following standard factory tests will be performed on the MV Transformer according to ANSI C57.12.90 including:

- Ratio, Polarity and Phase Rotation Test
- Resistance Test
- Routine Impulse Test
- Applied Potential Test
- Induced Potential Test
- Loss Test
- Leak Test
- Nameplate verifications, alarm, trip setting verifications
- Physical and Mechanical inspections
- Demag Test
- No-Load Loss and Excitation Current

Transformer is pressurized at manufacturer's facility and may vary depending on site location and conditions; customer is responsible for maintaining transformer pressure per manufacturer's recommendations.

3.1. E. Power Plant Controller (Option)

Hardware

1 - RTAC SEL-3355-4 Real Time Automation Controller

Communications	
Ethernet Ports	2 rear; 10 or 100/Mbps, RJ-45
USB Ports	2 front, 4 rear
Encrypted Communications	RDP
Protocols	DNP3, Modbus TCP/IP

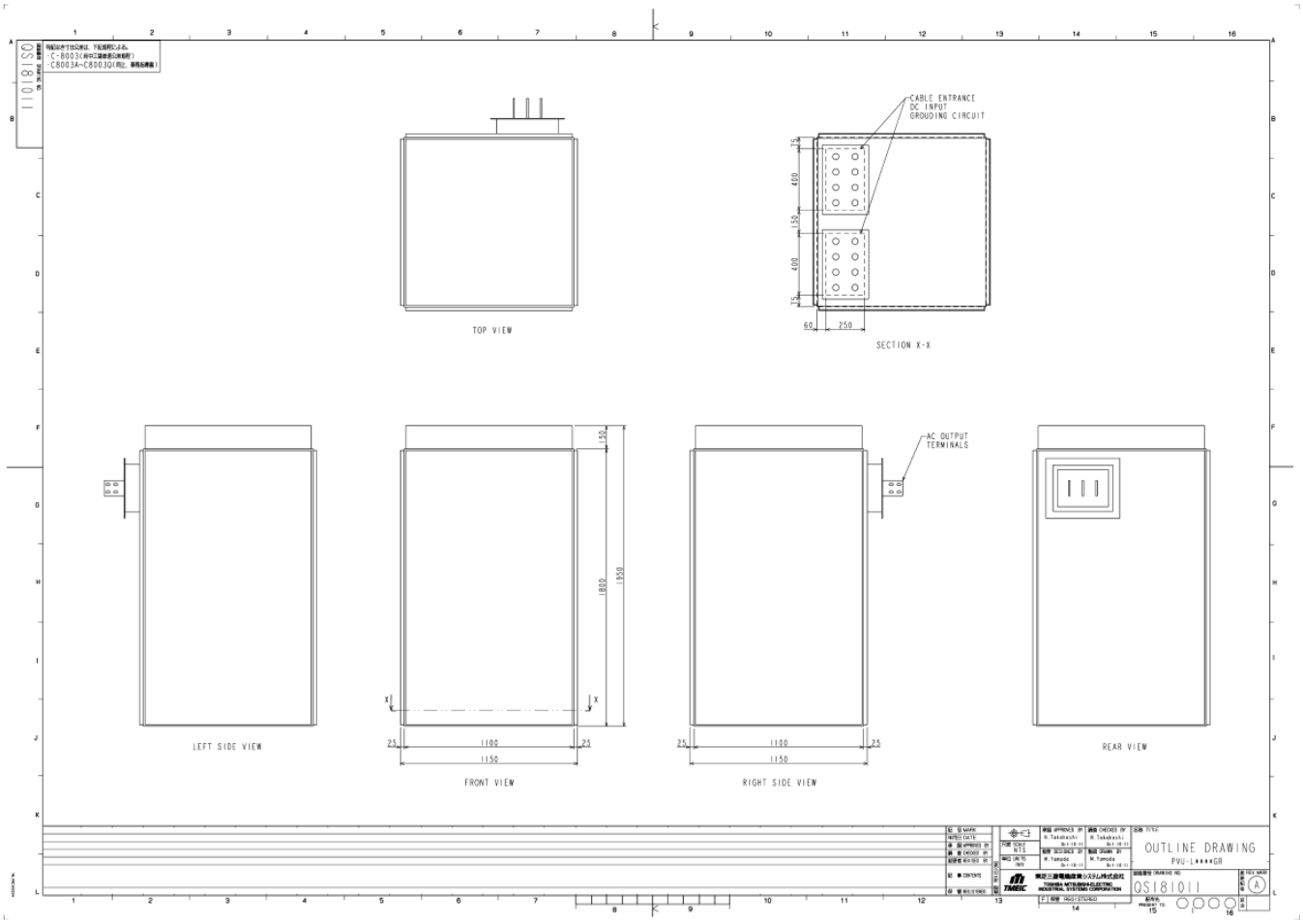
Physical	
Dimensions	19"" (W) x 5.22"" (H) x 11.49"" (D)
	482.6mm (W) x 132.6mm (H) x 291.8mm (D)
Weight	20 lbs. (9.072kg)
Enclosure	Treated for chemically harsh / humid environments
Power Supply	125/250 VDC or 120/240 VAC, 160W HV power supply
Operating Temperature	-40C to +75C
Maximum Altitude	2000m

Power Plant Controller Function

One Power Plant Controller communicates over an Ethernet network to control multiple power converters for a single site.

1) Sequential Start-up/Shut-down
   - Based on a command from the HMI, the Power Plant Controller issues a single command to start and stop all inverters.
2) Power Factor Control
   - Using power generation feedback from the inverter network, the Power Plant Controller will calculate a reactive current reference for each power converter such that the total power factor does not change with load.
3) Output Limitation Control
   - Using power generation feedback from the inverter network, the Power Plant Controller will calculate a power limit for each inverter such that the power output of the entire site does not exceed a preset value.
4) Power slew rate control
   - Based on an adjustable power slew rate the Power Plant Controller controls the rate at which power output from the system changes.
5) Live Trending
   - Capable of monitoring inverter signals such as input current, total power output, power factor etc.
6) Data Historian
   - Record of all site signals that are processed by the Power Plant Controller. One-second poll rate data is kept on an external hard drive for one year before old data is overwritten.
7) Dynamic Power Factor Control:
   - Using feedback from a Power Factor meter at the POCC (customer supplied), the Power Plant Controller will adjust the behavior of the inverters to meet a required PF at the measured point.
   - VAR levels will be set and dynamically adjusted to keep the Power Factor (as measured at the PF meter) to a setting within a range.
   - The Ninja inverters can produce VARs to support a power factor range of +/-0.8 at the inverter. The resultant range of Power Factor at the PF meter will depend on the site equipment between the inverters and the PF meter. Refer to D-Curve provided in Temperature Derate Curve section.
   - These ranges can be achieved when the DC bus voltage is greater than 915VDC and the grid voltage is no more than 10% above nominal.
   - Total apparent power (available as real power or VAR) is 4200 kVA at temperatures up to -20 ~ 25DegC, 1 pu, and 915Vdc ~ 1300Vdc condition. Please refer to derate curves provided in Temperature Derate Curve section.

3.1. F. Structural Outline *Preliminary



50PG03–28
Ultra High Efficiency Single Package Electric Cooling with Optional Electric Heat Commercial Rooftop Units with PURON® (R–410A) Refrigerant, Optional EnergyX™ (Energy Recovery Ventilator)

Carrier®
Turn to the Experts.℠

Product Data

CENTURION



EnergyX model shown

DEALER DESIGN AWARDS
theNEWS | GOLD

BUILDINGS magazine
Editors' Choice
TOP 100 PRODUCTS
2005

Puron
the environmentally sound refrigerant

Operation Air Quantity Limits

50PG03-16 Units

UNIT 50PG	COOLING (cfm)		HEATING (cfm) ELECTRIC HEAT	
	Min	Max	Min	Max
03	600	1000	600	1000
04	900	1500	900	1500
05	1200	2000	1200	2000
06	1500	2500	1500	2500
07	1800	3000	1800	3000
08	2250	3750	2250	3750
09	2550	4250	2550	4250
12	3000	5000	3000	5000
14	3750	6250	3750	6250
16	4500	7500	4500	7500

50PG20-28 Units

50PG	COOLING		ELECTRIC HEAT	ELECTRIC HEAT (Vertical)	ELECTRIC HEAT (Horizontal)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm
20	5000	9,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
24	5500	10,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
28	6500	12,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750

Outdoor Sound Power (Total Unit)

UNIT 50PG	A-WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	75.0	82.6	79.9	75.7	73.3	70.0	64.3	58.4	50.5
04	73.2	79.8	77.2	74.1	70.1	68.0	63.6	58.4	51.9
05	71.9	79.7	79.6	72.6	69.6	66.0	61.4	56.4	48.5
06	78.5	82.2	82.6	79.5	75.7	73.9	68.6	64.0	56.3
07	78.5	87.5	83.0	78.5	76.3	73.8	68.4	63.8	56.5
08	80.0	91.7	83.6	81.0	77.9	75.0	69.9	66.0	59.3
09	79.9	89.1	82.7	80.0	77.7	75.0	70.2	66.3	57.8
12	80.0	90.4	83.1	80.9	77.8	75.2	70.0	66.1	57.6
14	83.3	86.4	85.9	85.3	81.8	78.2	72.2	67.9	59.9
16	84.0	90.3	85.2	83.5	81.1	79.0	73.7	70.5	65.4
20	81.7	90.2	84.8	80.7	79.0	77.6	71.4	66.7	60.7
24	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5
28	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5

LEGEND

db – Decibel

*Sound Rating ARI or Tone Adjusted, A–Weighted Sound Power Level in dB. For sizes 03–12, the sound rating is in accordance with ARI Standard 270–1995. For sizes 14–28, the sound rating is in accordance with ARI 370–2001.

Outdoor Sound Power (Total Unit)
with High CFM EnergyX

UNIT 50PG w/ERV	A−WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	83.0	82.8	81.4	79.7	78.1	77.9	76.5	72.5	70.1
04	82.7	80.2	79.6	79.1	77.3	77.6	76.5	72.5	70.1
05	82.6	80.1	81.1	78.8	77.2	77.4	76.4	72.4	70.0
06	83.8	82.4	83.4	81.6	79.1	78.8	76.9	72.9	70.2
07	83.8	87.6	83.8	81.1	79.3	78.8	76.9	72.9	70.2
08	87.3	92.0	86.8	84.5	82.4	81.8	80.5	78.0	74.2
09	87.2	89.6	86.4	84.1	82.4	81.8	80.5	78.1	74.2
12	87.3	90.8	86.5	84.5	82.4	81.8	80.5	78.0	74.2
14	88.2	87.2	88.0	87.0	84.2	82.7	80.8	78.2	74.3
16	91.4	93.2	92.8	88.2	86.3	85.5	84.4	83.4	78.4
20	91.2	93.1	92.7	87.4	85.8	85.2	84.2	83.3	78.3
24	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5
28	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5

LEGEND
dB − Decibel
***** Sound Rating ARI or tone Adjusted, A−Weighted Sound Power Level in dB. For sizes 03−12, the sound rating is in accordance with ARI Standard 270−1995. For sizes 14−28, the sound rating is in accordance with ARI 370−2001.

PHYSICAL DATA

50PG03-07

BASE UNIT 50PG		03	04	05	06	07
NOMINAL CAPACITY (Tons)		2	3	4	5	6
OPERATING WEIGHT (lb)						
Unit*		704	704	775	829	874
Economizer						
Vertical		40	40	40	40	40
Horizontal		50	50	50	50	50
Humidi-MiZer™ Adaptive Dehumidification System		22	22	31	27	26
Roof Curb						
14-in.		122	122	122	122	122
24-in.		184	184	184	184	184
COMPRESSOR		Fully Hermetic Scroll				
Quantity		1	1	1	1	1
Oil Type		Copeland 3MA				
Number of Refrigerant Circuits		1	1	1	1	1
Oil (oz)		38	42	42	66	56
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)				
Expansion Device		TXV	TXV	TXV	TXV	TXV
Operating Charge (lb) — Standard Unit		7.3	9.0	15.7	16.6	19.0
Operating Charge (lb) — Unit with Humidi-MiZer System		11.75	13.50	25.00	22.00	22.70
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Condenser A (Outer)						
Rows...Fins/in.		1…17	1…17	2…17	2…17	2…17
Face Area (sq ft)		12.6	12.6	12.6	12.6	12.6
Condenser B (Inner)						
Rows...Fins/in.		—	1…17	2…17	2…17	2…17
Face Area (sq ft)		—	12.6	12.6	12.6	12.6
HUMIDI–MIZER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Rows...Fins/in.		1...17	1...17	1...17	1...17	1...17
Face Area (sq ft)		6.4	6.4	9.3	9.3	9.3
CONDENSER FAN		Propeller				
Quantity…Diameter (in.)		1…24	1…24	1…24	1…24	1…24
Nominal Cfm (Total, all fans)		3500	3500	3500	4500	4500
Motor Hp		1/8	1/8	1/8	1/4	1/4
Nominal Rpm — High Speed		825	825	825	1100	1100
Nominal Rpm — Low Speed		300	300	300	300	300
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split				
Rows…Fins/in.		2…15	2…15	2…15	3…15	4…15
Face Area (sq ft)		9.3	9.3	9.3	9.3	9.3
EVAPORATOR FAN		Centrifugal Type, Belt Drive				
Quantity…Size (in.)	Low	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
	High	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
Type Drive	Low	Belt	Belt	Belt	Belt	Belt
	High	Belt	Belt	Belt	Belt	Belt
Nominal Cfm		800	1200	1600	2000	2400
Maximum Continuous Bhp	Low	0.85	0.85	0.85	0.85/2.40†	2.40
	High	0.85	0.85	1.60/2.40†	1.60/2.40†	3.10
Motor Nominal Rpm		1620	1620	1620	1725	1725
Motor Frame Size	Low	48Y	48Y	48Y	56Y	56Y
	High	48Y	48Y	56Y	56Y	56Y
Fan Rpm Range	Low	482-736	482-736	596-910	690-978	796-1128
	High	656-1001	796-1128	828-1173	929-1261	1150-1438
Motor Bearing Type		Ball	Ball	Ball	Ball	Ball
Maximum Fan Rpm		2000	2000	2000	2000	2000
Motor Pulley Pitch Diameter Range (in.)	Low	1.9-2.9	1.9-2.9	1.9-2.9	2.4-3.4	2.4-3.4
	High	1.9-2.9	2.4-3.4	2.4-3.4	2.8-3.8	4.0-5.0
Fan Pulley Pitch Diameter (in.)	Low	6.8	6.8	5.5	6.0	5.2
	High	5.0	5.2	5.0	5.2	6.0
Nominal Motor Shaft Diameter (in.)	Low	1/2	1/2	1/2	5/8	5/8
	High	1/2	1/2	5/8	5/8	7/8
Belt…Pitch Length (in.)	Low	49.3	49.3	49.3	49.3	49.3
	High	49.3	49.3	49.3	49.3	52.3
Belt…Type	Low	AX	AX	AX	AX	AX
	High	AX	AX	AX	AX	AX
Pulley Center Line Distance Min. (in.)	Low	16.2	16.2	16.2	16.2	16.2
	High	16.2	16.2	16.2	16.2	16.2
Pulley Center Line Distance Max. (in.)	Low	20.2	20.2	20.2	20.2	20.2
	High	20.2	20.2	20.2	20.2	20.2
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low	48	48	59	58	66
	High	65	62	69	66	58
Movable Pulley Maximum Full Turns from Closed Position	Low	5	5	5	5	5
	High	5	5	5	5	5
Factory Pulley Setting (rpm)	Low	482	482	596	690	796
	High	656	796	828	929	1150
Fan Shaft Diameter at Pulley (in.)		3/4	3/4	3/4	3/4	3/4
HIGH-PRESSURE SWITCH (psig)						
Cutout		660 ± 10	660 ± 10	660 ± 10	660 ± 10	660 ± 10
Reset (Auto.)		505 ± 20	505 ± 20	505 ± 20	505 ± 20	505 ± 20
RETURN-AIR FILTERS		Throwaway				
Quantity…Size (in.)		4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2

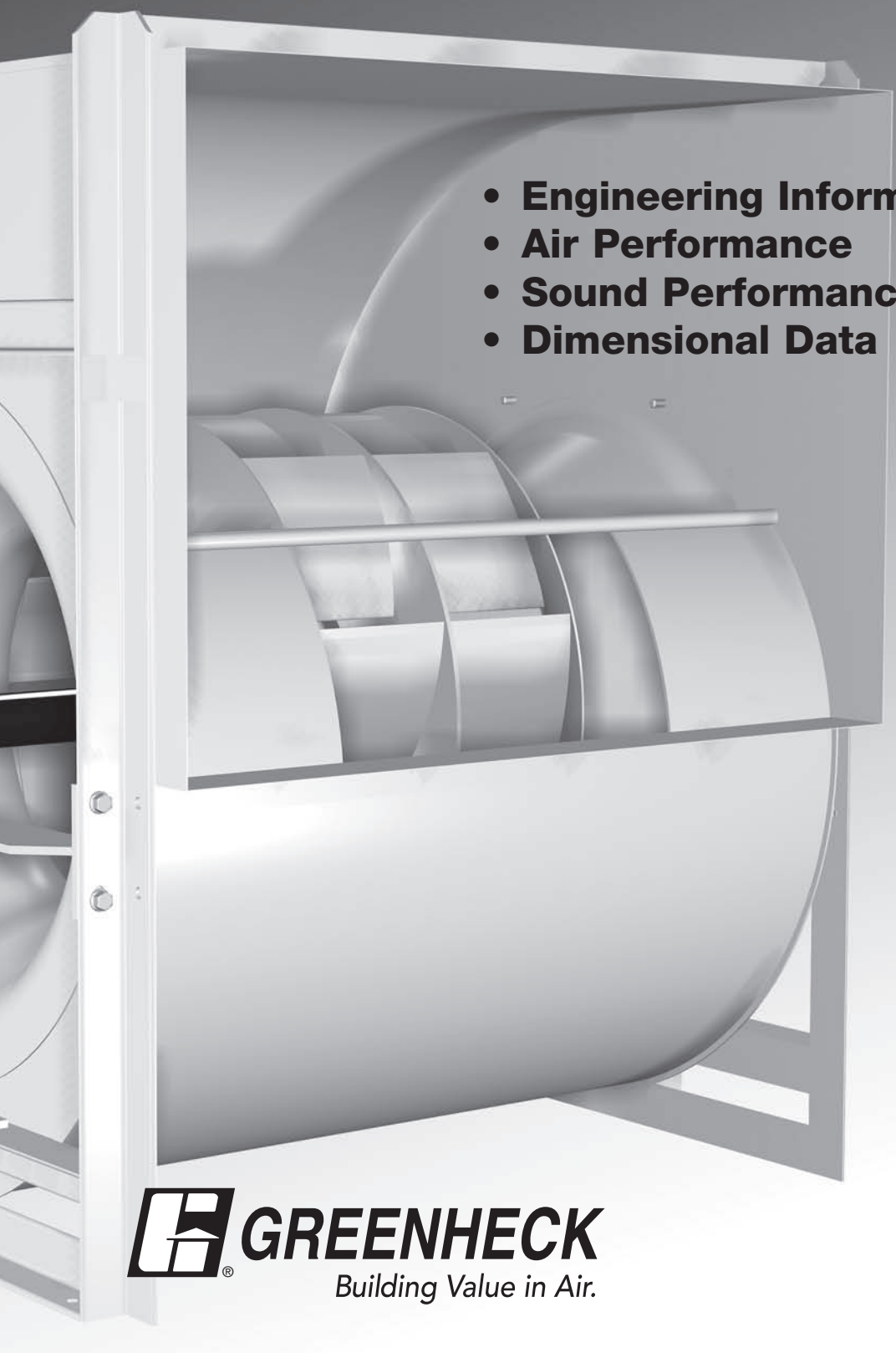
LEGEND

TXV – Thermostatic Expansion Valve

*Aluminum evaporator coil/aluminum condenser coil.

† Single phase/three phase

Double Width Centrifugal Fan Catalog Supplement



- Engineering Information
- Air Performance
- Sound Performance
- Dimensional Data

GREENHECK
Building Value in Air.

November 2004

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amca CERTIFIED RATINGS SOUND and AIR PERFORMANCE AIR MOVEMENT AND CONTROL ASSOCIATION, INC. PRINTED IN THE UNITED STATES OF AMERICA

Greenheck Fan Corporation certifies that the backward inclined and airfoil centrifugal fans shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

Engineering Data

GREENHECK
Building Value in Air.

Motor Selection

Greenheck centrifugal fans can be supplied with any motor that is commercially available and is appropriate for the fan size and performance required. The table shows motor frame sizes corresponding to those motors readily available.

Notes:

1. Fractional horsepower motor frame sizes shown may change due to variations in voltage, special features and manufacturer. 2. Motors shown are ball bearing, continuous duty. Two speed motors are two winding, 1/3 reduction in RPM. 3. Single phase motors are capacitor start.

1800 RPM Motors

HP	Single Speed									2 SP 2 WDG	
	Open			TE		Explosion Resistant		High Efficiency		Open	
								Open	TE		
	115V 1PH	230 1PH	3PH	115V 230V 1PH	3PH	115V 230V 1PH	3PH	230V 460V 3PH	230V 460V 3PH	115V 1PH 1PH	3PH
¼	48	48	48	48	48	48	48			48	
⅓	48	48	56	56	56	56	56			56	
½	56	56	56	56	56	56	56			56	
¾	56	56	56	56	56	56	56			56	
1	56	56	143T	56	143T		56	143T	143T		56
1½	145T	145T	145T	145T	145T		145T	145T	145T		56
2	182T	182T	145T	182T	145T		145T	145T	145T		182T
3			182T		182T		182T	182T	182T		184T
5			184T		184T		184T	184T	184T		215T
7.5			213T		213T		213T	213T	213T		254T
10			215T		215T		215T	215T	215T		256T
15			254T		254T		254T	254T	254T		256T
20			256T		256T		256T	256T	256T		284T
25			284T		284T		284T	284T	284T		286T
30			286T		286T		286T	286T	286T		324T
40			324T		324T		324T	324T	324T		326T
50			326T		326T		326T	326T	326T		365T
60			364T		364T		364T	364T	364T		
75			365T		365T		365T	365T	365T		
100			405T		405T		405T	405T	405T		
125			405T		444T		444T	405T	444T		
150			444T		445T		445T	444T	445T		

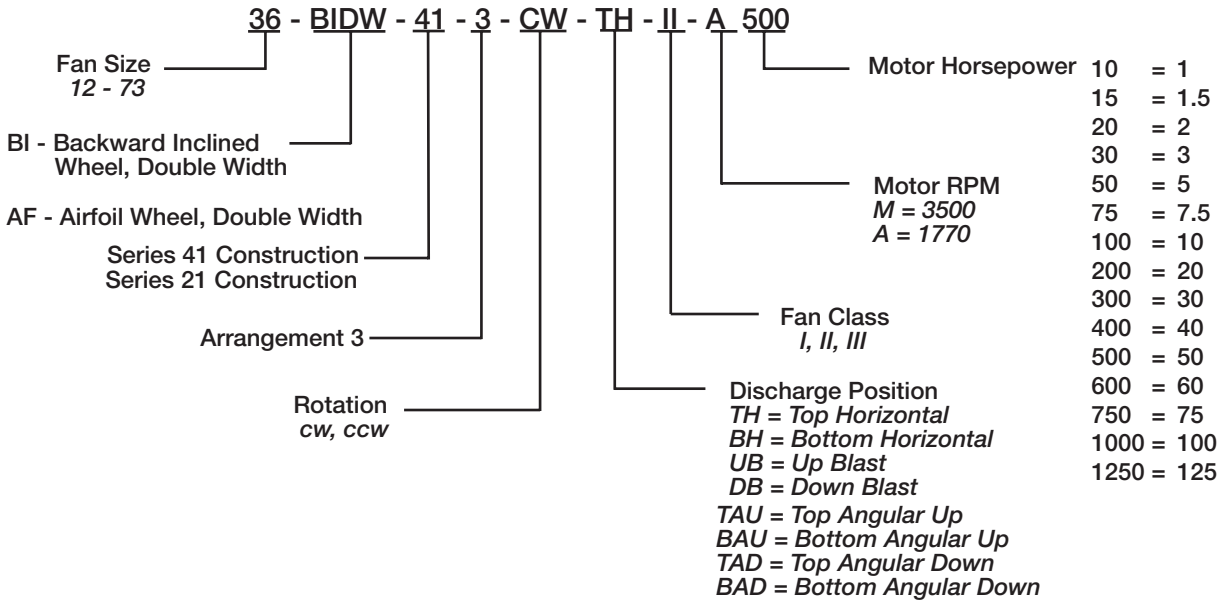
3600 RPM Motors

3600 RPM motors are recommended for fan speed over 2700 RPM

HP	Single Speed								
	Open			TE		Explosion Resistant		High Efficiency	
								Open	TE
	115V 1PH	230 1PH	3PH	115V 230V 1PH	3PH	115V 230V 1PH	3PH	230V 460V 3PH	230V 460V 3PH
⅓	48	48			56				
½	48	48	56	56	56				
¾	56	56	56	56	56				
1	56	56	56	56	56				
1½	143T	143T	143T	143T	143T		143T	143T	143T
2	145T	145T	145T	145T	145T		145T	145T	145T
3	182T	182T	145T	182T	182T		182T	145T	182T
5		184T	182T	182T	184T		184T	182T	184T
7.5		213T	184T	184T	213T		213T	184T	213T
10		215T	213T	213T	215T		215T	213T	215T
15			215T		254T		254T	215T	254T
20			254T		256T		256T	254T	256T
25			256T		284TS		284TS	256T	284TS
30			284TS		286TS		286TS	284TS	286TS
40			286TS		324TS		324TS	286TS	324TS
50			324TS		326TS		326TS	324TS	326TS

The model number codes on this page are a complete guide to ordering or specifiing Greenheck centifugal fan models.

Belt Drive Model Number Code



Motor Starting Torque

When selecting a motor for an industrial process fan, the motor must be capable not only of driving the fan at operating speed, but also must be capable of accelerating the fan wheel, shaft and drive to the operating speed.

The fan performance tables and curves in this catalog show the brake horsepower required to operate the fan once it is brought to speed. For applications requiring a large air volume at a low static pressure, the BHP required at the fan's operating RPM may not be sufficient to initially start the fan. If the time required to bring the fan to speed is excessive, the motor winding insulation can be damaged due to excessive temperature rise and the life of the motor seriously affected.

For a belt drive industrial process fan the required motor starting torque capability can be expressed by the following formula:

$$WR^2_M = WR^2_F \times \left(\frac{FRPM}{MRPM}\right)^2 \times (1.1)$$

WR^2_M = The moment of inertia that the motor must be capable of turning at the motor shaft, LB-Ft.^{2}

WR^2_F = The moment of inertia of the fan wheel, LB-Ft.^{2}

FRPM = Fan RPM

MRPM = Motor RPM

V Belt Drives

Constant Speed Drives
Advantages of constant speed drives include low vibration levels, ease of assembly and low cost. Fan speed changes can be accomplished in most cases simply by changing the motor pulley.

Constant speed drives are recommended over variable speed drives for applications that require motors 15 Hp and larger, and all applications requiring 3600 RPM motors.

Variable Speed Drives
Variable speed drives allow the fan speed to be changed by adjusting the pitch diameter of the motor pulley. The power to the fan must be off and locked out and the belts must be removed before manually adjusting the variable pitch pulley.

High Temperature Operating Limits

Temperature	Material	Arrangement	Options Included
-20 to 180° F	Steel, Alum., SS	3	None

Moments of Inertia (Lb-Ft^2)

Moments of inertia are shown for steel wheels. Aluminum wheels are one-third of the value shown.

Fan Size	STEEL BACKWARD INCLINED CENTRIFUGAL WHEELS			STEEL AIRFOIL CENTRIFUGAL WHEELS		
	Class I	Class II	Class III	Class I	Class II	Class III
12	2.2	2.7	3.8	–	–	–
13	3.1	4.3	5.6	–	–	–
15	5.4	6.1	7.8	–	–	–
16	7.9	8.9	10.5	–	–	–
18	12.5	13.8	18.9	15.6	16.9	23.9
20	17.3	19.1	35.2	21.6	23.4	38.1
22	32.0	32.0	52.3	38.8	38.8	57.2
24	44.2	49.4	71.3	54.1	54.1	78.2
27	66.2	79.1	96.9	80.2	85.5	129
30	105	136	144	118	139	178
33	152	198	210	172	234	261
36	260	303	399	267	362	428
40	435	505	628	444	582	665
44	642	863	927	638	842	955
49	971	1310	1380	1130	1300	1450
54	1760	2120	2130	1700	2100	2430
60	2850	3480	3700	3210	3180	3530
66	4650	5070	5350	4590	4550	5290
73	6950	7570	7950	6860	6860	7860

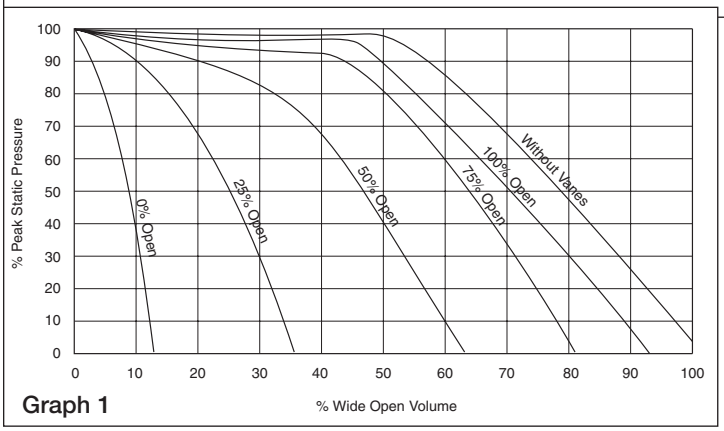
Fan RPM Limitations

The maximum allowable wheel RPM shown on the fan performance pages are for fans of standard steel operating at 70°F. Since the strength of the fan wheel, shaft and bearings decrease with an increase in temperature, maximum allowable speeds must be reduced by the correction factors shown below.

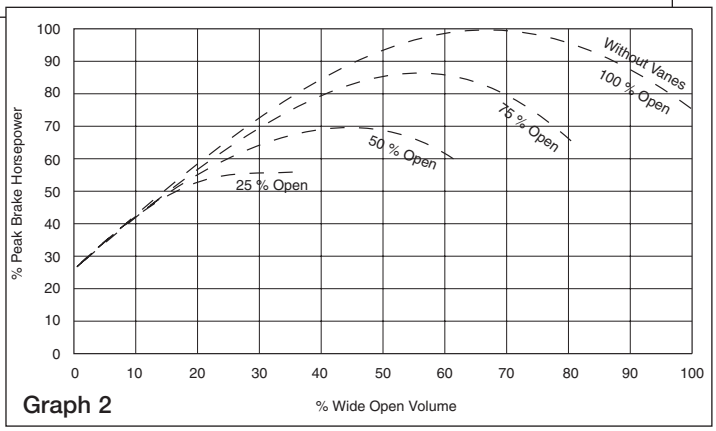
RPM Correction Factors For High Temperatures			
Temperature (Degrees F)	Wheel Material		
	Aluminum	Steel	316 SS
70	1.00	1.00	1.00
200	1.00	.97	.92

Inlet Vane Performance

As inlet vanes are closed they impart a spin to the airflow in the direction of wheel rotation and reduce airflow, static pressure and brake horsepower as shown in the graphs below. The graphs show how CFM, static pressure and brake horsepower are affected as inlet vanes are modulated from 100% open to 0% open in a typical variable air volume system. Graph 3 provides RPM and BHP correction factors for fans equipped with inlet vanes.



Graph 1



Graph 2

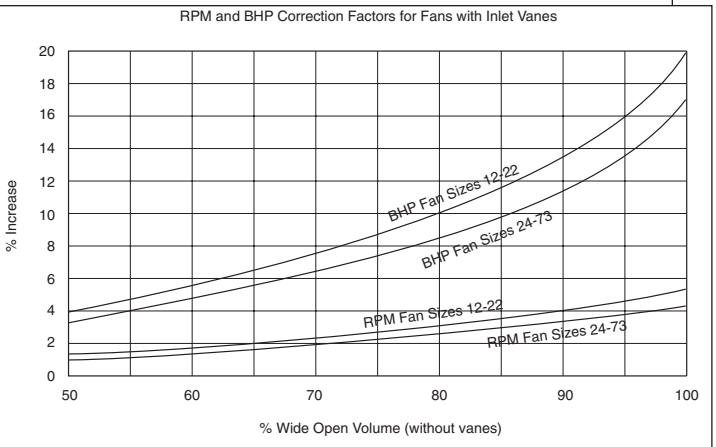
RPM & BHP Corrections

To compensate for pressure drop through inlet vanes, a percentage increase in fan RPM and BHP at full load design conditions must be applied.

Enter graph 3 with "% wide open volume" (see page 9 for calculation of % WOV) and the appropriate fan size.

Move horizontally left to the "% increase" scale. Record the % increase.

Increase the selected fan RPM by the % increase shown. Also increase the BHP by the % increase shown.



Graph 3

Use the chart below to determine minimum torque required for an inlet vane actuator.

Minimum Recommended Actuator Torque For Inlet Vanes (In-Lbs) for Double Width Fans

	Fan Size																		
Class	12	13	15	16	18	20	22	24	27	30	33	36	40	44	49	54	60	66	73
I	52	60	66	76	94	114	136	220	260	280	320	360	540	640	740	860	1000	1200	1400
II	76	86	98	116	146	176	220	320	360	400	460	520	840	980	1160	1360	1600	1920	2200
III	108	126	144	172	220	260	320	440	520	560	660	760	1240	1480	1760	2000	2400	3000	3400

Effect of Air Density - Temperature and Elevation

Ratings in the fan performance tables and curves of this catalog are based on standard air (clean, dry air with a density of .075 pounds per cubic foot, barometric pressure at sea level of 29.92 inches of mercury, temperature of 70°F.). Selecting a fan to operate at conditions other than standard air requires an adjustment to both static pressure and brake horsepower.

A cubic foot of air has a constant volume regardless of temperature or elevation. However, air density changes with non-standard temperature or elevation. Therefore, when selecting a fan to operate at a non-standard air density using standard air density tables and curves, corrections must be made to parameters affected by air density. These parameters are static pressure and brake horsepower.

For example, a size 30 BIDW centrifugal fan is to deliver 35,000 cfm at 4.5 inches static pressure. Elevation is 4,000 feet, temperature is 100°F.

The 4.5 inches static pressure refers to the static pressure at the operating air density, in this case at 4,000 feet, 100°F. Intuitively, we realize that at higher than standard elevations and temperatures, air density will be lower than standard. Therefore, we must determine what static pressure at standard air density will equate to 4.5 inches static pressure at our operating density. Since standard air density is greater than operating air density in this case, we would expect the corrected static pressure to be greater than the operating static pressure.

AIR DENSITY CORRECTION FACTORS

Air Temp. °F	Elevation (Feet Above Sea Level)															
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000
0	0.87	0.90	0.94	0.97	1.01	1.05	1.08	1.13	1.17	1.22	1.26	1.31	1.37	1.43	1.48	1.54
50	0.96	1.00	1.04	1.08	1.11	1.15	1.20	1.24	1.30	1.34	1.40	1.45	1.51	1.57	1.63	1.70
70	1.00	1.04	1.08	1.12	1.16	1.22	1.25	1.30	1.35	1.40	1.45	1.51	1.57	1.64	1.70	1.77
100	1.06	1.10	1.14	1.18	1.22	1.27	1.32	1.37	1.42	1.48	1.54	1.60	1.66	1.74	1.80	1.88
150	1.15	1.19	1.24	1.30	1.33	1.38	1.44	1.49	1.55	1.61	1.67	1.74	1.81	1.89	1.96	2.04
200	1.25	1.29	1.34	1.40	1.44	1.50	1.56	1.61	1.68	1.75	1.81	1.89	1.96	2.05	2.13	2.21
250	1.34	1.39	1.44	1.50	1.55	1.61	1.67	1.74	1.80	1.88	1.95	2.02	2.10	2.20	2.28	2.37
300	1.43	1.49	1.54	1.60	1.66	1.72	1.79	1.86	1.93	2.01	2.08	2.16	2.25	2.35	2.43	2.53
350	1.53	1.58	1.64	1.71	1.77	1.84	1.91	1.98	2.06	2.14	2.22	2.31	2.40	2.51	2.60	2.71
400	1.62	1.68	1.75	1.81	1.88	1.94	2.03	2.09	2.19	2.27	2.37	2.45	2.54	2.66	2.75	2.87
500	1.81	1.88	1.95	2.02	2.10	2.18	2.26	2.35	2.44	2.54	2.63	2.73	2.84	2.97	3.08	3.20
600	2.00	2.07	2.15	2.23	2.31	2.40	2.50	2.59	2.69	2.84	2.91	3.02	3.14	3.28	3.40	3.54
700	2.19	2.27	2.35	2.44	2.53	2.63	2.73	2.83	2.94	3.07	3.17	3.31	3.44	3.59	3.72	3.88
800	2.38	2.48	2.57	2.67	2.76	2.86	2.98	3.09	3.21	3.33	3.45	3.59	3.74	3.90	4.05	4.21
900	2.56	2.66	2.76	2.87	2.97	3.07	3.20	3.33	3.46	3.58	3.71	3.87	4.02	4.20	4.35	4.53
1000	2.76	2.87	2.989	3.09	3.20	3.31	3.45	3.59	3.73	3.86	4.00	4.17	4.33	4.53	4.69	4.89

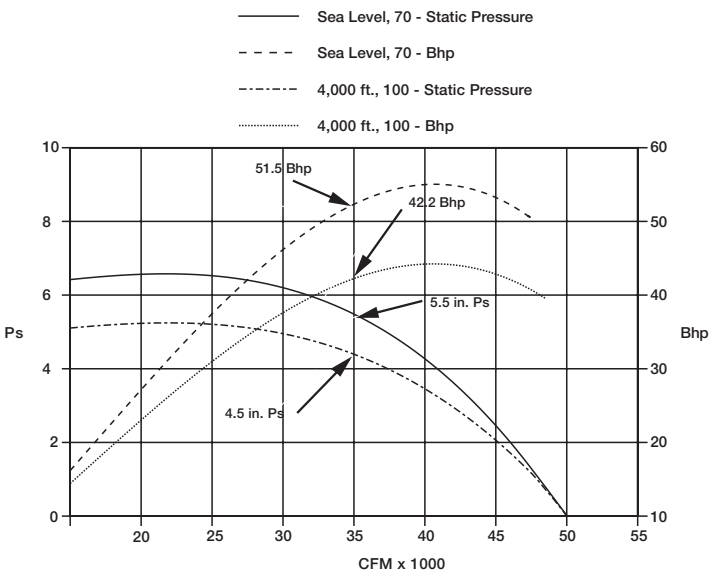
The accompanying table gives air density correction factors for non-standard temperatures and elevations.

The example below shows the relationship of fan performance at sea level and at 4,000 ft. elevation and 100°F.

EXAMPLE

The following example shows how to properly select the fan described above:

1. Since the air volume delivered by the fan is not affected by density, airflow remains 35,000 cfm.
2. Determine correction factor from chart for an elevation of 4,000 feet and air temperature of 100°F. The correction factor is 1.22.
3. Multiply the specified operating static pressure by the correction factor to determine the standard air density equivalent static pressure (Corrected static pressure = 4.5 in. x 1.22 = 5.5 in. static pressure).
4. Refer to the fan performance table for a 30 BIDW. At 35,000 cfm and 5.5 in. static pressure: Fan rpm = 1521, Bhp = 51.5.
5. 1571 Fan rpm is required to produce the desired performance.
6. Since the horsepower selected refers to standard air density, this must be corrected to reflect actual Bhp at the lighter operating air. Operating Bhp = standard Bhp ÷ 1.22, or 51.5 ÷ 1.22 = 42.2 Bhp.



If a fan is selected to operate at high temperatures, the motor must be of sufficient horsepower to handle the increased load at any lower operating temperature where the air is more dense. Assume the air entering the 30 BIDW fan at start-up is 0°F. For 0°F and 4,000 feet elevation the air density correction factor is 0.97. Bhp at 0°F = 51.5 ÷ 0.97 = 53.9, therefore, a 60 hp motor is required.

Effect Of Installation On Performance

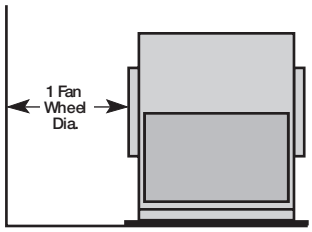
Ratings presented in the performance tables and curves of this catalog were derived from tests made in accordance with AMCA Standard 210 – "Laboratory Methods of Testing Fans for Ratings." The AMCA test procedure utilizes an open inlet and a straight outlet duct to assure maximum static regain.

Any installation with inlet or discharge configurations that deviate from this standard may result in reduced fan performance. Restricted or unstable flow at the fan inlet can cause pre-rotation of incoming air or uneven loading of the fan wheel yielding large system losses and increased sound levels. Free discharge or turbulent flow in the discharge ductwork will also result in system effect losses.

Static pressure losses due to inlet and discharge conditions can be expressed in terms of system effect factors. The static pressure for selection of the fans equals the system static pressure plus the system effect factor.

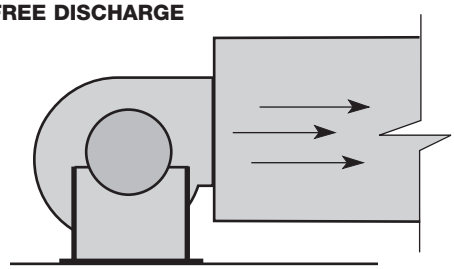
Some common inlet and discharge conditions which affect fan performance are:

NON-DUCTED INLET CLEARANCE



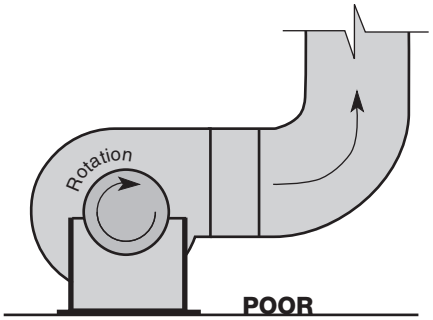
Installation of a fan with an open inlet too close to a wall or bulkhead will cause reduced fan performance. It is desirable to have one fan wheel diameter if possible and a minimum of three fourths of a wheel diameter between the fan inlet and the wall. System effect curve #2 depicts the pressure loss for one-half wheel diameter clearance.

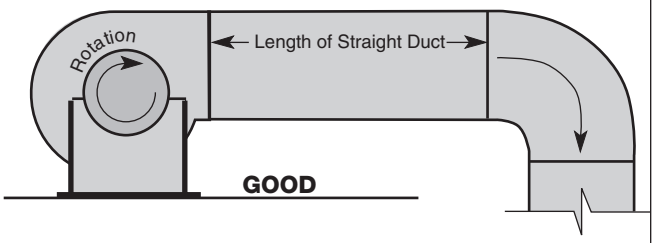
FREE DISCHARGE



Free or abrupt discharge into a plenum results in a reduction in fan performance. The effect of static regain in discharge is not realized. System effect curve #1 depicts the pressure loss for free or abrupt discharge.

DISCHARGE DUCT TURNS

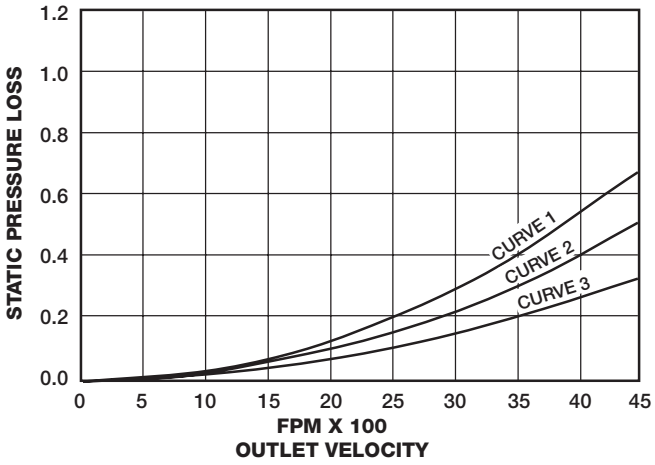




Duct turns located near the fan discharge should always be in the direction of the fan rotation.

Fan performance is reduced when duct turns are made immediately off the fan discharge. To achieve cataloged fan performance there should be at least three equivalent duct diameters of straight ductwork between the fan discharge and any duct turns. Curve #3 shows the system effect factor for two diameters of straight ductwork and curve #1 for one diameter.

SYSTEM EFFECT FACTOR CURVES



Additional information on system effect factors can be found in AMCA Publication 201 – "Fans and Systems" and ASHRAE Handbooks.

Sound Performance Data

AMCA Licensed Ratings
Sound tests of Model BIDW and AFDW were conducted in Greenheck's AMCA Registered sound laboratory in accordance with AMCA Standard 300. Inlet and outlet sound ratings comply with AMCA Publication 311, qualifying these models to bear the AMCA seal for sound and air performance. The sound power levels published here can be compared directly with those of other similarly rated fans, or used as a baseline to determine sound levels in occupied spaces.

The sound data in this brochure is the result of extensive testing, which included both inlet and outlet sound tests on double width centrifugal fans. Typically, fan manufacturers publish only inlet sound for double width fans. The assumption they make is that outlet sound is identical to inlet sound. Sound data based on this assumption is simply not accurate enough for today's sound sensitive installations. This assumption also ignores duct end corrections for outlet sound.

Test Methods
AMCA standard 300 clearly defines methods used to test fans in a reverberant sound test room. The reverberant room is specifically designed to allow sound waves to be dispersed evenly throughout the room. The walls have a hard surface that reflects sound and are positioned to prevent resonances which could result in quiet areas within the room.

Sound power cannot be directly measured. The test method is based on a Reference Sound Source (RSS) substitution for determining fan sound power. The RSS is a laboratory calibrated device which has a known sound power output level. The test fan is installed as shown below. The RSS is energized and the sound pressure levels in the reverberant room are recorded. The fan is then operated without the RSS and the fan sound pressure levels are recorded for various points of operation. Since the sound power levels of the RSS are known, the substitution method is used to determine the sound power levels of the fan. This method is illustrated in the following example.

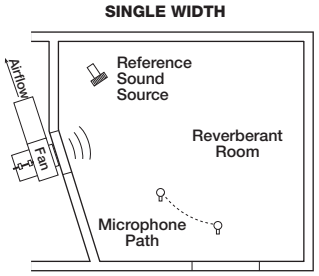
Calculating Fan Sound Power

Octave Band	1	2	3	4	5	6	7	8
Center Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Calibrated RSS Sound Power (Lwr)	82	81	81	81	81	81	79	78
Measured RSS Sound Pressure (Lpq)	70	74	75	76	75	74	69	61
Difference (Lwr-Lpq)	12	7	6	5	6	7	10	17
Measured Fan Sound Pressure (Lpm)	68	72	69	69	68	62	57	46
Substitution (Lwr-Lpq, from above)	+12	+7	+6	+5	+6	+7	+10	+17
Fan Sound Power (Lw)	80	79	75	74	74	69	67	63

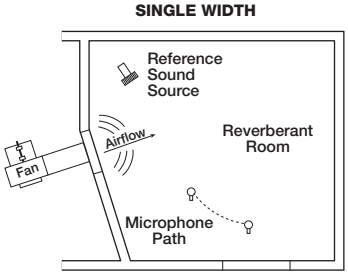
Units in dB

Test Setups
The illustrations at right show where the sound levels were measured with respect to the fan. Inlet sound was tested as in Figure 2 of Standard 300 and outlet sound was tested as in Figure 3. Inlet and outlet sound were determined in the same inlet and outlet configurations as the air tests. (Installation Type B - free inlet, ducted outlet.)

Since double width fans are more often ducted at the inlet, they are tested only for sound radiated from the fan inlet.



AMCA Standard 300 - Figure 2:
Fan Inlet Sound Testing
Installation Type B:
Free Inlet, Ducted Outlet



AMCA Standard 300 - Figure 3:
Fan Outlet Sound Testing
Installation Type B: Free Inlet, Ducted Outlet
(Ratings include the effects of duct end correction)

Interpreting Sound Data
Sound power levels in this brochure are presented as dB (re 10^{-12} watts) in each of the eight full octave bands with center frequencies from 63 Hz to 8000 Hz. They are also presented as a single A-weighted sound power level, LwA. Charts are provided covering the full range of fan speeds and percent wide open volume (%WOV) for each fan size. Outlet sound power data is based on a ducted outlet and therefore includes duct end reflection corrections.

Outlet Sound - Duct End Corrections

This correction accounts for sound that is reflected back into the duct where there is an abrupt termination of the duct.

AMCA Standard 300 requires that outlet sound power for fans with ducted outlets include Duct End Corrections. These corrections account for any sound power that may be present in the duct but is not measured in the reverberant room, because it is reflected back into the duct at the discharge.

Duct end corrections are included in all outlet sound power ratings.

Duct End Corrections (dB)

Size	Double Width Fans		
	63 Hz	125 Hz	250 Hz
18	9	5	2
20	9	4	1
22	8	4	1
24	7	3	
27	6	3	
30	6	2	
33	5	2	
36	5	2	
40	4	1	
44	4	1	
49	3		
54	3		
60	2		
66	2		
73	2		

Tolerance and Application

The certification process in AMCA Standard 311 call for a precertification test to verify original test results. Check tests are also required every 3 years for each model licensed. Test data must agree with the published sound power within the following tolerance levels:

Octave Band	1	2	3	4	5	6	7	8
Center Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Tolerance	+6	+3	+3	+3	+3	+3	+3	+3

These tolerance levels are a good indication of the variance that could occur from one fan or test setup to another. Once installed, however, there are many other factors that can affect the sound power generated by a fan.

The lower frequencies (below 125 Hz) are greatly affected by vibration. Fan wheel balance, motor balance, drive alignment, etc., all affect the vibration level of the fan and can increase sound power in the 1st and 2nd octaves. When ducts are not properly isolated from the fan, these vibrations can be transmitted into the ducts, which can generate additional low frequency sound.

Sound power generated by a fan can also be influenced by system effects. System effects are pressure losses caused by inlet or outlet restrictions, or other conditions causing non-uniform airflow at the inlet or discharge of a fan (see AMCA publication 201). Examples include inlet or outlet elbows too close to a fan, restricted inlets, and fan accessories. While system effects can prevent fans from reaching their designed air performance, they can also result in increased sound power levels. Typically, system effects cause pressure fluctuations which influence the lower frequencies. Poor inlet conditions can also greatly increase sound levels at the blade passage frequency (BPF). The blade passage frequency refers to how often a blade or wheel fin passes a stationary location of the housing and can be calculated using the following equation:

$$\text{BPF (Hz)} = \frac{\text{Fan RPM x Number of Blades}}{60}$$ (All Greenheck wheels have 9 blades)

Sound is becoming increasingly critical for most fan installations. Greenheck employs extensive research and testing to provide sound data that is as thorough and accurate as possible. However, sound pressure levels in occupied spaces are affected by the acoustical qualities of the space, distance from source to receiver, etc. Therefore, published sound power data can be used only as a baseline for determining the resulting sound pressure levels an occupant hears. While Greenheck provides products which meet published sound power levels, no manufacturer can be responsible for poor installations or system designs beyond their control. For further information on installation practices, see AMCA publication 201, “Fans and Systems.”

Sound Power

Sound power data is charted for the full range of RPM and percent wide open volume (% WOV) for belt drive and RPM and static pressure for direct drive in each unit size.

The % WOV is a convenient way to indicate the operating point (pressure and CFM) for a given fan RPM. To calculate the % WOV for a given fan size, use the equation given on the performance page.

$$\%\ \text{WOV} = \frac{\text{CFM x 100}}{\text{RPM x K}}$$

Use the following procedure to calculate sound data for a specific Fan RPM and % WOV:
1. Determine the eight sound power levels for the specified % WOV using the higher Fan RPM shown.
2. Determine the eight sound power levels for the specified % WOV using the lower Fan RPM shown.
3. Interpolate between the higher and lower sound power levels using the specified RPM.

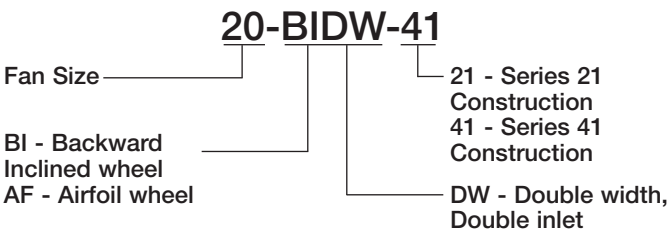
Sample Fan Selection

The purpose of these two pages is to demonstrate the manual centrifugal fan selection process. These pages also contain helpful tips to check your fan selection as well as a step by step set of instructions on how to use this manual to properly select a centrifugal fan.

An important point to remember when manually selecting a centrifugal fan is that more than one fan is available to meet the desired performance (CFM and Ps). Selection criteria such as unit size, efficiency, speed, outlet velocity, horsepower, or construction material may also dictate which fan is chosen.

Sound and Air performance are identical for Greenheck Series 21 and 41 Centrifugal fans.

The following example explains the model number code for both series of centrifugal fans.



A The Outlet Area is used for the Outlet Velocity (OV) calculation.
$OV = \frac{CFM}{OA}$

B The Maximum BHP can be calculated for a given fan RPM along the fan curve.

C The minimum starting HP is determined by the inertia (WR^2) of the fan and motor. See page 4 for a complete motor starting torque chart.

D The maximum fan RPM for each fan class is listed.

E Constant HP curves are plotted for each motor HP size.

F The % WOV is used to identify the fan operating point. The lines in the fan curve or the equation can be used.

20 BIDW

Wheel Diameter = 20 in.
A Outlet Area = 4.14 ft.^{2}
Tip Speed = 5.24 x RPM
B Maximum BHP = (RPM/832)^3

D Maximum RPM Class I = 1960
Maximum RPM Class II = 2554
Maximum RPM Class III = 3219

C Minimum Motor Size For Starting Torque: ¾ HP

CFM	OV	Static Pressure In Inches																			
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	724	489	0.20	596	0.34	699	0.52														
3800	917	561	0.31	654	0.47	736	0.65	823	0.87	900	1.11	977	1.37								
4600	1111	639	0.45	723	0.65	797	0.85	865	1.07	936	1.31	1005	1.59	1069	1.87	1132	2.17				
5400	1304	720	0.65	796	0.87	864	1.11	927	1.35	987	1.60	1042	1.85	1105	2.16	1165	2.48	1221	2.81	1274	3.14
6200	1497	803	0.89	874	1.16	936	1.42	995	1.69	1050	1.96	1103	2.25	1154	2.54	1201	2.83	1257	3.19	1310	3.55
7000	1690	888	1.19	954	1.50	1012	1.80	1066	2.10	1119	2.40	1167	2.71	1215	3.03	1262	3.35	1306	3.67	1348	4.00
7800	1884	974	1.57	1035	1.92	1090	2.25	1142	2.58	1190	2.91	1237	3.25	1282	3.59	1324	3.94	1367	4.30	1409	4.66
8600	2077	1061	2.02	1119	2.41	1171	2.78	1219	3.14	1265	3.51	1309	3.87	1352	4.25	1393	4.62	1432	5.00	1471	5.39
9400	2270	1149	2.56	1203	2.98	1252	3.39	1298	3.79	1342	4.19	1384	4.59	1424	4.99	1463	5.40	1502	5.81	1539	6.22
10200	2463	1238	3.19	1288	3.64	1335	4.10	1379	4.54	1421	4.97	1461	5.41	1499	5.84	1536	6.27	1573	6.71	1609	7.15
11000	2657	1328	3.93	1374	4.41	1419	4.90	1461	5.39	1501	5.85	1539	6.32	1576	6.79	1612	7.26	1646	7.72	1680	8.20
11800	2850	1419	4.77	1461	5.28	1504	5.81	1544	6.34	1583	6.85	1619	7.35	1655	Step 1	1689	8.36	1722	8.85	1755	9.35
12600	3043	1509	5.74	1548	6.27	1589	6.83	1628	7.40	1665	7.96	1700	8.50	1734	9.03	1767	9.57	1800	10.1	1831	10.6
13400	3236	1600	6.83	1637	7.39	1675	7.98	1712	8.58	1748	9.19	1782	9.77	1815	10.3	1847	10.9	1878	11.5	1908	12.1
14200	3429	1691	8.05	1726	8.65	1762	9.27	1797	9.90	1832	10.5	1865	11.2	1897	11.8	1928	12.4	1958	13.0	1987	13.6
15000	3623	1782	9.41	1816	10.1	1849	10.7	1883	11.4	1916	12.0	1949	12.7	1980	13.4	2010	14.0	2039	14.7	2067	15.3

CFM	OV	Static Pressure In Inches																			
		2.50		3.00		3.50		4.00		4.50		5.00		5.50		6.00		6.50		7.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	1690	1348	4.00	1444	4.80	1534	5.63	1619	6.49	1700	7.39	1786	8.38								
7800	1884	1409	4.66	1486	5.39	1571	6.23	1655	7.15	1734	8.09	1809	9.05	1881	10.0	1959	11.1				
8600	2077	1471	5.39	1547	6.18	1619	6.98	1692	7.85	1770	8.85	1845	9.86	1916	10.9	1984	12.0	2049	13.0	2119	14.2
9400	2270	1539	6.22	1610	7.06	1680	7.92	1746	8.80	1809	9.68	1881	10.7	1952	11.8	2020	12.9	2085	14.1	2148	15.2
10200	2463	1609	7.15	1677	8.05	1743	8.96	1808	9.89	1870	10.8	1929	11.8	1989	12.8	2056	14.0	2121	15.2	2184	16.4
11000	2657	1680	8.20	1747	9.15	1810	10.1	1871	11.1	1932	121.0	1990	13.1	2046	14.1	2100	15.2	2158	16.3	2220	17.6
11800	2850	1755	9.35	1818	10.4	1880	11.4	1938	12.4	1995	13.5	2052	14.6	2108	15.6	2161	16.7	2212	17.8	2262	19.0
12600	3043	1831	10.6	1892	11.7	1951	12.8	2008	13.9	2063	150.0	2116	16.1	2170	17.3	2223	18.4	2274	19.6	2323	20.7
13400	3236	1908	12.1	1967	13.2	2023	14.3	2079	15.5	2133	167.0	2185	17.8	2235	19.0	2285	20.2	2336	21.4	2384	22.7
14200	3429	1987	13.6	2044	14.8	2099	16.0	2152	17.2	2204	185.0	2255	19.7	2305	20.9	2352	22.2	2399	23.4	2447	24.7
15000	3623	2067	15.3	2122	16.6	2175	17.8	2227	19.1	2276	204.0	2326	21.7	2375	23.0	2422	24.3	2467	25.6	2512	27.0
15800	3816	2148	17.1	2201	18.5	2253	19.8	2303	21.2	2352	225.0	2398	23.9	2446	25.2	2492	26.6	2537	28.0	2581	29.4
16600	4009	2229	19.1	2281	20.5	2331	22.0	2380	23.4	2428	24.8	2474	26.2	2518	27.6	2564	29.0	2608	30.5	2651	31.9
17400	4202	2312	21.3	2362	22.8	2411	24.3	2458	25.8	2505	27.2	2550	28.7	2593	30.2	2636	31.7	2679	33.2	2722	34.7
18200	4396	2395	23.7	2444	25.2	2491	26.8	2538	28.3	2582	29.9	2626	31.4	2669	32.9	2711	34.5	2752	36.0	2793	37.6
19000	4500	2470	26.1	2526	27.8	2573	29.4	2618	31.0	2661	32.7	2704	34.3	2746	35.9	2787	37.5	2827	39.1	2867	40.7

CFM	OV	Static Pressure In Inches																			
		7.00		7.50		8.00		8.50		9.00		10.00		11.00		12.00		13.00		14.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
9000	2173	2130	14.7	2195	15.9	2262	17.1														
9900	2391	2170	15.9	2231	17.1	2289	18.4	2346	19.6	2405	20.9	2526	23.7								
10800	2608	2211	17.3	2272	18.5	2330	19.8	2387	21.1	2442	22.4	2548	25.1	2656	28.0	2766	31.1				
11700	2826	2255	18.7	2313	20.0	2371	21.4	2428	22.7	2482	24.1	2588	26.9	2689	29.8	2785	32.7	2887	35.9	2988	39.2
12600	3043	2323	20.7	2371	21.9	2417	23.1	2469	24.4	2524	25.9	2629	28.8	2729	31.8	2825	34.9	2918	38.0	3006	41.1
13500	3260	2392	22.9	2440	24.2	2486	25.4	2530	26.7	2574	28.0	2670	30.8	2770	33.9	2866	37.1	2958	40.4	3047	43.6
14400	3478	2463	25.3	2509	26.6	2555	27.9	2599	29.2	2643	30.6	2726	33.3	2812	36.2	2907	39.5	2999	42.8	3087	46.2
15300	3695	2538	27.8	2581	29.2	2625	30.6	2669	32.0	2712	33.4	2795	36.2	2874	39.1	2951	42.0	3040	45.4	3129	49.0
16200	3913	2616	30.6	2658	32.1	2699	33.5	2740	34.9	2782	36.4	2864	39.4	2943	42.4	3019	45.4	3092	48.4	3170	51.8
17100	4130	2695	33.6	2737	35.1	2777	36.6	2817	38.1	2856	39.7	2935	42.7	3013	45.9	3088	49.0	3160	52.2		
18000	4347	2775	36.9	2816	38.4	2856	40.0	2896	41.6	2934	43.1	3008	46.3	3083	49.6	3158	52.9				
18900	4565	2857	40.3	2897	42.0	2936	43.6	2975	45.2	3013	46.9	3086	50.2	3157	53.6						
19800	4782	2942	44.1	2980	45.8	3017	47.5	3055	49.2	3092	50.9	3165	54.3								
20700	5000	3028	48.1	3065	49.8	3101	51.6	3137	53.4	3173	55.1										
21600	5217	3114	52.3	3150	54.2	3186	56.0														
22500	5434	3201	56.9																		

Performance shown is for model BIDW arrangement 3, installation type B - free inlet, ducted outlet.
Performance ratings do not include the effects of appurtenances in the airstream.
Power rating (BHP) does not include drive losses.

Fan Selection Procedure

STEP 1
Enter the performance table with the desired CFM and Ps. Obtain the fan RPM, BHP and Class.

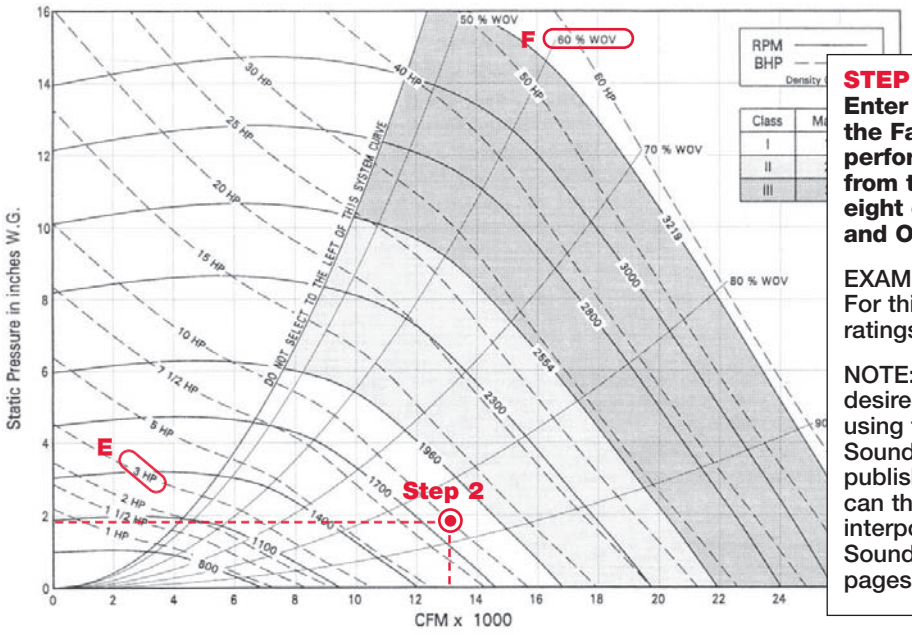
EXAMPLE
For this example, we will use 13,400 cfm at 2.0 Ps. This gives us a fan RPM of 1,847, requiring 10.9 Bhp, with Class I construction.

NOTE: If your specific fan selection requires inlet vanes or if the fan operating point is not at standard air (70˚C), refer to the inlet vane and air density correction factor tables found on pages 5 and 6.

STEP 2
Enter the Fan Curve with the desired CFM and Ps. Obtain the fan operating point, % WOV, Motor HP and verify fan class by curve shading.

EXAMPLE
For this example, the fan operating point is at 85% WOV using a 15 hp motor.

20 BIDW



STEP 3
Enter the Fan Sound Table with the Fan RPM from the performance table and the % WOV from the fan curve. Obtain the eight octave ratings for inlet (Lwi) and Outlet (Lwo) Sound Power.

EXAMPLE
For this example, the eight octave ratings are circled in the table below.

NOTE: The exact % WOV for your desired performance can be found using the equation at the top of the Sound Power Table if it is not published. The eight octave ratings can then be found using the interpolation instructions found in the Sound Performance section on pages 8 and 9.

% WOV = (CFM X 100) / (RPM X 8.58)

Sound Power [dB Ref 10^{-12} watts]

Inlet Sound Power, Lwi

RPM	%WOV	1	2	3	4	5	6	7	8	LwiA
550	100	78	75	74	78	68	62	56	52	76
	80	76	73	71	75	67	60	54	50	74
	60	75	70	70	76	67	60	54	50	74
	50	75	69	69	76	67	60	54	50	75
	40	74	69	69	77	67	60	54	50	75
800	100	79	91	83	82	76	72	64	60	83
	80	80	89	81	78	72	67	59	54	80
	60	77	83	76	77	71	67	59	54	77
	50	76	80	74	76	71	67	60	55	77
	40	77	78	74	76	71	67	60	55	77
1100	100	85	92	91	89	85	81	74	70	90
	80	84	88	88	87	81	77	69	65	87
	60	83	84	83	83	79	76	70	65	85
Step 3	50	80	83	82	83	79	76	70	66	84
	40	80	83	82	83	78	75	70	66	84
1600	100	91	94	98	95	92	89	83	78	97
	80	88	91	96	93	90	86	80	75	95
	60	87	88	93	89	86	83	78	75	92
	50	87	88	91	88	85	82	78	75	91
	40	89	88	90	87	85	82	78	76	90
2200	100	98	100	103	105	98	96	91	88	105
	80	95	97	100	103	96	92	87	84	102
	60	92	93	98	99	93	91	87	84	100
	50	93	93	98	97	93	90	87	84	99
	40	95	95	98	98	92	90	88	86	99
3219	100	105	109	110	114	110	106	102	98	115
	80	103	106	107	111	107	102	98	94	112
	60	100	102	105	107	104	101	97	94	109
	50	101	103	105	105	103	100	97	94	108
	40	103	105	106	106	103	99	98	96	108

Outlet Sound Power, Lwo

RPM	%WOV	1	2	3	4	5	6	7	8	LwoA
550	100	90	78	75	68	67	59	52	47	73
	80	90	77	71	64	64	54	47	45	70
	60	83	74	68	63	62	54	48	45	67
	50	82	73	67	63	63	54	48	45	67
	40	82	73	67	63	63	54	48	46	67
800	100	93	96	83	77	77	71	63	57	84
	80	90	92	81	73	72	64	57	52	80
	60	87	84	76	72	69	63	57	53	75
	50	87	82	74	72	68	62	57	54	74
	40	89	83	73	71	68	62	57	54	74
1100	100	99	93	90	86	86	80	74	67	90
	80	96	92	88	83	81	74	67	61	86
	60	91	87	83	78	77	71	66	61	82
	50	91	86	82	77	76	71	66	62	81
	40	92	86	81	76	75	70	66	62	80
1600	100	105	98	98	94	93	89	85	77	98
	80	102	95	96	91	92	87	81	73	96
	60	100	91	93	87	87	83	77	72	92
	50	100	92	92	86	86	81	76	72	91
	40	100	93	92	85	84	81	76	72	90
2200	100	109	105	106	109	102	97	93	88	109
	80	107	101	101	105	98	93	89	83	105
	60	103	97	96	99	96	91	86	81	100
	50	104	98	95	97	94	89	85	81	99
	40	107	100	95	95	92	89	85	81	98
3219	100	117	115	113	118	114	108	104	99	118
	80	115	112	109	113	110	104	100	94	114
	60	111	108	105	107	106	102	97	92	110
	50	112	109	104	105	104	100	96	92	108
	40	116	112	106	103	102	99	95	92	107

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi, LwiA and outlet Lwo, LwoA sound power levels for Installation Type B: free inlet, ducted outlet. Outlet ratings include the effects of duct and correction.

20 BIDW

Wheel Diameter = 20 in.
Outlet Area = 4.14 ft.^{2}
Tip Speed = 5.24 x RPM
Maximum BHP = (RPM/832)^3

Maximum RPM Class I = 1960
Maximum RPM Class II = 2554
Maximum RPM Class III = 3219

Minimum Motor Size
For Starting Torque: ¾ HP

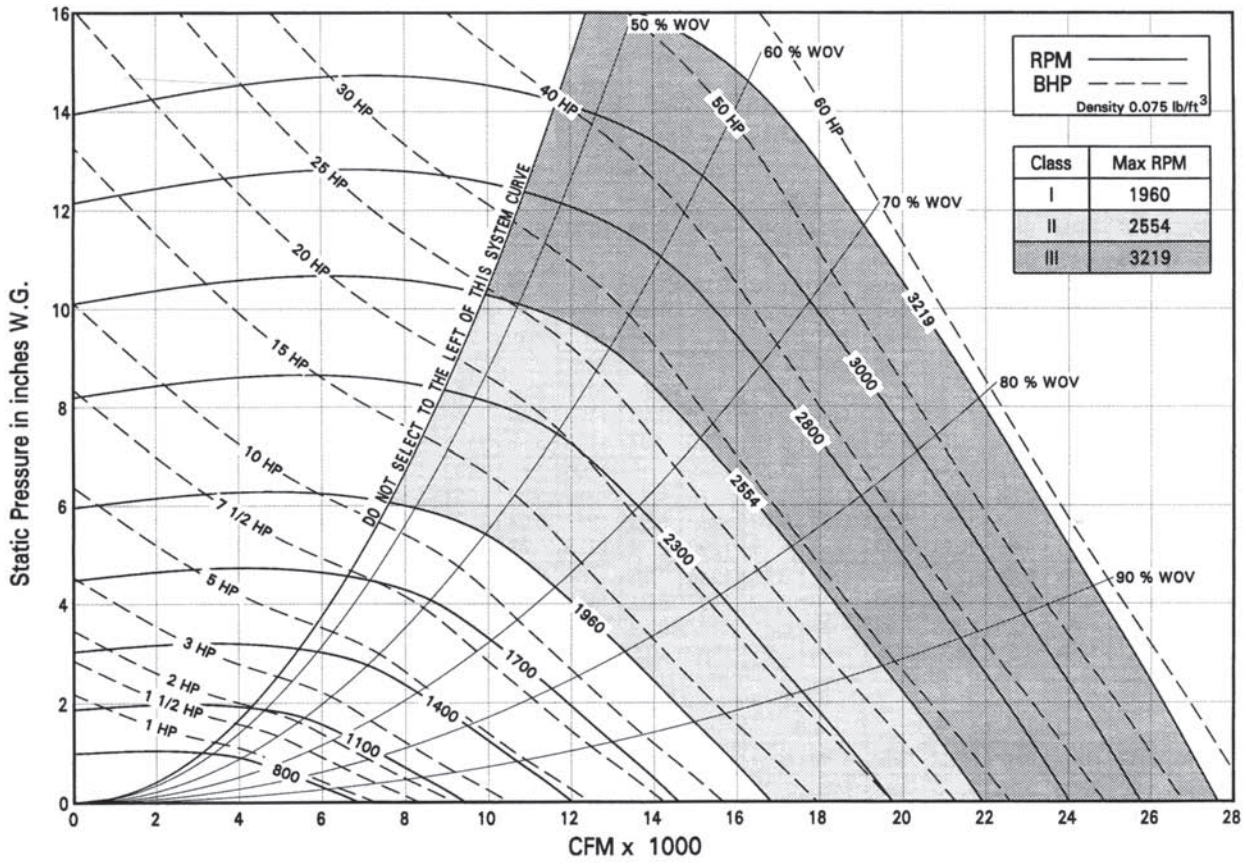
CFM	OV	Static Pressure In Inches																			
		0.25		0.50		0.75		1.00		1.25		1.50		1.75		2.00		2.25		2.50	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	724	489	0.20	596	0.34	699	0.52														
3800	917	561	0.31	654	0.47	736	0.65	823	0.87	900	1.11	977	1.37								
4600	1111	639	0.45	723	0.65	797	0.85	865	1.07	936	1.31	1005	1.59	1069	1.87	1132	2.17				
5400	1304	720	0.65	796	0.87	864	1.11	927	1.35	987	1.60	1042	1.85	1105	2.16	1165	2.48	1221	2.81	1274	3.14
6200	1497	803	0.89	874	1.16	936	1.42	995	1.69	1050	1.96	1103	2.25	1154	2.54	1201	2.83	1257	3.19	1310	3.55
7000	1690	888	1.19	954	1.50	1012	1.80	1066	2.10	1119	2.40	1167	2.71	1215	3.03	1262	3.35	1306	3.67	1348	4.00
7800	1884	974	1.57	1035	1.92	1090	2.25	1142	2.58	1190	2.91	1237	3.25	1282	3.59	1324	3.94	1367	4.30	1409	4.66
8600	2077	1061	2.02	1119	2.41	1171	2.78	1219	3.14	1265	3.51	1309	3.87	1352	4.25	1393	4.62	1432	5.00	1471	5.39
9400	2270	1149	2.56	1203	2.98	1252	3.39	1298	3.79	1342	4.19	1384	4.59	1424	4.99	1463	5.40	1502	5.81	1539	6.22
10200	2463	1238	3.19	1288	3.64	1335	4.10	1379	4.54	1421	4.97	1461	5.41	1499	5.84	1536	6.27	1573	6.71	1609	7.15
11000	2657	1328	3.93	1374	4.41	1419	4.90	1461	5.39	1501	5.85	1539	6.32	1576	6.79	1612	7.26	1646	7.72	1680	8.20
11800	2850	1419	4.77	1461	5.28	1504	5.81	1544	6.34	1583	6.85	1619	7.35	1655	7.85	1689	8.36	1722	8.85	1755	9.35
12600	3043	1509	5.74	1548	6.27	1589	6.83	1628	7.40	1665	7.96	1700	8.50	1734	9.03	1767	9.57	1800	10.1	1831	10.6
13400	3236	1600	6.83	1637	7.39	1675	7.98	1712	8.58	1748	9.19	1782	9.77	1815	10.3	1847	10.9	1878	11.5	1908	12.1
14200	3429	1691	8.05	1726	8.65	1762	9.27	1797	9.90	1832	10.5	1865	11.2	1897	11.8	1928	12.4	1958	13.0	1987	13.6
15000	3623	1782	9.41	1816	10.1	1849	10.7	1883	11.4	1916	12.0	1949	12.7	1980	13.4	2010	14.0	2039	14.7	2067	15.3

CFM	OV	Static Pressure In Inches																			
		2.50		3.00		3.50		4.00		4.50		5.00		5.50		6.00		6.50		7.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
7000	1690	1348	4.00	1444	4.80	1534	5.63	1619	6.49	1700	7.39	1786	8.38								
7800	1884	1409	4.66	1486	5.39	1571	6.23	1655	7.15	1734	8.09	1809	9.05	1881	10.0	1959	11.1				
8600	2077	1471	5.39	1547	6.18	1619	6.98	1692	7.85	1770	8.85	1845	9.86	1916	10.9	1984	12.0	2049	13.0	2119	14.2
9400	2270	1539	6.22	1610	7.06	1680	7.92	1746	8.80	1809	9.68	1881	10.7	1952	11.8	2020	12.9	2085	14.1	2148	15.2
10200	2463	1609	7.15	1677	8.05	1743	8.96	1808	9.89	1870	10.8	1929	11.8	1989	12.8	2056	14.0	2121	15.2	2184	16.4
11000	2657	1680	8.20	1747	9.15	1810	10.1	1871	11.1	1932	121.0	1990	13.1	2046	14.1	2100	15.2	2158	16.3	2220	17.6
11800	2850	1755	9.35	1818	10.4	1880	11.4	1938	12.4	1995	13.5	2052	14.6	2108	15.6	2161	16.7	2212	17.8	2262	19.0
12600	3043	1831	10.6	1892	11.7	1951	12.8	2008	13.9	2063	150.0	2116	16.1	2170	17.3	2223	18.4	2274	19.6	2323	20.7
13400	3236	1908	12.1	1967	13.2	2023	14.3	2079	15.5	2133	167.0	2185	17.8	2235	19.0	2285	20.2	2336	21.4	2384	22.7
14200	3429	1987	13.6	2044	14.8	2099	16.0	2152	17.2	2204	185.0	2255	19.7	2305	20.9	2352	22.2	2399	23.4	2447	24.7
15000	3623	2067	15.3	2122	16.6	2175	17.8	2227	19.1	2276	204.0	2326	21.7	2375	23.0	2422	24.3	2467	25.6	2512	27.0
15800	3816	2148	17.1	2201	18.5	2253	19.8	2303	21.2	2352	225.0	2398	23.9	2446	25.2	2492	26.6	2537	28.0	2581	29.4
16600	4009	2229	19.1	2281	20.5	2331	22.0	2380	23.4	2428	24.8	2474	26.2	2518	27.6	2564	29.0	2608	30.5	2651	31.9
17400	4202	2312	21.3	2362	22.8	2411	24.3	2458	25.8	2505	27.2	2550	28.7	2593	30.2	2636	31.7	2679	33.2	2722	34.7
18200	4396	2395	23.7	2444	25.2	2491	26.8	2538	28.3	2582	29.9	2626	31.4	2669	32.9	2711	34.5	2752	36.0	2793	37.6
19000	4500	2470	26.1	2526	27.8	2573	29.4	2618	31.0	2661	32.7	2704	34.3	2746	35.9	2787	37.5	2827	39.1	2867	40.7

CFM	OV	Static Pressure In Inches																			
		7.00		7.50		8.00		8.50		9.00		10.00		11.00		12.00		13.00		14.00	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
9000	2173	2130	14.7	2195	15.9	2262	17.1														
9900	2391	2170	15.9	2231	17.1	2289	18.4	2346	19.6	2405	20.9	2526	23.7								
10800	2608	2211	17.3	2272	18.5	2330	19.8	2387	21.1	2442	22.4	2548	25.1	2656	28.0	2766	31.1				
11700	2826	2255	18.7	2313	20.0	2371	21.4	2428	22.7	2482	24.1	2588	26.9	2689	29.8	2785	32.7	2887	35.9	2988	39.2
12600	3043	2323	20.7	2371	21.9	2417	23.1	2469	24.4	2524	25.9	2629	28.8	2729	31.8	2825	34.9	2918	38.0	3006	41.1
13500	3260	2392	22.9	2440	24.2	2486	25.4	2530	26.7	2574	28.0	2670	30.8	2770	33.9	2866	37.1	2958	40.4	3047	43.6
14400	3478	2463	25.3	2509	26.6	2555	27.9	2599	29.2	2643	30.6	2726	33.3	2812	36.2	2907	39.5	2999	42.8	3087	46.2
15300	3695	2538	27.8	2581	29.2	2625	30.6	2669	32.0	2712	33.4	2795	36.2	2874	39.1	2951	42.0	3040	45.4	3129	49.0
16200	3913	2616	30.6	2658	32.1	2699	33.5	2740	34.9	2782	36.4	2864	39.4	2943	42.4	3019	45.4	3092	48.4	3170	51.8
17100	4130	2695	33.6	2737	35.1	2777	36.6	2817	38.1	2856	39.7	2935	42.7	3013	45.9	3088	49.0	3160	52.2		
18000	4347	2775	36.9	2816	38.4	2856	40.0	2896	41.6	2934	43.1	3008	46.3	3083	49.6	3158	52.9				
18900	4565	2857	40.3	2897	42.0	2936	43.6	2975	45.2	3013	46.9	3086	50.2	3157	53.6						
19800	4782	2942	44.1	2980	45.8	3017	47.5	3055	49.2	3092	50.9	3165	54.3								
20700	5000	3028	48.1	3065	49.8	3101	51.6	3137	53.4	3173	55.1										
21600	5217	3114	52.3	3150	54.2	3186	56.0														
22500	5434	3201	56.9																		

Performance shown is for model BIDW arrangement 3, installation type B - free inlet, ducted outlet.
Performance ratings do not include the effects of appurtenances in the airstream.
Power rating (BHP) does not include drive losses.

20 BIDW



% WOV = (CFM X 100) / (RPM X 8.58)

Sound Power [dB Ref 10^{-12} watts]

Inlet Sound Power, Lwi										
RPM	%WOV	1	2	3	4	5	6	7	8	LwiA
550	100	78	75	74	78	68	62	56	52	76
	80	76	73	71	75	67	60	54	50	74
	60	75	70	70	76	67	60	54	50	74
	50	75	69	69	76	67	60	54	50	75
	40	74	69	69	77	67	60	54	50	75
800	100	79	91	83	82	76	72	64	60	83
	80	80	89	81	78	72	67	59	54	80
	60	77	83	76	77	71	67	59	54	77
	50	76	80	74	76	71	67	60	55	77
	40	77	78	74	76	71	67	60	55	77
1100	100	85	92	91	89	85	81	74	70	90
	80	84	88	88	87	81	77	69	65	87
	60	83	84	83	83	79	76	70	65	85
	50	80	83	82	83	79	76	70	66	84
	40	80	83	82	83	78	75	70	66	84
1600	100	91	94	98	95	92	89	83	78	97
	80	88	91	96	93	90	86	80	75	95
	60	87	88	93	89	86	83	78	75	92
	50	87	88	91	88	85	82	78	75	91
	40	89	88	90	87	85	82	78	76	90
2200	100	98	100	103	105	98	96	91	88	105
	80	95	97	100	103	96	92	87	84	102
	60	92	93	98	99	93	91	87	84	100
	50	93	93	98	97	93	90	87	84	99
	40	95	95	98	98	92	90	88	86	99
3219	100	105	109	110	114	110	106	102	98	115
	80	103	106	107	111	107	102	98	94	112
	60	100	102	105	107	104	101	97	94	109
	50	101	103	105	105	103	100	97	94	108
	40	103	105	106	106	103	99	98	96	108

Outlet Sound Power, Lwo										
RPM	%WOV	1	2	3	4	5	6	7	8	LwoA
550	100	90	78	75	68	67	59	52	47	73
	80	90	77	71	64	64	54	47	45	70
	60	83	74	68	63	62	54	48	45	67
	50	82	73	67	63	63	54	48	45	67
	40	82	73	67	63	63	54	48	46	67
800	100	93	96	83	77	77	71	63	57	84
	80	90	92	81	73	72	64	57	52	80
	60	87	84	76	72	69	63	57	53	75
	50	87	82	74	72	68	62	57	54	74
	40	89	83	73	71	68	62	57	54	74
1100	100	99	93	90	86	86	80	74	67	90
	80	96	92	88	83	81	74	67	61	86
	60	91	87	83	78	77	71	66	61	82
	50	91	86	82	77	76	71	66	62	81
	40	92	86	81	76	75	70	66	62	80
1600	100	105	98	98	94	93	89	85	77	98
	80	102	95	96	91	92	87	81	73	96
	60	100	91	93	87	87	83	77	72	92
	50	100	92	92	86	86	81	76	72	91
	40	100	93	92	85	84	81	76	72	90
2200	100	109	105	106	109	102	97	93	88	109
	80	107	101	101	105	98	93	89	83	105
	60	103	97	96	99	96	91	86	81	100
	50	104	98	95	97	94	89	85	81	99
	40	107	100	95	95	92	89	85	81	98
3219	100	117	115	113	118	114	108	104	99	118
	80	115	112	109	113	110	104	100	94	114
	60	111	108	105	107	106	102	97	92	110
	50	112	109	104	105	104	100	96	92	108
	40	116	112	106	103	102	99	95	92	107

The sound power level ratings shown are in decibels, referred to 10^{-12} watts calculated per AMCA Standard 301. Values shown are for inlet Lwi, LwiA and outlet Lwo, LwoA sound power levels for Installation Type B: free inlet, ducted outlet. Outlet ratings include the effects of duct end correction.

Appendix I

Transportation Impact Study

Aramis Solar Energy Generation and Storage Project
Transportation Impact Study

Final Report

Prepared for:

IP Aramis, LLC

HELIX Environmental Planning, Inc.

Prepared by:

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September 2020

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1.0 Introduction

This study provides an evaluation of potential traffic and transportation impacts associated with construction of the proposed Aramis Solar Energy Generation and Storage Project (Project) in unincorporated Alameda County. This analysis is based on Project plans dated June 19, 2020, Project Sponsor construction data, and CHS Consulting Group (CHS) collected field data. The purpose of the transportation impact study is to inform the Project environmental review. The following Project impact analysis topics are addressed in this study:

- Level of Service (LOS) traffic operations (for informational purposes only);
- Vehicle Miles Traveled (VMT);
- Transit;
- Walking; and
- Bicycling.

1.1 Project Location and Site

The Project site is located in unincorporated Alameda County on portions of four privately-owned parcels (APNs 903-0006-001-02 [eastern 350 acres of a 536 acre parcel], 903-0007-002-01), 903-0006-003-07, and 902-0001-005-00) approximately 2.5 miles north of the City of Livermore.

The Project site and surrounding areas are zoned "A" (Agriculture). The site is currently cultivated and grazed and does not contain any structures. Uses of surrounding properties include grazing, electric utilities, intensive agriculture, estate and rural residential uses, and plant and animal habitat associated with Cayetano Creek, an intermittent waterway. Proposed nearby land uses include a solar photovoltaic development proposed by an unrelated applicant.

Figure 1 shows the Project location and vicinity.

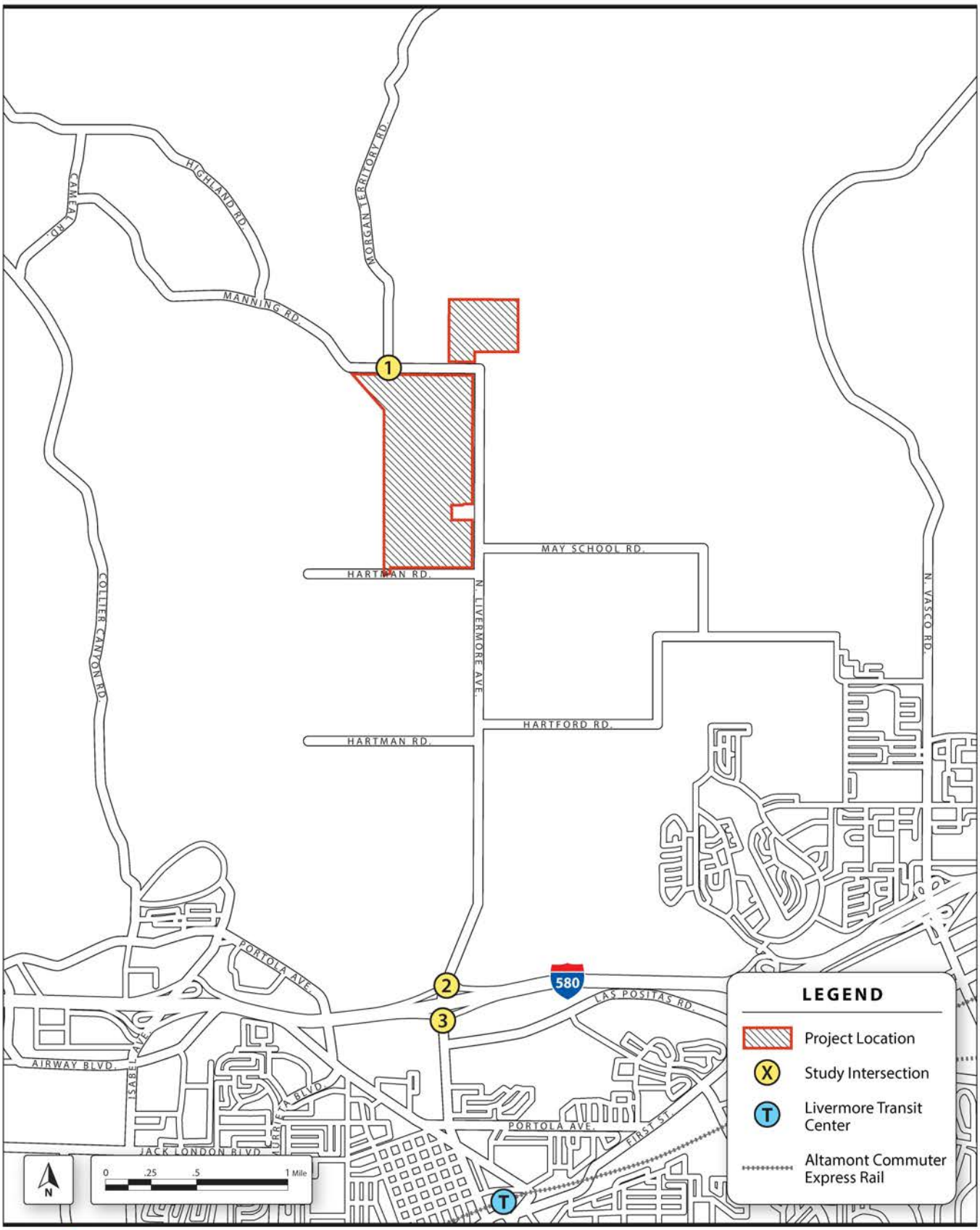

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Figure 1
Project Location

1.2 Project Description

The Project would consist of the construction and operation of a solar energy generation and storage facility within a 410-acre development footprint located in unincorporated Alameda County about two miles north of the Livermore city limits and Interstate I-580, primarily on the west side of North Livermore Avenue, and extending about two miles further north, including portions about a half mile north of the terminus of North Livermore Avenue at Manning Road.

The Project would generate 100 megawatts (MWs) of photovoltaic power with an interconnect to the public distribution system at Pacific Gas and Electric Company's (PG&E) Cayetano 230 kilovolt (kV) substation located adjacent to the Project site. The Project would serve East Bay Clean Energy (EBCE) or PG&E customers by providing local generation capacity under a long-term contract.

The Project facility would be comprised of photovoltaic modules connected in strings mounted onto a single-axis tracker racking system, which would in turn be affixed to steel piles. The module strings would track the sun during the day, from east to west, to optimize power generation of the facility. Modules would be connected by low-voltage underground or above-ground electrical wiring to a central inverter station or to string inverters located throughout the facility.

A newly constructed Project substation would be located adjacent to the PG&E Cayetano Substation, allowing the gen-tie (energy generation link to the PG&E substation) to be short and overhead with a possibility of underground construction as well. Overhead lines would be constructed on either tubular steel poles or wood H-Frames and may be constructed to be single-circuit or double-circuit. The heights of the overhead poles could vary from 30 to 100 feet.

The duration of Project construction would be approximately nine months, beginning with installation of interconnection facilities, followed by site preparation activities, cable installation, pile and skid installation, and finishing with tracker and module installation and site cleanup. Project construction would be completed in four phases, including Phase 1 site preparation (30 days), Phase 2 photovoltaic installation (150 days), Phase 3 electrical and gen-tie installation (75 days), and Phase 4 general construction operations and site clean-up and restoration (175 days). Phase 4 spans the entire construction duration. It is anticipated that construction Phases 2, 3, and 4 would overlap for approximately 10 weeks duration. According to the Project Sponsor, work for all phases would be conducted Monday through Friday between the hours of 8 a.m. and 5 p.m.

Access to the Project site would be provided via all-weather, rocked driveway aprons at four access points along North Manning Road, two access points along North Livermore Avenue, and one access point along Hartman Road. The primary internal access roads would be designed by a licensed civil engineer to ensure all-weather access by emergency response vehicles, including large fire apparatus. The primary access roads would be designed to be 16 feet wide. Banked corners and periodic three-point turnaround locations would ensure that large fire trucks may navigate the site safely. The narrower, inter-array pathways would be constructed of compacted dirt and be accessible by smaller maintenance vehicles.

Once Project construction is complete and the facilities are in full operation, up to four permanent staff could be onsite at a time for ongoing facility maintenance and repairs and up to 12 workers could be onsite once annually for module washing. Personnel and time required for emergency maintenance would vary in accordance with the necessary response.

Figure 2 presents the Project site layout. Detailed Project site plans are provided in **Appendix A**.

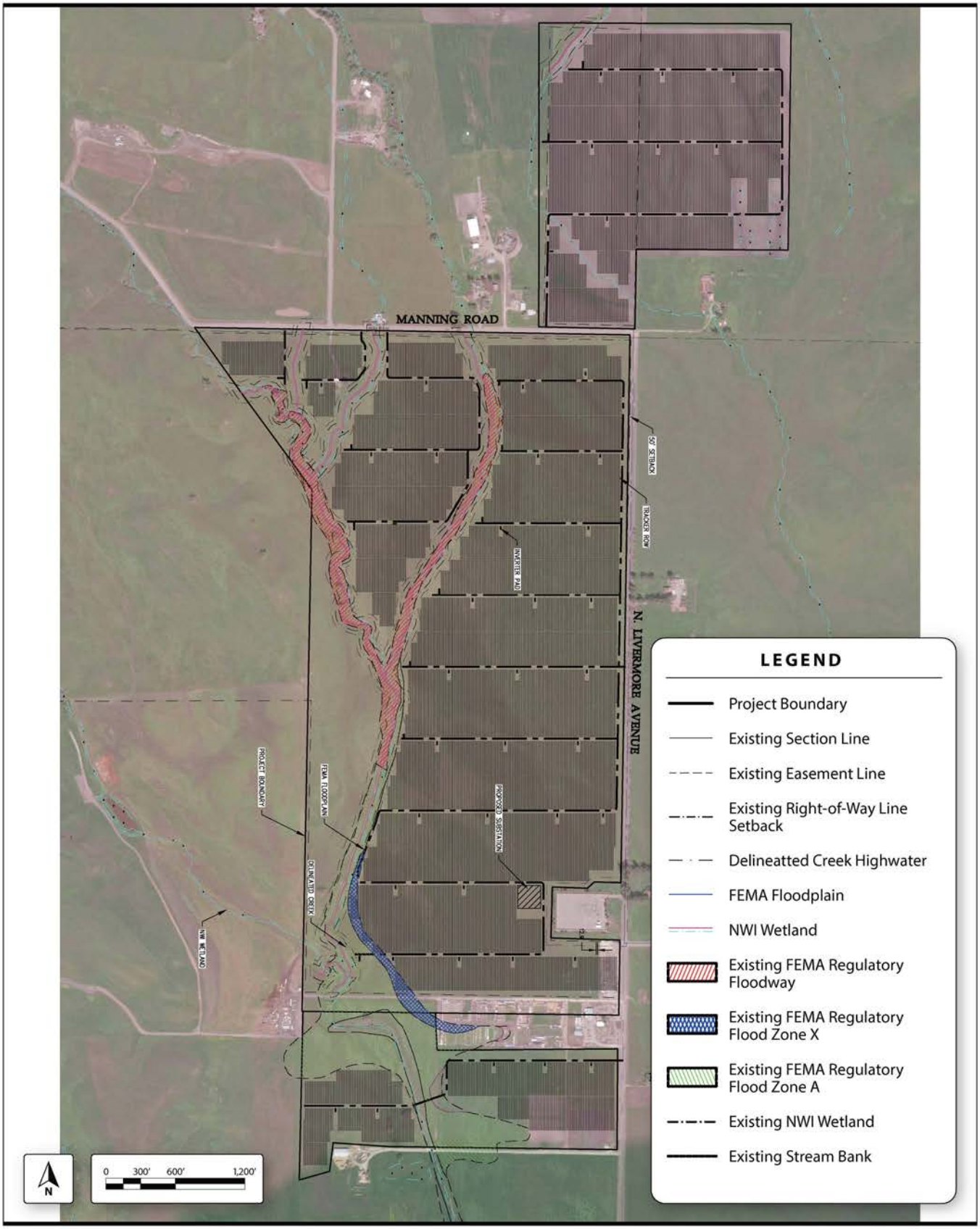

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Figure 2
Project Site Plan

1.3 Study Scope and Approach

The scope of this transportation study includes analysis of impacts under the following two scenarios:

- Existing Conditions – this scenario represents current traffic and transportation conditions prior to commencement of Project construction.[1]
- Existing plus Project Conditions – this scenario is identical to Existing Conditions, but with the addition of Project-generated construction traffic.

Typically, most transportation studies focus on impacts after a project is constructed and in operation, as the expected traffic generation once in operation is usually higher than that generated under any construction phase or combination of phases. For this Project, however, the reverse is true. Once the Project is in operation, an average of four workers would be onsite each weekday and up to 12 workers would access the site once annually for scheduled module washing, which would result in daily vehicle volumes below any threshold of measurable or adverse effect. As such, this study focuses on construction-related impacts.

Given the minimal traffic that would be generated by the Project on a daily basis once in operation, the study focuses only on near-term impacts, and as such, no cumulative year analysis has been conducted. Project-generated VMT was evaluated for the purposes of traffic analysis consistent with CEQA Guidelines Appendix G. Additionally, study intersections were evaluated using the *2000 Highway Capacity Manual* operations methodology to determine potential Project effects on local traffic operations during construction for informational purposes.[2] Project trips were estimated based on a Project Sponsor-provided construction program that estimates the maximum number of construction truck haul trips and worker trips based on overlapping phases during construction. Trip distribution was based on Project Sponsor-anticipated commute origins of Project contractors and origin/destination data for construction truck haul trips.

The following three intersections were analyzed for this study, which CHS developed in coordination with County Staff and is based on experience with the study area and the Project Sponsor-anticipated origins and routes of construction worker and truck trips:[3]

1. Morgan Territory Road / Manning Road
2. North Livermore Avenue / I-580 Westbound Ramps
3. North Livermore Avenue / I-580 Eastbound Ramps

---

[1] Note: The field analysis for this study was completed prior to the initiation of state and local health official orders to Shelter-in-Place due to the Covid-19 pandemic, which has generally resulted in lower traffic volumes both locally and regionally. The volumes used in this study therefore represent worst-case pre Covid-19 pandemic conditions.

[2] The *2000 Highway Capacity Manual* (HCM) operations methodology was used for the purposes of this study because of a limitation in the *2010 HCM* methodology. The *2010 HCM* methodology cannot calculate delay for turning movements with shared and exclusive lanes, which includes the study intersections of North Livermore Avenue and the I-580 westbound and eastbound ramps. For consistency, the *2000 HCM* methodology was used for all study intersections.

[3] Based on discussions with County Staff it is noted that Hartford, Lorraine, and Raymond roads are used as alternative "cut-through" traffic routes between I-580 and the Springtown neighborhood in Livermore. However, these traffic volumes have been captured at the above study intersections.

2.0 Existing Conditions

This section describes the existing transportation conditions in the Project area, presented in **Figure 1,** p. 2. The existing setting includes descriptions of the roadways and documentation of existing vehicular traffic, local and regional transit service, pedestrian, and bicycle access conditions.

2.1 Roadway Network

The following includes a discussion of existing roadways in the vicinity of the Project. The functional designation of each roadway was obtained from the *Alameda County General Plan (General Plan)*[4] and the *East County Area Plan (ECAP)*.[5]

The Alameda County roadway system is comprised of freeways, arterials, collector, and local streets. The *General Plan* defines freeways as high-speed, high-capacity transportation facilities serving regional and countywide travel; arterials as high mobility, high-capacity roadways that provide access to regional transportation facilities, accommodate intra-community travel, and connect the rest of the countywide collector system; collectors as low-speed, low-volume streets with two lanes that provide for circulation within and between neighborhoods, and support relatively short trips and are meant to collect vehicles from local streets and distribute them to the arterial network; and local streets as roadways that provide access to individual properties, primarily residences and businesses, and connect to the County's network of arterial and collector streets.

2.1.1 Regional Access

Interstate 580 (I-580) is an eight- to ten-lane east-west freeway that runs from the San Francisco-Oakland Bay Bridge, traveling through the Eden Area in Ashland, before turning east to Castro Valley, Livermore, and the Central Valley. Access to I-580 from the Project site is provided via North Livermore Avenue (approximately two miles south of the Project site).

2.1.2 Local Access

Local access is provided by several local roadways in proximity to the Project site, all designated as collector roadways in the *ECAP*. Descriptions of these roadways are presented below.

North Livermore Avenue is a north-south roadway that runs from Manning Road to I-580 and continues south through downtown Livermore to Tesla Road in the south Livermore area. In the vicinity of the Project site, this roadway operates with one travel lane in each direction. On-street parking is prohibited at all times along both sides of the roadway. Class II bike lanes are provided on both sides of the street, between Manning Road and the I-580 westbound ramps. The *General Plan* identifies North Livermore Road as an arterial roadway within the Livermore city limits and as a collector route north of I-580.

---

[4] *Alameda County General Plan Annual Report for 2017*

[5] *East County Area Plan, A Portion of the Alameda County General Plan,* Volume 1, May 2002

May School Road is an east-west roadway that extends eastward from North Livermore Avenue, and connects in sequence to Dagnino and Raymond Roads, Ames Street and Dalton Avenue, by which vehicles can connect to Vasco Road, an expressway connecting the Tri-Valley area to eastern Contra Costa County. Hartford Avenue and Lorraine Street functionally parallel the connection of May School and Dagnino Roads to Raymond Road about a mile to the south.

Manning Road is an east-west roadway that extends westward from the terminus of North Livermore Avenue to various roads that lead into Contra Costa County and a mixture of farms, estate properties and other agricultural uses in both Alameda and Contra Costa Counties, served by Morgan Territory, Highland, Collier Canyon and Carneal Roads. Camino Tassajara and the rural residential community of Tassajara in Contra Costa County is approximately six miles west of the North Livermore Avenue terminus.

Morgan Territory Road is a north-south roadway that runs from Manning Road to Marsh Creek Road. In the vicinity of the Project site, this roadway operates with one travel lane in each direction. There are no pedestrian or bicycle facilities provided on Morgan Territory Road. The *General Plan* identifies Morgan Territory Road as a collector street.

There are no pedestrian facilities on any of the local roads and the bike lane on North Livermore Avenue is the only Class II bicycle facility in the area. Manning, May School, Hartford and Collier Canyon roads are designated as Class III rural routes in the *Alameda County Bicycle and Pedestrian Master Plan for Unincorporated Areas.* [6]

2.2 Intersection Traffic Volumes

The three study intersections were counted on Thursday, February 26, 2020 during weekday a.m. (7-9 a.m.) and p.m. (4-6 p.m.) peak periods. The intersections and their traffic controls are listed below. Collected vehicle, bicycle, and pedestrian volumes for the weekday a.m. and p.m. peak periods are presented in **Appendix B**.

1. Morgan Territory Road / Manning Road (One-Way Stop Controlled)
2. North Livermore Avenue / I-580 Westbound Ramps (Signalized)
3. North Livermore Avenue / I-580 Eastbound Ramps (Signalized)

Figure 3 presents existing lane configurations and weekday a.m. and p.m. peak hour vehicle turning movements for the study intersections.

[6] Public Works Agency, 2012, as updated through 2019.

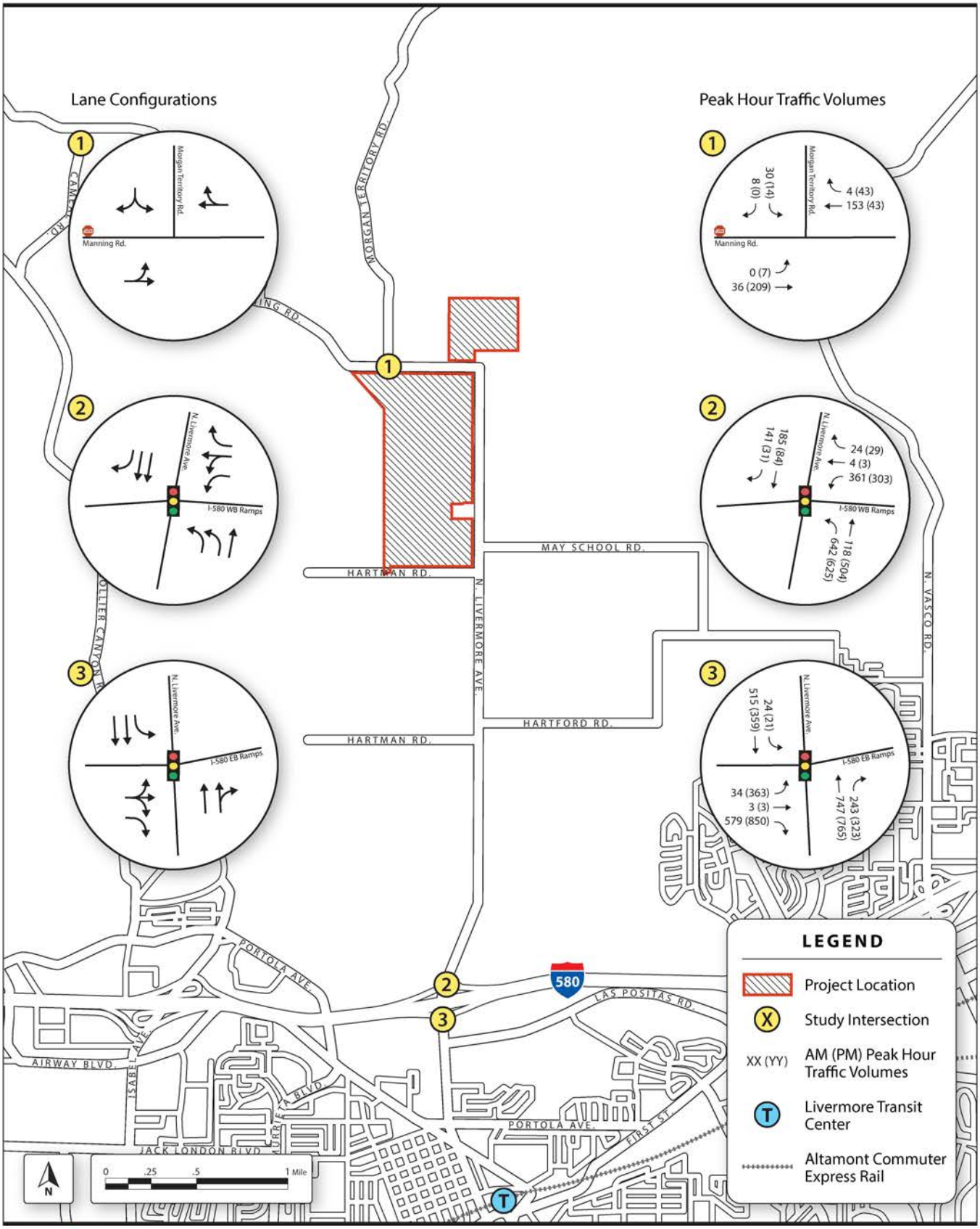

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Figure 3
Existing Conditions Lane Configurations
and Peak Hour Traffic Volumes

2.3 Level of Service Methodology

Traffic operational level of service (LOS) conditions were evaluated for traffic during weekday a.m. (7-9 a.m.) and p.m. (4-6 p.m.) peak periods and is provided for informational purposes only. LOS is a qualitative description of an intersection's performance based on the average delay per vehicle. Intersection LOS range from LOS A, which indicates free flow conditions with minimal delays, to LOS F, which indicates congested conditions with considerably long delays.

The study intersections were evaluated using the *2000 Highway Capacity Manual* operations methodology. This method determines the capacity for each directional approach to an intersection. LOS is calculated based on the average stopped delay (seconds per vehicle) for the various approaches at the intersection. For signalized intersections, CHS additionally incorporated current Caltrans signal timing cards.[7]

2.4 Level of Service Analysis – Existing Conditions

Table 1 presents the LOS and delay analysis results for the study intersections during the weekday a.m. and p.m. peak hours under Existing Conditions. Existing Conditions intersection LOS calculations are provided in **Appendix C**. As shown in **Table 1,** all the study intersections are currently operating at LOS C or better under Existing Conditions.

Table 1: Existing Conditions: Peak Hour Intersection Level of Service Results

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
1. Morgan Territory Rd. / Manning Rd.	One-Way Stop Controlled	9.9	A	10.7	B
2. North Livermore Ave. / I-580 WB Ramps	Signalized	16.9	B	16.5	B
3. North Livermore Ave. / I-580 EB Ramps	Signalized	10.7	B	26.6	C

Source: CHS Consulting Group, 2020

Notes:

1. Delay reported as seconds per vehicle. For signalized and all-way stop controlled intersections, a weighted average delay and level of service (LOS) based on all intersection approaches is reported. For unsignalized intersections (1-way and 2-way stop controlled), delay and LOS for the worst stop-controlled approach is reported.
2. WB = westbound; EB = eastbound; LOS = Level of Service

2.5 95th Percentile Vehicle Queue Length Analysis – Existing Conditions

Peak hour 95th percentile queue lengths were also reviewed and compared with the existing storage capacity of turn lanes at study intersections where Project-generated traffic is expected to be added, including the southbound right-turn lane at the North Livermore Avenue and I-580 westbound ramp intersection and southbound left-turn and eastbound shared left, through, and right-turn lane at the North Livermore Avenue and I-580 eastbound ramp intersection. Existing a.m. and p.m. peak hour intersection queue analysis results are summarized in **Table 2,** which shows that the 95th percentile vehicle queue lengths at study intersections

[7] Signal timing cards provide the complete timing program for signalized traffic intersections that establish the sequence of operation and amount of time allocated to each intersection approach while considering time for pedestrians and other users.

are currently accommodated within existing storage capacity for both peak hours under Existing Conditions. Furthermore, field analysis for this study was completed prior to the Shelter-in-Place order due to the Covid-19 pandemic that has resulted in substantially lower traffic volumes both locally and regionally, and thus represents a conservative worst-case condition that may not reflect actual conditions at the time of construction.

Table 2: Existing Conditions: Peak Hour Intersection Queue Analysis Results

Intersection	Turn Lane	Storage Capacity (feet)	95th Percentile Queue Length (feet)	
			AM Peak Hour	PM Peak Hour
North Livermore Ave. / I-580 WB Ramps	SBR	140	40	0
North Livermore Ave. / I-580 EB Ramps	EBLTR	530	66	454
	SBL	240	16	8

Source: CHS Consulting Group, 2020

Notes:

1. Results for the a.m. peak hour queue analysis can be reasonably expected based on field observations of existing a.m. peak hour vehicle queues conducted on Thursday, February 26, 2020 (pre-COVID shelter in place orders).
2. Bold text indicates 95th percentile queue length exceeds existing turn pocket capacity
3. WB = westbound; EB = eastbound; EBLTR = eastbound shared left, thru, right lane; SBL = southbound left-turn lane; SBR = southbound right-turn lane

2.6 Vehicle Miles Traveled (VMT) – Existing Conditions

Vehicle miles traveled (VMT) is a measurement of miles traveled by vehicles within a specified region for a specified time period.[8] The Project site is located in a rural setting and the site itself is currently used for agricultural cultivation and grazing. As such, the Project site generates minimal vehicle trips and proportionally minimal VMT that cannot be feasibly quantified.

2.7 Transit Conditions

The Project site is not currently served by local public transit service, nor is any such service anticipated to be established in the area in the foreseeable future. The Livermore–Amador Valley Transit Authority (LAVTA) operates the WHEELS bus service, which provides local public transit to the cities of Dublin, Livermore, Pleasanton, and unincorporated areas of Alameda County. LAVTA also provides connecting service to Bay Area Rapid Transit (BART), Altamont Commuter Express (ACE), and Central Contra County Transportation Authority (County Connection). The closest WHEELS route, Route 580X, operates through two study intersections (North Livermore Avenue / I-580 eastbound ramps and North Livermore Avenue / I-580 westbound ramps). The nearest transit stops are located on North Livermore Avenue just south of the intersection with Las Positas Road (approximately 2.2 miles south of the Project site), no bus stops directly serve the Project site. Route 580X operates two-way express service between 5:57 a.m. and 8:26 a.m., and between 4:29 p.m. and 7:28 p.m. with 30-minute headways. This route provides service between the Livermore Transit Center and East Dublin / Pleasanton BART Station. **Figure 4** presents the transit lines and bus stop locations within the Project area.

[8] Source: Alameda County Congestion Management Program, September 2019

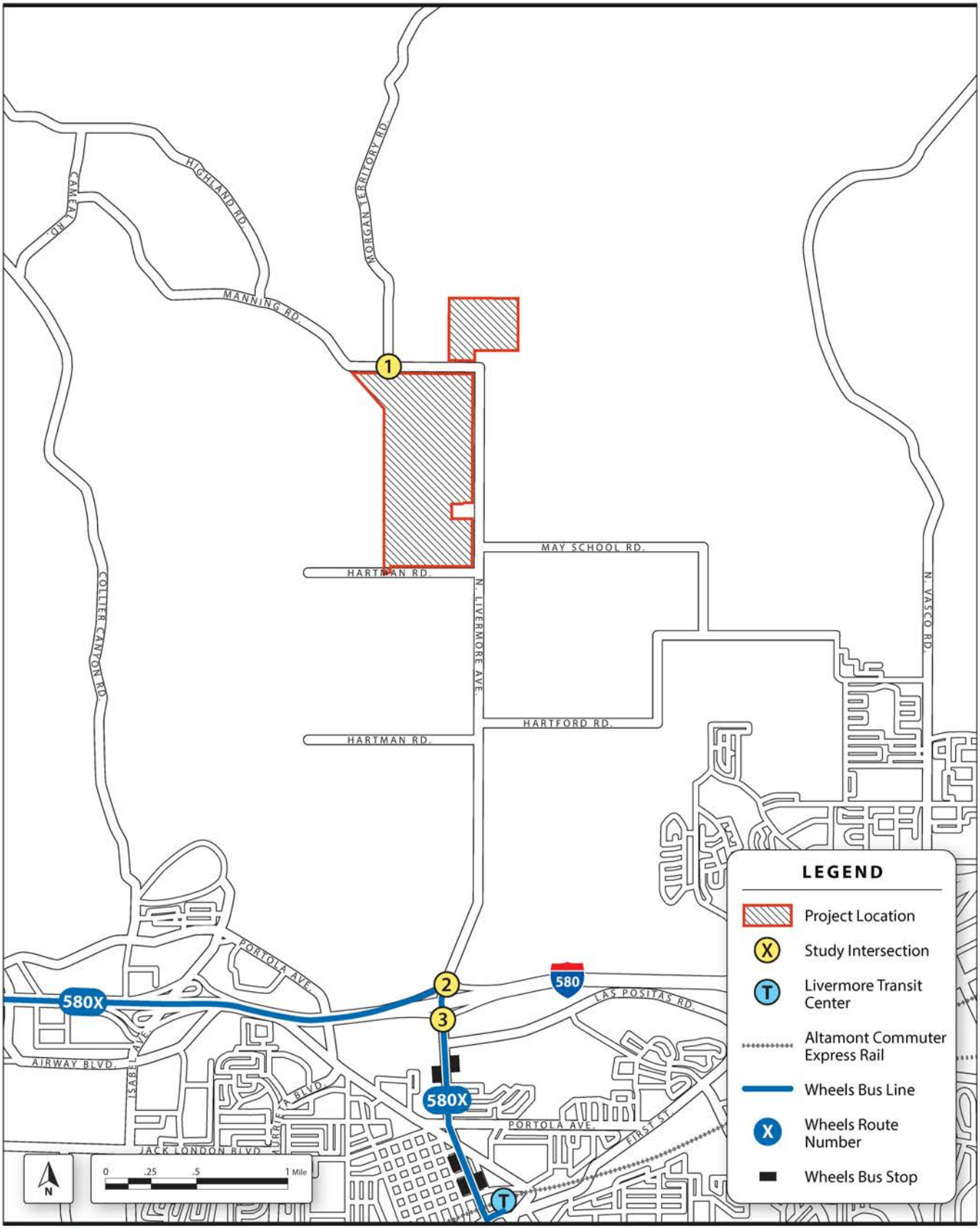

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Figure 4
Existing Transit Network

2.8 Walking/Accessibility Conditions

The Project site is located in a rural setting in unincorporated Alameda County. Generally, there are no pedestrian facilities surrounding the Project site or at any of the study intersections in the Project vicinity. Such facilities may include pedestrian crosswalks, curb-ramps, and pedestrian signal heads.

CHS collected pedestrian counts at each study intersection on Thursday, November 7, 2019 during the a.m. (7-9 a.m.) and p.m. (4-6 p.m.) peak periods (see **Appendix B**). Indicative of the rural Project vicinity, existing peak hour pedestrian volumes are generally very low, with three during the a.m. peak hour and two during the p.m. peak hour at the Morgan Territory / Manning intersection. No pedestrian crossings were observed at the intersections of North Livermore Avenue and the I-580 ramps.

2.9 Bicycle Conditions

Bicycle facilities include bicycle lanes, trails, and paths. On-street bicycle facilities include the following classifications:

Class I Bikeways - Shared-use paths with two-way paved facilities, physically separated from vehicular traffic for use by bicyclists, pedestrians, or other non-motorized users; and includes trails that are unpaved paths accessible by bicycles and pedestrians, which are not considered accessible by Americans with Disabilities Act (ADA) standards.

Class II Bikeways **-** Bike lanes striped within the paved areas of roadways and established for the exclusive use of bicycles; and includes buffered bicycle lanes that provide an additional painted buffer between the striped bicycle lane and adjacent travel lane.

Class III Bikeways - Signed bicycle routes that allow bicycles to share travel lanes with vehicles on low-speed residential and rural roadways where bicyclists have priority.

Class IV Separated Bikeways - On-street bike facilities that are physically separated from traffic by curbs, plant boxes, bollards, grade separation, or parked cars for exclusive right-of-way for use by bicyclists.

Existing Bikeways

According to the *Alameda County Bicycle and Pedestrian Master Plan for Unincorporated Areas* (*Bike Plan*)[9], unincorporated Alameda County currently has approximately 65.8 miles of bikeways including Class I (4.4 miles), Class II (40.8 miles), Class III (20.6 miles). There are currently no Class IV bikeways in unincorporated Alameda County.

Adjacent to the Project site, there are Class II bike lanes that run in both the north and south directions along North Livermore Avenue, beginning north of Cayetano Court (north of I-580) and ending at Manning Avenue. There are no other existing bikeways in proximity to the Project site. Indicative of the minimal area bicycle

[9] Source: *Alameda County Bicycle and Pedestrian Master Plan for Unincorporated Areas*, Draft Plan, September 2019

facilities, no a.m. and p.m. peak hour bicycle trips were observed at the study intersections (see **Appendix B**). However, it is noted that bicycle routes in the study area would typically not serve a conventional bicycle commuter function, but primarily are intended for recreational and inter-regional access routes. As a result, bicycle traffic on study roadways are typically higher during the weekends and outside of the typical weekday peak commute periods. Furthermore, the area is host to several annual spring, summer, and fall bicycle touring, racing, and charity events that use these rural bike routes.

Future Bikeway Improvements

In terms of future bikeways, the *Bike Plan* recommends an additional 200 miles of bicycle facilities that would increase the system-wide total mileage of bikeways to 265.9 miles, including Class I shared use paths (32.2 miles), Class II bike lanes (58.9 miles), Class III bike routes (164.8 miles), and Class IV separated bikeways (10 miles).

South of the Project site, future Class III bike routes are proposed along Hartford Avenue, May School Road, and Manning Avenue. Further south, the *Livermore Bicycle, Pedestrian, and Trail Active Transportation Plan* (*Livermore Active Transportation Plan*)[10] proposes Class II bike lanes along North Livermore Avenue, between the I-580 westbound ramps and Las Positas Road.

Figure 5 shows the location of existing and proposed bikeways near the Project site.

[10] Source: Livermore Bicycle, Pedestrian, and Trails Active Transportation Plan, June 2018

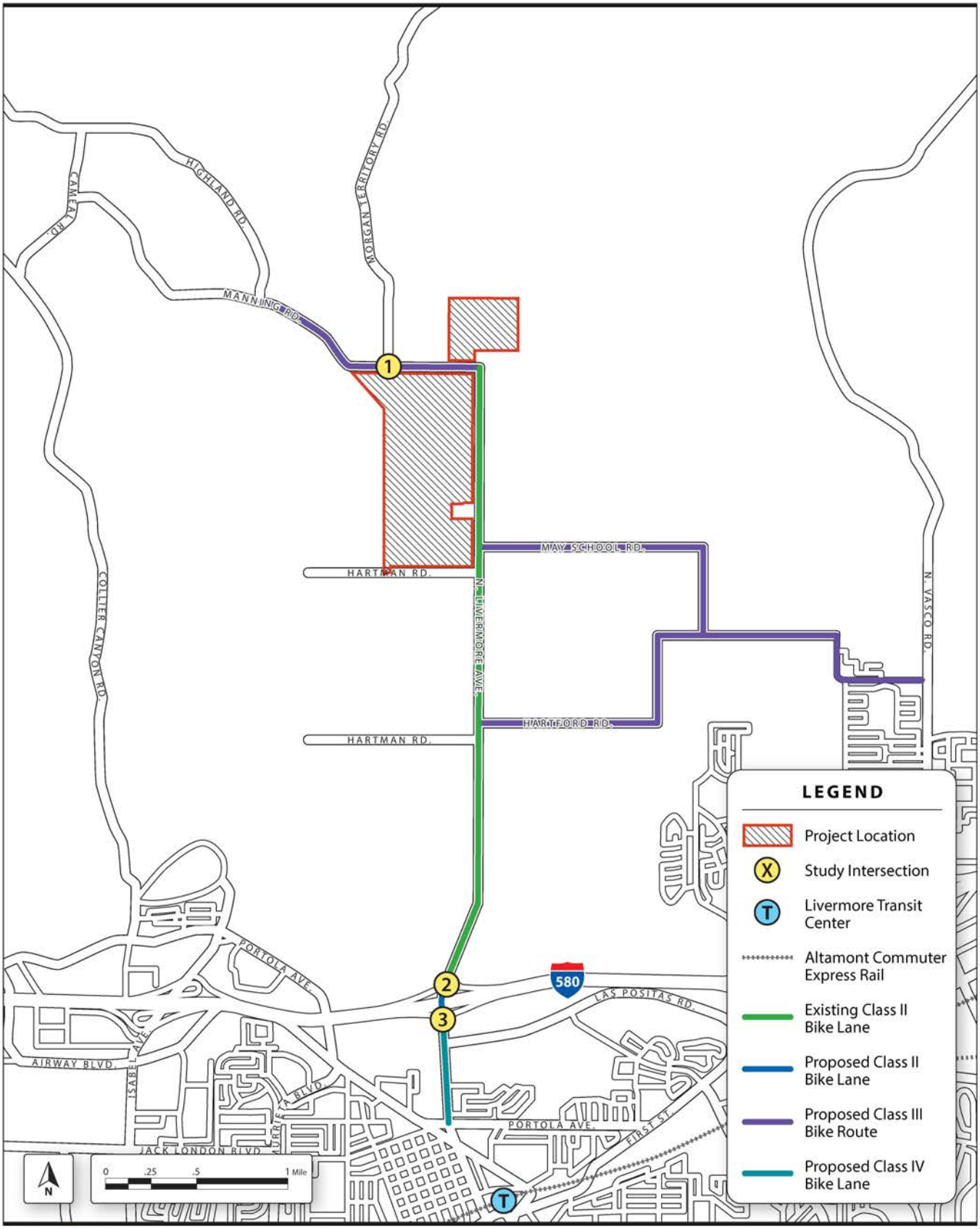

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Figure 5
Existing and Proposed Bicycle Network

3.0 Regulatory Setting

3.1 Alameda County

The ECAP contains goals and policies to maintain an efficient circulation network in the eastern portion of Alameda County. These goals include creating and maintaining a balanced multimodal transportation system, cooperating with other regional transportation planning agencies, integrating pedestrian infrastructure into the transportation system, and mitigating exceedances of LOS standards. The ECAP standard for major intercity arterials is LOS D or better, which includes the Project study intersection of Manning Road and Morgan Territory Road. Alameda County has not established designated local truck routes nor adopted specific policies regarding management of construction activities.

In 2013, the State of California passed Senate Bill (SB) 743, transitioning from automobile delay (commonly measures by LOS) to VMT in transportation analysis under the California Environmental Quality Act (CEQA). It should be noted that SB 743 requires CEQA lead agencies to eliminate the use of vehicular LOS as the primary transportation metric. Therefore, LOS analysis is presented for informational purposes only. The California Governor's Office of Planning and Research (OPR) has mandated that all CEQA lead agencies adopt a new VMT transportation metric by July 1, 2020. Alameda County, the CEQA lead agency for this Project, is currently in the process of transitioning to the VMT metric.

3.2 Alameda County Transportation Commission (Alameda CTC)

The Alameda County Transportation Commission (Alameda CTC) is a joint powers authority that plans, funds and delivers transportation programs and projects that expand access and improve mobility to foster a vibrant and livable Alameda County. It was formed in 2010 from the merger of the Alameda County Transportation Improvement Authority and the Alameda County Congestion Management Agency.

As required by state law, Alameda CTC updates its Congestion Management Program (CMP) every two years by monitoring the operational performance of the designated County CMP road network. The current CMP was adopted in September 2019. The Alameda CTC is currently in the process of transitioning to VMT as the primary metric for traffic impacts. Until this transition is complete and resolved through amended CMP legislation, the Alameda CMP minimum standard for monitored roads and freeways in the CMP network of LOS E remains the agency's transportation metric and as such is applied to this study. The study intersections include two County CMP network roadways, North Livermore Avenue and I-580.

It is noted that Alameda CTC CMP standards and travel demand measures are focused on traffic impacts associated with future development, and as such do not apply to construction activities such as the Project in which there are temporary, short-term traffic increases that are eliminated once construction is completed.

3.3 California Department of Transportation (Caltrans)

The California Department of Transportation (Caltrans) is a state agency overseeing state highway, bridge, and rail transportation planning, construction, maintenance and operation. Caltrans' 2002 Guide for the Preparation of Traffic Impact Studies provides the fundamental criteria and guidelines for conducting such studies. In terms of state highway LOS standards, Caltrans "endeavors to maintain a target LOS at the transition between LOS 'C' and LOS 'D'... on State highway facilities." (California Department of Transportation 2002:1). However, Caltrans recognizes that this may not always be feasible and invites lead agencies to consult with the agency to determine appropriate levels of service for particular state highway facilities. It should also be noted that the study intersections of North Livermore Avenue and the I-580 eastbound and westbound ramps are under Caltrans jurisdiction.

3.4 Project Study Transportation Metric

Based on the preceding criteria and for informational purposes only, the *Area Plan* LOS standards for major intercity arterials of LOS D or better apply to the study intersection of Manning and Morgan Territory roads, and the Alameda County CMA standards for key roads and freeways in the CMP network of LOS E or better apply to the study intersections of North Livermore Avenue and I-580 westbound ramps and North Livermore Avenue and I-580 eastbound ramps.

3.5 State Significance Criteria (CEQA)

Based on the CEQA Guidelines Appendix G, the Project would result in a significant impact on transportation and traffic if it would:

a. Conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

b. Conflicts, or be inconsistent, with CEQA Guidelines section 15064.3, subdivision (b)(1).[11]

c. Substantially increases hazards due to a geometric design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

d. Results in inadequate emergency access.

[11] CEQA Guidelines section 15064.3, subdivision (b)(1), establishes that VMT exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high-quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

4.0 EXISTING PLUS PROJECT CONDITIONS

This section presents analysis results for Existing plus Project Conditions, which is identical to Existing Conditions but with added traffic from Project construction activities.

4.1 Project Trip Generation

CHS developed Project vehicular trip generation based on Project Sponsor-provided data on proposed construction activities. Specific data used include the anticipated construction schedule, maximum number of workers onsite during each construction phase, and truck haul trips required to complete each phase. As discussed in Section 1.2, the Project would be constructed over a nine-month period and generally completed in four phases. The peak of construction activity is anticipated occur when Phases 2, 3, and 4 overlap for approximately 50 days. Worker vehicle trips and truck haul trips are estimated separately as they represent distinct trip types. Detailed Project trip generation calculations are provided in **Appendix D**.

4.1.1 Worker Trips

The total number of daily construction workers will vary depending on the specific phases and their overlap. Based on confirmation with the Project Sponsor, construction workers are expected to generate approximately four trips per person on a daily basis, including two commute trips (one a.m. peak hour inbound and one p.m. peak hour outbound) and two auxiliary trips (one inbound and one outbound) during the midday for offsite trips. For conservative (worst-case) calculation purposes and given the lack of transit access to the site, it was assumed that all workers would drive alone. **Table 3** shows the maximum number of workers anticipated on-site per day during each construction phase.

Table 3: Worker Trips by Construction Phase

Construction Phase	Maximum Workers Onsite	Worker Trips						
		Daily	AM Peak Hour			PM Peak Hour		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Phase 1	100	400	100	0	100	0	100	100
Phase 2	250	1,000	250	0	250	0	250	250
Phase 3	125	500	125	0	125	0	125	125
Phase 4[1]	0	0	0	0	0	0	0	0
Peak Construction[2]	**375**	**1,500**	**375**	**0**	**375**	**0**	**375**	**375**

Source: IP Aramis, LLC; CHS Consulting Group, 2020

Notes:

1. No additional worker trips are expected for Phase 4, as all Phase 4 activities would use available workers associated with Phases 1, 2, and 3.
2. Peak construction includes the overlap of Phases 2, 3, and 4 for up to 50 days in duration.

As shown in **Table 3**, during the peak overlap of Phases 2, 3, and 4, up to 375 workers would be on-site during a typical workday. This would equate to approximately 1,500 daily worker trips, including 375 trips inbound during the a.m. peak hour and 375 trips outbound during p.m. peak hour.

4.1.2 Truck Haul Trips

Similar to worker trips, the total number of truck haul trips generated at the Project site will vary depending on the construction phase and any overlap. The Project Sponsor provided CHS with the maximum expected truck haul trips required during each construction phase. Based on confirmation with the Project Sponsor, trucks would deliver construction materials and remove refuse material from the site on a continual basis on weekdays from 8 a.m. to 5 p.m. with an even 50/50, inbound/outbound split each hour. Based on these assumptions, the maximum number of truck haul trips were divided by the total number of workdays in each phase to estimate the maximum daily trips for each phase. **Table 4** shows the maximum number of daily truck haul trips to/from the Project site during each construction phase.

Table 4: Truck Haul Trips by Construction Phase

Construction Phase	Truck Haul Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		Inbound	Outbound	Total	Inbound	Outbound	Total
Phase 1	46	3	2	5	2	3	5
Phase 2	52	3	3	6	3	3	6
Phase 3	10	1	1	2	1	1	2
Phase 4	59	3	3	6	3	3	6
Peak Construction[1]	**121**	**7**	**7**	**14**	**7**	**7**	**14**

Source: Intersect Power; CHS Consulting Group, 2020

Notes:

1. Peak construction includes the overlap of Phases 2, 3, and 4 for up to 50 weeks duration.

As shown in **Table 4**, during the peak overlap of Phases 2, 3, and 4, up to 121 daily truck haul trips would be generated, including 14 trips (seven inbound and seven outbound) during both the a.m. and p.m. peak hours.

4.1.3 Composite of Project Trips

To estimate the maximum number of total Project trips, the preceding trip generation analysis of worker and truck haul trips were combined to estimate the maximum number of total trips per phase for use in the subsequent traffic analysis. **Table 5** shows the composite maximum number of trips to/from the Project site during each construction phase.

Table 5: Total Project Trips by Construction Phase

Construction Phase	Trip Type	Daily Trips	AM Peak Hour			PM Peak Hour		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Phase 1	Worker	400	100	0	100	0	100	100
	Truck	46	3	2	5	2	3	5
	Total	***446***	***103***	***2***	***105***	***2***	***103***	***105***
Phase 2	Worker	1,000	250	0	250	0	250	250
	Truck	52	3	3	6	3	3	6
	Total	***1,052***	***253***	***3***	***256***	***3***	***253***	***256***
Phase 3	Worker	500	125	0	125	0	125	125
	Truck	10	1	1	2	1	1	2
	Total	***510***	***126***	***1***	***127***	***1***	***126***	***127***
Phase 4[1]	Worker	0	0	0	0	0	0	0
	Truck	59	3	3	6	3	3	6
	Total	***59***	***3***	***3***	***6***	***3***	***3***	***6***
Peak Construction[2]	Worker	1,500	375	0	375	0	375	375
	Truck	121	7	7	14	7	7	14
	Total	**1,621**	**382**	**7**	**389**	**7**	**382**	**389**

Source: IP Aramis, LLC; CHS Consulting Group, 2020

Notes:

1. No additional worker trips are expected for Phase 4, as all Phase 4 activities would use available workers associated with Phases 1, 2, and 3.
2. Peak construction includes the overlap of Phases 2, 3, and 4 for up to 50 days in duration.

As shown in **Table 5**, during the peak overlap of Phases 2, 3, and 4, up to 1,621 trips would be generated (1,500 worker and 121 truck haul trips), including 389 trips (382 inbound and seven outbound) during the a.m. peak hour and 389 trips (seven inbound and 382 outbound) during the p.m. peak hour.

4.2 Project Trip Distribution and Assignment

The Project Sponsor provided CHS with specific worker home-origin data based on the home locations of anticipated construction contractors, which assumes that the Project workforce trips would primarily originate in the cities of Oakland, San Leandro, Hayward, Fremont, and Tracy. To estimate the proportion of construction workers arriving from each of the five East Bay cities, the US Census Bureau's 2018 American Community Survey (ACS) data was used to calculate the proportion of construction workers residing in each city. **Table 6** shows that most construction workers would come from Oakland (42 percent), followed by Hayward (20 percent), Tracy (15 percent), Fremont (12 percent) and San Leandro (11 percent).

Table 6: Distribution of Project Construction Workers by Origin City

Origin City	Construction Worker Population	Proportion of Workers (%)
Oakland	13,727	42
San Leandro	3,740	11
Hayward	6,441	20
Fremont	3,872	12
Tracy	4,885	15
Total	**32,665**	**100**

Source: American Community Survey (ACS), Industry for the Civilian Employed Population 16 Years and Over, 2018; CHS Consulting Group, 2020

Additionally, all Project truck haul trips are expected to originate from the Port of Oakland. The resulting proportion of worker trips originating from each city and Project truck haul trips originating from the Port of Oakland were used to estimate a composite trip distribution for assigning Project trips to the study roadway network. Based on additional discussion with County Staff, it was determined there is potential for workers to originate locally from the Tri-Valley area, including Dublin, Livermore, Pleasanton, and San Ramon, and from Walnut Creek, Pittsburg, Byron, and Concord to the north. As a result, the majority of construction trips are expected use I-580, 10 percent would use Manning Road, and 10 percent would use North Livermore Avenue to access the Project site. **Table 7** shows the composite distribution of worker vehicle trips and truck haul trips on the study roadway network during the a.m. and p.m. peak hours.

Table 7: Peak Hour Project Vehicle Trip Distribution

Route	Proportion of Trips (%)
I-580 (to/from the east)	13
I-580 (to/from the west)	67
Manning Road (to/from the north)	10
North Livermore Avenue (to/from the south)	10

Project trips were then assigned to the study intersections based on the distribution of workers and truck trips during the a.m. and p.m. peak hours indicated in **Tables 6** and **7**. **Figure 6** presents the a.m. and p.m. peak hour trip distribution and trip assignment at Project study intersections. **Figure 7** presents the a.m. and p.m. peak hour Existing plus Project Conditions traffic volumes at the study intersections, resulting from the addition of Project trips to Existing Conditions traffic volumes.

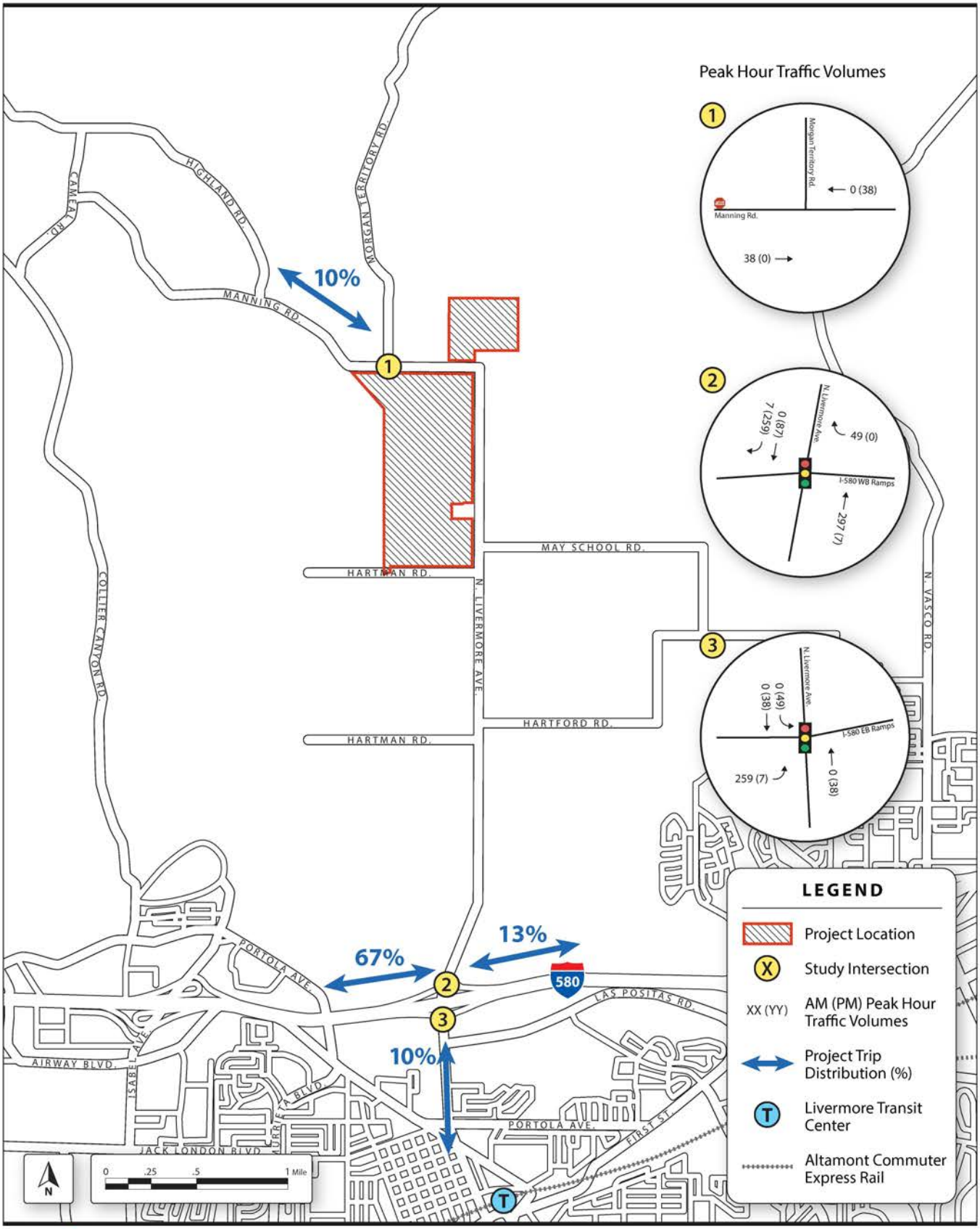

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Figure 6
Project Trip Distribution and Trip Assignments

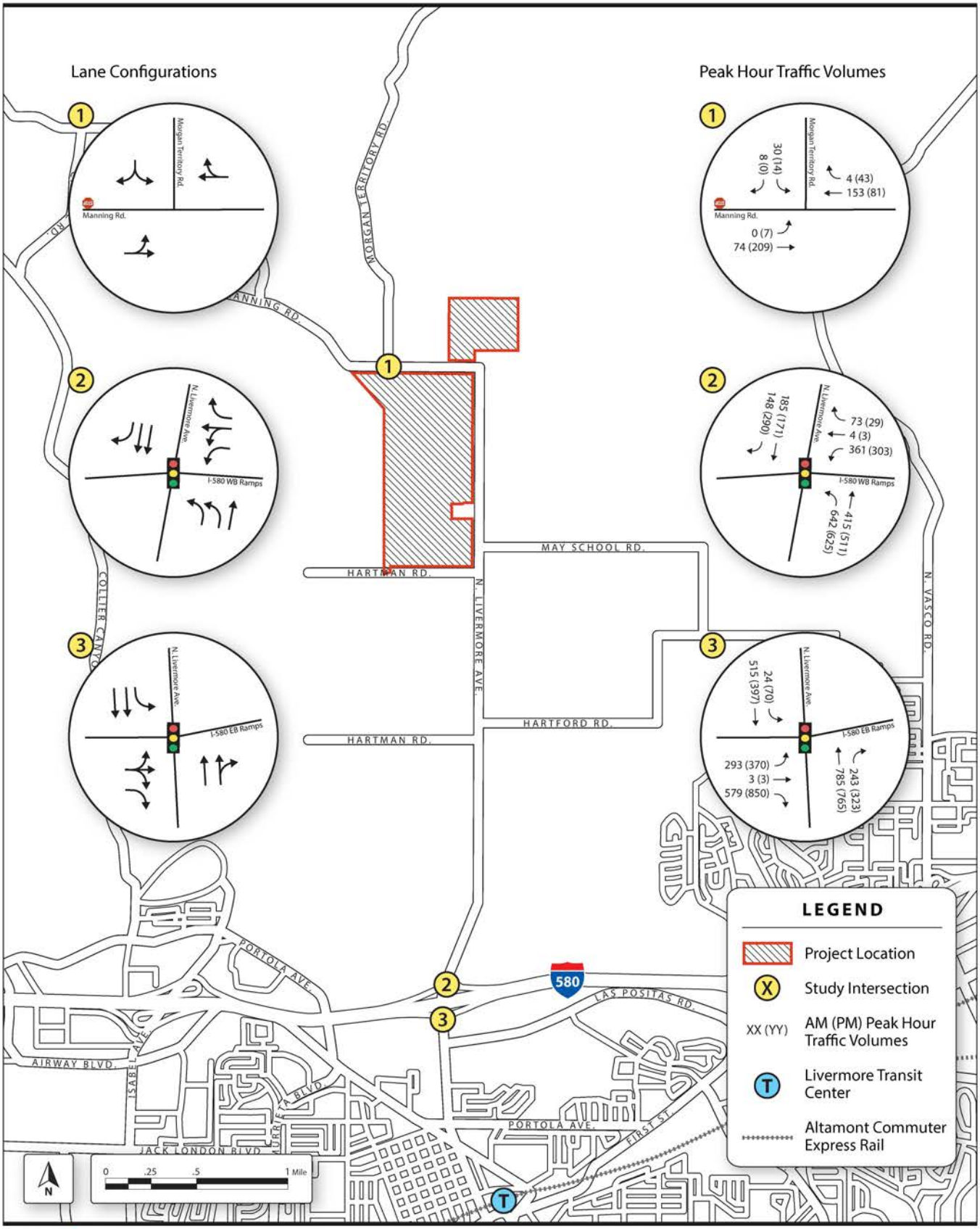

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Figure 7
Existing plus Project Conditions Lane Configurations and Peak Hour Traffic Volumes

4.3 Level of Service Analysis – Existing plus Project Conditions

Table 8 presents the LOS and delay analysis results for study intersections during the weekday a.m. and p.m. peak hours under Existing plus Project Conditions. Existing plus Project Conditions intersection LOS calculations are provided in **Appendix E**.

Table 8: Existing plus Project Conditions: Peak Hour Intersection LOS Results

Intersection	Control Type	Existing				Existing plus Project			
		AM Peak Hr.		PM Peak Hr.		AM Peak Hr.		PM Peak Hr.	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Morgan Territory Rd. / Manning Rd.	OWSC	9.9	A	10.7	B	10.4	B	11.5	B
2. North Livermore Ave. / I-580 WB Ramps	Signalized	16.9	B	16.5	B	15.7	B	19.3	B
3. North Livermore Ave. / I-580 EB Ramps	Signalized	10.7	B	26.6	C	18.5	B	31.2	C

Source: CHS Consulting Group, 2018

Notes:

1. Delay reported as seconds per vehicle. For signalized intersections, a weighted average delay and level of service (LOS) based on all intersection approaches is reported.
2. LOS = Level of Service; OWSC = One-Way Stop Controlled; WB = westbound; EB = eastbound

As shown in **Table 8**, with the addition of Project construction traffic, all study intersections would continue to operate acceptably at LOS C or better with minimal added delays under Existing plus Project Conditions. Therefore, the Project is not expected to cause a significant impact with respect to traffic. It should be noted that this analysis assumes a worst-case-scenario in which all workers drive to/from the Project site alone, and thus the Project could generate less vehicle delay if workers were encouraged to carpool, subject to participation if construction were to occur during the Covid-19 pandemic.

4.4 95th Percentile Vehicle Queue Length Analysis – Existing plus Project Conditions

Peak hour 95th percentile queue lengths were additionally analyzed and compared with the existing storage capacity of study intersection turn lanes where Project-generated traffic is expected to be added to determine any capacity concerns. Existing and Existing plus Project peak hour intersection queue analysis results are compared in **Table 9**. Detailed 95th percentile queue length analysis calculations are provided in **Appendix E**.

As shown in **Table 9**, under Existing plus Project Conditions the 95th percentile queue lengths at study intersections would continue to be accommodated within available storage capacity without spillover during the peak of construction activity.

Table 9: Existing plus Project Conditions: Peak Hour Intersection Queue Analysis Results

Intersection	Turn Pocket	Storage Capacity (feet)	95th Percentile Queue Length (feet)			
			Existing		Existing plus Project	
			AM Peak Hour[1]	PM Peak Hour	AM Peak Hour[1]	PM Peak Hour
North Livermore Ave. / I-580 WB Ramps	SBR	140	40	0	40	58
North Livermore Ave. / I-580 EB Ramps	EBLTR	530	66	454	313	467
	SBL	240	16	8	16	76

Source: CHS Consulting Group, 2020

Notes:

1. Results for the a.m. peak hour queue analysis can be reasonably expected based on field observations of existing a.m. peak hour vehicle queues conducted on Thursday, February 26, 2020.
2. Bold text indicates 95th percentile queue length exceeds existing turn pocket capacity
3. WB = westbound; EB = eastbound; EBLTR = eastbound shared left, thru, right lane; SBL = southbound left-turn lane; SBR = southbound right-turn lane

4.5 Vehicle Miles Traveled – Existing plus Project Conditions

As discussed in Section 3.1, Alameda County is currently transitioning to VMT as the County's CEQA threshold of significance related to transportation impacts, and thus the following VMT impact analysis relative to the Project is provided pursuant to CEQA Guidelines Appendix G. Detailed Project VMT calculations are provided in **Appendix F**.

4.5.1 Project VMT Analysis Methodology

Project-generated daily VMT were estimated separately for each Project trip type, based on Project-specific data for each of the four phases of construction. Project trip types are discussed individually below.

Daily Worker Commute Trips

As discussed in Section 4.1, Project-specific worker home-origin data provided by the Project Sponsor, assumed that the workforce would be based in the cities of Oakland, San Leandro, Hayward, Fremont, and Tracy.

For the purpose of assigning a distance for daily worker commute trips, a Google Maps measurement was utilized to approximate a centroid location for each of the worker origin cities. Based on Google Maps city centroid distance measurements to the Project site, the daily VMT analysis assumed a distance of 31.7 miles for worker commute trips to/from Oakland, 25.7 miles to/from San Leandro, 24.5 miles to/from Hayward, 37.5 miles to/from Hayward, and 21.9 miles to/from Tracy. This analysis represents a conservative worst-case scenario, as some workers may originate from the Tri-Valley area and other communities to the north that are closer in proximity to the Project site. The worker commute analysis assumed one daily round-trip per worker, with all workers arriving to the Project site during the a.m. peak hour and departing the Project site during the p.m. peak hour.

Daily Worker Off-Site Midday Trips

It is anticipated that each Project construction worker would take a midday off-site round trip for lunch or other work purposes. In order to conservatively estimate the daily VMT associated with these trips, it was assumed that each worker would take one round-trip to/from downtown Livermore, approximately 4.6 miles south of the Project site. For the peak overlap of Phases 2, 3, and 4, the number of worker off-site trips would be 750 (375 inbound and 375 outbound). These assumptions represent a conservative worst-case scenario, as some workers may find closer lunch options or bring their lunch and eat at the Project site.

Daily Truck Haul Trips

Per Project-specific truck haul trip data provided by the Project sponsor, during the peak overlap of Phases 2, 3, and 4, up to 121 daily truck haul trips would be generated. It is anticipated that all Project truck haul trips would travel to and from the Port of Oakland, approximately 34.1 miles west of the Project site.

4.5.2 Project-Generated VMT Analysis Results

In order to calculate the daily VMT for the peak of Project construction (the 50-day duration of overlap between Phases 2, 3, and 4), daily VMT was first estimated for each individual Project construction phase.

The daily VMT for worker commute trips for each phase were estimated by multiplying the number of daily trips by the assumed distance for worker commute trips from the cities described earlier. The VMT results for each city were then multiplied by each city's ACS construction workforce population percentage. The resulting daily VMT for each city were then combined for the total daily worker commute trip VMT per phase.

The daily VMT for worker off-site trips per phase were estimated by multiplying the number of daily trips by the assumed distance from the Project site to the commercial and dining locations in downtown Livermore (4.6 miles). Daily VMT for construction truck haul trips per phase were estimated by multiplying the total daily truck haul trips by the distance between the Project site and the Port of Oakland (34.1 miles). The total daily VMT for each trip type during Phases 2, 3, and 4 of Project construction were then combined to estimate the total daily VMT for a typical workday during the peak of Project construction. **Table 10** shows the resulting total daily VMT and daily per capita VMT generated by the Project during the peak of construction activities.

Table 10: Project-Generated VMT Analysis Results

Trip Type	Total Daily VMT (miles)	Daily per Capita VMT (miles)	
Worker Commute Trips (Home/Site)	21,616	57.6	66.9
Worker Midday Trips (Site and back)	3,454	9.2	
Truck Haul Trips	4,127	68.2	

Source: CHS Consulting Group, 2020

On a typical workday, the Project would generate 29,197 VMT. The worker VMT (21,616 miles for commute trips and 3,454 miles for midday trips) was divided by the number of anticipated workers on site during the peak of Project construction (375 workers), resulting in a daily per capita VMT of 66.9 miles. The number of peak daily truck haul trips (121) was divided by two (one worker driving two one-way trips to and from the Port

of Oakland). The total daily truck haul VMT of 4,127 miles was then divided by 60.5 trips, resulting in a daily per capita VMT of 68.2 miles for truck haul trips. These VMT estimates also represent the net VMT increase at the site, given there is minimal VMT generated currently.

4.6 Impact Discussion (CEQA Appendix G Checklist)

This section presents the Project's potential transportation-related impacts based on State CEQA Guidelines Appendix G described here:

a. Conflicts with a plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

As discussed in Section 4.3, all study intersections would continue to operate within acceptable County, Alameda CTC, and Caltrans LOS standards, under Existing plus Project Conditions. Most maintenance and construction activities associated with the Project would be contained within the Project site and are not expected to result in the long-term closures of travel lanes or roadway segments, permanently alter the public access roadways, create new public roadways that could substantially change the travel patterns of vehicles and bicycles on surrounding roadways, or conflict with the policies and plans regarding bicycle facilities.

There are no transit or pedestrian facilities adjacent to the Project site that would be impacted by Project-generated construction traffic. Although the Project would add vehicular traffic to intersections used by WHEELS bus route 580X, these study intersections would continue to operate at the same LOS as existing conditions and thus would not affect transit operations in the vicinity of the Project site.

There are Class II bike lanes along North Livermore Avenue adjacent to the Project site where there were no observed bicycle trips during the weekday a.m. and p.m. peak hours. However, the rural roadways in the study area are generally used for recreational and inter-regional travel that typically occur outside of the typical weekday peak commute periods and on weekends. During construction, slow-moving oversized trucks could potentially disrupt the movement of bicycles on North Livermore Avenue and Manning Road in the study area. However, Project construction activities would primarily occur between 7:00 a.m. and 7:00 p.m. on weekdays with the highest concentration of construction-generated traffic occurring during the typical a.m. and p.m. peak commute periods when bicycle volumes are low, and no weekend work is anticipated. No lane or road closures are anticipated during Project construction that could temporarily disrupt bicycle access on these roads. Furthermore, the analyzed Project-generated traffic would be related to temporary construction whose short-term traffic increases end when construction activities are completed.

For these reasons, the Project would not conflict with a plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Therefore, the Project would result in less-than-significant impacts to the performance of the local circulation system.

b. Conflicts, or is inconsistent, with CEQA Guidelines section 15064.3, subdivision (b)(1).

The Project would represent an increase in VMT during the nine-month construction period compared with the existing agricultural cultivation and grazing uses at the Project. The Project at the construction peak would generate a daily per capita VMT of 66.9 miles for workers and 68.2 miles for truck haul trips. However, once the Project is constructed and in operation, an average of four workers would be onsite each weekday and up to 12 workers would access the site once annually for scheduled module washing. This would result in fewer than 110 trips per day to the Project site. As per Office of Planning and Research (OPR) guidance, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact.[12] For these reasons, the Project would result in less-than-significant impacts related to VMT.

c. Substantially increases hazards due to a geometric design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

The Project would not permanently alter any roadways that would result in a design feature that could substantially increase hazards. The Project would construct new driveways at four access points along North Manning Road, two access points along North Livermore Avenue, and one access point along Hartman Road that would conform to County sight distance standards and would not introduce new hazards. All Project solar arrays and other structures would be set back from public roadways to avoid any sight distance hazards. The Project land use is considered a compatible use as discussed in the land use analysis of the Project. For these reasons, the Project would result in less-than-significant impacts related to increased hazards due to design features or incompatible uses.

d. Result in inadequate emergency access.

The Project would not permanently alter any roadways nor create any traffic conditions that would impede emergency access. Furthermore, the analyzed Project-generated traffic would be related to temporary construction whose short-term traffic increases would end when construction is completed. Therefore, the Project would result in less-than-significant impacts related to emergency access.

[12] Source: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf, accessed August 2020.

5.0 CONCLUSIONS

This section presents the conclusions for the Aramis Renewable Energy Project Transportation Impact Study in unincorporated Alameda County. Implementation of the Project would result in less than significant transportation impacts, and therefore, no mitigation measures are required.

- Under Existing Conditions, all three study intersections operate at LOS C or better.
- Under Existing Conditions, 95th percentile vehicle queue lengths at study intersections are accommodated by available storage capacity and no spillover conditions were observed.
- The peak of Project construction activities is expected to generate up to 1,621 daily trips, including 1,500 worker vehicle trips and 121 truck haul trips. This includes up to 389 a.m. and 389 p.m. peak hour trips, with 375 peak hour worker vehicle trips and 14 truck haul trips each peak hour.
- Under Existing plus Project Conditions, study intersections are anticipated to continue to operate at LOS C or better. As such, no significant impacts are expected with respect to Project traffic.
- Under Existing plus Project Conditions, the Project would increase 95th percentile queue lengths modestly at study intersection turn lanes during both the a.m. and p.m. peak hours. However, these queues would continue to be accommodated by available storage capacity during construction.
- The Project would not conflict with a plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities; and thus, would result in less-than-significant impacts to the performance of the local circulation system.
- The Project at the construction peak would generate a daily per capita VMT of 66.9 miles for workers and 68.2 miles for truck haul trips. These results represent the net increase at the site, given there is minimal VMT generated currently. However, once in operation, the Project would generate fewer than 110 trips per day and per OPR guidance, would result in less-than-significant transportation impacts related to VMT.
- The Project would not substantially increase hazards due to a geometric design feature or incompatible uses and thus, the Project would result in less-than-significant transportation impacts.
- The Project would not permanently alter any roadways nor create any traffic conditions that would impede emergency access and thus, the Project would result in less-than-significant impacts related to emergency access.
- Although no traffic impacts have been identified, it is recommended that the contractor encourage carpooling/vanpooling during construction (subject to participation during the Covid-19 pandemic) to reduce the vehicular footprint at the site as well as the number of trips using I-580 and North Livermore Avenue. Such measures to reduce worker trips would reduce the estimated increase in vehicle delay and 95th percentile vehicle queue lengths during construction.

Appendices

Appendix A Detailed Project Site Plans

Appendix B AM and PM Peak Hour Intersection Turning Movement Counts

Appendix C Existing Conditions LOS and Queue Length Calculations

Appendix D Detailed Project Trip Generation Calculations

Appendix E Existing plus Project Conditions LOS and Queue Length Calculations

Appendix F Detailed Project-Generated Vehicle Miles Traveled (VMT) Calculations

APPENDIX A – DETAILED PROJECT SITE PLANS

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Aramis Solar

Up to 102-MW-AC
Alameda County, CA
Conditional Use Permit Plan

PROJECT OWNER/DEVELOPER
CONTACT: MARISA MITCHELL
PHONE: (415) 846-0730

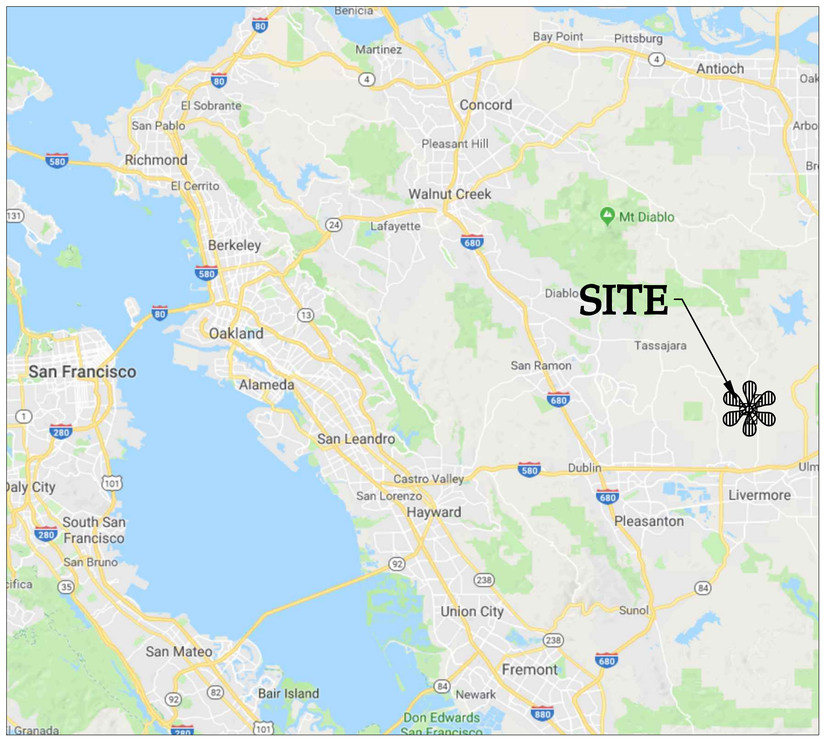
ENGINEERING PROJECT MANAGER
WESTWOOD PROFESSIONAL SERVICES, INC.
N., 2740 DALLAS PKWY. #280
PLANO, TX
CONTACT: JACK HAYS
PHONE: (972) 473-4640

PROJECT CIVIL ENGINEER OF RECORD
WESTWOOD PROFESSIONAL SERVICES, INC.
12701 WHITEWATER DRIVE SUITE #300
MINNETONKA, MN 55343
CONTACT: CHRIS CARDA, P.E.
PHONE: (952) 906-7459

Sheet List Table	
Sheet Number	**Sheet Title**
T.100	COVER
C.100	EXISTING CONDITIONS PLAN-NORTH
C.101	EXISTING CONDITIONS PLAN-SOUTH
C.200	CIVIL SITE PLAN-NORTH
C.201	CIVIL SITE PLAN-SOUTH
C.400	CONSTRUCTION DETAILS
C.401	CONSTRUCTION DETAILS

DIRECTIONS TO SITE
HEADING EAST ON I-580
1. TAKE EXIT 52 FOR N. LIVERMORE AVE. TOWARD LIVERMORE.
2. TURN LEFT ONTO N. LIVERMORE AVE.
3. DRIVE APPROXIMATELY 2.9 MILES NORTH.
4. THE SITE ENTRANCE WILL BE ON THE LEFT.

Regional Map



SOURCE: MAP DATA ©2018 GOOGLE (NOT TO SCALE)

Vicinity Map



SOURCE: MAP DATA ©2018 GOOGLE (NOT TO SCALE)

PROJECT LOCATION
LATITUDE= 37° 44' 57.29"
LONGITUDE= -121° 46' 25.79"

PROJECT COORDINATE SYSTEM
NSRS 2011 CALIFORNIA STATE PLANE, ZONE III, US FOOT

FEMA MAPPING
FIRM PANELS 06001C0332G AND 06013C0500F

APN
903-0007-002-01
903-0006-003-07
903-0006-001-02

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A	08/13/20	ADDED UTILITY CROSSING LOCATIONS
B	08/31/20	SUBSTATION RELOCATED

Prepared for:

IP Aramis, LLC

IP Aramis, LLC

Alameda County, CA

Cover

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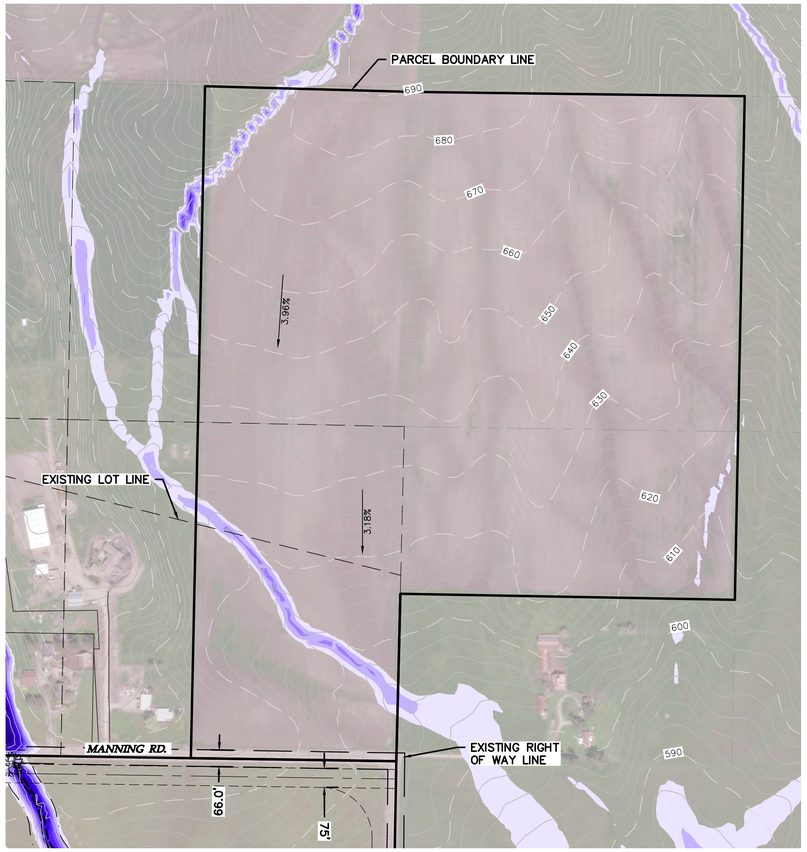


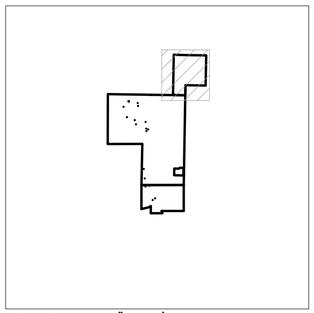
LEGEND:

- PROJECT BOUNDARY LINE
- EXISTING EASEMENT LINE
- EXISTING RIGHT–OF–WAY LINE
- EXISTING OVERHEAD POWERLINE
- EXISTING PAVED ROAD
- EXISTING GRAVEL ROAD
- EXISTING INDEX CONTOUR LINE (1070)
- EXISTING INTERVAL CONTOUR LINE (1071)
- EXISTING STREAM BANK
- SETBACK FROM STREAM BANK
- EXISTING FEMA REGULATORY FLOODWAY
- EXISTING FEMA FLOOD ZONE X
- EXISTING FEMA FLOOD ZONE A
- EXISTING TREE

NOTES:

1. MATURE TREES (AS SHOWN) WILL REMAIN.

100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	



KEY MAP SCALE: 1"=5000'

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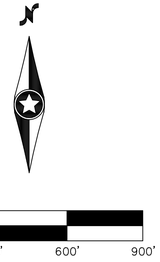

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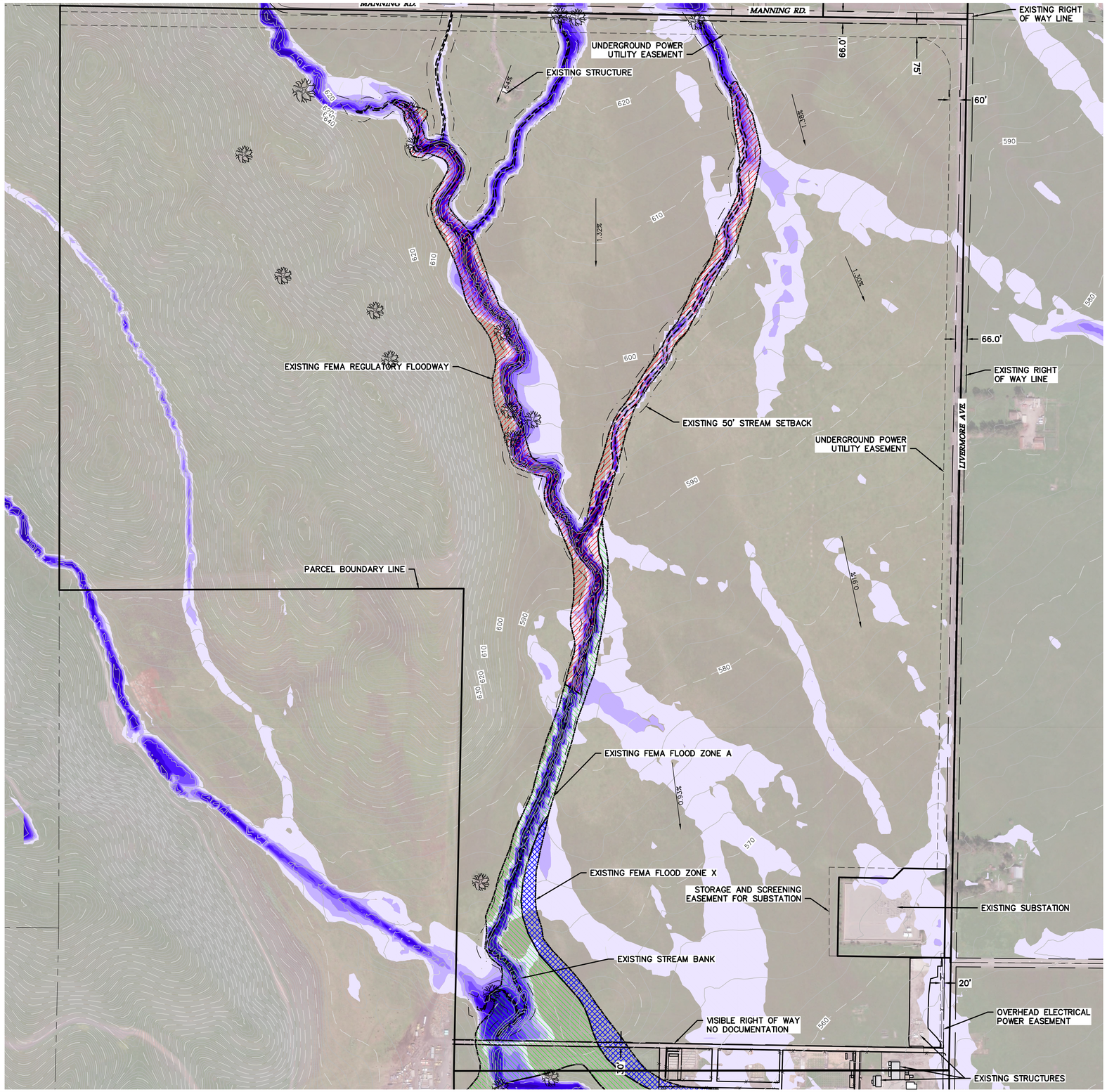

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- EXISTING FEMA FLOOD ZONE X
- EXISTING FEMA FLOOD ZONE A
- EXISTING TREE

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1.01	1.50	
1.51	2.00	
2.01	2.50	
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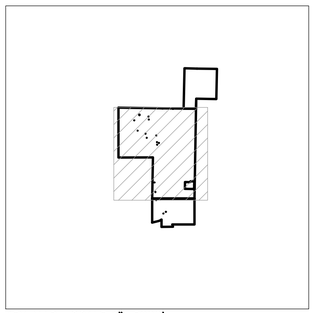
4.01	6.00	
6.00	20.00	



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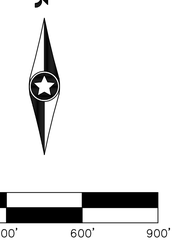

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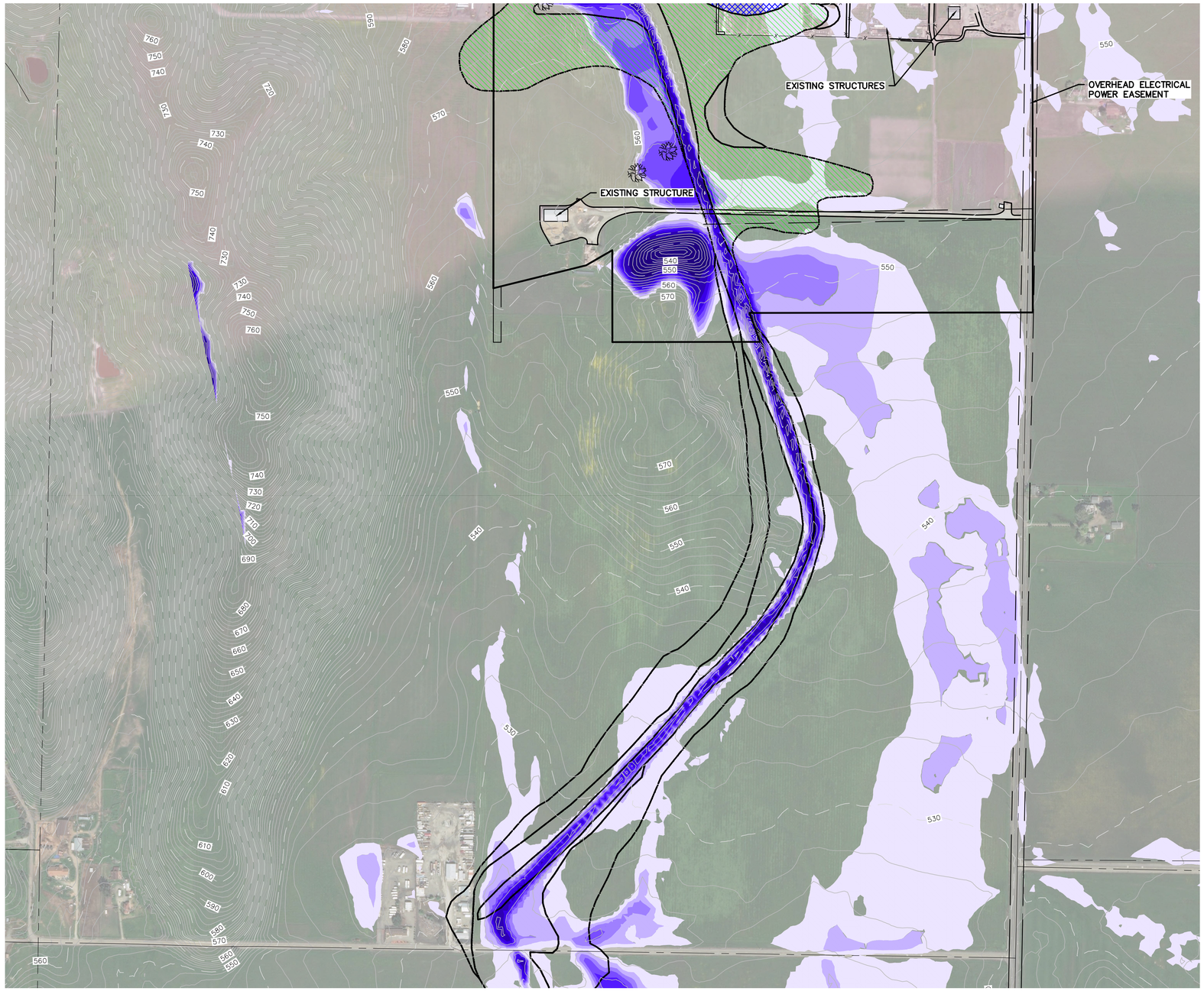

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- EXISTING TREE

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100 Year Max Flow Depth (ft)		
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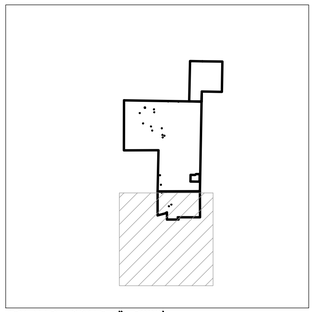
6.00	20.00	



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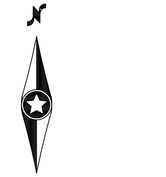

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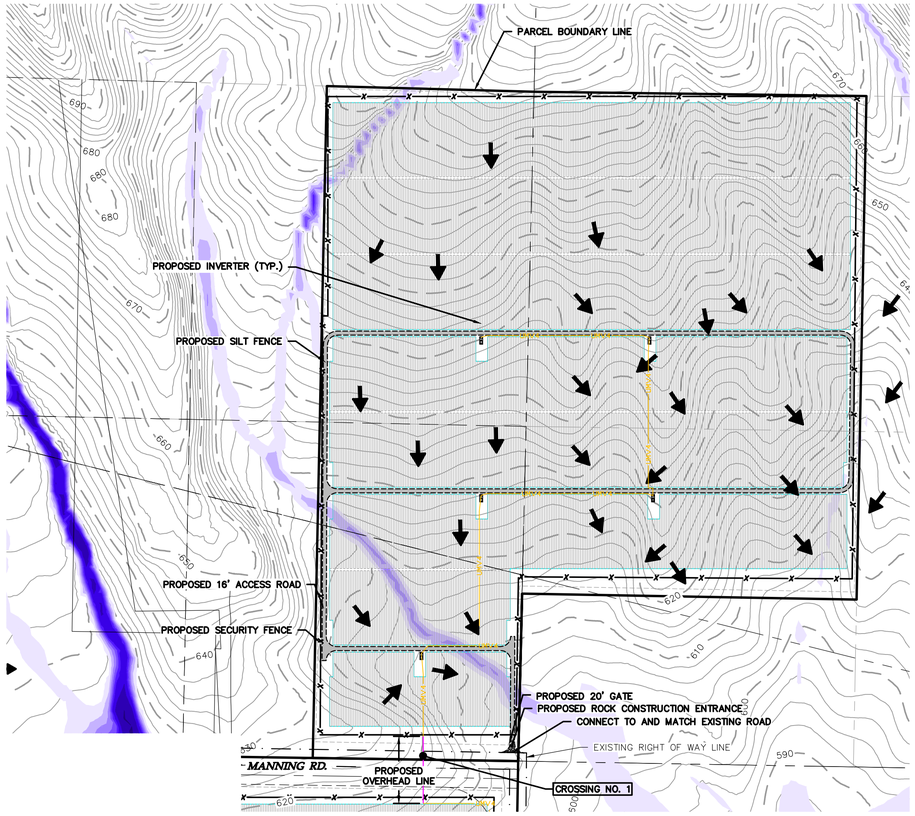

LEGEND:

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- EXISTING GRAVEL ROAD
- EXISTING FEMA REGULATORY FLOODWAY
- EXISTING FEMA FLOOD ZONE X
- EXISTING FEMA FLOOD ZONE A
- EXISTING STREAM BANK
- EXISTING INDEX CONTOUR LINE
- EXISTING INTERVAL CONTOUR LINE
- PROPOSED SOLAR ARRAY
- PROPOSED ELECTRICAL EQUIPMENT
- PROPOSED ACCESS ROAD
- PROPOSED WALKING PATH
- UNDERGROUND MVAC ROUTE OPTION 1
- UNDERGROUND MVAC ROUTE OPTION 2
- OVERHEAD MVAC ROUTE
- HDD (HORIZONTAL DIRECTIONAL DRILLING)
- PROPOSED SILT FENCE
- PROPOSED SECURITY FENCE
- MODULE SETBACK LINE
- DRAINAGE DIRECTION
- PROPOSED SUBSTATION
- PROPOSED LAYDOWN YARD
- PROPOSED BATTERY ENERGY STORAGE SYSTEM

100 Year Max Flow Depth (ft)		
Minimum Elevation	Maximum Elevation	Color
0.50	1.00	
1.01	1.50	
1.51	2.00	
2.01	2.50	
2.51	3.00	
3.01	4.00	
4.01	6.00	
6.00	20.00	

Project Module Setbacks

Item	Required
SIDE	10' FROM PROPERTY LINE
REAR	10' FROM PROPERTY LINE
FRONT	30' FROM PROPERTY LINE
STREAM BANK	50'

Disturbance Limits

Item	Area
TOTAL CLEARING AND GRUBBING (WITHIN PROPOSED SECURITY FENCE).	415 acres

Fenced Area

Location	Area (acres)
BOARDMAN (NORTH)	105
CROSBY (CENTRAL)	270
STANLEY (SOUTH)	40
TOTAL	415

Location	Crossing Equipment	Existing Infrastructure	Infrastructure Owner/Responsible Party
1	overhead power line, 34.5kV	66' county road ROW (Manning)	Alameda County
		75' power line easement	Pacific Gas & Electric
		75' underground electrical easement	Pacific Gas & Electric
2	underground power line, 2kV	waterway	Alameda County and/or local water district
3	overhead power line, 34.5kV	waterway	Alameda County and/or local water district
4	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
5	underground power line, 34.5kV	paved road (Hartman)	Alameda County (no public ROW evident)
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
6	overhead power line, 34.5kV	FEMA Flood Zone "AE Floodway"	Alameda County and/or local water district
		FEMA Flood Zone X	Alameda County and/or local water district
		FEMA Flood Zone AE	Alameda County and/or local water district
7	underground power line, 34.5kV	66' county road ROW (Livermore)	Alameda County
		20' communications easement	Pacific Telephone & Telegraph (AT&T)

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IP Aramis, LLC

0' 300' 600' 900'

IP Aramis, LLC

Alameda County, CA

Civil Site Plan-North

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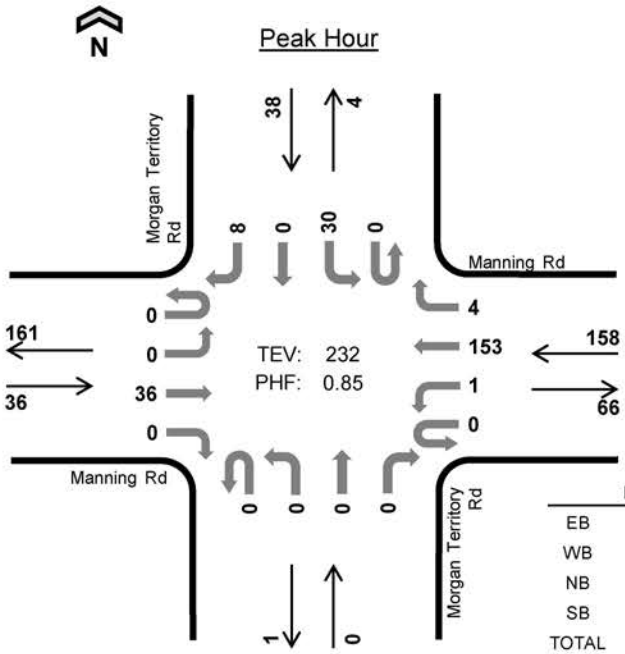
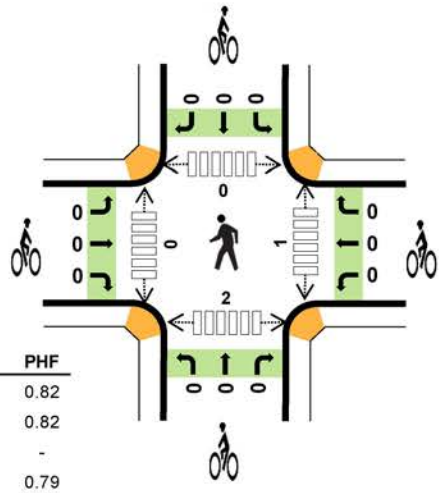
APPENDIX B – AM AND PM PEAK HOUR INTERSECTION TURNING MOVEMENT COUNTS

Morgan Territory Rd
Manning Rd



Date: 02-26-2020
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM



	HV %:	PHF
EB	2.8%	0.82
WB	1.3%	0.82
NB	-	-
SB	0.0%	0.79
TOTAL	1.3%	0.85

Two-Hour Count Summaries

Interval Start		Manning Rd Eastbound				Manning Rd Westbound				Morgan Territory Rd Northbound				Morgan Territory Rd Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	5	0	0	0	25	1	0	0	0	1	0	4	0	0	36	0
7:15 AM		0	0	11	0	0	0	34	0	0	0	0	0	0	7	0	1	53	0
7:30 AM		0	0	11	0	0	0	33	1	0	0	0	0	0	6	0	2	53	0
7:45 AM		**0**	**0**	**8**	**0**	**0**	**1**	**39**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**2**	**55**	197
8:00 AM		**0**	**0**	**9**	**0**	**0**	**0**	**31**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**2**	**50**	211
8:15 AM		**0**	**0**	**11**	**0**	**0**	**0**	**37**	**1**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**2**	**59**	217
8:30 AM		**0**	**0**	**8**	**0**	**0**	**0**	**46**	**2**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**2**	**68**	**232**
8:45 AM		0	0	6	0	0	0	31	2	0	0	0	0	0	4	0	1	44	221
Count Total		0	0	69	0	0	1	276	8	0	0	0	1	0	51	0	12	418	0
Peak Hour	**All**	**0**	**0**	**36**	**0**	**0**	**1**	**153**	**4**	**0**	**0**	**0**	**0**	**0**	**30**	**0**	**8**	**232**	**0**
	HV	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**
	HV%	**-**	**-**	**3%**	**-**	**-**	**0%**	**1%**	**0%**	**-**	**-**	**-**	**-**	**-**	**0%**	**-**	**0%**	**1%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	0	0	*0*	1	0	0	0	*1*	0	0	0	0	*0*
7:15 AM	0	0	0	1	*1*	0	0	0	0	*0*	0	0	0	0	*0*
7:30 AM	0	2	0	0	*2*	0	0	0	0	*0*	0	0	0	0	*0*
7:45 AM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**2**	*3*
8:00 AM	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:15 AM	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:30 AM	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
8:45 AM	1	0	0	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	2	4	0	1	*7*	1	0	0	0	*1*	1	0	0	2	*3*
Peak Hour	**1**	**2**	**0**	**0**	***3***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**2**	***3***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Manning Rd				Manning Rd				Morgan Territory Rd				Morgan Territory Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
7:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3
8:00 AM	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	4
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	4
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**3**
8:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
Count Total	0	0	2	0	0	0	4	0	0	0	0	0	0	1	0	0	7	0
Peak Hour	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**

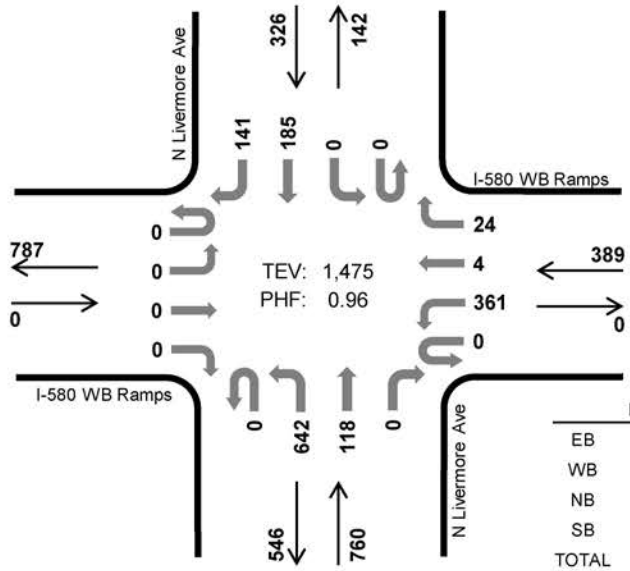
Two-Hour Count Summaries - Bikes

Interval Start	Manning Rd			Manning Rd			Morgan Territory Rd			Morgan Territory Rd			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	1	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

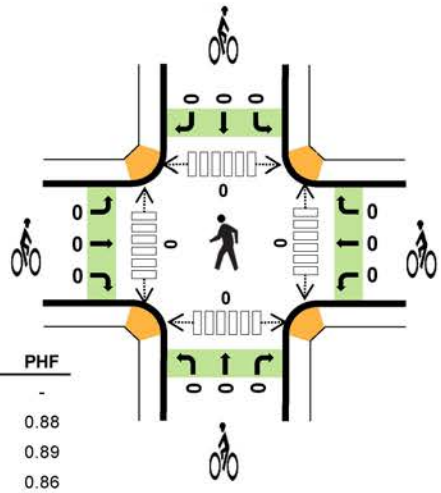
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Livermore Ave
I-580 WB Ramps

Date: 02-26-2020
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:30 AM to 8:30 AM



	HV %:	PHF
EB	-	-
WB	1.8%	0.88
NB	2.8%	0.89
SB	1.2%	0.86
TOTAL	2.2%	0.96



Two-Hour Count Summaries

Interval Start		I-580 WB Ramps Eastbound				I-580 WB Ramps Westbound				N Livermore Ave Northbound				N Livermore Ave Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM		0	0	0	0	0	63	0	8	0	155	10	0	0	0	15	27	278	0
7:15 AM		0	0	0	0	0	83	0	5	0	153	12	0	0	0	43	28	324	0
7:30 AM		**0**	**0**	**0**	**0**	**0**	**95**	**0**	**2**	**0**	**172**	**26**	**0**	**0**	**0**	**45**	**40**	**380**	0
7:45 AM		**0**	**0**	**0**	**0**	**0**	**100**	**2**	**8**	**0**	**142**	**24**	**0**	**0**	**0**	**38**	**28**	**342**	1,324
8:00 AM		**0**	**0**	**0**	**0**	**0**	**81**	**1**	**7**	**0**	**174**	**40**	**0**	**0**	**0**	**45**	**35**	**383**	1,429
8:15 AM		**0**	**0**	**0**	**0**	**0**	**85**	**1**	**7**	**0**	**154**	**28**	**0**	**0**	**0**	**57**	**38**	**370**	**1,475**
8:30 AM		0	0	0	0	0	80	0	11	0	126	25	0	0	0	35	42	319	1,414
8:45 AM		0	0	0	0	0	86	5	6	0	143	17	0	0	0	31	46	334	1,406
Count Total		0	0	0	0	0	673	9	54	0	1,219	182	0	0	0	309	284	2,730	0
Peak Hour	**All**	**0**	**0**	**0**	**0**	**0**	**361**	**4**	**24**	**0**	**642**	**118**	**0**	**0**	**0**	**185**	**141**	**1,475**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**1**	**0**	**15**	**6**	**0**	**0**	**0**	**3**	**1**	**32**	**0**
	HV%	-	-	-	-	-	**2%**	**0%**	**4%**	-	**2%**	**5%**	-	-	-	**2%**	**1%**	**2%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	2	6	0	*8*	0	0	0	0	*0*	0	0	0	0	*0*
7:15 AM	0	2	3	3	*8*	0	0	0	0	*0*	0	0	0	0	*0*
7:30 AM	**0**	**2**	**9**	**0**	***11***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:45 AM	**0**	**1**	**2**	**2**	***5***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:00 AM	**0**	**2**	**7**	**1**	***10***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:15 AM	**0**	**2**	**3**	**1**	***6***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
8:30 AM	0	2	3	1	*6*	0	0	0	0	*0*	0	0	0	0	*0*
8:45 AM	0	0	6	1	*7*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	0	13	39	9	*61*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	**0**	**7**	**21**	**4**	***32***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	I-580 WB Ramps				I-580 WB Ramps				N Livermore Ave				N Livermore Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	0	0	2	0	0	0	6	0	0	0	0	0	0	8	0
7:15 AM	0	0	0	0	0	2	0	0	0	3	0	0	0	0	3	0	8	0
7:30 AM	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**4**	**5**	**0**	**0**	**0**	**0**	**0**	**11**	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**1**	**5**	32
8:00 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**7**	**0**	**0**	**0**	**0**	**1**	**0**	**10**	34
8:15 AM	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**1**	**0**	**6**	**32**
8:30 AM	0	0	0	0	0	2	0	0	0	2	1	0	0	0	0	1	6	27
8:45 AM	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	1	7	29
Count Total	0	0	0	0	0	12	0	1	0	32	7	0	0	0	6	3	61	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**1**	**0**	**15**	**6**	**0**	**0**	**0**	**3**	**1**	**32**	**0**

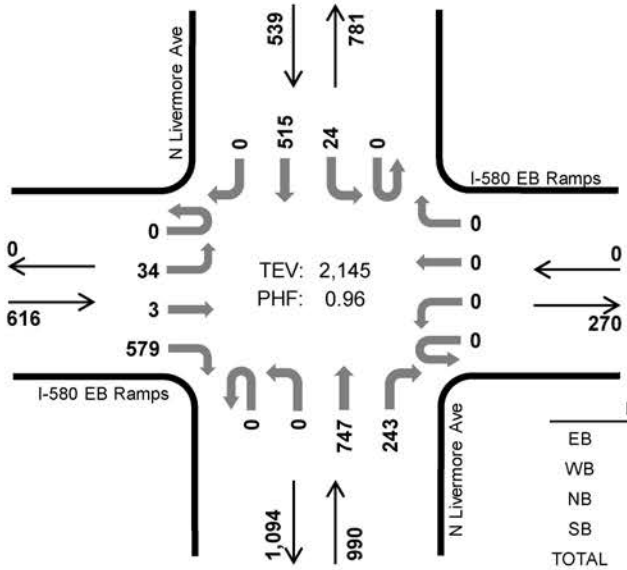
Two-Hour Count Summaries - Bikes

Interval Start	I-580 WB Ramps			I-580 WB Ramps			N Livermore Ave			N Livermore Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

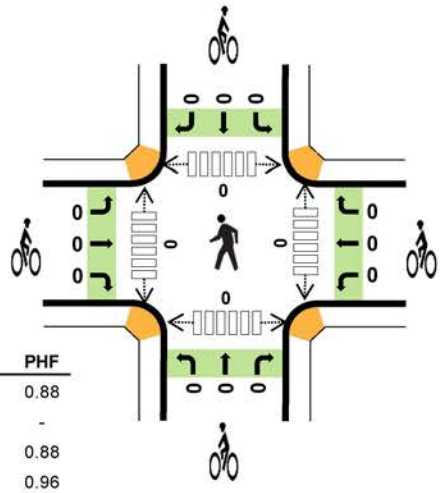
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Livermore Ave
I-580 EB Ramps

Date: 02-26-2020
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:30 AM to 8:30 AM



	HV %:	PHF
EB	4.5%	0.88
WB	-	-
NB	2.7%	0.88
SB	1.7%	0.96
TOTAL	3.0%	0.96



Two-Hour Count Summaries

Interval Start	I-580 EB Ramps Eastbound				I-580 EB Ramps Westbound				N Livermore Ave Northbound				N Livermore Ave Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	5	0	79	0	0	0	0	0	0	163	48	0	5	74	0	374	0
7:15 AM	0	2	1	122	0	0	0	0	0	0	167	60	0	9	118	0	479	0
7:30 AM	**0**	**10**	**0**	**124**	**0**	**0**	**0**	**0**	**0**	**0**	**189**	**46**	**0**	**7**	**134**	**0**	**510**	0
7:45 AM	**0**	**7**	**1**	**168**	**0**	**0**	**0**	**0**	**0**	**0**	**154**	**60**	**0**	**4**	**130**	**0**	**524**	1,887
8:00 AM	**0**	**11**	**1**	**130**	**0**	**0**	**0**	**0**	**0**	**0**	**216**	**65**	**0**	**6**	**121**	**0**	**550**	2,063
8:15 AM	**0**	**6**	**1**	**157**	**0**	**0**	**0**	**0**	**0**	**0**	**188**	**72**	**0**	**7**	**130**	**0**	**561**	**2,145**
8:30 AM	0	6	0	139	0	0	0	0	0	0	130	58	0	5	109	0	447	2,082
8:45 AM	0	6	0	163	0	0	0	0	0	0	150	39	0	6	106	0	470	2,028
Count Total	0	53	4	1,082	0	0	0	0	0	0	1,357	448	0	49	922	0	3,915	0
Peak Hour All	**0**	**34**	**3**	**579**	**0**	**0**	**0**	**0**	**0**	**0**	**747**	**243**	**0**	**24**	**515**	**0**	**2,145**	**0**
Peak Hour HV	**0**	**7**	**2**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**12**	**0**	**2**	**7**	**0**	**64**	**0**
Peak Hour HV%	**-**	**21%**	**67%**	**3%**	**-**	**-**	**-**	**-**	**-**	**-**	**2%**	**5%**	**-**	**8%**	**1%**	**-**	**3%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	4	0	6	2	*12*	0	0	0	0	*0*	0	0	0	0	*0*
7:15 AM	7	0	5	5	*17*	0	0	0	0	*0*	0	0	0	0	*0*
7:30 AM	**12**	**0**	**7**	**2**	***21***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:45 AM	**6**	**0**	**5**	**2**	***13***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:00 AM	**7**	**0**	**10**	**2**	***19***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:15 AM	**3**	**0**	**5**	**3**	***11***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
8:30 AM	2	0	8	2	*12*	0	0	0	0	*0*	0	0	0	0	*0*
8:45 AM	4	0	4	0	*8*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	45	0	50	18	*113*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	**28**	**0**	**27**	**9**	***64***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

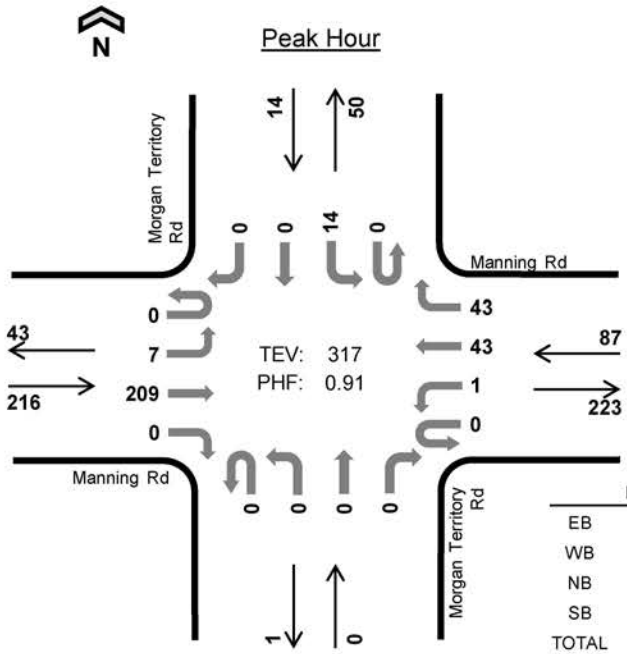
Interval Start	I-580 EB Ramps				I-580 EB Ramps				N Livermore Ave				N Livermore Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	4	0	0	0	0	0	0	6	0	0	0	2	0	12	0
7:15 AM	0	0	0	7	0	0	0	0	0	0	3	2	0	3	2	0	17	0
7:30 AM	**0**	**5**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**3**	**0**	**0**	**2**	**0**	**21**	0
7:45 AM	**0**	**0**	**1**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**1**	**0**	**0**	**2**	**0**	**13**	63
8:00 AM	**0**	**1**	**1**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**	**0**	**1**	**1**	**0**	**19**	70
8:15 AM	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**0**	**1**	**2**	**0**	**11**	**64**
8:30 AM	0	0	0	2	0	0	0	0	0	0	4	4	0	0	2	0	12	55
8:45 AM	0	0	0	4	0	0	0	0	0	0	4	0	0	0	0	0	8	50
Count Total	0	7	2	36	0	0	0	0	0	0	32	18	0	5	13	0	113	0
Peak Hour	**0**	**7**	**2**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**12**	**0**	**2**	**7**	**0**	**64**	**0**

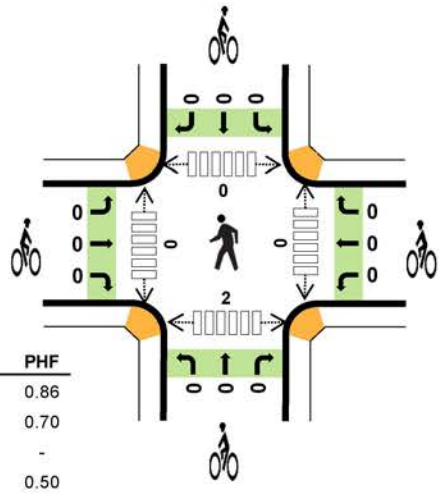
Two-Hour Count Summaries - Bikes

Interval Start	I-580 EB Ramps			I-580 EB Ramps			N Livermore Ave			N Livermore Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
8:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

Morgan Territory Rd
Manning Rd





Date: 02-26-2020
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM

	HV %:	PHF
EB	0.0%	0.86
WB	0.0%	0.70
NB	-	-
SB	0.0%	0.50
TOTAL	0.0%	0.91

Two-Hour Count Summaries

Interval Start		Manning Rd Eastbound				Manning Rd Westbound				Morgan Territory Rd Northbound				Morgan Territory Rd Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	1	65	0	0	0	8	5	0	0	0	0	0	4	0	1	84	0
4:15 PM		0	1	30	0	0	0	7	8	0	0	0	0	0	2	0	0	48	0
4:30 PM		**0**	**1**	**51**	**0**	**0**	**0**	**11**	**10**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**75**	0
4:45 PM		**0**	**3**	**60**	**0**	**0**	**1**	**9**	**7**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**87**	294
5:00 PM		**0**	**1**	**47**	**0**	**0**	**0**	**8**	**10**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**69**	279
5:15 PM		**0**	**2**	**51**	**0**	**0**	**0**	**15**	**16**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**86**	**317**
5:30 PM		0	4	39	0	0	0	11	6	0	0	0	0	0	4	0	1	65	307
5:45 PM		0	2	45	0	0	0	7	10	0	0	0	0	0	1	0	0	65	285
Count Total		0	15	388	0	0	1	76	72	0	0	0	0	0	25	0	2	579	0
Peak Hour	All	**0**	**7**	**209**	**0**	**0**	**1**	**43**	**43**	**0**	**0**	**0**	**0**	**0**	**14**	**0**	**0**	**317**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	HV%	-	**0%**	**0%**	-	-	**0%**	**0%**	**0%**	-	-	-	-	-	**0%**	-	-	**0%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**2**	*2*
5:00 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:30 PM	1	0	0	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	1	0	0	0	*1*	0	0	0	0	*0*	0	0	0	2	*2*
Peak Hour	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**2**	***2***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	Manning Rd				Manning Rd				Morgan Territory Rd				Morgan Territory Rd				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Count Total	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

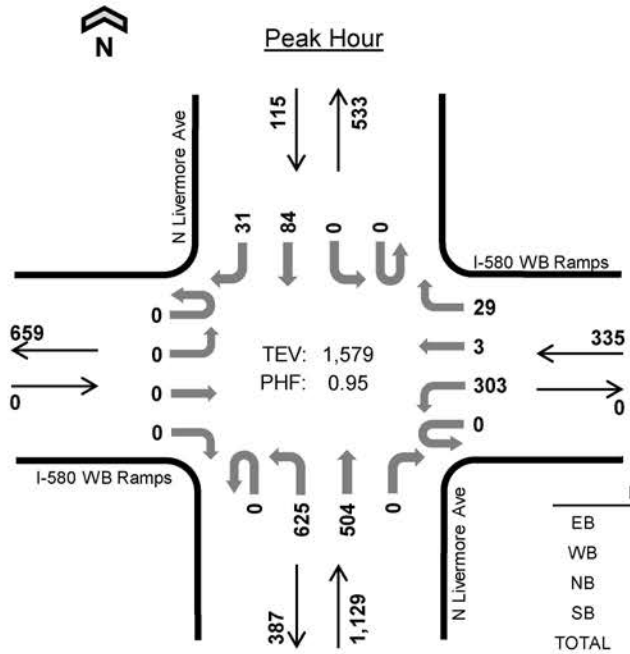
Two-Hour Count Summaries - Bikes

Interval Start	Manning Rd			Manning Rd			Morgan Territory Rd			Morgan Territory Rd			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

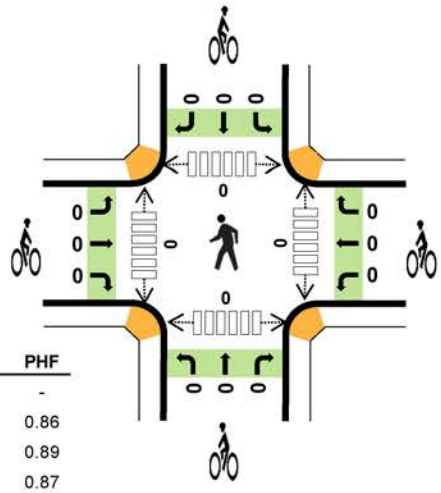
Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Livermore Ave
I-580 WB Ramps

Date: 02-26-2020
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	-	-
WB	1.8%	0.86
NB	0.9%	0.89
SB	0.0%	0.87
TOTAL	1.0%	0.95



Two-Hour Count Summaries

Interval Start		I-580 WB Ramps Eastbound				I-580 WB Ramps Westbound				N Livermore Ave Northbound				N Livermore Ave Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	0	0	0	69	0	5	0	124	106	0	0	0	25	8	337	0
4:15 PM		0	0	0	0	0	73	4	4	0	121	106	0	0	0	10	2	320	0
4:30 PM		**0**	**0**	**0**	**0**	**0**	**76**	**0**	**9**	**0**	**150**	**114**	**0**	**0**	**0**	**16**	**12**	**377**	0
4:45 PM		**0**	**0**	**0**	**0**	**0**	**90**	**1**	**6**	**0**	**134**	**131**	**0**	**0**	**0**	**26**	**7**	**395**	1,429
5:00 PM		**0**	**0**	**0**	**0**	**0**	**60**	**2**	**5**	**0**	**192**	**125**	**0**	**0**	**0**	**23**	**8**	**415**	1,507
5:15 PM		**0**	**0**	**0**	**0**	**0**	**77**	**0**	**9**	**0**	**149**	**134**	**0**	**0**	**0**	**19**	**4**	**392**	**1,579**
5:30 PM		0	0	0	0	0	71	2	4	0	138	116	0	0	0	25	6	362	1,564
5:45 PM		0	0	0	0	0	65	1	3	0	160	90	0	0	0	23	8	350	1,519
Count Total		0	0	0	0	0	581	10	45	0	1,168	922	0	0	0	167	55	2,948	0
Peak Hour	**All**	**0**	**0**	**0**	**0**	**0**	**303**	**3**	**29**	**0**	**625**	**504**	**0**	**0**	**0**	**84**	**31**	**1,579**	**0**
	HV	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**1**	**0**	**9**	**1**	**0**	**0**	**0**	**0**	**0**	**16**	**0**
	HV%	-	-	-	-	-	**2%**	**0%**	**3%**	-	**1%**	**0%**	-	-	-	**0%**	**0%**	**1%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	1	5	0	*6*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	0	2	4	0	*6*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	**0**	**1**	**4**	**0**	***5***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**1**	**1**	**0**	***2***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**0**	**1**	**3**	**0**	***4***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**0**	**3**	**2**	**0**	***5***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:30 PM	0	0	3	1	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	1	0	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	0	10	22	1	*33*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	**0**	**6**	**10**	**0**	***16***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	I-580 WB Ramps				I-580 WB Ramps				N Livermore Ave				N Livermore Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	0	0	0	0	1	0	0	0	3	2	0	0	0	0	0	6	0
4:15 PM	0	0	0	0	0	1	1	0	0	3	1	0	0	0	0	0	6	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	19
5:00 PM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	17
5:15 PM	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**16**
5:30 PM	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	4	15
5:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	14
Count Total	0	0	0	0	0	8	1	1	0	17	5	0	0	0	1	0	33	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**1**	**0**	**9**	**1**	**0**	**0**	**0**	**0**	**0**	**16**	**0**

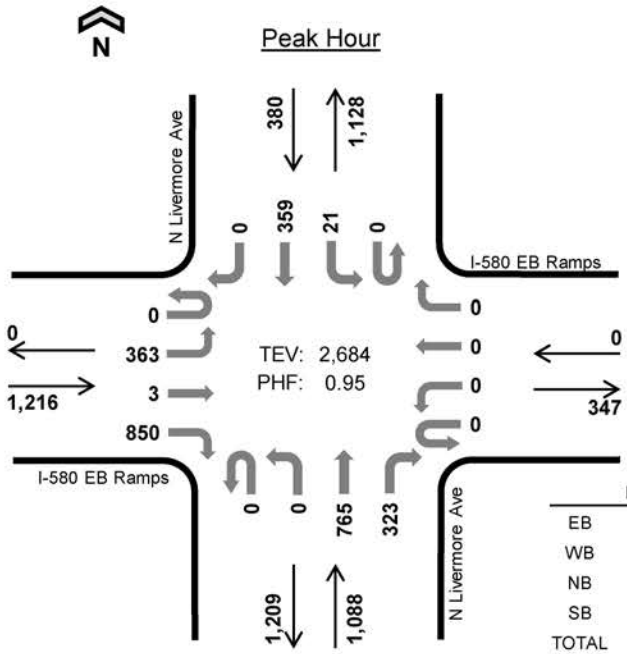
Two-Hour Count Summaries - Bikes

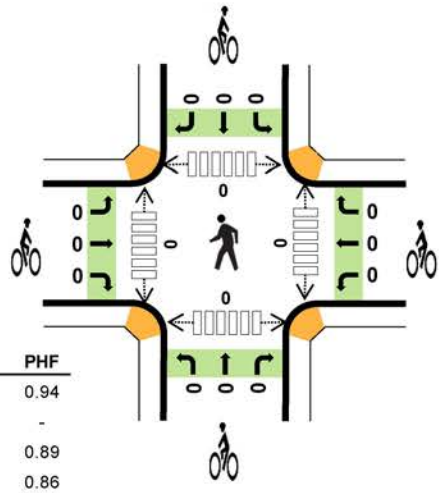
Interval Start	I-580 WB Ramps			I-580 WB Ramps			N Livermore Ave			N Livermore Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

N Livermore Ave
I-580 EB Ramps

Date: 02-26-2020
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM





	HV %:	PHF
EB	0.7%	0.94
WB	-	-
NB	0.9%	0.89
SB	1.1%	0.86
TOTAL	0.8%	0.95

Two-Hour Count Summaries

Interval Start		I-580 EB Ramps Eastbound				I-580 EB Ramps Westbound				N Livermore Ave Northbound				N Livermore Ave Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	75	1	182	0	0	0	0	0	0	164	79	0	4	90	0	595	0
4:15 PM		0	77	2	195	0	0	0	0	0	0	154	78	0	2	81	0	589	0
4:30 PM		**0**	**77**	**3**	**205**	**0**	**0**	**0**	**0**	**0**	**0**	**180**	**89**	**0**	**5**	**93**	**0**	**652**	0
4:45 PM		**0**	**104**	**0**	**207**	**0**	**0**	**0**	**0**	**0**	**0**	**160**	**75**	**0**	**8**	**103**	**0**	**657**	2,493
5:00 PM		**0**	**91**	**0**	**231**	**0**	**0**	**0**	**0**	**0**	**0**	**230**	**76**	**0**	**3**	**76**	**0**	**707**	2,605
5:15 PM		**0**	**91**	**0**	**207**	**0**	**0**	**0**	**0**	**0**	**0**	**195**	**83**	**0**	**5**	**87**	**0**	**668**	**2,684**
5:30 PM		0	74	1	207	0	0	0	0	0	0	173	78	0	8	89	0	630	2,662
5:45 PM		0	60	1	229	0	0	0	0	0	0	182	62	0	5	86	0	625	2,630
Count Total		0	649	8	1,663	0	0	0	0	0	0	1,438	620	0	40	705	0	5,123	0
Peak Hour	**All**	**0**	**363**	**3**	**850**	**0**	**0**	**0**	**0**	**0**	**0**	**765**	**323**	**0**	**21**	**359**	**0**	**2,684**	**0**
	HV	**0**	**2**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**2**	**0**	**1**	**3**	**0**	**22**	**0**
	HV%	**-**	**1%**	**0%**	**1%**	**-**	**-**	**-**	**-**	**-**	**-**	**1%**	**1%**	**-**	**5%**	**1%**	**-**	**1%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	2	0	4	1	*7*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	2	0	3	1	*6*	0	0	0	0	*0*	0	0	0	0	*0*
4:30 PM	**1**	**0**	**5**	**0**	***6***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**2**	**0**	**0**	**1**	***3***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**3**	**0**	**2**	**1**	***6***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**2**	**0**	**3**	**2**	***7***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:30 PM	2	0	2	1	*5*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	4	0	1	2	*7*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	18	0	20	9	*47*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	**8**	**0**	**10**	**4**	***22***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Two-Hour Count Summaries - Heavy Vehicles

Interval Start	I-580 EB Ramps				I-580 EB Ramps				N Livermore Ave				N Livermore Ave				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	2	0	0	0	0	0	0	0	0	3	1	0	0	1	0	7	0
4:15 PM	0	1	0	1	0	0	0	0	0	0	3	0	0	0	1	0	6	0
4:30 PM	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**1**	**0**	**0**	**0**	**0**	**6**	0
4:45 PM	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**3**	22
5:00 PM	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**6**	21
5:15 PM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**	**0**	**2**	**0**	**7**	**22**
5:30 PM	0	1	0	1	0	0	0	0	0	0	2	0	0	1	0	0	5	21
5:45 PM	0	0	0	4	0	0	0	0	0	0	0	1	0	0	2	0	7	25
Count Total	0	6	0	12	0	0	0	0	0	0	16	4	0	2	7	0	47	0
Peak Hour	**0**	**2**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**2**	**0**	**1**	**3**	**0**	**22**	**0**

Two-Hour Count Summaries - Bikes

Interval Start	I-580 EB Ramps			I-580 EB Ramps			N Livermore Ave			N Livermore Ave			15-min Total	Rolling One Hour
	Eastbound			Westbound			Northbound			Southbound				
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT		
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:00 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
5:15 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Count Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note: U-Turn volumes for bikes are included in Left-Turn, if any.

APPENDIX C – EXISTING CONDITIONS LOS AND QUEUE LENGTH CALCULATIONS



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	36	153	4	30	8
Future Volume (Veh/h)	0	36	153	4	30	8
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	42	180	5	35	9
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	185				226	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	185				226	182
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				95	99
cM capacity (veh/h)	1390				762	860

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	42	185	44
Volume Left	0	0	35
Volume Right	0	5	9
cSH	1390	1700	780
Volume to Capacity	0.00	0.11	0.06
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	9.9
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.9
Approach LOS			A

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	18.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	361	4	24	642	118	0	0	185	141
Future Volume (vph)	0	0	0	361	4	24	642	118	0	0	185	141
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Lane Util. Factor				0.95	0.95		0.97	1.00			0.95	1.00
Frt				1.00	0.98		1.00	1.00			1.00	0.85
Flt Protected				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1665		3433	1863			3539	1583
Flt Permitted				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1665		3433	1863			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	376	4	25	669	123	0	0	193	147
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	105
Lane Group Flow (vph)	0	0	0	203	192	0	669	123	0	0	193	42
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)				10.8	10.8		15.0	35.3			16.1	16.1
Effective Green, g (s)				10.8	10.8		15.0	35.3			16.1	16.1
Actuated g/C Ratio				0.19	0.19		0.26	0.62			0.28	0.28
Clearance Time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Vehicle Extension (s)				2.0	2.0		2.0	2.5			2.5	2.5
Lane Grp Cap (vph)				318	315		903	1153			999	447
v/s Ratio Prot							c0.19	0.07			c0.05	
v/s Ratio Perm				c0.12	0.12							0.03
v/c Ratio				0.64	0.61		0.74	0.11			0.19	0.09
Uniform Delay, d1				21.3	21.2		19.2	4.4			15.5	15.1
Progression Factor				1.00	1.00		0.66	0.97			1.00	1.00
Incremental Delay, d2				3.1	2.5		2.6	0.2			0.4	0.4
Delay (s)				24.4	23.6		15.4	4.5			16.0	15.5
Level of Service				C	C		B	A			B	B
Approach Delay (s)		0.0			24.0			13.7			15.7	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	15.1
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	3	579	0	0	0	0	747	243	24	515	0
Future Volume (vph)	34	3	579	0	0	0	0	747	243	24	515	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7					5.4		3.7	5.4	
Lane Util. Factor		0.95	0.95					0.95		1.00	0.95	
Frt		0.87	0.85					0.96		1.00	1.00	
Flt Protected		0.99	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1527	1504					3409		1770	3539	
Flt Permitted		0.99	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1527	1504					3409		1770	3539	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	35	3	603	0	0	0	0	778	253	25	536	0
RTOR Reduction (vph)	0	243	245	0	0	0	0	32	0	0	0	0
Lane Group Flow (vph)	0	78	76	0	0	0	0	999	0	25	536	0
Turn Type	Split	NA	Prot					NA		Prot	NA	
Protected Phases	4	4	4					2		1	6	
Permitted Phases												
Actuated Green, G (s)		8.1	8.1					33.7		1.4	38.8	
Effective Green, g (s)		8.1	8.1					33.7		1.4	38.8	
Actuated g/C Ratio		0.14	0.14					0.59		0.02	0.68	
Clearance Time (s)		4.7	4.7					5.4		3.7	5.4	
Vehicle Extension (s)		2.0	2.0					2.5		2.0	2.5	
Lane Grp Cap (vph)		216	213					2015		43	2409	
v/s Ratio Prot		c0.05	0.05					c0.29		c0.01	0.15	
v/s Ratio Perm												
v/c Ratio		0.36	0.35					0.50		0.58	0.22	
Uniform Delay, d1		22.1	22.1					6.7		27.5	3.4	
Progression Factor		1.00	1.00					1.00		1.13	0.22	
Incremental Delay, d2		0.4	0.4					0.9		11.5	0.2	
Delay (s)		22.5	22.5					7.6		42.7	1.0	
Level of Service		C	C					A		D	A	
Approach Delay (s)		22.5			0.0			7.6			2.8	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	7	209	43	43	14	0
Future Volume (Veh/h)	7	209	43	43	14	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	8	246	51	51	16	0
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	102				340	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	102				340	76
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	100
cM capacity (veh/h)	1490				652	985

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	254	102	16
Volume Left	8	0	16
Volume Right	0	51	0
cSH	1490	1700	652
Volume to Capacity	0.01	0.06	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.3	0.0	10.7
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	10.7
Approach LOS			B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	303	3	29	625	504	0	0	84	31
Future Volume (vph)	0	0	0	303	3	29	625	504	0	0	84	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Lane Util. Factor				0.95	0.95		0.97	1.00			0.95	1.00
Frt				1.00	0.97		1.00	1.00			1.00	0.85
Flt Protected				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1656		3433	1863			3539	1583
Flt Permitted				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1656		3433	1863			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	316	3	30	651	525	0	0	88	32
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	0	21
Lane Group Flow (vph)	0	0	0	177	159	0	651	525	0	0	88	11
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)				11.3	11.3		16.7	42.8			21.9	21.9
Effective Green, g (s)				11.3	11.3		16.7	42.8			21.9	21.9
Actuated g/C Ratio				0.17	0.17		0.26	0.66			0.34	0.34
Clearance Time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Vehicle Extension (s)				2.0	2.0		2.0	2.5			2.5	2.5
Lane Grp Cap (vph)				292	287		882	1226			1192	533
v/s Ratio Prot							c0.19	c0.28			0.02	
v/s Ratio Perm				c0.11	0.10							0.01
v/c Ratio				0.61	0.55		0.74	0.43			0.07	0.02
Uniform Delay, d1				24.8	24.5		22.1	5.3			14.7	14.4
Progression Factor				1.00	1.00		0.90	0.68			1.00	1.00
Incremental Delay, d2				2.4	1.3		1.5	0.6			0.1	0.1
Delay (s)				27.2	25.9		21.4	4.2			14.8	14.5
Level of Service				C	C		C	A			B	B
Approach Delay (s)		0.0			26.6			13.7			14.7	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	15.1
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	363	3	850	0	0	0	0	765	323	21	359	0
Future Volume (vph)	363	3	850	0	0	0	0	765	323	21	359	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7					5.4		3.7	5.4	
Lane Util. Factor		0.95	0.95					0.95		1.00	0.95	
Frt		0.94	0.85					0.96		1.00	1.00	
Flt Protected		0.97	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1612	1504					3382		1770	3539	
Flt Permitted		0.97	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1612	1504					3382		1770	3539	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	378	3	885	0	0	0	0	797	336	22	374	0
RTOR Reduction (vph)	0	40	218	0	0	0	0	59	0	0	0	0
Lane Group Flow (vph)	0	615	393	0	0	0	0	1074	0	22	374	0
Turn Type	Split	NA	Prot					NA		Prot	NA	
Protected Phases	4	4	4					2		1	6	
Permitted Phases												
Actuated Green, G (s)		25.9	25.9					23.9		1.4	29.0	
Effective Green, g (s)		25.9	25.9					23.9		1.4	29.0	
Actuated g/C Ratio		0.40	0.40					0.37		0.02	0.45	
Clearance Time (s)		4.7	4.7					5.4		3.7	5.4	
Vehicle Extension (s)		2.0	2.0					2.5		2.0	2.5	
Lane Grp Cap (vph)		642	599					1243		38	1578	
v/s Ratio Prot		c0.38	0.26					c0.32		c0.01	0.11	
v/s Ratio Perm												
v/c Ratio		0.96	0.66					0.86		0.58	0.24	
Uniform Delay, d1		19.0	15.9					19.0		31.5	11.1	
Progression Factor		1.00	1.00					1.00		0.37	0.75	
Incremental Delay, d2		24.9	2.0					8.1		12.1	0.3	
Delay (s)		44.0	17.9					27.1		23.6	8.6	
Level of Service		D	B					C		C	A	
Approach Delay (s)		31.4			0.0			27.1			9.5	
Approach LOS		C			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	203	202	669	123	193	147
v/c Ratio	0.64	0.62	0.74	0.11	0.19	0.27
Control Delay	30.3	28.1	17.6	5.3	18.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.3	28.1	17.6	5.3	18.4	6.0
Queue Length 50th (ft)	67	62	106	25	26	0
Queue Length 95th (ft)	120	114	12	3	55	40
Internal Link Dist (ft)		347		287	361	
Turn Bay Length (ft)						140
Base Capacity (vph)	406	411	1072	1156	1006	555
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.49	0.62	0.11	0.19	0.26

Intersection Summary

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	321	320	1031	25	536
v/c Ratio	0.70	0.70	0.46	0.15	0.22
Control Delay	13.1	13.0	7.9	28.2	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	13.0	7.9	28.2	1.1
Queue Length 50th (ft)	12	11	49	7	0
Queue Length 95th (ft)	66	65	214	m16	0
Internal Link Dist (ft)	984		364		287
Turn Bay Length (ft)					
Base Capacity (vph)	660	654	2219	288	2406
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.49	0.49	0.46	0.09	0.22

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	177	172	651	525	88	32
v/c Ratio	0.61	0.57	0.74	0.43	0.07	0.05
Control Delay	33.0	29.1	22.5	4.9	18.4	0.2
Queue Delay	0.0	0.0	0.0	0.6	0.0	0.0
Total Delay	33.0	29.1	22.5	5.5	18.4	0.2
Queue Length 50th (ft)	69	60	90	62	12	0
Queue Length 95th (ft)	115	106	m105	m80	33	0
Internal Link Dist (ft)		347		287	361	
Turn Bay Length (ft)						140
Base Capacity (vph)	423	428	1204	1229	1193	599
Starvation Cap Reductn	0	0	0	367	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.40	0.54	0.61	0.07	0.05

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	655	611	1133	22	374
v/c Ratio	0.96	0.75	0.78	0.15	0.24
Control Delay	45.8	13.3	22.4	12.1	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	13.3	22.4	12.1	8.9
Queue Length 50th (ft)	231	73	170	3	21
Queue Length 95th (ft)	#454	208	#384	m8	29
Internal Link Dist (ft)	984		364		287
Turn Bay Length (ft)					
Base Capacity (vph)	692	824	1455	253	1579
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.95	0.74	0.78	0.09	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

APPENDIX D – DETAILED PROJECT TRIP GENERATION CALCULATIONS

Aramis Renewable Energy Project - Construction Phasing and Trip Assumptions

Phase	Duration (business days)	Start (week number)	End (week number)	Start (calendar day number)	Start (calendar day number)	Trips/day	Onroad trips/day
Site Prep	30	0	6	0	42	58	25
PV Installation	150	7	30	49	210	57	55
Electrical + Gen-tie	75	20	35	140	245	16	12
Vehicles and Equipment Used Throughout Construction & Restoration	175	0	35	0	245	0	0

	Vehicle	Onroad?	Phase	Total one-way trips
Modules	Flatbed	Yes	2	5000
Foundation posts	Flatbed	Yes	2	1000
Racking	Flatbed	Yes	2	1200
Cable	Flatbed	Yes	3	150
Interters	Flatbed	Yes	3	225
Transformers	Flatbed	Yes	3	200
Concrete	Concrete mixer	No	2	400
Road base	Dump truck	No	1	1000
Trash haul off	Haul	Yes	4	125
Fencing	Flatbed	Yes	1	50
Offroad eq transp	Flatbed	Yes	1	300
Electrical equip	Flatbed	No	3	125
Water	Tank truck	No	4	10000
Worker commute	Passenger car	Yes	1	400
Worker commute	Passenger car	Yes	2	1000
Worker commute	Passenger car	Yes	3	500

Aramis Renewable Energy Project - Trip Generation by Construction Phase

Phase	Trip Type	Trips Per Day	AM Peak	PM Peak
Phase I	Workers	400	100	100
	Haul Trips	46	5	5
	Total	***446***	***105***	***105***
Phase II	Workers	1000	250	250
	Haul Trips	52	6	6
	Total	***1052***	***256***	***256***
Phase III	Workers	500	125	125
	Haul Trips	10	1	1
	Total	***510***	***126***	***126***
Phase IV	Workers	-	-	-
	Haul Trips	59	7	7
	Total	***59***	***7***	***7***
Max Trips	Workers	1500	375	375
	Haul Trips	121	14	14
	Total	***1621***	***389***	***389***

Notes

1. Phase 4 occurs simultaneously to Phases 1-3.
2. Worker trips assume 4 worker trips per day (AM in, lunch break in/out, PM out)

Aramis Renewable Energy Project - Trip Distribution Calculations

Trips	AM				PM			
	Inbound		Outbound		Inbound		Outbound	
Total Worker Trips	**375**						**375**	
580 Worker Trips	**338**	**80%**					**338**	**80%**
580 WB Worker Trips	49	13%					252	67%
580 EB Worker Trips	252	67%					49	13%
Non-580 Worker Trips	**76**	**20%**					**76**	**20%**
Manning (to/from north)	38	10%					38	10%
Livermore (to/from south)	38	10%					38	10%
Total Haul Trips	**7**		**7**		**7**		**7**	
580 WB Haul Trips			7	50%			7	50%
580 EB Haul Trips	7	50%			7	50%	0	
Total EB 580 Trips	259	68%			7	2%	49	13%
Total WB 580 Trips	49	13%	7	2%			259	68%
Total SB Manning	38	10%					38	10%
Total NB North Livermore	38	10%					38	10%
Total Trips	**384**	**99%**	**7**	**2%**	**7**	**2%**	**384**	**99%**

Notes

1. All haul trips arrive to and depart from the Port of Oakland
2. 20% of worker trips assumed to not depart/arrive via I-580. All other worker trips assumed to arrive via I-580.
3. Worker trip origin/destination assumes even distribution from 5 East Bay cities (per sponsor data): Oakland, San Leandro, Hayward, Fremont, and Tracy.

City	Gen Population		Worker Population		Worker Population by Industry	
Oakland	429,114	43%	235,825	44%	13,727	42%
San Leandro	89,683	9%	48,974	9%	3,740	11%
Hayward	159,618	16%	78,738	15%	6,441	20%
Fremont	237,815	24%	124,130	23%	3,872	12%
Tracy	91,803	9%	47,555	9%	4,885	15%
Total	**1,008,033**	**100%**	**535,222**	**100%**	**32,665**	**100%**

Source: US Census Bureau - American Community Survey (ACS)

- General Population by Age (2018)
- Class of Worker for Civilian Employed Population 16 Years+ (2018)
- Industry for the Civilian Employed Population 16 Years+ (2018)

APPENDIX E – EXISTING PLUS PROJECT CONDITIONS LOS AND QUEUE LENGTH CALCULATIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	74	0	1	153	4	0	0	0	30	0	8
Future Volume (Veh/h)	0	74	0	1	153	4	0	0	0	30	0	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.92	0.92	0.85	0.85	0.92	0.92	0.92	0.85	0.92	0.85
Hourly flow rate (vph)	0	87	0	1	180	5	0	0	0	35	0	9
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					3.5							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	185			87			280	274	88	272	272	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	185			87			280	274	88	272	272	182
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	95	100	99
cM capacity (veh/h)	1390			1509			664	633	969	679	635	860

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	87	186	0	44
Volume Left	0	1	0	35
Volume Right	0	5	0	9
cSH	1390	1509	1700	710
Volume to Capacity	0.00	0.00	0.00	0.06
Queue Length 95th (ft)	0	0	0	5
Control Delay (s)	0.0	0.0	0.0	10.4
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.0	0.0	10.4
Approach LOS			A	B

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	361	4	73	642	415	0	0	185	148
Future Volume (vph)	0	0	0	361	4	73	642	415	0	0	185	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Lane Util. Factor				0.95	0.95		0.97	1.00			0.95	1.00
Frt				1.00	0.95		1.00	1.00			1.00	0.85
Flt Protected				0.95	0.97		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1627		3433	1863			3539	1583
Flt Permitted				0.95	0.97		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1627		3433	1863			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	376	4	76	669	432	0	0	193	154
RTOR Reduction (vph)	0	0	0	0	34	0	0	0	0	0	0	113
Lane Group Flow (vph)	0	0	0	233	189	0	669	432	0	0	193	41
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)				11.6	11.6		15.0	34.5			15.3	15.3
Effective Green, g (s)				11.6	11.6		15.0	34.5			15.3	15.3
Actuated g/C Ratio				0.20	0.20		0.26	0.61			0.27	0.27
Clearance Time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Vehicle Extension (s)				2.0	2.0		2.0	2.5			2.5	2.5
Lane Grp Cap (vph)				342	331		903	1127			949	424
v/s Ratio Prot							c0.19	c0.23			0.05	
v/s Ratio Perm				c0.14	0.12							0.03
v/c Ratio				0.68	0.57		0.74	0.38			0.20	0.10
Uniform Delay, d1				21.0	20.5		19.2	5.8			16.1	15.7
Progression Factor				1.00	1.00		0.73	0.89			1.00	1.00
Incremental Delay, d2				4.4	1.5		2.1	0.7			0.5	0.5
Delay (s)				25.4	21.9		16.1	5.9			16.6	16.1
Level of Service				C	C		B	A			B	B
Approach Delay (s)		0.0			23.7			12.1			16.4	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	15.1
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	3	579	0	0	0	0	785	243	24	515	0
Future Volume (vph)	293	3	579	0	0	0	0	785	243	24	515	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.7	4.7					5.4		3.7	5.4	
Lane Util. Factor		0.95	0.95					0.95		1.00	0.95	
Frt		0.95	0.85					0.96		1.00	1.00	
Flt Protected		0.97	1.00					1.00		0.95	1.00	
Satd. Flow (prot)		1625	1504					3414		1770	3539	
Flt Permitted		0.97	1.00					1.00		0.95	1.00	
Satd. Flow (perm)		1625	1504					3414		1770	3539	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	305	3	603	0	0	0	0	818	253	25	536	0
RTOR Reduction (vph)	0	34	202	0	0	0	0	40	0	0	0	0
Lane Group Flow (vph)	0	437	239	0	0	0	0	1031	0	25	536	0
Turn Type	Split	NA	Prot					NA		Prot	NA	
Protected Phases	4	4	4					2		1	6	
Permitted Phases												
Actuated Green, G (s)		16.7	16.7					25.1		1.4	30.2	
Effective Green, g (s)		16.7	16.7					25.1		1.4	30.2	
Actuated g/C Ratio		0.29	0.29					0.44		0.02	0.53	
Clearance Time (s)		4.7	4.7					5.4		3.7	5.4	
Vehicle Extension (s)		2.0	2.0					2.5		2.0	2.5	
Lane Grp Cap (vph)		476	440					1503		43	1875	
v/s Ratio Prot		c0.27	0.16					c0.30		c0.01	0.15	
v/s Ratio Perm												
v/c Ratio		0.92	0.54					0.69		0.58	0.29	
Uniform Delay, d1		19.5	16.9					12.8		27.5	7.4	
Progression Factor		1.00	1.00					1.00		1.28	0.45	
Incremental Delay, d2		22.2	0.7					2.6		11.3	0.4	
Delay (s)		41.7	17.7					15.4		46.6	3.7	
Level of Service		D	B					B		D	A	
Approach Delay (s)		30.1			0.0			15.4			5.6	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	233	223	669	432	193	154
v/c Ratio	0.68	0.61	0.74	0.38	0.20	0.29
Control Delay	31.2	23.5	17.9	6.7	19.1	6.1
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	31.2	23.5	17.9	7.2	19.1	6.1
Queue Length 50th (ft)	76	57	114	96	27	0
Queue Length 95th (ft)	136	114	m57	m31	55	40
Internal Link Dist (ft)		347		287	361	
Turn Bay Length (ft)						140
Base Capacity (vph)	413	432	1072	1137	961	541
Starvation Cap Reductn	0	0	0	329	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.52	0.62	0.53	0.20	0.28

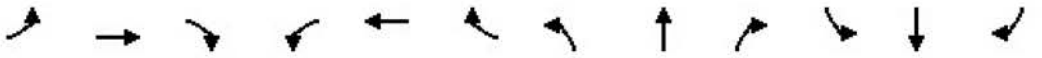
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	471	440	1071	25	536
v/c Ratio	0.93	0.69	0.62	0.15	0.29
Control Delay	45.7	12.7	14.1	31.7	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	45.7	12.7	14.1	31.7	3.8
Queue Length 50th (ft)	144	42	111	9	36
Queue Length 95th (ft)	#313	132	#284	m16	1
Internal Link Dist (ft)	984		364		287
Turn Bay Length (ft)					
Base Capacity (vph)	526	654	1721	288	1876
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.90	0.67	0.62	0.09	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	209	0	1	81	43	0	0	0	14	0	0
Future Volume (Veh/h)	7	209	0	1	81	43	0	0	0	14	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.92	0.92	0.85	0.85	0.92	0.92	0.92	0.85	0.92	0.85
Hourly flow rate (vph)	8	246	0	1	95	51	0	0	0	16	0	0
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					3.5							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	146			246			384	410	247	386	384	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146			246			384	410	247	386	384	120
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	97	100	100
cM capacity (veh/h)	1436			1320			571	528	791	570	546	931

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	254	147	0	16
Volume Left	8	1	0	16
Volume Right	0	51	0	0
cSH	1436	1320	1700	570
Volume to Capacity	0.01	0.00	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.3	0.1	0.0	11.5
Lane LOS	A	A	A	B
Approach Delay (s)	0.3	0.1	0.0	11.5
Approach LOS			A	B

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	25.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	303	3	29	625	511	0	0	171	290
Future Volume (vph)	0	0	0	303	3	29	625	511	0	0	171	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Lane Util. Factor				0.95	0.95		0.97	1.00			0.95	1.00
Frt				1.00	0.97		1.00	1.00			1.00	0.85
Flt Protected				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (prot)				1681	1656		3433	1863			3539	1583
Flt Permitted				0.95	0.96		0.95	1.00			1.00	1.00
Satd. Flow (perm)				1681	1656		3433	1863			3539	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	316	3	30	651	532	0	0	178	302
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	0	200
Lane Group Flow (vph)	0	0	0	177	159	0	651	532	0	0	178	102
Turn Type				Perm	NA		Prot	NA			NA	Perm
Protected Phases					8		5	2			6	
Permitted Phases				8								6
Actuated Green, G (s)				11.2	11.2		16.7	42.9			22.0	22.0
Effective Green, g (s)				11.2	11.2		16.7	42.9			22.0	22.0
Actuated g/C Ratio				0.17	0.17		0.26	0.66			0.34	0.34
Clearance Time (s)				4.7	4.7		4.2	6.2			6.2	6.2
Vehicle Extension (s)				2.0	2.0		2.0	2.5			2.5	2.5
Lane Grp Cap (vph)				289	285		882	1229			1197	535
v/s Ratio Prot							c0.19	c0.29			0.05	
v/s Ratio Perm				c0.11	0.10							0.06
v/c Ratio				0.61	0.56		0.74	0.43			0.15	0.19
Uniform Delay, d1				24.9	24.6		22.1	5.3			15.0	15.2
Progression Factor				1.00	1.00		1.32	0.72			1.00	1.00
Incremental Delay, d2				2.7	1.3		1.1	0.4			0.3	0.8
Delay (s)				27.6	26.0		30.2	4.2			15.2	16.0
Level of Service				C	C		C	A			B	B
Approach Delay (s)		0.0			26.8			18.5			15.7	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	15.1
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX F – DETAILED PROJECT-GENERATED VEHICLE MILES TRAVELED (VMT) CALCULATIONS

Aramis Renewable Energy Project - VMT Calculations

Project-Generated VMT by Construction Phase

Construction Phase	Duration (Business Days)	Trip Type	Daily Trips	Daily Oakland VMT	Daily San Leandro VMT	Daily Hayward VMT	Daily Fremont VMT	Daily Tracy VMT	Daily Port of Oakland VMT	Total Daily VMT	Per Capita VMT[1]
(1) Site Prep	30	Worker (Home/Site)	200	2665	589	967	890	656	-	5767	67
		Worker (Lunch Break)	200	387	106	182	110	138	-	923	
		Haul Truck	46	-	-	-	-	-	1569	1569	68
		Total	***446***	***3052***	***695***	***1149***	***1000***	***794***	***1569***	***8259***	**-**
(2) PV Installation	150	Worker (Home/Site)	500	6661	1472	2416	2223	1638	-	14410	
		Worker (Lunch Break)	500	967	264	454	273	344	-	2302	67
		Haul Truck	52	-	-	-	-	-	1774	1774	68
		Total	***1052***	***7628***	***1736***	***2870***	***2496***	***1982***	***1774***	***18486***	**-**
(3) Electric+Gen-tie	75	Worker (Home/Site)	250	3331	736	1208	1112	819	-	7206	
		Worker (Lunch Break)	250	484	132	227	137	172	-	1152	67
		Haul Truck	10	-	-	-	-	-	341	341	68
		Total	***510***	***3815***	***868***	***1435***	***1249***	***991***	***341***	***8699***	
(4) Vehicles - Equipment	175	Worker (Home/Site)	-	-	-	-	-	-	-	-	-
		Worker (Lunch Break)	-	-	-	-	-	-	-	-	
		Haul Truck	59	-	-	-	-	-	2012	2012	68
		Total	***59***	**-**	**-**	**-**	**-**	**-**	***2012***	***2012***	
Total				**14495**	**3299**	**5454**	**4745**	**3767**	**3684**	**35444**	

Peak Construction Period VMT (Overlap of Phases 2, 3, and 4)

Trip Type	Total Daily VMT	Daily per Capita VMT
Worker (Home/Site)	*21,616*	*57.6*
Worker (Lunch Break)	*3,454*	*9.2*
Worker (Combined)	**25,070**	**66.9**
Haul Truck	**4,127**	**68.2**

Notes

1. Per capita VMT for workers reflects combined VMT for home/site trips and off-site lunch-break trips

Trip Distribution and Trip Length by Origin/Destination

City	Worker Population by Industry	Distance from Project Site
Oakland[1]	42%	31.7
San Leandro[2]	11%	25.7
Hayward[3]	20%	24.5
Fremont[4]	12%	37.5
Tracy[5]	15%	21.9
Livermore[6]	-	4.6
Port of Oakland[7]	-	34.1
Total	**100%**	**-**

Notes

1. Assumes approximate City centroid at intersection of Fruitvale Ave & Macarthur Blvd
2. Assumes approximate City centroid at intersection of Alvarado St & Marina Blvd
3. Assumes approximate City centroid at intersection of W Harder Rd & Gading Rd
4. Assumes approximate City centroid at intersection of Fremont Blvd & Mowry Ave
5. Assumes approximate City centroid at intersection of Tracy Blvd & W 11th St
6. Half of all worker trips are assumed to be lunch-break trips off site to a commercial/restaurant center location. This analysis uses Livermore's Arcade Shopping Center, approximately 4.6 miles south of the Project site.
7. All haul trips assumed to travel to and from the Port of Oakland



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