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Appendix3.7B
Geotechnical Memorandum

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July 24, 2019

TECHNICAL MEMORANDUM

TO: Kristen Hulett and Peter Magoulick, Jacobs

FROM: Brian O'Neill PE/GE, and Eric Johnson, PE

PROJECT No.: 20200410.001A

SUBJECT: **Geotechnical Memorandum**
Updated Recommendations for Ground Improvement, and Estimated Settlement due to Loads from Proposed New Fill from Mass Grading
Proposed SJC02 Data Center Development
San Jose, California

This supplemental memorandum presents the results of our updated geotechnical recommendations for the proposed SJC02 Lightspeed Data Center Facility, located in San Jose, California. The specific geotechnical recommendations addressed in this memorandum as part of our scope of work under Task 2 include updated recommendations for Ground Improvement (GI), and estimated ground settlement due to loads imposed by the proposed new fill associated with mass grading of the site.

The updated geotechnical recommendations presented herein are based on our ongoing correspondence with the project team since April 2019, preliminary foundation, civil grading, and drainage drawings provided by Jacobs, dated May 2019, preliminary information regarding structure and ground settlement tolerances as well as general performance requirements from the engineering design team discussed during a meeting on June 12, 2019, and subsequent email correspondence from the structural engineer dated July 10, 2019. A supplementary geotechnical investigation was not performed as part of our current Task 2 work scope. The engineering analysis performed made use of the existing subsurface data collected by Kleinfelder in 2016, which was presented in the report titled "*Geotechnical Investigation Report, Pacland Project 1926, San Jose, California*", dated June 10, 2016. See the referenced 2016 report for an expanded discussion of site and subsurface conditions, geologic hazards, and preliminary geotechnical conclusions and recommendations.

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Ground Improvement, and Recommended Performance Requirements

The development and design team has selected implementation of GI to address the liquefaction related ground settlement hazard concern as described in Kleinfelder's memo dated May 13, 2019 that was issued as part of our Task 1 services. Based on the design team's performance requirements pertaining to liquefaction settlement, the GI work would include areas of the site within the footprints of the single-story Pre-Engineered Metal Buildings (PEMBs), as well as zones external to (beyond the limits of) the buildings to include areas of equipment pads, buried utility service lines leading to the buildings, at-grade walkways, and vehicle driveway areas. The specific coverage areas and boundary limits of zones for GI work external to the buildings have not been finalized but are expected to extend about 60 to 70 feet beyond the building wall lines (corresponding to locations of the various features identified above) according to information received from the engineering designers. The building will be supported using a shallow spread footing type foundation system.

As described in Kleinfelder's Technical Memorandum dated May 13, 2019, and as discussed with the development/design team in recent meetings, the purpose of the GI work is to provide advance mitigation to limit the potential ground surface settlement due to seismic hazard conditions from liquefaction induced settlement during medium to strong earthquakes. As discussed recently with the design and development team, the liquefaction settlement hazard at the site is estimated to range from about 1 to 6 inches, and is not expected to be uniform across the site.

Based on information discussed with the design and development team, we interpret that the key "performance requirement" goals can be stated as follows:

- Limit seismic case (liquefaction) total ground settlement/movement to a maximum tolerance of 1 inch within the structure footprint including slab on grade areas as well as interior column spread footing locations, along the perimeter wall spread footing lines, at grade beams, at all utility and duct banks, etc.
- Limit seismic case (liquefaction) differential ground settlement/movement to a maximum tolerance of 1.5 inches for the surrounding ground external to the buildings at the interface zone where the exterior building wall lines meet critical utility lines (data and electricity source cables etc.) entering the building.

- Similarly, the seismic case settlement performance goal spans to the remainder of the designated zones external to the buildings (as described above) to receive GI treatment, to limit total liquefaction settlement in treated areas to a maximum tolerance to 1.5 inches.

A key goal of the current design team effort is to ultimately provide guideline performance requirements and specifications that a few qualified ground improvement specialty contractors can use to prepare construction bids so that the design/development team can evaluate them and make "best value" comparisons (cost, and schedule durations). As described in our Technical Memorandum dated May 13, 2019, there are a few different GI methods deemed viable for the purpose of advance liquefaction settlement mitigation at the site that can be communicated to the potential bidders, summarized as follows:

1. **Vibro-replacement** - using stone columns. This is a densification method, plus it provides some added shear reinforcement.
2. **Drilled displacement columns** - this is a densification method, plus it provides some added shear reinforcement.
3. **Grouting** - target liquefiable layers using panel/grid configuration or cellular pattern, this is a shear reinforcement type mitigation method.
4. **Vibro-compaction** - this is a densification method. *Note that this method might not be fully effective for densification due to the types and content of soil fines. We recommend further consultation with specialty contractors to confirm viability*.
5. **Hybrid GI methods are also permissible**

Since there are several options available listed above for mitigation by shear reinforcement and densification, multiple specialty ground improvement contractors should be able to bid the work and propose their optimal system (as well as pattern, spacing, depths of treatment, etc.) as a solution for the seismic case settlement hazard in order to meet the performance requirements summarized above. The contractor awarded the GI work will be required to successfully demonstrate the installation method with an advance trial pilot program at the site (for purposes of review and acceptance by the design and development team) prior to proceeding with the 'production' phase GI work.

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We anticipate that the bidding contractors will likely propose GI 'coverage' area replacement ratios (ARRs) on the order of about 20% to 30% areal coverage. We anticipate that the final mitigation method selected will be conducted within the vertical interval from ground surface to depth of about 40 feet below existing grade. The GI work can likely be performed before or after placement of the 3 to 4 feet of imported fill to raise site and building pad grades. Following placement of fill and the GI treatment, shallow foundations (spread footings or mats) can be used for structural support in improved/treated areas. A preliminary estimate of allowable footing bearing capacity is in the range of 2,500 to 3,500 pounds per square foot (psf) for treated areas. All four of the methods listed above generate only minor spoils, or none.

In addition to the acceptable methods presented above, other alternative methods of ground improvement that were considered but deemed likely not to be feasible include the following:

Drainage – such as installation of "earthquake drains", using sand and/or aggregates, or 'wick' type materials made from geosynthetics.

Removal and Replacement – overexcavation and replacement with engineered fill is not feasible due to depth extent of liquefiable layers that exceed 35 feet below ground surface.

Deep Dynamic Compaction – the application of high levels of impact energy at the ground surface by repeatedly dropping a heavy tamper weight is not expected to be feasible due to a combination of the types and thicknesses of soil layers overlying the liquefiable soil layers, and shallow groundwater table.

We recommend that bidding contractors should be informed to not consider or include those methods listed immediately above in their proposal bids.

Additionally, the general method known as mixing/solidification using Deep Soil Mixing (DSM) a.k.a. Cement Deep Soil Mixing (CDSM) is generally not considered to be feasible due to a typically very high percentage of wet soil spoils (range 35% to 50%, or more) generated by this method, as well as a rather large area replacement ratio (ARR). Another method that generates a significant amount of spoils is Jet-Grouting, which would also be expected to require a rather large (excessive) ARR for this site. However, if the General Contractor can later reuse and incorporate the spoils on site (from CDSM, Jet-Grouting or similar methods) into mass grading fill and still meet environmental constraints, then these methods can be reconsidered to evaluate acceptability.

Other Considerations and Constraints Related to GI Work

In addition to consideration of the geotechnical (subsurface) conditions and seismic case liquefaction settlement hazard, other site characteristics and important constraints that have been considered in our evaluation and that will likely need to be communicated in advance to bidding contractors, as well as be addressed further by the design/development team and eventually the contractors, include the following:

- The upper subgrade soil layers in parts of the approximately 60-acre site are impacted by various chemical contaminants (potentially including some hazardous materials) due to former agricultural land use. The areal extent of impacted soils includes various portions of the site. Details regarding the types, concentrations, and extent of contaminants in soil and groundwater have been studied and compiled in documents by the former environmental consultant to PACLAND, and should be made available to bidding contractors. We are not aware if there are environmental-related remedial action and monitoring programs that are on-going at the site. However, we understand from the development and design team that the general remedial approach in place to date as the environmental measure for the site is a "cap and containment" strategy with minimal to no disturbance of the near surface subgrade soils in the upper few feet below ground surface level.

- GI method(s) deemed acceptable and selected for use will be required to prevent or substantially minimize the potential spreading of existing contaminants laterally and vertically to other (i.e. deeper) soil layers and groundwater beyond their current extent. The bidding contractor will likely be required to prepare and submit advance shop drawings and 'workplan' type documentation (including contaminated soil/groundwater management plans) prior to construction. These submittals are potentially subject to review and approval by local environmental regulatory agencies. The design/development/contractor team will need to collaborate along with environmental management staff to comply with these types of requirements.

- If the method selected for use by the GI contractor awarded the work results in generation of 'spoils' (i.e. soil cuttings, groundwater) impacted by contaminants, the preference is to reuse the spoils on site within the General Contractor's (GC) earthwork grading program rather than off-haul and disposal at an approved off-site facility. The specialty ground improvement contractor will be required to coordinate in advance with the GC to accomplish this, and include associated costs and necessary measures, standard 'haz-mat' and site specific training, monitoring and controls, etc. within their bid.

ADDITIONAL GI-RELATED RECOMMENDATIONS

1. The development and design team will need to evaluate whether to contract the specialty ground improvement contractor using a design-build or design-bid-build approach; however, the design-build approach is expected to likely be more beneficial to the owner/developer in this case since the work is tied to a performance specification (tolerable settlement), and potentially also an extended warranty period of at least 10 years. <u>For this method of design-build contracting, the specified seismic case settlement threshold tolerance value described above as well as warranty period are strongly recommended</u>, especially considering that one of the recommended methods of mitigation (shear reinforcement) is generally not amenable to post-treatment verification by an in-situ testing program.

2. The development and design team will need to determine "in what condition" the sites for GI work will be made available to the GI contractor, such as a relatively level/flat subgrade that has already been filled and graded, whether or not all demolition and removals have been done for existing features (if any remnant pavements, buildings, foundations, other buried structures or vaults, underground tanks, buried utility pipelines, etc.).

3. The development and design team should also identify site-specific health and safety or training requirements that may flow down on the construction contract, as well as identify designated laydown area(s) for the specialty contractor. The contractors proposed method must be compatible with any environmental-related remedial action and monitoring programs that may be implemented or on-going at the site.

4. The specialty contractors should be required to submit detailed proposals that include technical descriptions to substantiate the method proposed, rational analytical engineered approach to design effective solutions, dimensions/spacings as well as vertical and areal

extent of ground improvement ‘coverage’ at the site (including lateral overbuild beyond the required treatment area which is typically equal to 1/3 to 1/2 the total depth of treatment or liquefiable layer thickness, whichever is greater), materials and equipment to be used, strength and stiffness of reinforcement elements, QA/QC monitoring methods, demonstrated past project experience and references, as well as post-treatment field verification (if feasible). It is expected that the minimum depth of treatment will extend to approximately 40 feet below finished grade, but this will need to be engineered for the final design-build approach by the specialty contractor considering their specific system(s).

5. The specialty contractor’s submittal should provide written information regarding successful past projects performed by their company using the general method proposed on at least 3 projects within the past 7 years. The engineered technical design submittals should also be prepared and sealed by Sate of California registered Professional Engineer (PE).

6. The development and design team should prepare a written list of additional requirements for use by the bidders, including minimum levels of insurance, required certifications, health and safety programs, minimum qualifications and experience as well as qualifications for contractors lead personnel, anticipated schedule term durations available to perform the work, etc. as the project advances. The above factors, as well as any exceptions taken by bidders to the contractual agreement from the development team, must be considered in evaluating proposal bids by the various bidders.

In advance of bidding, the GI contractors will need to obtain a copy of at least a “geotechnical data package” of subsurface information, including soil boring and CPT logs, plus soil lab testing results. These items can be culled by Kleinfelder staff from the June 10, 2016 subsurface investigation report. It is probably premature to share a full copy of the June 2016 report with interested contractors, considering that our upcoming Task 3 work includes submittal of a comprehensive Geotechnical Report specifically for the currently planned SJC02 Data Center facility. The potential contractors will also need information from the team on settlement threshold tolerances for the static loading conditions for all critical structures, including building appendages such as equipment pads and related features. They will also need to be made aware of your preliminary construction schedule and duration for this phase of work, and that the site elevation is to raised by filling with a few feet of imported non-expansive fill.

Following review of this geotechnical memo we recommend that the development team provide review feedback input, and the information necessary to address items identified as Nos. 1, 2, 3 and 6 immediately above. Once that information is available from the team, Kleinfelder can then refine the information and assist to compile a written bid package under a future task that can be sent to invited bidders on behalf of the development and design team. At that time, Kleinfelder can also refresh the list (that was previously communicated on May 14, 2019 via email) of potential specialty ground improvement contractors.

Other expected elements to be developed and included in a “request for proposal/bid package” for bidding contractors include procurement and construction schedules, text for instructions to bidders, designated person(s) as primary point of contact, pre-bid site walk at jobsite, requirements for submission of bids, identification of contract ‘type’ and process for award, basis of payment and units of measurement, contractual agreement and terms, final acceptance criteria, required inspections, QA/QC, permitting, identification of required submittals by contractor for design and construction phases, other work requirements, bid form(s) requirements including pricing, designation of subcontractors and suppliers, etc. The formal bid package should also contain appendices with final subsurface soil and groundwater data collected from various investigations, including geotechnical boring and CPT logs, laboratory test results, environmental summary reports, etc.

Updated Ground Settlement Estimates from Loads of Proposed New Fill / Mass Grading

Placement of future site grading fills over large lateral areas will lead to site settlement. Based on the existing and proposed grade elevations shown on the conceptual grading and drainage plans dated May 24, 2019, the planned fill thickness was estimated to be approximately 2 to 5 feet. Settlement analysis was performed using conventional consolidation and elasticity theory methods using the computer program Settle3D, Version 4.0 (RocScience). The computed settlement estimate resulting from placement 2 to 5 feet of conventional soil fill across the majority of the site ranges from 1 to 2 inches. Our analysis indicates this settlement will require about 2 to 3 months to be substantially complete.

Shallow Foundation Design Input, and Earthwork Recommendations

Spread footings for the PEMBs should extend a minimum depth of 24 inches below the bottom of the floor slab for interior footings or below adjacent finished grade for exterior footings. For interior and exterior continuous footings, a minimum width of 24 inches is recommended. Isolated interior and exterior footings should measure a minimum of 24 inches by 24 inches. The recommended allowable soil bearing pressure for preliminary engineering design purposes is 2,500 psf. Allowable soil bearing pressures may be increased by one-third for transient loads such as wind and seismic loads. Total estimated static case settlement due to dead plus live loading (DL+LL) of spread footings will vary depending on the plan dimensions of the foundation and the actual load supported. Based on anticipated foundation dimensions and loads, the estimated total static load case settlement of footings is expected to typically range from ½ inch to 1 inch. For footings founded on similar subgrade materials, the estimated magnitude of differential settlements between adjacent footings are expected to be up to ½ of the magnitudes provided for total settlement.

Where footings are located adjacent to below-grade structures or near major underground utilities, the footings should extend below a 2:1 (horizontal to vertical) plane projected upward from the structure footing or bottom of the underground utility to avoid surcharging the below grade structure and underground utility with building loads.

Resistance to lateral loads can also be provided by passive soil pressure against the foundations in the direction of loading, and by soil frictional resistance against the sides and bottoms of footings. For preliminary design purposes, the passive pressure should be calculated using equivalent fluid pressure value of 300 pounds per cubic foot (pcf). Friction along the sides and bottoms of shallow foundations may be used in combination with the passive resistance. The frictional resistance can be estimated by using a coefficient of friction of 0.35. The effective at-rest pressures normal to the sides of the structural elements should be used in estimating frictional resistance along the sides. We recommend using equivalent fluid weight of 60 pcf for the effective at-rest earth pressure in soils above the groundwater level.

The resistance from the upper 12 inches of footings should be neglected in lateral resistance calculations unless the adjacent soil surface is covered by a permanent pavement or floor slab.

However, the pressure distribution for any case should be calculated from the soil surface. The friction coefficient and passive resistance may be used concurrently, and the passive resistance can be increased by one-third for wind and/or seismic loading.

Grading and earthwork recommendations including use of non-expansive fill, earthwork for slab on grade preparation as well as exterior slabs and flatwork, and a preliminary design value for modulus of subgrade reaction for use in slab on grade design are presented in the referenced report dated June 10, 2016.

LIMITATIONS

The conclusions and preliminary recommendations presented in this interim deliverable are based on our review and interpretation of available data including previous reports. It is possible that soil conditions could vary between or beyond the points explored. If subsurface conditions are encountered during later design phases or construction that differ from those described in the June 2016 report, we should be notified immediately in order that a review may be made, and any supplemental recommendations provided.

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Kleinfelder makes no other representation, guarantee or warranty, expressed or implied, regarding the services communication (oral or written), report, opinion, or instrument of service provided.

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Appendix 3.7C
San José Data Center Small Power Plant Project – Paleontological Resources Assessment

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San José Data Center Small Power Plant Project

Paleontological Resources Assessment

November 5, 2019

Contents

Appendix

Figure

Acronyms and Abbreviations

BLM	Bureau of Land Management
BP	before present
CEQA	California Environmental Quality Act
kW	kilowatt(s)
LECEF	Los Esteros Critical Energy Facility
LORS	laws, ordinances, regulations, and standards
MW	megawatt(s)
NEPA	National Environmental Policy Act
PFYC	Potential Fossil Yield Classification
PG&E	Pacific Gas and Electric
PRC	California Public Resources Code
PRMP	Paleontological Resources Monitoring Plan
RWF	Regional Wastewater Facility
SJC02	San José Data Center Small Power Plant Project
SVP	Society of Vertebrate Paleontology
UCMP	University of California at Berkeley Museum of Paleontology
USGS	U.S. Geological Survey
WEAT	Worker Environmental Awareness Training

1. Introduction

1.1 Purpose of Investigation

This technical memorandum was completed to evaluate the potential for sensitive paleontological resources to be encountered during the construction of San José Data Center Small Power Plant Project (SJC02 or project). Paleontological resources are the mineralized (fossilized) remains of prehistoric plants and animals and the mineralized impressions (trace fossils) left as indirect evidence of the form and activity of such organisms. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i. e., older than about 5,000 radiocarbon years). These resources are located within geologic units and are considered to be nonrenewable. Thus, they are afforded protection under several federal, state, and local laws, ordinances, regulations, and standards (LORS).

1.2 Project Location and

The San José Data Center (SJC02) will be located within the City of San José on an approximately 64.5-acre site and will consist of two data center buildings totaling over approximately 479,000 square feet of space. The project will include 40 3.0-MW standby diesel generators (20 per building) to provide electrical power to support the IT load during utility outages or certain onsite electrical equipment interruptions or failures., as well as the installation of 20 3-MW emergency diesel generators at each building. In addition to the 40 backup generators, the project will include two administrative generators, rated at 1.25 MW and 0.5 MW, to support administrative functions during an interruption in the normal delivery of electrical power from the utility. The facility design will not require more than approximately 99 MW of electrical power, which will be used only for backup power for onsite data center operations in the event of an electrical outage by Pacific Gas & Electric (PG&E), although the estimated load is 92 MW.

The land has been used historically for farming since the early 1920s but is not currently in agricultural use. There are two residences, a mobile home, and a storage shed/warehouse currently onsite, which will be demolished as part of the SJC02 project. To the north of the project site are the San José/Santa Clara Regional Wastewater Treatment Plant sludge drying beds, to the south is Highway 237, to the west is the Los Esteros Critical Energy Facility, a PG&E substation, and to the east is Coyote Creek. The project is anticipated to begin construction in the 3rd quarter of 2020, with operations beginning in the 1st quarter of 2022.

The SJC02 will include several linears (described in the following subsection) to facilitate new offsite connections to potable water, reclaimed water, sewer, and electricity, as shown on Figure 1. No natural gas will be used at the site.

1.3 Potable Water

For redundancy purposes, three potable water lines are proposed. Water Line Route #1 and Water Line Route #2 begin in the northwestern corner of the project. Both routes travel south to the proposed entrance road, Nortech Extension. From there, they both turn west to Zanker Road. At Zanker Road, Water Line Route #1 heads north briefly and then west, ultimately connecting to the Nortech valve. Water Line Route #1 is approximately 1.5 miles (7,900 feet) long. At Zanker Road, Water Line Route #2 turns south before turning west alongside Highway 237, and eventually turning south to go under Highway 237 to connect to the new Holger Valve. Water Line Route #2 is approximately 1.3 miles (7,100 feet) long. Water Line Route #3 begins at the southwestern corner of the project, and heads generally east to Zanker Road, where it will parallel Water Line Route #2 connecting to the new Holger Valve. Water Line Route #3 is approximately 1.4 miles (7,500 feet long). The water will come from the San José Municipal Water System to the project.

1.4 Reclaimed Water

Reclaimed water will be used at the site for landscaping purposes. The reclaimed water line will start at the northwest corner of the project site and proceed south to the proposed entrance road, Nortech Extension. From there the line turns west and ends at an existing reclaimed water line that is oriented generally north to south. The reclaimed water line will be approximately ½ mile (2,900 feet long).

1.5 Sanitary Sewer

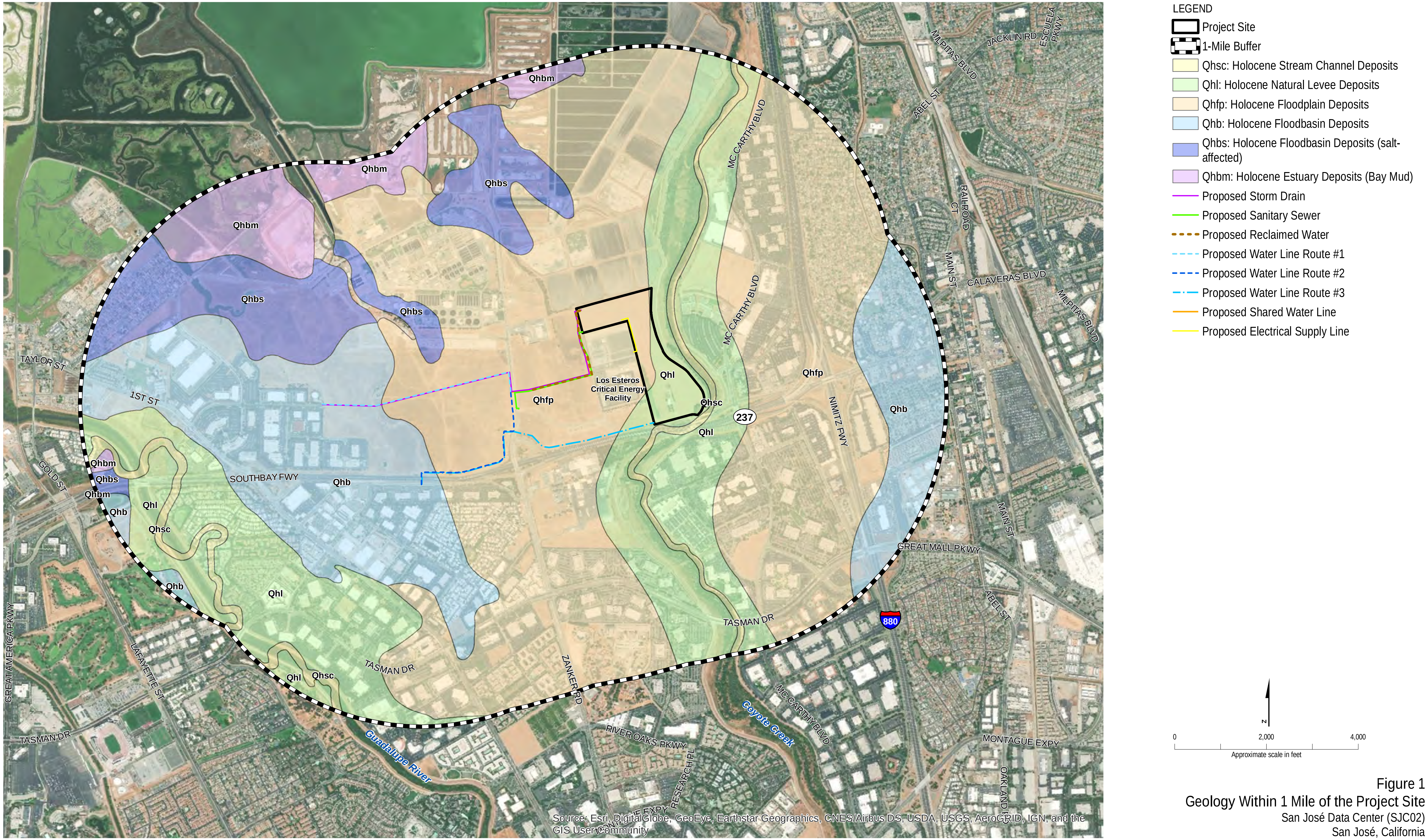
A sanitary sewer line will begin at the northwest corner of the property, and head south to the proposed entrance road, where the line turns to the west. At Zanker Road the line turns south and will connect to the existing sanitary sewer force main/pump station at the corner of Zanker Road and Thomas Foon Chew Way. The sewer line is approximately 0.6 mile (3,300 feet long)..

1.6 Storm Drain

The stormwater line for the Project will begin in the northwest corner of the project site, paralleling the water line route, terminating at Nortech Parkway extension off of Zanker Road where it will tie into the City of San José's stormwater system in the vicinity of Nortech Parkway. The stormwater line to Zanker Road is approximately 0.55 miles (3,000 feet)..

1.7 Electrical Supply Line

The onsite substation will be located in the northwestern corner of the project site and will interconnect to the PG&E substation via two, 0.2-mile long distribution lines. The approximately 1,000-foot-long electrical supply lines will be located along the western fenceline of the project site, between the project site and the LECEF.



GEOLOGIC MAP FROM Helley and Wesling (1989) USGS Open-File Report 89-671

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Figure 1
Geology Within 1 Mile of the Project Site
San José Data Center (SJC02)
San José, California

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2. Regulatory Setting

This section summarizes the federal, state, and local LORS that may apply to paleontological resources on the project site and in the project vicinity.

2.1 Federal Laws, Ordinances, Regulations, and Standards

The National Environmental Policy Act (NEPA) as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258 § 4(b), September 13, 1982) recognizes the continuing responsibility of the federal government to "preserve important historic, cultural, and natural aspects of our national heritage..." (Sec. 101 [42 U.S.C. § 4321]) (#382). Fossils are important historical and natural aspects of our national heritage. When not on federal lands, paleontological analysis under NEPA is at the discretion of the lead federal agency.

Paleontological resources are also protected by several federal laws (Federal Antiquities Act of 1906, Federal Land Management and Policy Act of 1962, National Historic Preservation Act of 1966, *Code of Federal Regulations* Title 43, Section 8365.1-5, and the Paleontological Resources Preservation Act).

2.2 State Laws, Ordinances, Regulations, and Standards

At the state level, paleontological resources are protected by both the California Environmental Quality Act (CEQA) and California Public Resources Code (PRC) Section 5097.5. CEQA (Public Resources Code [PRC] Sections 21000 et seq.). Both require public agencies and private interests to identify the environmental consequences of proposed projects requiring a discretionary permit on any object or site of significance to the scientific annals of California. Specifically, in Appendix G, Section VII(f) of the CEQA Guidelines, Lead Agencies are directed to consider if the project would "directly or indirectly destroy a unique paleontological resource, or site, or unique geological feature" when assessing the potential environmental impacts of a project.

An impact to paleontological resources would be considered significant if a project could result in the direct or indirect destruction of a unique paleontological resource or site., A paleontological resource or site is deemed unique, per the Society of Vertebrate Paleontology (SVP) (2010), if it contains identifiable vertebrate fossils, large or small; uncommon invertebrate, plant, or trace fossils; and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronologic information, or a combination thereof.

PRC Chapter 1.7, Section 5097.5/5097.9 (Stats. 1965, c. 1136, p. 2792), entitled Archaeological, Paleontological, and Historical Sites, defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor and specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources.

2.3 Local Regulations

The Envision San José 2040 General Plan (2011) includes policies applicable to all development projects in San José. The following policies are specific to paleontological resources and are applicable to the proposed project:

- Policy ER-10.1: Proposed development sites that have been identified as archaeologically or paleontologically sensitive require investigation during the planning process in order to determine whether potentially significant archaeological or paleontological information may be affected by the project and then require, if needed, that appropriate mitigation measures be incorporated into the project design.

- Policy ER-10.3: Ensure that City, State, and Federal historic preservation laws, regulations, and codes are enforced, including laws related to archaeological and paleontological resources, to ensure the adequate protection of historic and prehistoric resources.

The Santa Clara County General Plan (1994) includes goals and strategies for responsible resource conservation applicable to all development projects in the county. The following goals and strategies are specific to paleontological resources and are applicable to the proposed project.

- Goal 1.1A Healthy, Well-Functioning Natural Environment, Section 5 “Heritage Resources Protected”, Subsection 5.1: Protection and preservation of heritage resources both natural (e.g. heritage trees; and paleontological resources) and cultural (eg. historic sites and structures, and archeological sites). Cultural heritage resources reflecting the contributions to society of all cultures acknowledged, preserved and commemorated.
- Strategy #5: Conduct Special Studies, Area Planning, and Assessment of Projects Under CEQA, Subsection 5.4: Mapping and storage of spatial data regarding known natural hazards and critical resources on Geographic Information Systems technology to facilitate data maintenance and public dissemination of information (e.g. geologic hazard data, Farmland Mapping Program data, historical sites inventories, archeological and paleontological sites, etc.) {R-HS(i) 9, and various implementation recommendations from Resource Conservation and Health & Safety chapters}

The General Plan defines “Heritage Resources” as particular types of resources, both natural and man-made, which due to their vulnerability or irreplaceable nature deserve special protection if they are to be preserved for current and future generations. The types of resources addressed as heritage resources include the following:

- Historical sites, structures, and areas
- Archeological and paleontological sites and artifacts
- Historical and specimen trees

The General Plan defines “Heritage Resource Values” as resources including historical sites and structures, heritage trees, and archeological and paleontological sites that have multiple values:

- Scientific value; the potential to increase our knowledge of the natural world
- Cultural/historical value; the potential to preserve the historical context from which our current culture and built environment has evolved, as well as to learn from past experience
- Place value; the potential to give to our surroundings a true “sense of place” which defines us, contributes to our sense of wellbeing, and distinguishes Santa Clara County from other areas

2.4 Professional Standards and Guidelines

The SVP, an international scientific organization of professional paleontologists, has established guidelines and standard procedures that outline acceptable professional practices in the conduct of paleontological resource assessments (SVP 2010). This assessment was prepared in accordance with these guidelines.

3. Affected Environment

3.1 Regional Geology

The project site is located within the City of San José, at the southern end of the San Francisco Bay in Santa Clara Valley. The Santa Clara Valley is a northwest-southeast trending structural trough bounded by the Santa Cruz Mountains to the west, the Hamilton/Diablo Range to the east, and the San Francisco Bay to the north. The Santa Clara Valley was formed over the last few million years as sediments derived from the Santa Cruz Mountains and the Hamilton/Diablo Range were eroded and shed to the valley floor during continued tectonic uplift. Sediments within the basin were also deposited during transgression and regression of the inland sea that had previously inundated the area. It is estimated that, during the

Pleistocene era (15,000 years before present [BP]), sea levels were about 328 feet lower than today. As a consequence, the shoreline lay far to the west of San Francisco near the present-day Farallon Islands, and the “Bay” of that time was a broad and deeply incised dry valley (e.g., Sloan and Lipps 2002; Clifton and Leithold 1991). Between the historical San Francisco Bay shoreline and the project site, the historical habitat consisted of a low-lying estuarine marsh. From approximately 14,500–8,200 BP, sea level began and continued to rise, which caused the active shoreline of the Pacific Ocean to migrate eastward into the lower reaches of the valley (which later became San Francisco Bay). Uplift and erosion of the mountains and changes in sea level led to alternating depositional sequences of coarse grained alluvium and fine-grained silts and clays in the Santa Clara Valley (Maguire and Holroyd 2016).

The oldest rocks in the region belong to the Franciscan Complex of Jurassic to Cretaceous age (205 to 65 million years before present [Ma]). These rocks are intensely deformed (i.e., folded, faulted, and fractured) due to tectonic processes associated with the San Andreas Fault system. A sequence of Tertiary (65 to 1.8 Ma) marine and nonmarine sedimentary rocks unconformably overlies the Franciscan Complex. This unconformity represents an erosional surface, creating a gap in the depositional sequence separating the younger Tertiary rocks from the older Jurassic to Cretaceous rocks. During the Plio-Pleistocene (5 Ma to 11,700 BP), sediments eroded from the uplifting Diablo Range and the Santa Cruz Mountains formed broad alluvial fan complexes along the margins of Santa Clara Valley. The 5 Ma to 300,000 BP (Plio-Pleistocene) Santa Clara Formation, which consists of a sequence of fluvial and lacustrine sediments, was deposited unconformably on the older Tertiary and Franciscan rocks along the margins of Santa Clara Valley. The Santa Clara Formation is unconformably overlain by younger Pleistocene and Holocene (11,700 BP to present) alluvial and fluvial deposits (stream channel, overbank, and flood basin environments), which interfinger to the north with estuarine muds of San Francisco Bay (Helley and Wesling 1989).

South San Francisco Bay is a north-northwest trending subsiding basin that is filled primarily with Quaternary fluvial deposits eroded from the surrounding margins and estuarine deposits (Bay mud). Estuarine muds (Bay Mud) were deposited in San Francisco Bay when sea levels were high 130,000 to 70,000 BP (Sangamon interglacial stage) and during the Holocene (Atwater et al. 1977). The older Sangamon Bay Mud is lithologically similar to the Holocene Bay Mud; both are uniformly fine-grained clays with minor amounts of sand. The Holocene Bay Mud is separated from the Sangamon Bay Mud by a mixture of sands, gravels, silts, and clays transported and deposited predominantly by streams during periods of lowered sea level (i.e., prior to 130,000 BP and between 70,000 and 11,700 BP [Wisconsin Glacial Period]) (Treasher 1963).

The structural depression presently occupied by San Francisco Bay appears to have undergone almost continuous subsidence at least since the late Pliocene, while the surrounding hills were being uplifted. Gilbert (1917) was among the first to recognize that historical active subsidence had occurred around the margins of the Bay. This is now known to have been caused by the static rise in sea level. Atwater et al. (1977) have shown, on the basis of bedrock sill depths, thalwegs, and stream gradients, that the South Bay has subsided since the Sangamon interglacial stage and that some of the sediments under southern San Francisco Bay appear to be below the level at which they were initially deposited. The vertical crustal movement suggested by these sediments may be summarized as follows: (1) Some Quaternary sediments have sustained at least 328 feet of tectonic subsidence in less than 1.5 million years relative to the likely elevation of the lowest Pleistocene land surface; (2) the deepest Sangamon Bay Mud deposits subsided tectonically about 66 to 131 feet in about 0.1 million years relative to the assumed initial elevations of the thalwegs buried by these sediments; and (3) Holocene Bay Mud deposits have undergone about 16 feet of tectonic and possibly isostatic subsidence in about 6,000 years relative to elevations which might be expected from eustatic sea-level changes alone (Atwater et al. 1977). Thus, deposits within and along the shore of the San Francisco Bay are generally deeper than those found near the valley margins.

3.2 Geology Units in the Study Area

The local geology of a project area determines its paleontological potential. A study area within 1 mile of the project site was established to assess project area geology (study area) consistent with the California Energy Commission regulations (Title 20 California Code of Regulations, 1704, Appendix B] General geologic mapping sources reviewed in this analysis include maps compiled by the U.S. Geological Survey

(Dibblee 1972; Helley and Wesling 1989) both at a scale of 1:24,000. According to both maps, the study area is underlain by surficial sediments Holocene (11,700 years ago to present) in age. Dibblee (1972) mapped the area as underlain by undifferentiated Holocene alluvium, while Helley and Wesling (1989) have differentiated the Holocene deposits into mappable units associated with depositional environments (i.e., floodplain, levee, stream channel, or other). Although surficial sediments within Santa Clara Valley have historically been mapped as Holocene in age (i.e., Helley and Wesling 1989), recent studies of Pleistocene age (2.6 million to 11,700 years ago) vertebrate fossils recovered at relatively shallow depths from deposits within Santa Clara Valley mapped as Holocene indicate that Pleistocene deposits occur closer to the surface than historical mapping indicates (Maguire and Holroyd 2016). Thus, Holocene deposits should be thought of as a relatively thin veneer over older Pleistocene deposits. The geological units within the study area are presented as follows and are mapped on Figure 1; the three- to four-letter mapping designations as shown on Figure 1 are also listed herein.

- Holocene Stream Channel Deposits (Qhsc): Poorly- to well-sorted sandy silt, silty sand, sand, or sandy gravel with minor cobbles. Stream channel deposits occur along the modern and ancient stream channels of Coyote Creek and the Guadalupe River.
- Holocene Natural Levee Deposits (Qhl): Loose, moderate- to well-sorted sandy or clayey silt grading to sandy or silty clay. Levee deposits border the channels of Guadalupe River and Coyote Creek. Deposits along Coyote Creek tend to be coarser (sandy or clayey silt) than those along the Guadalupe River (sandy or silty clay).
- Holocene Floodplain Deposits (Qhfp): Medium to dark gray, dense, sandy to silty clay. Lenses of coarser material (silt, sand, and pebbles) may be locally present. Floodplain deposits are found between the levee deposits of Coyote Creek and the Guadalupe River and between the levee and floodbasin deposits on the east side of Coyote Creek.
- Holocene Floodbasin Deposits (Qhb): Organic-rich clay to very fine silty-clay deposits occupying the lowest topographic positions either between the levee deposits or floodplain deposits.
- Holocene Floodbasin Deposits (salt-affected) (Qhbs): Clay to very fine silty-clay deposits similar to the Qhb deposits except that they contain carbonate nodules and iron-stained mottles. These deposits may have been formed by the interaction of bicarbonate-rich upland water and saline water of the San Francisco Bay estuary. Salt-affected basin deposits generally occur along the margin of the Bay and are in contact with estuary deposits (Qhbm).
- Holocene Estuary Deposits (Bay Mud) (Qhbm): Clay and silty clay underlying tidal mudflats, marshland and salt evaporators of San Francisco Bay. May contain shelly and peaty layers. Estuary deposits interfinger with floodbasin deposits (Qhb) and salt affected floodbasin deposits (Qhbs).

4. Paleontological Potential

The paleontological potential of a geologic unit exposed in a project area is inferred from the abundance of fossil specimens or previously recorded fossil sites in exposures of the unit, or of similar units in similar geological settings, or both. The underlying assumption of this assessment method is that a geologic unit is mostly likely to yield fossil remains in a quantity and of a quality similar to those previously recorded from the unit elsewhere in the region.

The paleontological potential of a geologic unit reflects (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for proper stratigraphic interpretation, age determination of a geologic unit, paleoenvironmental and paleoclimatic reconstructions, or to understanding evolutionary processes.

Determining the paleontological potential of a geologic unit helps to determine which units may require mitigation to reduce potential impacts to paleontological resources during the development of the project. In its guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (2010) established the following four categories of paleontological potential: high, low, none, and undetermined. These categories are described as follows:

- **High Potential**: Geologic units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Geologic units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units which may contain new vertebrate deposits, traces, or trackways, are also classified as having high potential.

- **Low Potential**: Geologic units with low potential are known to produce significant fossils only on rare occasions, and/or only preserve fossils in rare circumstances such that the presence of fossils is the exception not the rule (e.g., basalt flows or Recent colluvium).
- **No Potential**: Geologic units with no potential are those that formed at high temperatures and/or pressures, deep within the earth, such as plutonic igneous rocks, and high-grade metamorphic rocks. Since the environment in which these rocks formed is not conducive to the preservation of biological remains, they do not contain fossils.
- **Undetermined Potential**: Geologic units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these units have high or low potential to contain significant paleontological resources.

The SVP classification of paleontological potential makes nuanced interpretation difficult because it does not have a “moderate” rating and has a single “high” rating. For a more nuanced assessment, the Bureau of Land Management (BLM) Potential Fossil Yield Classification (PFYC) system for paleontological resources (BLM 2016) is often employed regardless of land ownership. The PFYC system is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of 1 (very low potential) to 5 (very high potential). It is widely used for paleontological assessments in the western U.S. and has been adopted by agencies other than BLM. The PFYC system adapted from the BLM (2016) is as follows:

Class 5 – Very High. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics:

- Significant paleontological resources have been documented and occur consistently.
- Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.
- Unit is frequently the focus of illegal collecting activities.

Management concerns for paleontological resources in Class 5 areas are high to very high. Pre-work field surveys are usually needed and on-site monitoring may be necessary during land disturbing activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

Class 4 – High. Geologic units that are known to contain a high occurrence of paleontological resources. Units assigned to Class 4 typically have the following characteristics:

- Significant paleontological resources have been documented, but may vary in occurrence and predictability.
- Surface disturbing activities may adversely affect paleontological resources.
- Rare or uncommon fossils, including nonvertebrate or unusual plant fossils, may be present.
- Illegal collecting activities may impact some areas.

Management concerns for paleontological resources in Class 4 are moderate to high. Field assessment by a qualified paleontologist is normally needed to assess local conditions. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. On-site monitoring or spot-checking may be necessary during land disturbing activities. Avoidance of known paleontological resources may be necessary.

Class 3 – Moderate. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics:

- They are marine in origin with sporadic known occurrences of paleontological resources.
- Significant paleontological resources may occur intermittently, but these occurrences are widely scattered.
- The potential for an authorized land use to impact a significant paleontological resource is known to be low-to-moderate.

Management concerns for paleontological resources are moderate, because the existence of significant paleontological resources occur intermittently and are generally widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting. Management considerations may include pre-disturbance surveys, monitoring, mitigation, or avoidance.

Class 2 – Low. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics:

- Field surveys have verified that significant paleontological resources are not present or are very rare.
- Units are generally younger than 10,000 years before present.
- Recent aeolian deposits are present.
- Sediments exhibit significant physical and chemical changes that make fossil preservation unlikely.

Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary. However, standard stipulations should be put in place in order to accommodate unanticipated discoveries.

Class 1 – Very Low. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics:

- Geologic units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
- Geologic Units are Precambrian in age.

Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.

Class U – Unknown. Geologic units that cannot receive an informed PFYC assignment. Characteristics of Class U may include the following:

- Geological units exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known.
- Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.
- Scientific literature does not exist or does not reveal the nature of paleontological resources for that geologic unit.
- Area or geologic unit is poorly or under-studied.
- BLM staff has not yet been able to assess the nature of the geologic unit.

Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns. Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

4.1 Existing Paleontological Resources

This paleontological resource assessment consisted of an examination of published geological maps of the study area, a paleontological locality search using the University of California at Berkeley Museum of Paleontology (UCMP) online database (UCMP 2019), and a review of published paleontological reports to determine if the geologic units present within the study area typically yield paleontological resources. The purpose of the literature review and locality search was to assess the potential for paleontological resources to be uncovered during ground-disturbing activities associated with the proposed project. As geologic formations and units can be exposed over large geographic areas but contain similar lithologies and fossils, the literature review and fossil locality search includes localities outside the immediate study area. The fossil record from the UCMP database is provided as Appendix A.

While Holocene deposits do not generally yield significant fossils because of the relatively young age of the sediments, Holocene sediments can and do exist as a relatively thin veneer on top of older Holocene (between 5,000 and 11,700 years ago) and Pleistocene (11,700 years to 2.6 million years ago) sediments, which can contain scientifically significant fossils. This is of particular importance for Holocene deposits in the study area, and larger Santa Clara Valley. As discussed previously, a recent study on Pleistocene vertebrate localities near the San Francisco Bay in Santa Clara County (Maguire and Holroyd 2016) reports on three new vertebrate localities and eight previously described localities that were discovered close to the surface (between 2 and 33 feet below ground surface) in Pleistocene deposits. These localities have produced 210 vertebrate fossils including specimens of mammoth (*Mammuthus columbi*), sloth (*Paramylodon harlani*), horse (*Equus* sp.), bison (*Bison* sp.), and pronghorn (*Capromeryx minor*), among other taxa (Maguire and Holroyd 2016). All but two localities in the study were discovered in sediments mapped as Holocene, indicating that Pleistocene deposits occur closer to the surface in Santa Clara County than historical mapping indicates (Maguire and Holroyd 2016). Besides validating the existence of potentially more expansive Pleistocene deposits in the Santa Clara Valley and demonstrating that the Pleistocene fossils and sediments may be encountered at minimal depths, the locality data demonstrate that the Quaternary alluvium of the Santa Clara Valley has a higher paleontological potential than previously recognized.

The UCMP has records of 14 sites (also called localities) from which fossils from the Holocene or Pleistocene periods were found in Santa Clara County (UCMP 2019). Two additional USGS localities were also reported from the literature (Brown 1978; Jefferson 1991; Maguire and Holroyd 2016; Savage 1951). At least nine of these fossil localities occur with 5 miles of the project site: two to the northwest, one to the northeast, and six to the southwest as discussed in the following bullets:

- Approximately 0.5 mile northwest of the project site, a bison fossil was discovered in a sandy layer about 2 feet below ground surface in a former pear orchard located adjacent to the west bank of Coyote Creek (UCMP location V4916). Prior mapping of the area suggested the area is underlain by Holocene floodplain deposits but the presence of bison remains suggest an older age for the deposits or Pleistocene deposits closer to the surface than current mapping indicates.
- Approximately 2.5 miles southwest of the project site, three fossil localities were found along the Guadalupe River channel in 2005 and 2006:
  - Fragments of juvenile mammoth skull, tusk, and other bones were found eroding out of the Guadalupe River channel just north of San José International Airport and the East Trimble Road overpass (UCMP location V99597). Prior mapping of the area suggested a Holocene age for the underlying stream channel deposits, but the presence of associated mammoth remains and charcoal dates suggest that the deposits are Pleistocene in age, indicating that Pleistocene deposits are closer to the surface than current mapping indicates.
  - At a second locality in the Guadalupe River channel about 200 feet away from V99597, a mammoth fossil was found also on the surface of the riverbed (UCMP location V99893).
  - At a third locality, just 30 to 40 feet from V99597, fossils of bison, camel, giant sloth, horse, peccary, and mammoth were discovered (UCMP location V99891). Postcranial material belonging to the family Bovidae was also discovered, but was not assignable to a lower taxonomic level because it was within the size of modern and extinct species. Thus, this locality may have a mix of both Pleistocene and Holocene specimens, as is true of several Rancholabrean localities in the area. For example, the Pacheco localities east of the San Francisco Bay contain specimens of Holocene and Pleistocene vertebrates in close proximity (Tomiya et al. 2011). This locality indicates that significant fossil remains can be found at the Holocene- Pleistocene interface, and that this interface is at or very near the surface in areas of the Santa Clara Valley mapped as only Holocene.

- Approximately 2.8 miles northeast of the project site, invertebrate fossils (not further identified) (UCMP location A9442), and horse and fish fossils (UCMP location V5313) were discovered from a pit excavated at a stone quarry. The stone quarry no longer exists, as the area has since been built over with residential housing. Prior mapping of the area suggested the area is underlain by Pleistocene age alluvial fan deposits of the Santa Clara Formation.
- Approximately 4.3 miles southwest of the project site, a mammoth fossil was discovered in 1990 in sandy gravel deposits 9 feet below ground surface at the site of a housing development near the intersection of Lawrence Expressway and Highway 101 (UCMP location V91128). Current mapping indicates the area is underlain by Holocene deposits, but the presence of associated mammoth remains suggest an older age for the deposits or that Pleistocene deposits are closer to the surface than current mapping indicates.
- Approximately 5 miles southwest of the project site near the intersection of Briton and Taylor Avenues fossil specimens of bison, camel, horse, and gopher were found during the excavation of the Sunnyvale sewer in 1970 (USGS location M1218). Near locality M1218, but closer to Calabasas Creek, fossils specimens of camel, squirrel, and gopher were found during continued excavation of the Sunnyvale sewer in 1970 to 1972 (USGS location M1218A). Current mapping indicates the area is underlain by Holocene deposits, but the presence of a Pleistocene fossil assemblage suggests an older age for the deposits or that Pleistocene deposits are closer to the surface than current mapping indicates.

The other localities identified are located between 5.7 and 24 miles from the project site. Two of these localities (UCMP V79134 and UCMP V91248) occur in a similar setting to the SJC02 project (along the southern margin of the San Francisco Bay in Santa Clara County) and produced vertebrate fossils in sediments mapped as Holocene floodplain, floodbasin, and estuary (Bay Mud) deposits. In addition, Schlocker (1974) has reported fossil plant remains from sediments he referred to as “Bay mud and clay” and Bonilla (1971) has reported fossil shells and plant remains from “Bay Mud.”

4.2 Paleontological Potential of the Study Area

During the peak of the last ice-age (also known as the late Pleistocene Epoch), sea level was much lower than it is today, because water was tied up in continental glaciers. At that time, the Pacific coastline was west of the Farallon Islands and, where the San Francisco Bay is today, there was a wide, grassy river valley that has been called the California Serengeti (Parkman 2006). The valley was teeming with animals now known as the Rancholabrean fauna, including herbivores such as mammoth, mastodon, camels, bison, llamas, elk, and horses, as well as predators such as the short-faced bear, saber-tooth cat, scimitar cat, dire wolf, and California lion.

According to Anderson et al. (2008), ice-age fossils in Santa Clara Valley are anomalously shallow. A more recent study also suggests that Pleistocene deposits containing vertebrate fossils are more extensive at the surface in Santa Clara County than current mapping would suggest (Maguire and Holroyd 2016). As previously described, significant Pleistocene age fossils have been recovered from areas mapped as Holocene floodplain (Qhfp), floodbasin (Qhb), and stream channel deposits (Qhsc), as close as 0.5 mile from the project site. In addition, many of the fossil localities in the Santa Clara Valley have been found near or within the stream channels of the Guadalupe River, Calabasas Creek, and Coyote Creek. The project site is located adjacent to Coyote Creek and is about 2.3 miles east of the Guadalupe River (Figure 1).

Boring logs from the geotechnical investigation conducted within the proposed project footprint (not linears) indicates that soils from the surface to around 5 feet below ground surface (bgs) consist of clayey sands, sands, and gravels with variable clay content. From 5 to between 15 and 25 feet bgs, fat and lean clays were predominantly encountered. Below the clay, dense interbedded gravels and sands with occasional clay interbeds were encountered to 100 feet bgs (total depth explored) (Kleinfelder 2016). When compared with previous geological studies of the southern margin of the San Francisco Bay (including Atwater et al. 1977; Conomos 1963; and Treasher 1963) the clay interval between 5 and 25 feet below ground surface (bgs) appears to correlate with the description of the Bay Mud. The underlying dense interbedded gravels and sands appear to be correlative with the fluvial deposits that separate the Holocene Bay Mud from the older Sangamonian Bay Mud. As discussed previously, these more coarse-grained deposits were likely laid down when sea level was low (i.e., during the Pleistocene Wisconsin glaciation) (Bloom 1983).

At the adjacent LECEF (Figure 1), subsurface investigations were conducted as part of the paleontological resources monitoring and mitigation program and included presence-absence testing by mechanical-excavation (Busby 2002), and paleontological monitoring of excavations for plant construction (LAG 2004). No paleontological resources were encountered during the presence-absence testing or monitoring (CH2M HILL 2010). During paleontological monitoring, the underlying sediments encountered were described as primarily estuarine clay (Bay Mud) overlain by a fluvial silty sand. The latter frequently contained historic and recent debris. Modern deer and cow bones were also encountered during trenching at an approximate depth of 4.4 feet in a light brown clay. Based on the findings of the initial monitoring program, as well as an understanding the geology of the area, Lawler Associates Geoscience (LAG 2004) concluded that:

“The high rate of sedimentation in this portion of the San Francisco Bay would suggest that all sediments within… the light brown clay are Holocene or sub-recent in age.” (LAG 2004).

Based on the results of actual field investigations and monitoring, and the geomorphic setting of the project area (Atwater et al. 1977; Malamud-Roam 2002; Bloom 1983) sediments shallower than 20 feet bgs underlying the LECEF were re-assigned from high to low paleontological potential (CH2M HILL 2010). Given the proximity of the SJC02 project to the LECEF, this re-assignment was considered in tandem with the paleontological locality and literature review to evaluate the paleontological potential of sediments underlying the SJC02 site. Nine fossil localities have been documented within 5 miles of the project site from sediments similar to those mapped as underlying the project footprint and associated linears, but these localities are widely scattered. While no fossils were encountered at the adjacent LECEF project and geotechnical borings indicate that potential Pleistocene sediments were encountered between 15 and 25 feet bgs, fossils have been recovered from the surface and near surface in sediments mapped as Holocene in areas similar to those that occur in the project area (i.e., near stream channels and along the southern margin of the San Francisco Bay). Consequently, all deposits underlying the SJC02 site and associated linears are designated as having moderate potential (PFYC Class 3) according to BLM criteria (see Paleontological Potential).

5. Environmental Impacts and Recommendations

The potential effects from construction and operation of the project on paleontological resources are assessed in the following sections.

5.1 Significance Criteria

CEQA provides that the damage or destruction of a unique paleontological resource or site is a significant impact to paleontological resources (SVP 2010). This is most typically thought of as occurring as a result of heavy equipment damage to fossils, but may also occur when fossils are looted, improperly removed from the surrounding sediment, or otherwise lost to the scientific world. Because fossils are a non-renewable resource (SVP 2010), any unmitigated impact on a unique paleontological resource would be considered significant.

Generally, the probability of adverse impacts during excavations within a geologic unit is proportionate to the paleontological potential of the unit. While it is theoretically possible to adversely affect paleontological resources in geologic units with Low Potential, this possibility would be remote because the units are not known to contain fossils. The highest probability of significant adverse effects to paleontological resources results from disturbance of geologic units with Moderate (Class 3) to Very High (Class 5) Potential, which have produced scientifically significant fossils, and recorded fossil localities are sufficiently frequent to anticipate encountering more (SVP 2010).

5.2 Impacts

The potential for construction activities to cause significant impacts (damage or destruction of unique paleontological resources) is dependent on the type of activity and the paleontological potential of each unit. Impacts on paleontological resources can be avoided by relocating the excavation or reduced by scientifically recovering the fossil(s). Because proper excavation and removal of paleontological resources do not lessen the scientific value of the resources, recovery is the recommended method of reducing impacts to paleontological resources resulting from project-related excavations and would reduce any impacts to non-significant levels.

Activities that do not involve excavations or other subsurface disturbance will not affect fossils buried in the sediments. Fossils not impacted by excavations are considered to be preserved; therefore, impacts to paleontological resources during the operation or maintenance of the project are not expected. The following design measures are applicable only to the construction phase of the project where significant adverse impacts may occur

As previously described, the lateral and vertical extent of Holocene deposits may vary significantly from what current mapping suggests, and Pleistocene deposits with higher paleontological potential may be encountered in the shallow subsurface. For these reasons, a worker environmental awareness training (WEAT) module for paleontological resources and a paleontological resources monitoring plan (PRMP) will be developed and implemented as part of the project design prior to construction.

5.3 Methods to Reduce Impacts

The results of this records search and literature review indicate that grading and excavation may encounter sediments with moderate to high paleontological potential in the shallow subsurface. Implementation of the PRMP and WEAT outlined as follows will reduce potential impacts to paleontological resources to less than significant.

5.4 Develop Paleontological Resource Monitoring Plan

Based on the potential to encounter paleontological resources in the shallow subsurface, a PRMP will be developed as part of the project design to reduce potential impacts to paleontological resources. A PRMP is only required for excavations, trenching, or rotary drilling. If driven piles are utilized, they will not require paleontological monitoring, as they are generally not conducive to the monitoring for, or collection of, paleontological remains (since there is no way to directly examine the sediments).

The PRMP will be prepared by a professional paleontologist and will stipulate the location and frequency of monitoring, and other appropriate procedures. It will also detail the significance criteria to be used to determine which resources will be recovered for their data potential, as well as the coordination strategy to verify adequate monitoring. The PRMP will detail methods of recovery; post-excavation preparation and analysis of specimens; final curation of specimens at an accredited facility; data analysis; and reporting. The PRMP will specify that all paleontological work will be conducted by qualified professionals meeting the SVP criteria (SVP 2010) so that any encountered resources will be quickly and professionally recovered while not impeding project development. At the end of the monitoring effort, a Paleontological Monitoring Report will be prepared by the professional paleontologist to document the results of monitoring.

5.5 Train Construction Personnel in Paleontological Resources Awareness

Since all ground disturbance is associated with some risk of encountering previously undiscovered paleontological resources, prior to the initiation of construction or ground-disturbing activities, a WEAT module for paleontological resources will be prepared by a qualified professional paleontologist, as defined by the SVP (2010). All construction personnel will be trained via the WEAT module regarding the recognition of possible buried paleontological resources, protection of paleontological resources during construction, and the procedures to be followed in the event that paleontological resources are encountered. All personnel will be instructed that unauthorized collection or disturbance of fossils is unlawful.

6. CEQA Significance Criteria

This section addresses the CEQA question regarding paleontological resources:

Would the project: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less Than Significant Impact. The paleontological potential of the deposits underlying the project site is considered to be Moderate (Class 3). The project site is located in an area, the Santa Clara Valley, known to have scientifically significant but widespread or intermittent fossil discoveries. Deposits underlying the project area have been mapped as Holocene (11,700 years before present), and paleontological evidence indicates that Pleistocene (2.6 million to 11,700 years before present) deposits containing significant paleontological resources may also be present at or near the surface.

The potential to disturb paleontological resources would occur during earth moving activities such as grading, trenching for utilities, excavation for foundations, or installation of support structures. There is no potential to disturb paleontological resources during project operation. The measures described herein will be included in the project design to confirm that impacts to paleontological resources are less than significant.

7. References

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Appendix A
UCMP Paleontological Resource Inventory Review

Appendix A. University of California Museum of Paleontology Inventory Review

Paleontological Resource Inventory Review, San Jose Data Center Small Power Plant Project

Locality ID	Locality Name	County	Period	Epoch	Storage Age	Fossil Collection
A9442	Scott Creek	Santa Clara	Quaternary	Pleistocene	Undisclosed	I
IP6849	Santa Cruz Point	Santa Clara	Quaternary	Pleistocene	Late Pleistocene	I
V4916	Milpitas	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V5313	Scott Creek	Santa Clara	Quaternary	Pleistocene	Irvingtonian	V
V6561	San Felipe	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V79134	Long Point	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V90003	Molecular Medicine bldg.	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V90055	Calabazas Creek	Santa Clara	Quaternary	Pleistocene	Irvingtonian	V
V91128	Lawrence Expressway E	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V91248	Onizuka	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V93037	Anderson Lake	Santa Clara	Quaternary	Pleistocene	Irvingtonian	V
V99597	SCVWD Mammoth	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V99891	Babcock's Bones	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V
V99893	SCVWD Humerus	Santa Clara	Quaternary	Pleistocene	Rancholabrean	V

Notes:

I = Invertebrate

V = Vertebrate

Appendix 3.17A
San Jose VMT Evaluation Tool

CITY OF SAN JOSE VEHICLE MILES TRAVELED EVALUATION TOOL SUMMARY REPORT

PROJECT:

Name:	San Jose Data Center Project	Tool Version:	2/29/2019
Location:	1595/1675 Alviso Milpitas Road	Date:	11/4/2019
Parcel:	01531054	Parcel Type:	Suburb with Single-Family Homes

Proposed Parking Spaces Vehicles: 0 Bicycles: 0

LAND USE:

Residential:		
Single Family	0	DU
Multi Family	0	DU
Subtotal	0	DU
Office:	0	KSF
Retail:	0	KSF
Industrial:	484	KSF

Percent of All Residential Units

Extremely Low Income (≤ 30% MFI)	0 % Affordable
Very Low Income (> 30% MFI, ≤ 50% MFI)	0 % Affordable
Low Income (> 50% MFI, ≤ 80% MFI)	0 % Affordable

VMT REDUCTION STRATEGIES

Tier 1 - Project Characteristics

Increase Residential Density

Existing Density (DU/Residential Acres in half-mile buffer)	11
With Project Density (DU/Residential Acres in half-mile buffer)	11

Increase Development Diversity

Existing Activity Mix Index	0.82
With Project Activity Mix Index	0.75

Integrate Affordable and Below Market Rate

Extremely Low Income BMR units	0 %
Very Low Income BMR units	0 %
Low Income BMR units	0 %

Increase Employment Density

Existing Density (Jobs/Commercial Acres in half-mile buffer)	12
With Project Density (Jobs/Commercial Acres in half-mile buffer)	15

Tier 2 - Multimodal Infrastructure

Pedestrian Network Improvements *(In Coordination with SJ)*

Are pedestrian improvements provided beyond the development frontage?	Yes

Tier 3 - Parking

Limit Parking Supply

Minimum Parking Required by Municipal Code	182 spaces
Total Parking Spaces Available to Employees	116 spaces
Does the surrounding street parking have RPP, meters, or time limits?	No

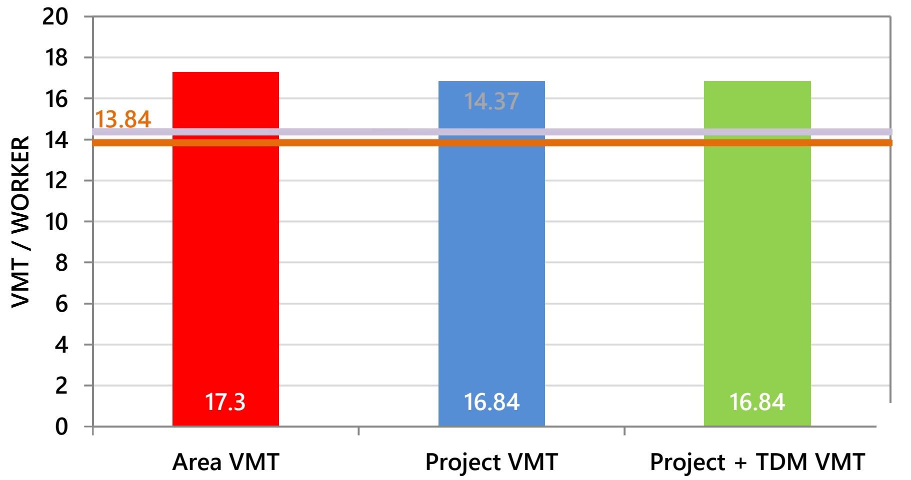
End of Trip Bike Facilities

Bicycle Parking Spaces Provided by Project	0 spaces
Project Provides Additional End-of-Trip Facilities Beyond Parking?	Yes

Tier 4 - TDM Programs

EMPLOYMENT ONLY

The tool estimates that the project would generate per non-industrial worker VMT and per industrial worker VMT above the City's threshold. There are selected strategies that require coordination with the City of San Jose to implement.



Est. Max Reduction Possible 13.84

Industrial Threshold 14.37

Appendix 3.17B
Air Cooler Generator Thermal Plum Calculations

Appendix 3.17-B1
Air Cooler Thermal Plume Calculations
Lightspeed SJC02
November 2019

PETER BEST PAPER ILLUSTRATIVE EXAMPLE
Plume Averaged Vertical Velocities from "*Aviation Safety and Buoyant Plumes*," Peter Best, et. al.

Ambient Conditions:							
Ambient Potential Temp, θ_a	272	Kelvins	30	°F			
Plume Exit Conditions:							
Stack Height, h_s	9.33	meters	30.6	feet			
Stack Diameter, D	1.50	meters	4.9	feet			
Stack Velocity, V_{exit}	9.70	m/s	31.8	ft/sec	Back-Calc'd from Volumetric Flow		
Volumetric Flow	17	cu.m/sec	36,300	ACFM	$\pi V_{exit}D^2/4$		Sect.2/¶1
Stack Potential Temp, θ_s	314	Kelvins	105.0	°F	Back-Calc'd from Buoyancy Flux		
Initial Stack Buoyancy Flux, F_o	7	m^4/s^3			$gV_{exit}D^2(1-\theta_a/\theta_s)/4$ = Vol.Flow$(g/\pi)(1-\theta_a/\theta_s)$		Sect.2/¶1
Plume Buoyancy Flux, F	N/A	m^4/s^3			$\lambda^2 gVa^2(1-\theta_a/\theta_p)$ for a,V,θ_p at plume height (not used here)		
Constants:							
Assume neutral conditions ($d\theta/dz=0$)							
Gravity, g	9.81	m/s^2					
λ	1.11						
Conversion Factor	0.3048	meters/feet					
Conditions at End (Top) of Jet Phase:							
Height above Stack, z	9.375	meters*	30.8	feet*	6.25D, meters*=meters above stack top		Sect.3/¶1
Height above Ground, z+h_s	18.702	meters	61.4	feet	h_s + 6.25D		Sect.3/¶1
Vertical Velocity, V_{plume}	4.850	m/s	15.91	ft/sec	$0.5V_{exit}$	$V_{exit}/2$	Sect.3/¶1
Plume Top-Hat Diameter, 2a	3.000	meters	9.8	feet	2D	Conservation of momentum	Sect.3/¶1
Spillane Methodology - Analytical Solutions for Calm Conditions for Plume Heights above Jet Phase:							
Plume Top-Hat Radius, a	**Solutions in Table Below**				$0.16(z-z_v)$, or linear increase with height		Sect.2/Eq.6
Virtual Source Height, z_v	0.618	meters*	2.0	feet*	$6.25D[1-(\theta_e/\theta_s)^{1/2}]$, meters*=meters above stack top		Sect.2/Eq.6
Height above Ground, z_v+h_s	9.944	meters	32.6	feet*		where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2}$= 0.93412399	
Method(1): Simplified Plume-averaged Vertical Velocity V' assuming Product Va constant above jet phase such that $V_{plume}(2a) = V_{exit}D$:							
Vertical Velocity, V'	**Solutions in Table Below**				$V_{exit}D/2a'$ (conservation of buoyancy)	Sect.3&4	
Method(2): Plume-averaged Vertical Velocity V given by Analytical Solution in Paper where Product Va given by equations below:							
Vertical Velocity, V	**Solutions in Table Below**				$\{(Va)_o^3 + 0.12F_o[(z-z_v)^2 - (6.25D-z_v)^2]\}^{(1/3)}$ / a	Sect.2.1(6)	
Product, $(Va)_o$	6.795	m^2/s			$V_{exit}D/2(\theta_e/\theta_s)^{1/2}$		

Table of Plume Top-Hat Diameters (2a) and Plume-averaged Vertical Velocities for both Method(1) (assuming conservation of buoyancy & gaussian distribution of vertical velocities) and Method (2) (based on Peter Best's paper's Analytical Solution) starting at end of jet phase:

from 100 meters above ground in increments of 50.0 meters

Height above stack top, meters*		Ht above Ground = $h_{plume}+h_s$ meters	feet	D_{plume} = 2a = $2*0.16(z-z_v)$	Vert.Vel (m/s) **Method (1)** $V'=V_{exit}*D/2a'$	**Method (2)** $V=\{(Va)_o^3+0.12F_o[(z-z_v)^2-(6.25D-z_v)^2]\}^{1/3}$ / a
End of jet phase at 6.25D = 9.375 meters*		***18.702***	***61.4***	***3.000***		***4.85***
90.673	meters*	100.000	328.1	28.818	0.50	1.34
140.67312	meters*	150.000	492.1	44.818	0.32	1.15
190.67312	meters*	200.000	656.2	60.818	0.24	1.03
240.67312	meters*	250.000	820.2	76.818	0.19	0.96
290.67312	meters*	300.000	984.3	92.818	0.16	0.90
340.67312	meters*	350.000	1148.3	108.818	0.13	0.85
390.67312	meters*	400.000	1312.3	124.818	0.12	0.81
440.67312	meters*	450.000	1476.4	140.818	0.10	0.78
490.67312	meters*	500.000	1640.4	156.818	0.09	0.75
540.67312	meters*	550.000	1804.5	172.818	0.08	0.73
590.67312	meters*	600.000	1968.5	188.818	0.08	0.71
640.67312	meters*	650.000	2132.5	204.818	0.07	0.69
690.67312	meters*	700.000	2296.6	220.818	0.07	0.67
740.67312	meters*	750.000	2460.6	236.818	0.06	0.66
790.67312	meters*	800.000	2624.7	252.818	0.06	0.64
840.67312	meters*	850.000	2788.7	268.818	0.05	0.63
890.67312	meters*	900.000	2952.8	284.818	0.05	0.62
940.67312	meters*	950.000	3116.8	300.818	0.05	0.61
990.67312	meters*	1000.000	3280.8	316.818	0.05	0.59
1040.6731	meters*	1050.000	3444.9	332.818	0.04	0.59
1090.6731	meters*	1100.000	3608.9	348.818	0.04	0.58
1140.6731	meters*	1150.000	3773.0	364.818	0.04	0.57
1190.6731	meters*	1200.000	3937.0	380.818	0.04	0.56
1240.6731	meters*	1250.000	4101.0	396.818	0.04	0.55

Number of Stacks (includes	138		
Stack Diameter	4.9		feet
Center-to-Center Distance Between Stacks	4.9		feet
Stack Distances (assumed right next to each other)	0		feet

0.000	meters*	9.327	30.6	-0.198	-73.62	-62.67
0.305	meters*	9.632	31.6	-0.100	-145.36	-123.69
0.610	meters*	9.936	32.6	-0.003	-5692.14	-4842.96
0.914	meters*	10.241	33.6	0.095	153.18	130.34
1.219	meters*	10.546	34.6	0.193	75.57	64.33
1.524	meters*	10.851	35.6	0.290	50.16	42.72
1.829	meters*	11.156	36.6	0.388	37.54	31.99
2.134	meters*	11.460	37.6	0.485	29.99	25.59
2.438	meters*	11.765	38.6	0.583	24.97	21.33
2.743	meters*	12.070	39.6	0.680	21.39	18.30
3.048	meters*	12.375	40.6	0.778	18.71	16.03
3.353	meters*	12.680	41.6	0.875	16.62	14.27
3.658	meters*	12.984	42.6	0.973	14.96	12.86
3.962	meters*	13.289	43.6	1.070	13.59	11.72
4.267	meters*	13.594	44.6	1.168	12.46	10.77
4.572	meters*	13.899	45.6	1.265	11.50	9.96
4.877	meters*	14.204	46.6	1.363	10.67	9.28
5.182	meters*	14.508	47.6	1.460	9.96	8.68
5.486	meters*	14.813	48.6	1.558	9.34	8.16
5.791	meters*	15.118	49.6	1.656	8.79	7.71
6.096	meters*	15.423	50.6	1.753	8.30	7.31
6.401	meters*	15.728	51.6	1.851	7.86	6.95
6.706	meters*	16.032	52.6	1.948	7.47	6.62
7.010	meters*	16.337	53.6	2.046	7.11	6.33
7.315	meters*	16.642	54.6	2.143	6.79	6.07
7.620	meters*	16.947	55.6	2.241	6.49	5.83
7.925	meters*	17.252	56.6	2.338	6.22	5.61
8.230	meters*	17.556	57.6	2.436	5.97	5.41
8.534	meters*	17.861	58.6	2.533	5.74	5.23
8.839	meters*	18.166	59.6	2.631	5.53	5.06
9.144	meters*	18.471	60.6	2.728	5.33	4.90
9.449	meters*	18.776	61.6	2.826	5.15	4.76
9.754	meters*	19.080	62.6	2.924	4.98	4.62
10.058	meters*	19.385	63.6	3.021	4.82	4.50
10.363	meters*	19.690	64.6	3.119	4.67	4.38
10.668	meters*	19.995	65.6	3.216	4.52	4.27
10.973	meters*	20.300	66.6	3.314	4.39	4.16
11.278	meters*	20.604	67.6	3.411	4.27	4.07
11.582	meters*	20.909	68.6	3.509	4.15	3.98
11.887	meters*	21.214	69.6	3.606	4.03	3.89
12.192	meters*	21.519	70.6	3.704	3.93	3.81
12.497	meters*	21.824	71.6	3.801	3.83	3.73
12.802	meters*	22.128	72.6	3.899	3.73	3.66
13.106	meters*	22.433	73.6	3.996	3.64	3.59
13.411	meters*	22.738	74.6	4.094	3.55	3.53
13.716	meters*	23.043	75.6	4.191	3.47	3.47
14.021	meters*	23.348	76.6	4.289	3.39	3.41
14.326	meters*	23.652	77.6	4.387	3.32	3.35
14.630	meters*	23.957	78.6	4.484	3.24	3.30
14.935	meters*	24.262	79.6	4.582	3.18	3.25
15.240	meters*	24.567	80.6	4.679	3.11	3.20
15.545	meters*	24.872	81.6	4.777	3.05	3.15
15.850	meters*	25.176	82.6	4.874	2.98	3.11
16.154	meters*	25.481	83.6	4.972	2.93	3.07
16.459	meters*	25.786	84.6	5.069	2.87	3.03
16.764	meters*	26.091	85.6	5.167	2.82	2.99
17.069	meters*	26.396	86.6	5.264	2.76	2.95
17.374	meters*	26.700	87.6	5.362	2.71	2.91
17.678	meters*	27.005	88.6	5.459	2.66	2.88
17.983	meters*	27.310	89.6	5.557	2.62	2.85
18.288	meters*	27.615	90.6	5.655	2.57	2.81
18.593	meters*	27.920	91.6	5.752	2.53	2.78
18.898	meters*	28.224	92.6	5.850	2.49	2.75
19.202	meters*	28.529	93.6	5.947	2.45	2.72
19.507	meters*	28.834	94.6	6.045	2.41	2.70
19.812	meters*	29.139	95.6	6.142	2.37	2.67
20.117	meters*	29.444	96.6	6.240	2.33	2.64
50.5968	meters*	59.924	196.6	15.993	0.91	1.67
81.0768	meters*	90.404	296.6	25.747	0.57	1.39
111.5568	meters*	120.884	396.6	35.501	0.41	1.24
142.0368	meters*	151.364	496.6	45.254	0.32	1.14

Method (3)

Ht above Ground = $h_{plume}+h_s$ feet	**V = V'*Number of Stacks$^{0.25}$** m/s	**Number of Stacks** (within plume)	**Plume Diameter** feet
30.6	-68.14	1	-0.65
31.6	-134.52	1	-0.33
32.6	-5267.55	1	-0.01
33.6	141.76	1	0.31
34.6	69.95	1	0.63
35.6	46.44	1	0.95
36.6	34.77	1	1.27
37.6	27.79	1	1.59
38.6	23.15	1	1.91
39.6	19.84	1	2.23
40.6	17.37	1	2.55
41.6	15.45	1	2.87
42.6	13.91	1	3.19
43.6	12.66	1	3.51
44.6	11.61	1	3.83
45.6	10.73	1	4.15
46.6	9.98	1	4.47
47.6	9.32	1	4.79
48.6	8.92	1	5.11
49.6	8.67	1	5.43
50.6	8.44	1	5.75
51.6	8.23	2	6.07
52.6	8.03	2	6.39
53.6	7.85	2	6.71
54.6	7.69	2	7.03
55.6	7.53	2	7.35
56.6	7.39	2	7.67
57.6	7.26	3	7.99
58.6	7.13	3	8.31
59.6	7.01	3	8.63
60.6	6.90	3	8.95
61.6	6.80	4	9.27
62.6	6.70	4	9.59
63.6	6.61	4	9.91
64.6	6.52	4	10.23
65.6	6.44	5	10.55
66.6	6.36	5	10.87
67.6	6.28	5	11.19
68.6	6.21	5	11.51
69.6	6.15	6	11.83
70.6	6.08	6	12.15
71.6	6.02	6	12.47
72.6	5.96	7	12.79
73.6	5.90	7	13.11
74.6	5.85	7	13.43
75.6	5.80	8	13.75
76.6	5.75	8	14.07
77.6	5.70	9	14.39
78.6	5.66	9	14.71
79.6	5.61	9	15.03
80.6	5.57	10	15.35
81.6	5.53	10	15.67
82.6	5.49	11	15.99
83.6	5.46	11	16.31
84.6	5.42	11	16.63
85.6	5.39	12	16.95
86.6	5.35	12	17.27
87.6	5.32	13	17.59
88.6	5.29	13	17.91
89.6	5.26	14	18.23
90.6	5.23	14	18.55
91.6	5.20	15	18.87
92.6	5.18	15	19.19
93.6	5.15	16	19.51
94.6	5.12	16	19.83
95.6	5.10	17	20.15
96.6	5.08	17	20.47
196.6	4.21	114	52.47
296.6	3.35	138	84.47
396.6	2.83	138	116.47
496.6	2.51	138	148.47

Exhaust velocity falls below the CEC's 10.6 m/s peak rate using any method
Exhaust velocity falls below the CEC's 5.3 m/s average rate using any method

Appendix 3.17-B2
Emergency Generator Thermal Plume Calculations
Lightspeed SJC02
November 2019

PETER BEST PAPER ILLUSTRATIVE EXAMPLE
Plume Averaged Vertical Velocities from "*Aviation Safety and Buoyant Plumes* ," Peter Best, et. al.

Ambient Conditions:

Ambient Potential Temp, θ_a	272	Kelvins	30	°F			

Plume Exit Conditions:

Stack Height, h_s	9.14	meters	30.0	feet			
Stack Diameter, D	0.77	meters	2.5	feet			
Stack Velocity, V_{exit}	24.18	m/s	79.3	ft/sec	Back-Calc'd from Volumetric Flow		
Volumetric Flow	11	cu.m/sec	23,365	ACFM	$\pi V_{exit} D^2/4$		Sect.2/¶1
Stack Potential Temp, θ_s	716	Kelvins	830.0	°F	Back-Calc'd from Buoyancy Flux		
Initial Stack Buoyancy Flux, F_o	22	m^4/s^3			$gV_{exit}D^2(1-\theta_a/\theta_s)/4$ = Vol.Flow$(g/\pi)(1-\theta_a/\theta_s)$		Sect.2/¶1
Plume Buoyancy Flux, F	N/A	m^4/s^3			$\lambda^2 gVa^2(1-\theta_a/\theta_p)$ for a,V,θ_p at plume height (not used here)		

Constants:

Assume neutral conditions ($d\theta/dz=0$)		
Gravity, g	9.81	m/s^2
λ	1.11	
Conversion Factor	0.3048	meters/feet

Conditions at End (Top) of Jet Phase:

Height above Stack, z	4.813	meters*	15.8	feet*	6.25D, meters*=meters above stack top		Sect.3/¶1
Height above Ground, z+h_s	13.957	meters	45.8	feet	h_s + 6.25D		Sect.3/¶1
Vertical Velocity, V_{plume}	12.090	m/s	39.66	ft/sec	$0.5V_{exit}$	$V_{exit}/2$	Sect.3/¶1
Plume Top-Hat Diameter, 2a	1.540	meters	5.1	feet	2D	Conservation of momentum	Sect.3/¶1

Spillane Methodology - Analytical Solutions for Calm Conditions for Plume Heights above Jet Phase:

Plume Top-Hat Radius, a	**Solutions in Table Below**				$0.16(z-z_v)$, or linear increase with height	Sect.2/Eq.6
Virtual Source Height, z_v	0.317	meters*	1.0	feet*	$6.25D[1-(\theta_e/\theta_s)^{1/2}]$, meters*=meters above stack top	Sect.2/Eq.6
Height above Ground, z_v+h_s	9.461	meters	31.0	feet*	where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2}$= 0.93412399	

Method(1): Simplified Plume-averaged Vertical Velocity V' assuming Product Va constant above jet phase such that $V_{plume}(2a) = V_{exit}D$:

Vertical Velocity, V'	**Solutions in Table Below**	$V_{exit}D/2a'$ (conservation of buoyancy)	Sect.3&4

Method(2): Plume-averaged Vertical Velocity V given by Analytical Solution in Paper where Product Va given by equations below:

Vertical Velocity, V	**Solutions in Table Below**	$\{(Va)_o^3 + 0.12F_o\,[\,(z-z_v)^2 - (6.25D-z_v)^2]\}^{(1/3)}$ / a	Sect.2.1(6)
Product, $(Va)_o$	8.696 m^2/s	$V_{exit}D/2(\theta_e/\theta_s)^{1/2}$	

Table of Plume Top-Hat Diameters (2a) and Plume-averaged Vertical Velocities for both Method(1) (assuming conservation of buoyancy & gaussian distribution of vertical velocities) and Method (2) (based on Peter Best's paper's Analytical Solution) starting at end of jet phase:

from 100 meters above ground in increments of 50.0 meters

		Ht above Ground = $h_{plume}+h_s$		D_{plume} = 2a =	Vert.Vel (m/s) Method (1)	Method (2)
Height above stack top, meters*		meters	feet	$2*0.16(z-z_v)$	$V'=V_{exit}*D/2a'$	$\surd a)_o^3+0.12F_o[(z-z_v)^2-(6.25D-z_v)^2]\}^{1/3}$ / a
End of jet phase at 6.25D = 9.375 meters*		***13.957***	***45.8***	***1.540***		***12.09***
90.856	meters*	100.000	328.1	28.972	0.64	1.94
140.856	meters*	150.000	492.1	44.972	0.41	1.66
190.856	meters*	200.000	656.2	60.972	0.31	1.50
240.856	meters*	250.000	820.2	76.972	0.24	1.39
290.856	meters*	300.000	984.3	92.972	0.20	1.30
340.856	meters*	350.000	1148.3	108.972	0.17	1.23
390.856	meters*	400.000	1312.3	124.972	0.15	1.18
440.856	meters*	450.000	1476.4	140.972	0.13	1.13
490.856	meters*	500.000	1640.4	156.972	0.12	1.09
540.856	meters*	550.000	1804.5	172.972	0.11	1.06
590.856	meters*	600.000	1968.5	188.972	0.10	1.03
640.856	meters*	650.000	2132.5	204.972	0.09	1.00
690.856	meters*	700.000	2296.6	220.972	0.08	0.97
740.856	meters*	750.000	2460.6	236.972	0.08	0.95
790.856	meters*	800.000	2624.7	252.972	0.07	0.93
840.856	meters*	850.000	2788.7	268.972	0.07	0.91
890.856	meters*	900.000	2952.8	284.972	0.07	0.90
940.856	meters*	950.000	3116.8	300.972	0.06	0.88
990.856	meters*	1000.000	3280.8	316.972	0.06	0.86
1040.856	meters*	1050.000	3444.9	332.972	0.06	0.85
1090.856	meters*	1100.000	3608.9	348.972	0.05	0.84
1140.856	meters*	1150.000	3773.0	364.972	0.05	0.82
1190.856	meters*	1200.000	3937.0	380.972	0.05	0.81
1240.856	meters*	1250.000	4101.0	396.972	0.05	0.80

Number of Stacks	42		
Stack Diameter	2.5	feet	
Center-to-Center Distance Between Stacks	99.3	feet	
Stack Distances	98	feet	

0.000	meters*	9.144	30.0	-0.101	-183.52	-169.68
0.305	meters*	9.449	31.0	-0.004	-4758.03	-4398.58
0.610	meters*	9.754	32.0	0.094	198.87	183.86
0.914	meters*	10.058	33.0	0.191	97.40	90.08
1.219	meters*	10.363	34.0	0.289	64.49	59.69
1.524	meters*	10.668	35.0	0.386	48.21	44.65
1.829	meters*	10.973	36.0	0.484	38.49	35.69
2.134	meters*	11.278	37.0	0.581	32.03	29.74
2.438	meters*	11.582	38.0	0.679	27.43	25.51
2.743	meters*	11.887	39.0	0.776	23.98	22.35
3.048	meters*	12.192	40.0	0.874	21.30	19.89
3.353	meters*	12.497	41.0	0.971	19.17	17.94
3.658	meters*	12.802	42.0	1.069	17.42	16.34
3.962	meters*	13.106	43.0	1.167	15.96	15.02
4.267	meters*	13.411	44.0	1.264	14.73	13.90
4.572	meters*	13.716	45.0	1.362	13.67	12.95
4.877	meters*	14.021	46.0	1.459	12.76	12.12
5.182	meters*	14.326	47.0	1.557	11.96	11.40
5.486	meters*	14.630	48.0	1.654	11.26	10.77
5.791	meters*	14.935	49.0	1.752	10.63	10.21
6.096	meters*	15.240	50.0	1.849	10.07	9.71
6.401	meters*	15.545	51.0	1.947	9.56	9.27
6.706	meters*	15.850	52.0	2.044	9.11	8.87
7.010	meters*	16.154	53.0	2.142	8.69	8.50
7.315	meters*	16.459	54.0	2.239	8.31	8.17
7.620	meters*	16.764	55.0	2.337	7.97	7.87
7.925	meters*	17.069	56.0	2.434	7.65	7.59
8.230	meters*	17.374	57.0	2.532	7.35	7.34
8.534	meters*	17.678	58.0	2.630	7.08	7.10
8.839	meters*	17.983	59.0	2.727	6.83	6.89
9.144	meters*	18.288	60.0	2.825	6.59	6.68
9.449	meters*	18.593	61.0	2.922	6.37	6.50
9.754	meters*	18.898	62.0	3.020	6.17	6.32
10.058	meters*	19.202	63.0	3.117	5.97	6.16
10.363	meters*	19.507	64.0	3.215	5.79	6.01
10.668	meters*	19.812	65.0	3.312	5.62	5.87
10.973	meters*	20.117	66.0	3.410	5.46	5.73
11.278	meters*	20.422	67.0	3.507	5.31	5.61
11.582	meters*	20.726	68.0	3.605	5.16	5.49
11.887	meters*	21.031	69.0	3.702	5.03	5.38
12.192	meters*	21.336	70.0	3.800	4.90	5.27
12.497	meters*	21.641	71.0	3.898	4.78	5.17
12.802	meters*	21.946	72.0	3.995	4.66	5.08
13.106	meters*	22.250	73.0	4.093	4.55	4.99
13.411	meters*	22.555	74.0	4.190	4.44	4.91
13.716	meters*	22.860	75.0	4.288	4.34	4.83
14.021	meters*	23.165	76.0	4.385	4.25	4.75
14.326	meters*	23.470	77.0	4.483	4.15	4.68
14.630	meters*	23.774	78.0	4.580	4.06	4.61
14.935	meters*	24.079	79.0	4.678	3.98	4.54
15.240	meters*	24.384	80.0	4.775	3.90	4.48
15.545	meters*	24.689	81.0	4.873	3.82	4.41
15.850	meters*	24.994	82.0	4.970	3.75	4.36
16.154	meters*	25.298	83.0	5.068	3.67	4.30
16.459	meters*	25.603	84.0	5.165	3.60	4.25
16.764	meters*	25.908	85.0	5.263	3.54	4.20
17.069	meters*	26.213	86.0	5.361	3.47	4.15
17.374	meters*	26.518	87.0	5.458	3.41	4.10
17.678	meters*	26.822	88.0	5.556	3.35	4.05
17.983	meters*	27.127	89.0	5.653	3.29	4.01
18.288	meters*	27.432	90.0	5.751	3.24	3.97
18.593	meters*	27.737	91.0	5.848	3.18	3.92
18.898	meters*	28.042	92.0	5.946	3.13	3.89
19.202	meters*	28.346	93.0	6.043	3.08	3.85
19.507	meters*	28.651	94.0	6.141	3.03	3.81
19.812	meters*	28.956	95.0	6.238	2.98	3.77
20.117	meters*	29.261	96.0	6.336	2.94	3.74
50.5968	meters*	59.741	196.0	16.090	1.16	2.41
81.0768	meters*	90.221	296.0	25.843	0.72	2.02
111.5568	meters*	120.701	396.0	35.597	0.52	1.80
142.0368	meters*	151.181	496.0	45.350	0.41	1.66

Ht above Ground = $h_{plume}+h_s$ feet	Method (3) V = V'*Number of $Stacks^{0.25}$ m/s	Number of Stacks (within plume)	Plume Diameter feet
30.0	-176.60	1	-0.33
31.0	-4578.31	1	-0.01
32.0	191.37	1	0.31
33.0	93.74	1	0.63
34.0	62.09	1	0.95
35.0	46.43	1	1.27
36.0	37.09	1	1.59
37.0	30.89	1	1.91
38.0	26.47	1	2.23
39.0	23.16	1	2.55
40.0	20.60	1	2.87
41.0	18.55	1	3.19
42.0	16.88	1	3.51
43.0	15.49	1	3.83
44.0	14.32	1	4.15
45.0	13.31	1	4.47
46.0	12.44	1	4.79
47.0	11.68	1	5.11
48.0	11.01	1	5.43
49.0	10.42	1	5.75
50.0	9.89	1	6.07
51.0	9.42	1	6.39
52.0	8.99	1	6.71
53.0	8.60	1	7.03
54.0	8.24	1	7.35
55.0	7.92	1	7.67
56.0	7.62	1	7.99
57.0	7.34	1	8.31
58.0	7.09	1	8.63
59.0	6.86	1	8.95
60.0	6.64	1	9.27
61.0	6.43	1	9.59
62.0	6.24	1	9.91
63.0	6.07	1	10.23
64.0	5.90	1	10.55
65.0	5.74	1	10.87
66.0	5.60	1	11.19
67.0	5.46	1	11.51
68.0	5.33	1	11.83
69.0	5.20	1	12.15
70.0	5.09	1	12.47
71.0	4.98	1	12.79
72.0	4.87	1	13.11
73.0	4.77	1	13.43
74.0	4.67	1	13.75
75.0	4.58	1	14.07
76.0	4.50	1	14.39
77.0	4.41	1	14.71
78.0	4.34	1	15.03
79.0	4.26	1	15.35
80.0	4.19	1	15.67
81.0	4.12	1	15.99
82.0	4.05	1	16.31
83.0	3.99	1	16.63
84.0	3.93	1	16.95
85.0	3.87	1	17.27
86.0	3.81	1	17.59
87.0	3.75	1	17.91
88.0	3.70	1	18.23
89.0	3.65	1	18.55
90.0	3.60	1	18.87
91.0	3.55	1	19.19
92.0	3.51	1	19.51
93.0	3.46	1	19.83
94.0	3.42	1	20.15
95.0	3.38	1	20.47
96.0	3.34	1	20.79
196.0	1.78	1	52.79
296.0	1.37	1	84.79
396.0	1.26	1	116.79
496.0	1.27	2	148.79

Exhaust velocity falls below the CEC's 10.6 m/s peak rate using any method
Exhaust velocity falls below the CEC's 5.3 m/s average rate using any method

Appendix 3.18A
Outreach ROC

Additional Information

California Native Americans
Cultural Resources
Strategic Plan
Commissioners
Federal Laws and Codes
State Laws and Codes
Local Ordinances and Codes
Additional Information
Return to CNAHC Home Page

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
915 Capitol Mall, RM 364
Sacramento, CA 95814
(916) 653-4082
(916) 657-5390 – Fax
nahc@pacbell.net

Information Below is Required for a Sacred Lands File Search

Project: Lightspeed Data Center

County Santa Clara

USGS Quadrangle

Name 7.5' Milpitas 1973

Township 6S Range 1W Section(s) N/A

Company/Firm/Agency:
PaleoWest

Contact Person: Christina Alonso

Street Address: 1870 Olympic Blvd St. 100

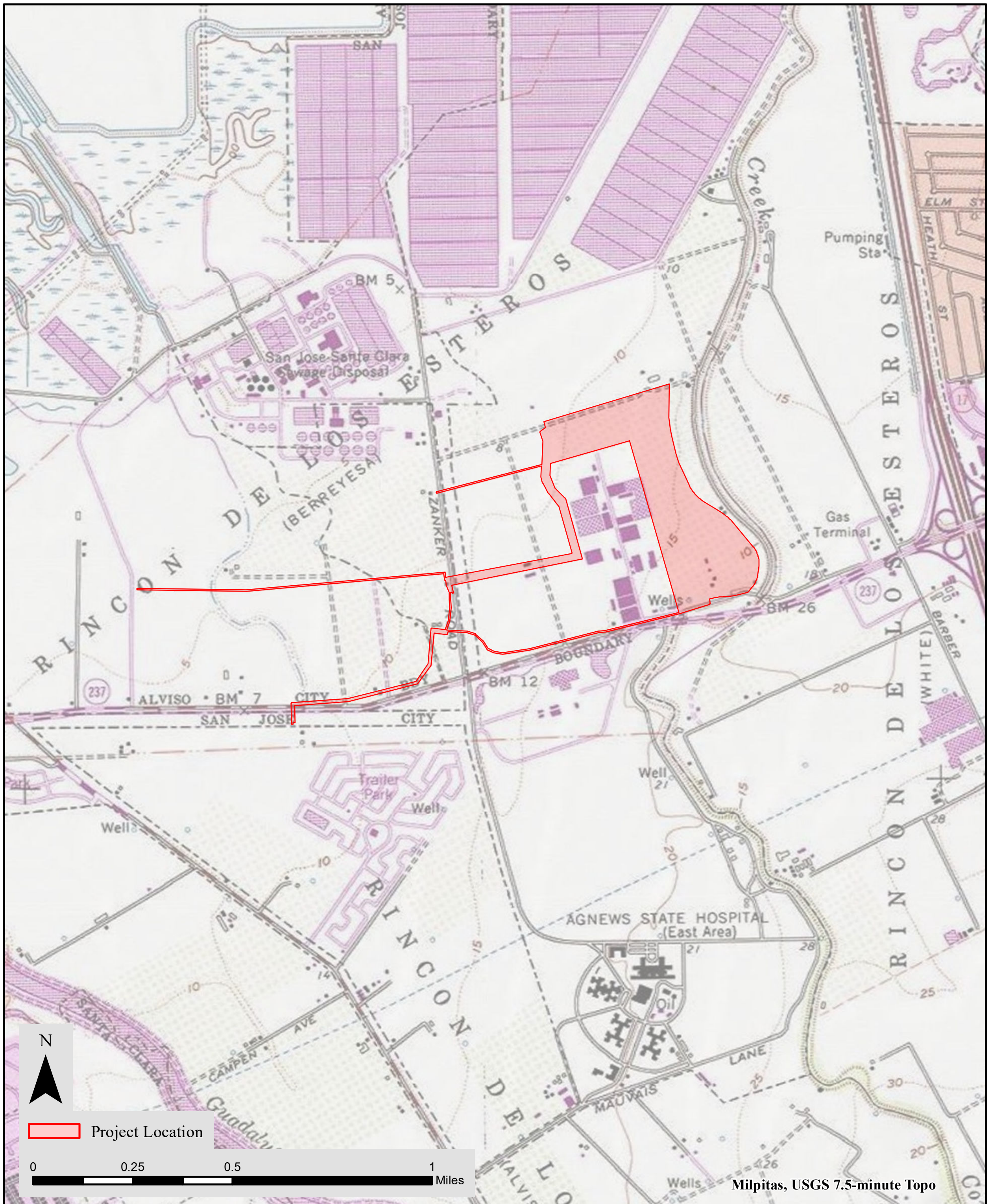
City: Walnut Creek, CA Zip: 94596

Phone: (925) 253-9070

Fax: (925) 254-3553

Email: calonso@paleowest.com

Project Description:



PALEO WEST archaeology	Project Location Map	Lightspeed Data Center Project Santa Clara County, CA

STATE OF CALIFORNIA **Gavin Newsom, Governor**

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

June 17, 2019

Christina Alonso
PaleoWest Archaeology

VIA Email to: calonso@paleowest.com
Cc: canutes@verizon.net

RE: **Lightspeed Data Center Project**, City of Milpitas; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Alonso:

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 **positive**. Please contact the **North Valley Yokut Tribe at (209) 887-3415** for more information. Please note the tribe has been cc'd on this letter.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, B.S., M.A., Ph. D
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Santa Clara County
6/17/2019

Amah MutsunTribal Band Valentin Lopez, Chairperson P.O. Box 5272 Galt, CA, 95632 Phone: (916) 743 - 5833 vlopez@amahmutsun.org	Costanoan Northern Valley Yokut
Amah MutsunTribal Band of Mission San Juan Bautista Irenne Zwierlein, Chairperson 789 Canada Road Woodside, CA, 94062 Phone: (650) 851 - 7489 Fax: (650) 332-1526 amahmutsuntribal@gmail.com	Costanoan
Indian Canyon Mutsun Band of Costanoan Ann Marie Sayers, Chairperson P.O. Box 28 Hollister, CA, 95024 Phone: (831) 637 - 4238 ams@indiancanyon.org	Costanoan
Muwekma Ohlone Indian Tribe of the SF Bay Area Charlene Nijmeh, Chairperson 20885 Redwood Road, Suite 232 Castro Valley, CA, 94546 Phone: (408) 464 - 2892 cnijmeh@muwekma.org	Costanoan
North Valley Yokuts Tribe Katherine Erolinda Perez, Chairperson P.O. Box 717 Linden, CA, 95236 Phone: (209) 887 - 3415 canutes@verizon.net	Costanoan Northern Valley Yokut
The Ohlone Indian Tribe Andrew Galvan, P.O. Box 3388 Fremont, CA, 94539 Phone: (510) 882 - 0527 Fax: (510) 687-9393 chochenyo@AOL.com	Bay Miwok Ohlone Patwin Plains Miwok

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Lightspeed Data Center Project, Santa Clara County.

PALEOWEST archaeology
925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Andrew Galvan
The Ohlone Indian Tribe
P.O. Box 3388
Fremont, CA 94539
VIA Email to: chochenyo@AOL.com

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Mr. Galvan:

PaleoWest has been contracted by Jacobs to prepare a Cultural Resources Assessment Report for the Lightspeed Data Center Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1973).

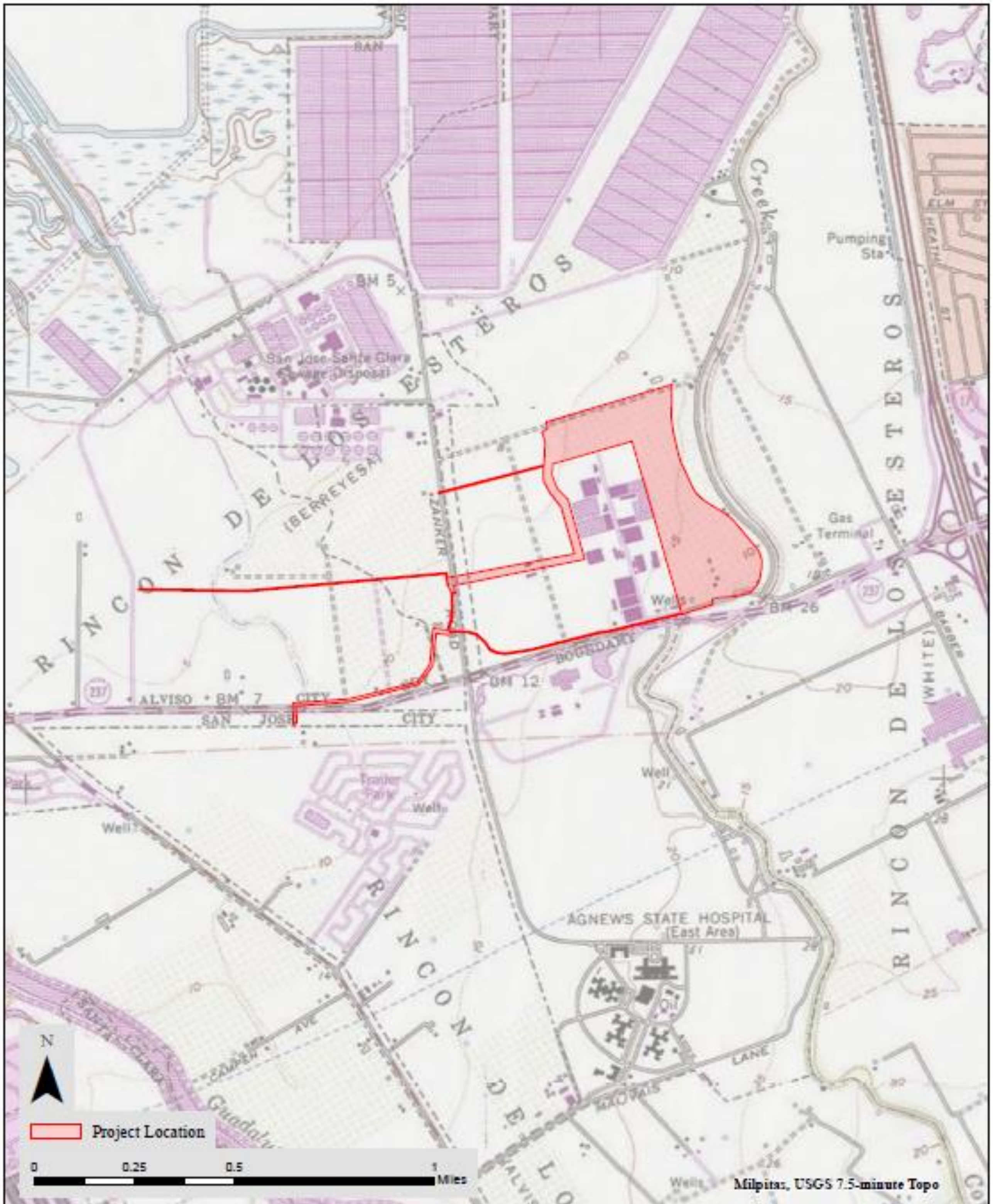
PaleoWest contacted the NAHC on May 29, 2019 with a request that they search their Sacred Lands File for the project vicinity. The June 17, 2019 response from Gayle Totton of the NAHC states, "A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive."

We would appreciate receiving any comments, concerns, or information you wish to share regarding cultural resources or sacred sites within the immediate project area. If you could provide your response in writing, at your earliest convenience, to the address below, we will make sure the relevant information is considered in preparing our report. Should you have any questions, I can be reached by e-mail at calonso@paleowest.com or by telephone at (925) 253- 9070, Ext. 321.

Thank you again for your assistance.

Sincerely,

Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



PALEO WEST archaeology

Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

PALEOWEST archaeology

925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Valentin Lopez
Amah Mutsun Tribal Band
P.O. Box 5272
Galt, CA 95632
VIA Email to: vlopez@amahmutsun.org

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Mr. Lopez:

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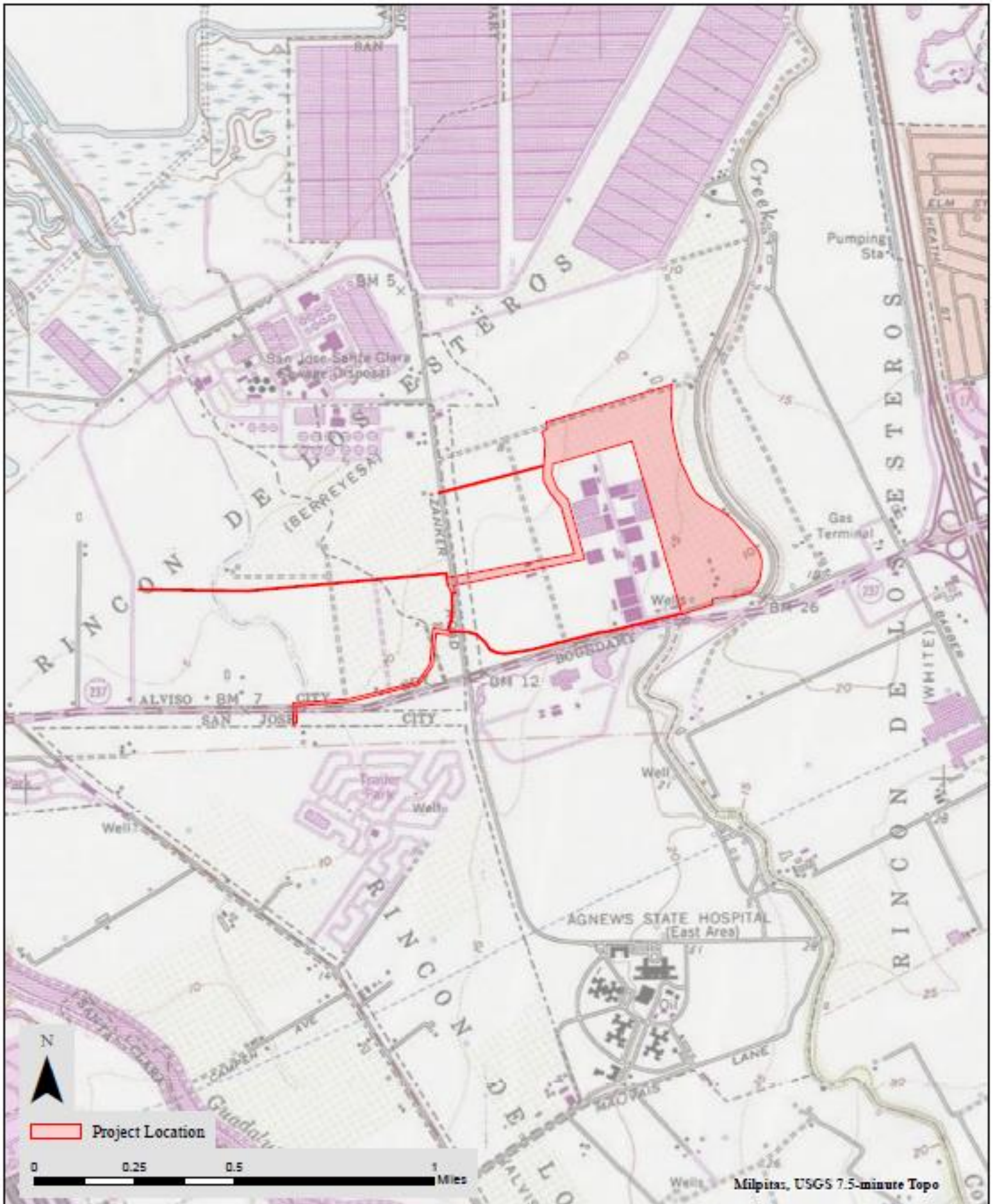


Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

PALEOWEST archaeology

925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Charlene Nijmeh, Chairperson
Muwekma Ohlone Indian Tribe of the SF Bay Area
20885 Redwood Road, Suite 232
Castro Valley, CA 94546
VIA Email to: cnijmeh@muwekma.org

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Nijmeh:

PaleoWest has been contracted by Jacobs to prepare a Cultural Resources Assessment Report for the Lightspeed Data Center Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1973).

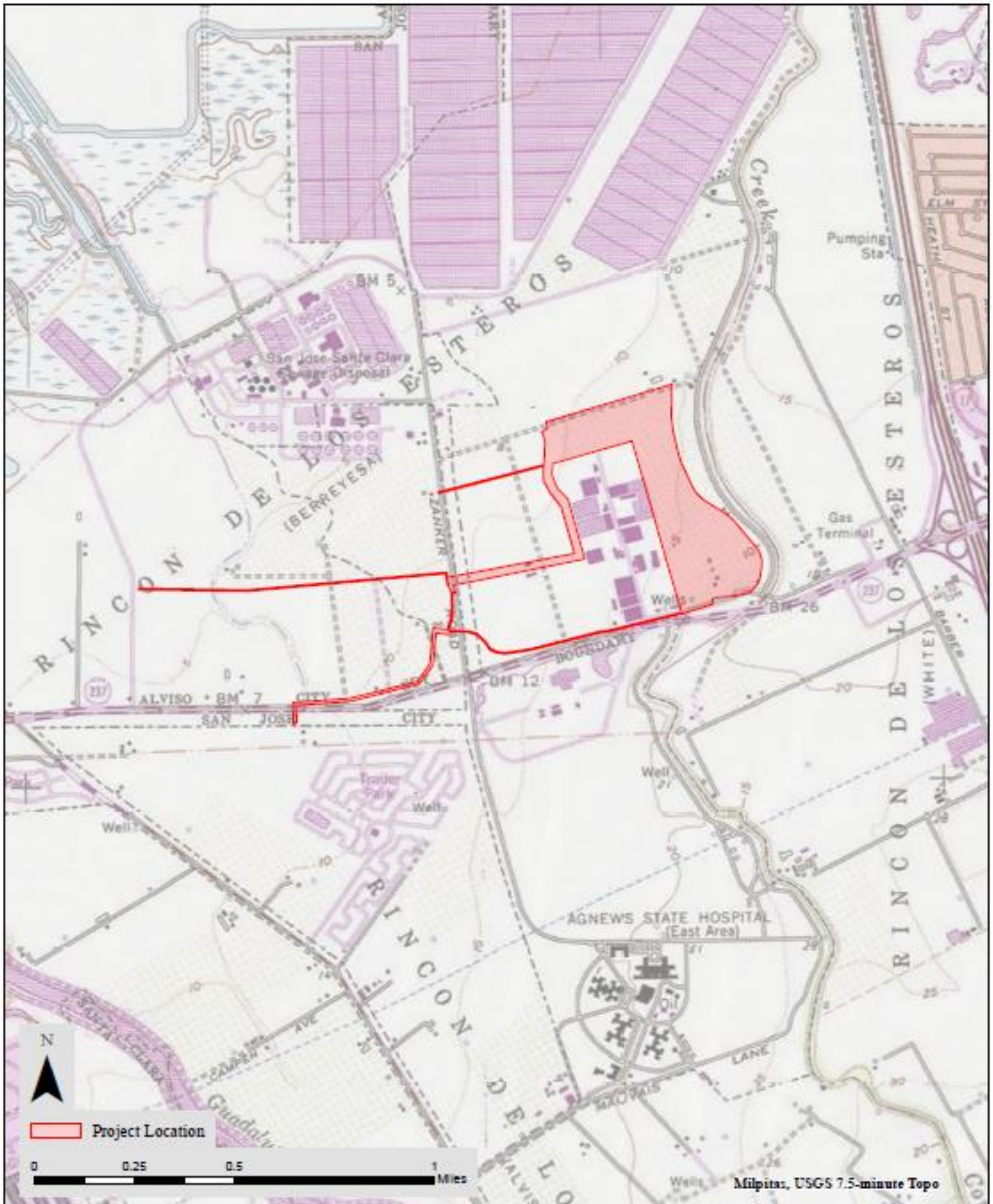
PaleoWest contacted the NAHC on May 29, 2019 with a request that they search their Sacred Lands File for the project vicinity. The June 17, 2019 response from Gayle Totton of the NAHC states, "A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were positive."

We would appreciate receiving any comments, concerns, or information you wish to share regarding cultural resources or sacred sites within the immediate project area. If you could provide your response in writing, at your earliest convenience, to the address below, we will make sure the relevant information is considered in preparing our report. Should you have any questions, I can be reached by e-mail at calonso@paleowest.com or by telephone at (925) 253- 9070, Ext. 321.

Thank you again for your assistance.

Sincerely,

Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

PALEOWEST archaeology

925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Katherine Erolinda Perez, Chairperson
North Valley Yokuts Tribe
P.O. Box 717
Linden, CA 95236
VIA Email to: canutes@verizon.net

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Perez:

PaleoWest has been contracted by Jacobs to prepare a Cultural Resources Assessment Report for the Lightspeed Data Center Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1973).

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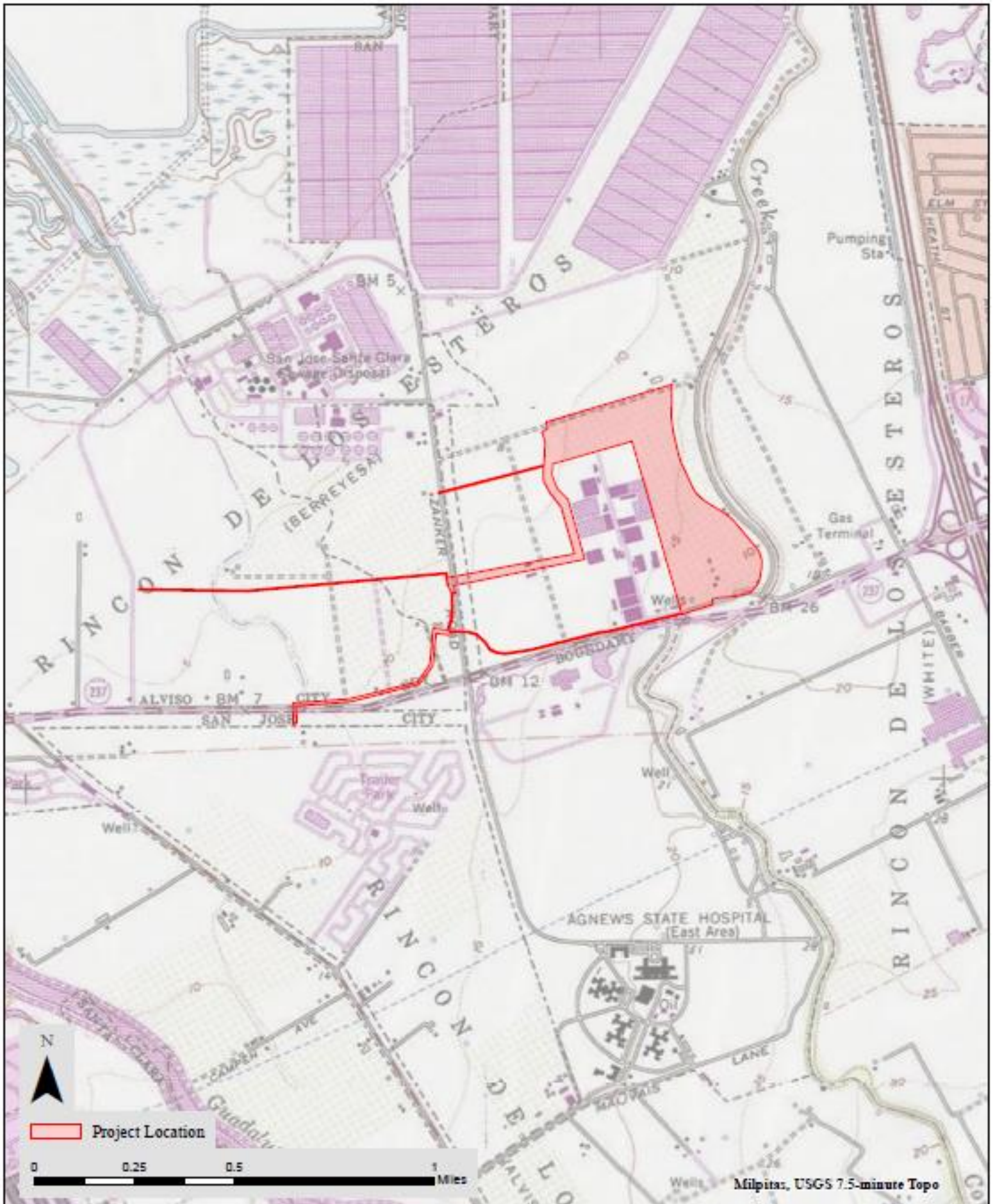
Sincerely,

Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

PALEOWEST archaeology

925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band of Costanoans
P.O. Box 28
Hollister, CA 95024
VIA Email to: ams@indiancanyon.org

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Sayers:

PaleoWest has been contracted by Jacobs to prepare a Cultural Resources Assessment Report for the Lightspeed Data Center Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1973).

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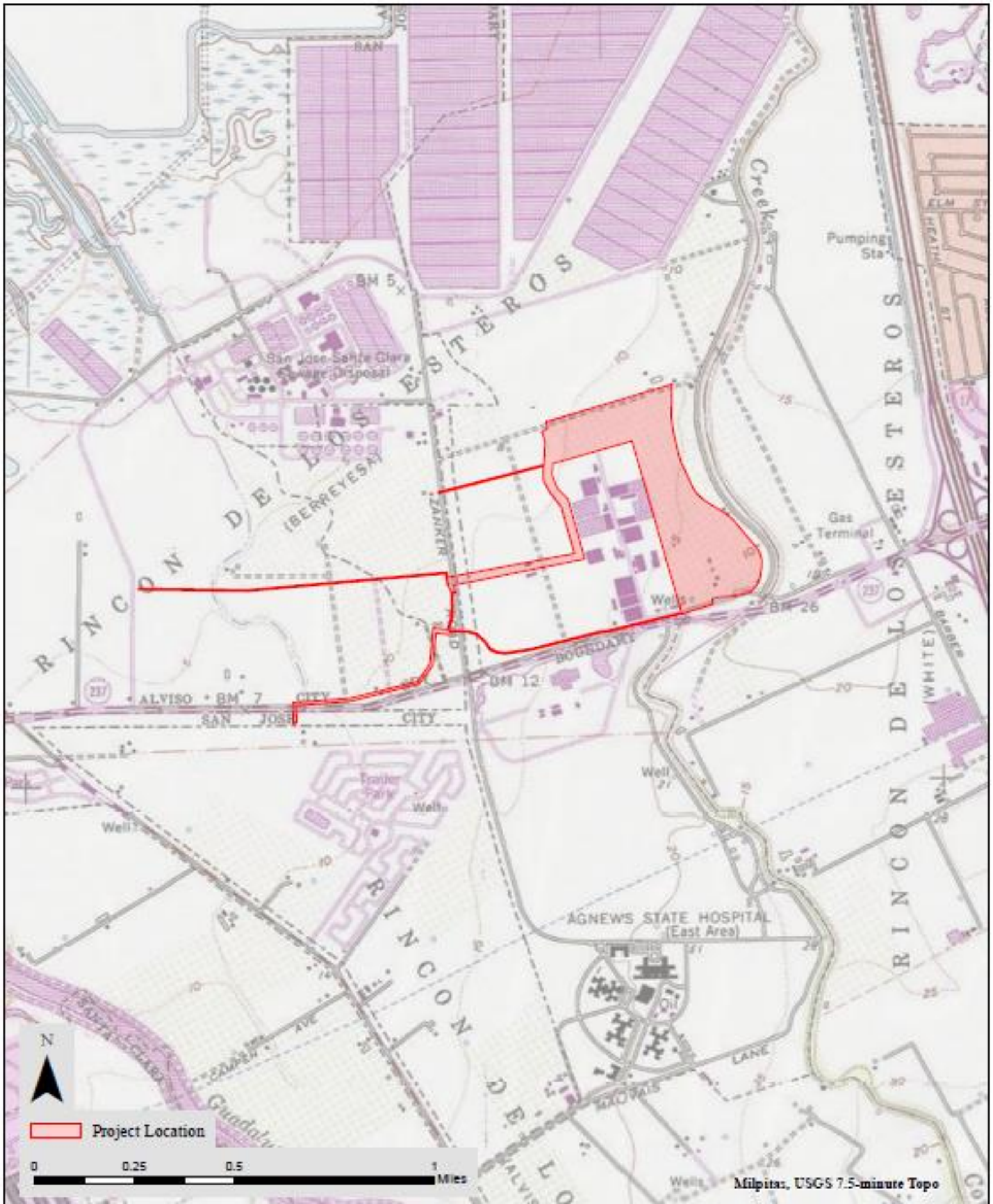
Thank you again for your assistance.

Sincerely,

Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



PALEO WEST archaeology

Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

PALEOWEST archaeology
925.253.9070 | paleowest.com | 1870 Olympic Boulevard, Suite 100 | Walnut Creek, CA 94596

July 9, 2019

Irenne Zwierlein, Chairperson
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062
VIA Email to: amahmutsuntribal@gmail.com

RE: Lightspeed Data Center Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Zwierlein:

PaleoWest has been contracted by Jacobs to prepare a Cultural Resources Assessment Report for the Lightspeed Data Center Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1973).

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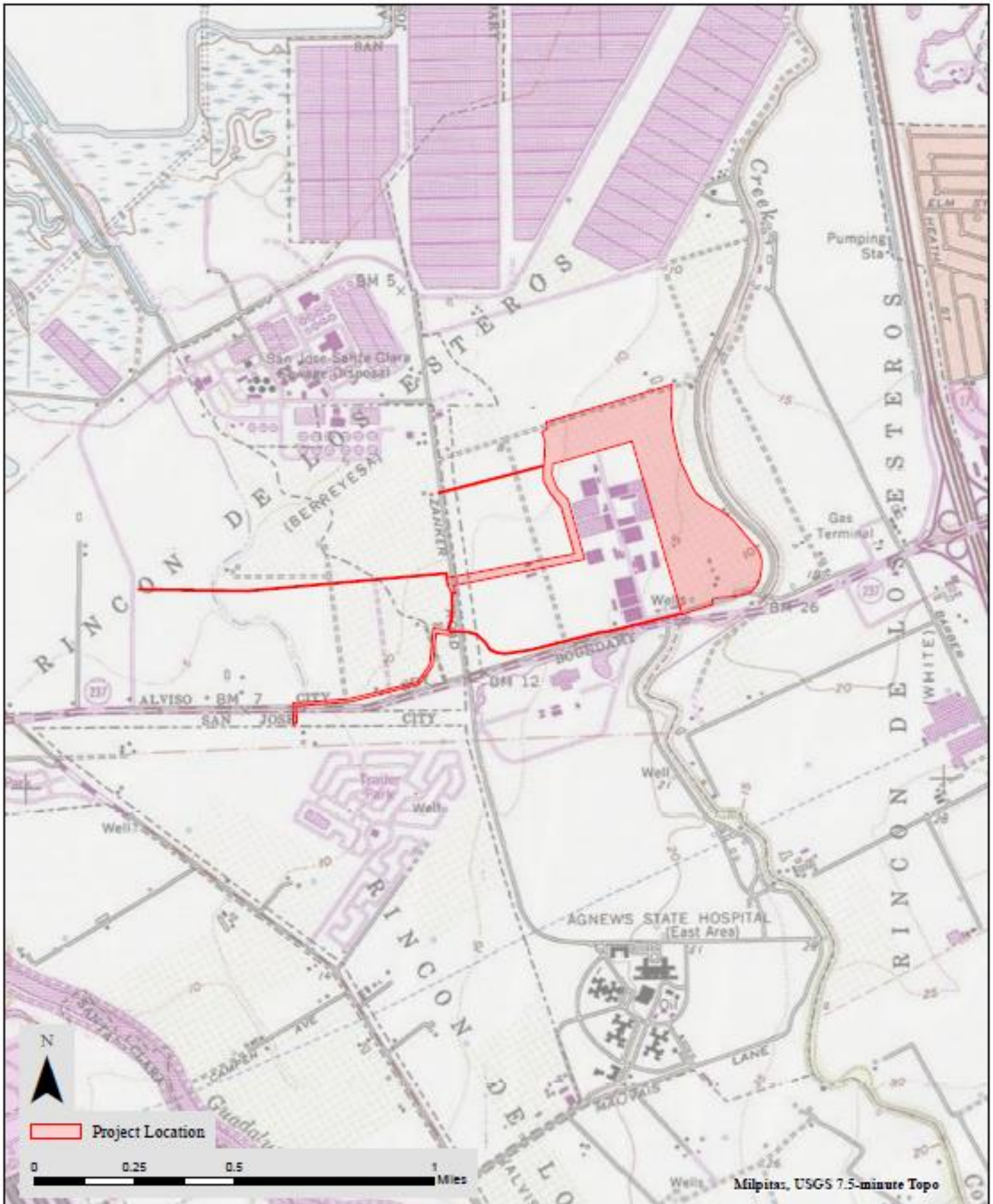
Thank you again for your assistance.

Sincerely,

Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



PALEO WEST archaeology

Project Location Map

Lightspeed Data Center Project
Santa Clara County, CA

Project #19-213: Lightspeed Data Center Project

Table #A-1. Record of Native American Contacts and Comments

Native American Contact	Date of Notification Email	Date of Phone Contact	Comments
Katherine Erolinda Perez, Chairperson North Valley Yokuts Tribe P.O. Box 717 Linden, CA 95236 209-887-3415 canutes@verizon.net	7/9/19	N/A	Ms. Perez responded via email (6/19). She provided recommendations for the project (see email below).
Valentin Lopez, Chairperson Amah Mutsun Tribal Band P.O. Box 5272 Galt, CA 95632 Phone: (916) 743 - 5833 vlopez@amahmutsun.org	7/9/19	7/15/2019 MMW	Spoke with Mr. Lopez on the telephone (7/15). He stated that the project is located outside of his tribal territory and he declined to comment on the project.
Irenne Zwierlein, Chairperson Amah Mutsun Tribal Band of Mission San Juan Bautista 789 Canada Road Woodside, CA 94062 650-851-7489 (cell) 650-851-7747 (office) 650-332-1526 (fax) amahmutsuntribal@gmail.com	7/9/19	7/15/2019 MMW	Spoke with Ms. Zwierlein on the telephone (7/15). She recommends that cultural resources awareness training be provided to the construction crews. She also recommends that if anything is discovered, an archaeological monitor and Native American monitor should be on site.
Ann Marie Sayers, Chairperson Indian Canyon Mutsun Band of Costanoan P.O. Box 28 Hollister, CA 95024 831-637-4238 ams@indiancanyon.org	7/9/19	7/15/2019 MMW	Spoke on the telephone with Ms. Sayers (7/15). She recommends that an archaeological monitor and a Native American monitor be present during all ground disturbing activities.
Charlene Nijmeh, Chairperson Muwekma Ohlone Indian Tribe of the SF Bay Area 20885 Redwood Road, Suite 232 Castro Valley, CA, 94546 Phone: (408) 464 - 2892 cnijmeh@muwekma.org	7/9/19	7/15/2019 MMW	Called (7/15), no answer, left a voicemail message.

Native American Contact	Date of Notification Email	Date of Phone Contact	Comments
Andrew Galvan The Ohlone Indian Tribe P.O. Box 3152 Fremont, CA 94539 510-882-0527 cell 510-687-9393 fax chochenyo@aol.com	7/9/19	7/15/2019 MMW	Called (7/15), no answer, left a voicemail message. Responded 7/16 via email, requested records search results and USGS map. See below.

Re: Lightspeed Data Center Outreach

Christina Alonso

Mon 7/22/2019 11:36 AM

To: cnijmeh@muwekma.org <cnijmeh@muwekma.org>;

Good afternoon Ms. Nijmeh,

I am writing to follow up on the project references below.

We would appreciate receiving any comments, concerns, or information you wish to share regarding cultural resources or sacred sites within the immediate project area. If you could provide your response in writing, at your earliest convenience, to the address below, we will make sure the relevant information is considered in preparing our report. Should you have any questions, I can be reached by e-mail at calonso@paleowest.com or by telephone at (925) 253- 9070, Ext. 321.

Thank you very much for your time.

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: Christina Alonso
Sent: Tuesday, July 9, 2019 1:07:20 PM
To: cnijmeh@muwekma.org <cnijmeh@muwekma.org>
Subject: Lightspeed Data Center Outreach

Good afternoon,

PaleoWest has been contracted by Jacobs to perform a cultural resources assessment of the Lightspeed Data Center Project in the City of Santa Clara, Santa Clara County.

Please find our scoping letter and project map attached.

Thank you very much for your time.

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

Lightspeed Data Center Outreach

Christina Alonso

Tue 7/9/2019 1:08 PM

To: ams@indiancanyon.org <ams@indiancanyon.org>;

1 attachments (564 KB)

Lightspeed Data Center NA Letter_Sayers.pdf;

Good afternoon,

PaleoWest has been contracted by Jacobs to perform a cultural resources assessment of the Lightspeed Data Center Project in the City of Santa Clara, Santa Clara County.

Please find our scoping letter and project map attached.

Thank you very much for your time.

Christina Alonso, M.A., RPA

Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596

925.253.9070 | 925.399.9220 cell | www.paleowest.com

Lightspeed Data Center Outreach

Christina Alonso

Tue 7/9/2019 1:08 PM

To: Amah Mutsun <amahmutsuntribal@gmail.com>;

1 attachments (565 KB)

Lightspeed Data Center NA Letter_Zwierlein.pdf;

Good afternoon,

PaleoWest has been contracted by Jacobs to perform a cultural resources assessment of the Lightspeed Data Center Project in the City of Santa Clara, Santa Clara County.

Please find our scoping letter and project map attached.

Thank you very much for your time.

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

Lightspeed Data Center Outreach

Christina Alonso

Tue 7/9/2019 1:03 PM

To: vlopez@amahmutsun.org <vlopez@amahmutsun.org>;

1 attachments (564 KB)

Lightspeed Data Center NA Letter_Lopez.pdf;

Good afternoon,

PaleoWest has been contracted by Jacobs to perform a cultural resources assessment of the Lightspeed Data Center Project in the City of Santa Clara, Santa Clara County.

Please find our scoping letter and project map attached.

Thank you very much for your time.

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

Re: Lightspeed Data Center Project

Christina Alonso

Tue 6/18/2019 8:41 PM

To: canutes@verizon.net <canutes@verizon.net>;

Cc: calonso@williamself.com <calonso@williamself.com>;

Hi Kathy!

I just received the contact list from the NAHC this week. I will be drafting our scoping letters next week and sending out.

Thank you for checking in! Please let know if you need anything else.

Best
C

Sent from my iPhone

On Jun 18, 2019, at 7:52 PM, "canutes@verizon.net" <canutes@verizon.net> wrote:

> Hello Christina,
>
> I am not sure you sent me any information regarding the Lightspeed Data Center Project, in the City of Milpitas. Can you please forward any information regarding the proposed project. It would be greatly appreciated.
>
> Thanks,
>
> Nototomne Cultural Preservation
> Northern Valley Yokut / Ohlone / Bay iwuk
> Katherine Perez
> P.O Box 717
> Linden, CA 95236
> Cell: 209.649.8972
> Email: canutes@verizon.net

Re: Lightspeed Datat Center Project

Christina Alonso

Fri 6/21/2019 11:43 AM

To: canutes@verizon.net <canutes@verizon.net>;

Good afternoon Kathy!

I just got news that our end of this project is currently on hold while we await some contracting and insurance clarification. Once we are back up and running I will be sending our official scoping letters regarding the project.

I will be happy to make a note of your request and follow up with you as soon as we are given the green light to continue our work.

Thank you!

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: canutes@verizon.net <canutes@verizon.net>
Sent: Wednesday, June 19, 2019 8:29:11 AM
To: Christina Alonso
Subject: Lightspeed Datat Center Project

Dear Christina Alonso,

On another note form my last email yesterday. The Northern Valley Yokuts Tribe received and email from the Native American Heritage Commission regarding the Lightspeed Data Center Project, City of Milpitas; Milpitas USGS Quadrangle, Santa Clara County (Project) dated, June 17, 2019. 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 positive for a Northern Valley Yokuts sacred site.

I am contacting you in order to:

- Request a site visit for this project;
- Request lead agency or land owner contact information;
- Prior to the site visit, please send us all existing cultural resource assessments, as well as requests for, and the results of, any records searches that may have been conducted.

Thank you for involving the Tribe early in the environmental review and planning process. We ask that you make this communication a part of the final report and will work with you to preserve and protect tribal cultural resources.

Please contact me by phone 209.649.8972 or email at canutes@verizon.net to continue the consultation.

Sincerely,

Katherine Erolinda Perez, Chairwoman

Lightspeed Datat Center Project

canutes@verizon.net

Wed 6/19/2019 8:29 AM

To: Christina Alonso <calonso@paleowest.com>;

Dear Christina Alonso,

On another note form my last email yesterday. The Northern Valley Yokuts Tribe received and email from the Native American Heritage Commission regarding the Lightspeed Data Center Project, City of Milpitas; Milpitas USGS Quadrangle, Santa Clara County (Project) dated, June 17, 2019. 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 positive for a Northern Valley Yokuts sacred site.

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Thank you for involving the Tribe early in the environmental review and planning process. We ask that you make this communication a part of the final report and will work with you to preserve and protect tribal cultural resources.

Please contact me by phone 209.649.8972 or email at canutes@verizon.net to continue the consultation.

Sincerely,

Katherine Erolinda Perez, Chairwoman

Re: Lightspeed

Christina Alonso

Thu 7/25/2019 8:44 AM

To: canutes@verizon.net <canutes@verizon.net>;

1 attachments (9 MB)

San Jose Data Center SJC02 CRTR 7_23_19.pdf;

Good morning Kathy,

Per our previous conversation, here is a copy of the final Technical Report for the Lightspeed Data Center (now called the San Jose Data Center (SJC02)).

Best,

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: canutes@verizon.net <canutes@verizon.net>
Sent: Wednesday, July 17, 2019 10:39:33 AM
To: Christina Alonso <calonso@paleowest.com>
Subject: Re: Lightspeed

Okay thanks.

Katherine Perez

-----Original Message-----
From: Christina Alonso <calonso@paleowest.com>

To: canutes@verizon.net <canutes@verizon.net>
Sent: Wed, Jul 17, 2019 10:36 am
Subject: Re: Lightspeed

Good morning Ms. Perez.

I will forward this email along to the Lead Agency for the Project who can assist with your requests below.

I can send you a copy of the final Cultural Resources Technical Report which will include the results of the records search for this project. We are finalizing the report now, and should be able to send you a copy shortly.

Thank you for your time, and please let me know if you have any additional questions.

Best,

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: canutes@verizon.net <canutes@verizon.net>
Sent: Wednesday, July 17, 2019 10:32:01 AM
To: Christina Alonso
Subject: Lightspeed

Dear Ms. Alonzo,

Thank you for your letter regarding the Lightspeed Data Center Outreach Project (Project) dated, July 9, 2019. I am contacting you in order to:

- Request a site visit for this project;
- Prior to the site visit, please send us all existing cultural resource assessments, as well as requests for, and the results of, any records searches that may have been conducted.

Thank you for involving the Tribe early in the environmental review and planning process. We ask that you make this communication a part of the final report and will work with you to preserve and protect tribal cultural resources.

Please contact me by phone 209.649.8972 or email at canutes@verizon.net to continue the consultation.

Sincerely,

Katherine Erolinda Perez, Chairwoman

Re: Lightspeed Data Center Outreach

Christina Alonso

Thu 7/25/2019 8:45 AM

Sent Items

To: andrew galvan <chochenyo@aol.com>;

1 attachments (9 MB)

San Jose Data Center SJC02 CRTR 7_23_19.pdf;

Good morning Andy,

Per our previous conversation, I wanted to send you a copy of the final technical report for the Lightspeed Data Center (now referred to as the San Jose Data Center).

Best,

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: Christina Alonso <calonso@paleowest.com>
Sent: Tuesday, July 16, 2019 12:02:44 PM
To: andrew galvan <chochenyo@aol.com>
Cc: Gayle.Totton@nahc.ca.gov <Gayle.Totton@nahc.ca.gov>; debbie.treadway@nahc.ca.gov <debbie.treadway@nahc.ca.gov>
Subject: Re: Lightspeed Data Center Outreach

Good afternoon Andy,

Our records search came back that there are no prehistoric sites within the Project area, there are a number of prehistoric sites within the 1-mile buffer of the Project Area. I have attached our Project location map here.

We can provide you a copy of the report when we complete it, that will provide you with the results of the records search as well as the results of our field survey which has yet to be completed.

Please let me know if this works for you.

Best,

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: andrew galvan <chochenyo@aol.com>
Sent: Tuesday, July 16, 2019 11:17:45 AM
To: Christina Alonso
Cc: Gayle.Totton@nahc.ca.gov; debbie.treadway@nahc.ca.gov
Subject: Re: Lightspeed Data Center Outreach

Hi there,

I am aware of numerous precontact sites in the general vicinity, specifically CA-SCI-528. SCI-528 has yielded human remains, midden and artifacts.

Please provide me with a copy of your Lit Search and the accompanying USGS.

Thank you,

Andrew Galvan
The Ohlone Indian Tribe

-----Original Message-----
From: Christina Alonso <calonso@paleowest.com>
To: Andy Galvan <chochenyo@aol.com>
Sent: Tue, Jul 9, 2019 12:55 pm
Subject: Lightspeed Data Center Outreach

Good afternoon,

PaleoWest has been contracted by Jacobs to perform a cultural resources assessment of the Lightspeed Data Center Project in the City of Santa Clara, Santa Clara County.

Please find our scoping letter and project map attached.

Thank you very much for your time.

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

Appendix 3.19A
Water Supply Assessment

Appendix L

Water Supply Assessment

FINAL

WATER SUPPLY ASSESSMENT

FOR THE

237 INDUSTRIAL CENTER PROJECT

Prepared by

THE CITY OF SAN JOSE

and

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

FOR

CITY OF SAN JOSE

May 2017

FINAL

WATER SUPPLY ASSESSMENT

FOR THE

237 INDUSTRIAL CENTER PROJECT

Prepared by

CITY OF SAN JOSE

and

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
1171 HOMESTEAD ROAD, SUITE 255
SANTA CLARA, CA 95050

FOR

CITY OF SAN JOSE

May 2017

Table of Contents

Appendices

List of Tables

List of Figures

Table i. Acronyms Used in this Report

Acronym	Description
ac-ft, AF	Acre-feet
ac-ft/yr, AFY	Acre-feet/year
ccf, hcf	Hundred cubic feet
gpd	Gallons per day
gpcd	Gallons per capita day, or gallons per person per day
mgd	Million gallons per day
MW	Megawatts
sqft, sf	Square feet
BAWSCA	Bay Area Water Supply & Conservation Agency
BMP	Best management practice
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
CIWQS	California Integrated Water Quality System Project
CWC	California Water Code
DDW	SWRCB Division of Drinking Water
DMM	Demand management measure
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ISA	Interim Supply Allocation
LI	Light Industrial
NSJ	North San Jose
RWF	Regional Wastewater Facility
SB	California Senate Bill
SBWR	South Bay Water Recycling
SCVWD	Santa Clara Valley Water District
SFPUC	San Francisco Public Utilities Commission
SJMWS	San Jose Municipal Water System
SUP	Special Use Permit
SWRCB	State Water Resources Control Board
UWMP	Urban Water Management Plan
WSA	Water Supply Assessment
WSAP	Water Shortage Allocation Plan
WVS	Written Verification of Supply

Table ii. Units of Measure Used in this Report

Unit	Equals
1 acre-foot	= 43,560 cubic feet = 325,851 gallons
1 cubic foot	= 7.48 gallons
1 CCF	= 100 cubic feet = 748 gallons
1 MGD	= 1,000,000 gallons/day = 1,120 acre-feet / year

Section 1 - Introduction

1.1 Project Overview

The proposed 237 Industrial Center project (Project) involves the development of a 66.5 acre parcel located to the north of Highway 237 in the North San Jose/Alviso area of the City of San Jose. The parcel is currently vacant and is zoned for Light Industrial (LI) use. The proposed development includes a 436,880 square foot data center and associated PG&E substation on the northern portion of the site (approximately 26.5 acres), and 728,000 square feet of light industrial development on the remaining 40 acres of the site. Zoning regulations require a Special Use Permit (SUP) for the data center component of the project.

The project is in the San Jose Municipal Water System's (SJMWS) North San Jose/Alviso service area. Potable water supply for this area is wholesale water purchased from the SFPUC with some backup supply available from locally produced groundwater. Non-potable supply, which is used primarily for irrigation and industrial purposes, is obtained from the South Bay Water Recycling (SBWR) system.

1.2 Purpose of Water Supply Assessment

This WSA is being prepared pursuant to the requirements of Senate Bill 610 (2001). Under this law, a WSA is required for any "project" that is subject to CEQA and that meets certain criteria, including a proposed industrial development of more than 40 acres or 650,000 square-feet and having a water demand equal to or greater than a 500 dwelling unit project. See Water Code §§ 10910(a), 10912(a). The 237 Industrial Center Project is subject to CEQA, and the City is preparing an EIR for the project. The 237 Industrial Center Project meets the criteria for preparing a WSA under SB 610, as it will develop over 40 acres and 728,000 sf of light industrial facilities and will have a water demand greater than a 500 dwelling unit project.

The purpose of the WSA is to evaluate whether "the total projected water supplies, determined to be available … for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses." Water Code § 10910(c)(4).

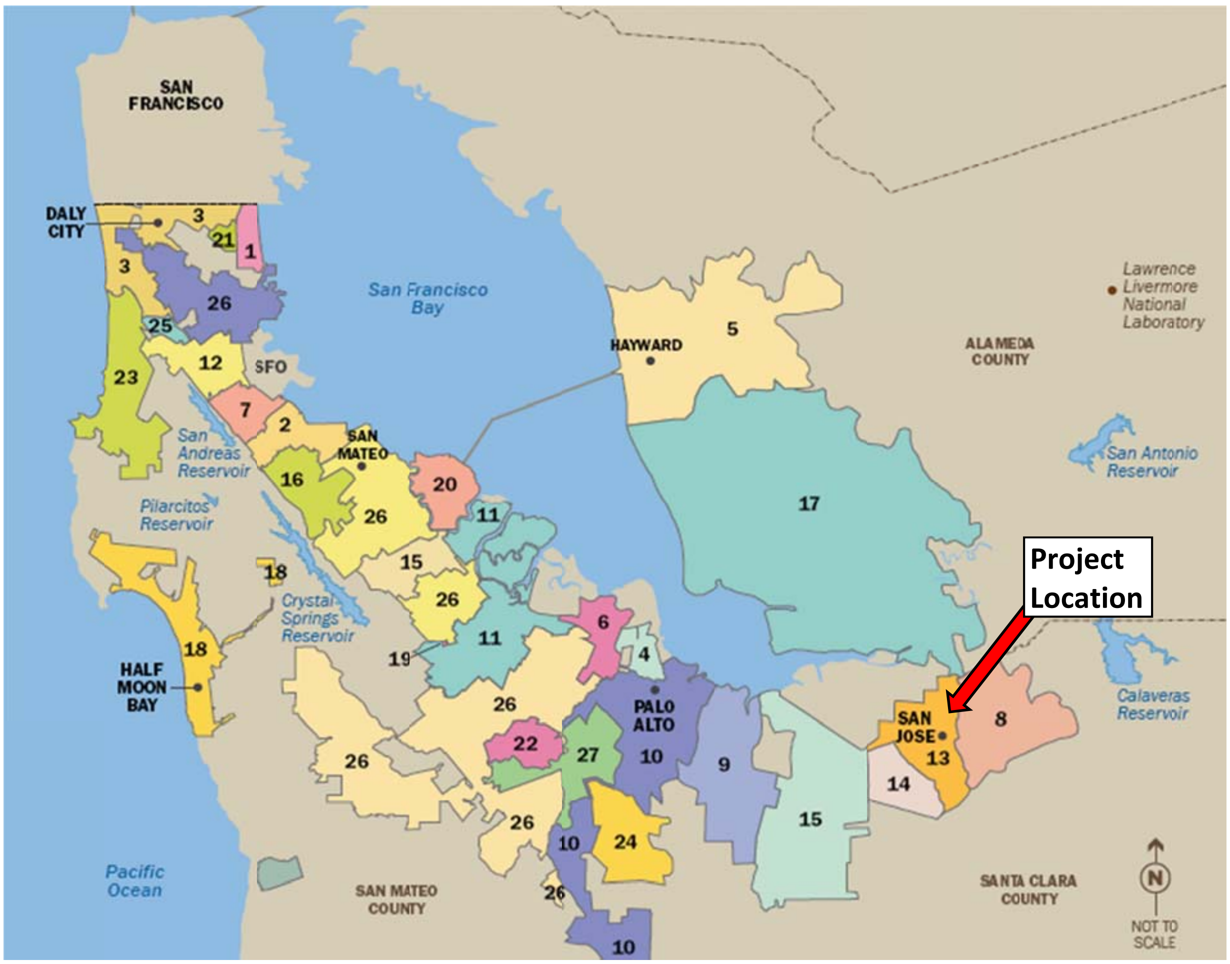
1.3 Identification of "Public Water Systems" Serving the Project

The San Jose Municipal Water System is the public water system serving this area. The City published a 2015 Urban Water Management Plan, which is the primary source of information used in this report.

SJMWS currently has three sources of potable water supply: (1) water purchased wholesale from the SFPUC, (2) groundwater, and (3) water purchased wholesale from Santa Clara Valley Water District (SCVWD). The SCVWD system does not serve the North San Jose service area.

The SFPUC acts as a "public water system" with respect to its retail customers in the City and County of San Francisco, but it does not serve as a "public water agency" when it provides water to its wholesale customers (such as SJMWS), who are responsible for supplying water to the ultimate end users. As a result, SJMWS is responsible for preparation and approval of the WSA with respect to potable water provided by SFPUC to serve the Project. As a reference, Figure 1-1 shows the SFPUC Wholesale Service Area.

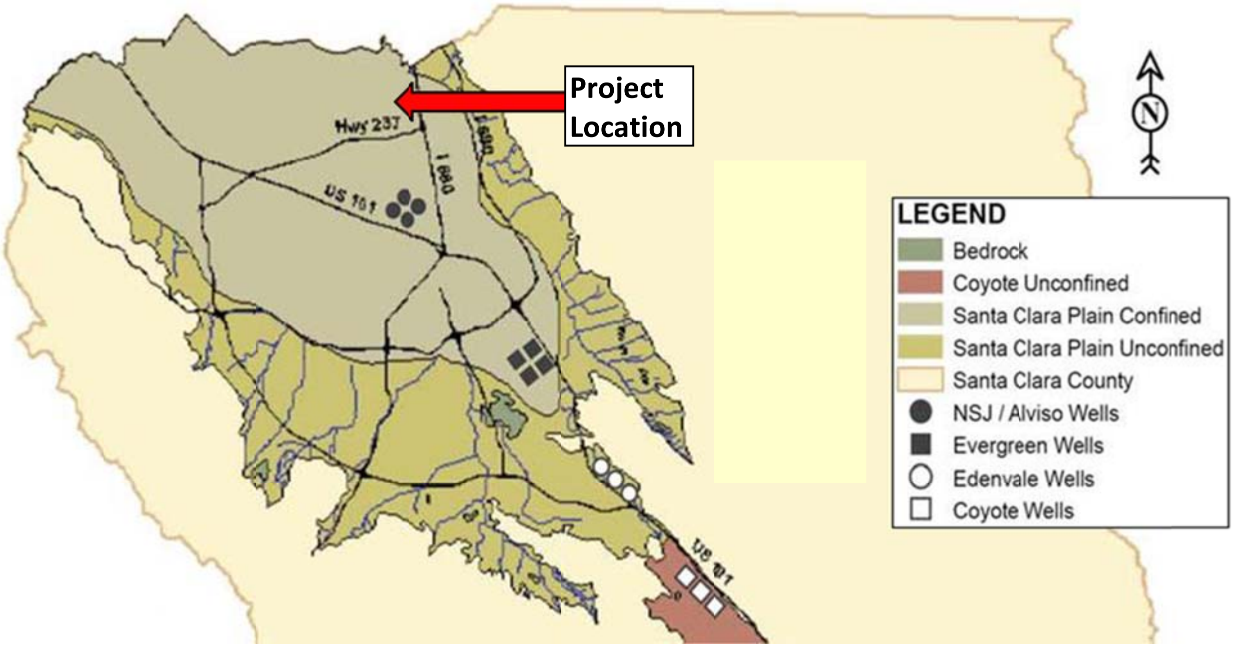
Figure 1-1: SFPUC Wholesale Service Area



The North San Jose/Alviso service area is numbered 13 above. *(Source: SFPUC 2015 UWMP)*

With respect to groundwater, SJMWS operates and maintains four wells (two active and two standby). These wells withdraw groundwater from the Santa Clara Plain, part of the Santa Clara Valley Groundwater Basin. Although the Santa Clara Valley Water District (SCVWD) oversees groundwater resources within the County and assesses a pumping fee for each acre foot of groundwater withdrawn, it does not serve as a "public water system" with respect to SJMWS's withdrawal of groundwater from its wells pursuant to its water rights. As a result, SJMWS is responsible for preparation and approval of the WSA with respect to groundwater usage for the Project. As a reference, Figure 1-2 below shows groundwater areas of northern Santa Clara County and the location of SJMWS's groundwater wells.

Figure 1-2: Groundwater Areas of Northern Santa Clara County



(Source: SJMWS 2015 UWMP)

1.4 Relationship of WSA to SFPUC and SCVWD Urban Water Management Plans

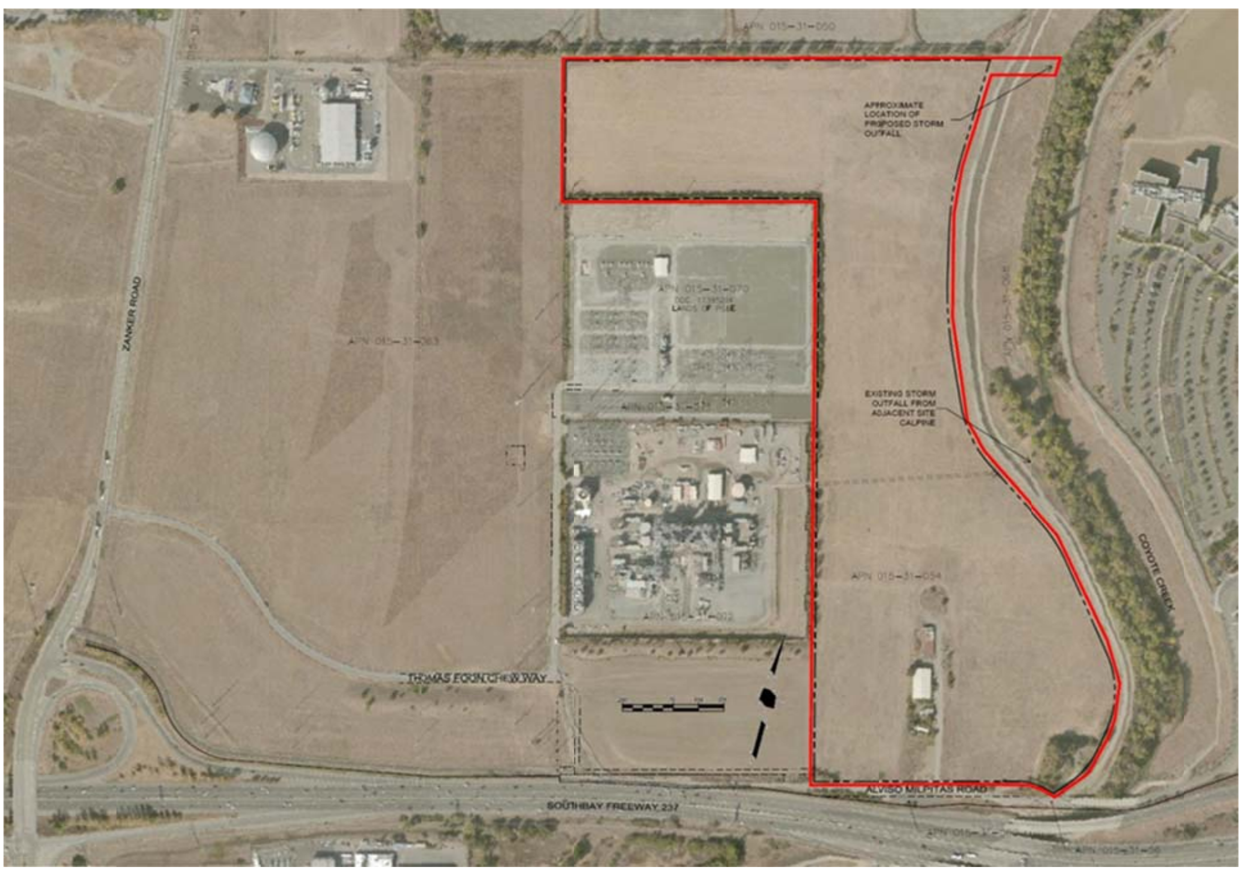
The California Urban Water Management Planning Act (Water Code §§ 10610-10656) requires urban water suppliers meeting certain criteria to prepare plans (urban water management plans or UWMPs) on a five-year, ongoing basis. An UWMP must demonstrate the continued ability of the provider to serve customers with water supplies that meet current and future expected demands under normal, single dry, and multiple dry year scenarios. These plans must also include the assessment of urban water conservation measures and wastewater recycling. Pursuant to Water Code § 10632, the plans must also include a water shortage contingency plan outlining how the water provider will manage water shortages, including shortages of up to fifty percent (50%) of their normal supplies, and catastrophic interruptions of water supply. SJMWS adopted its 2015 UWMP in June 2016. SFPUC also adopted its 2015 UWMP in June 2016, and the SCVWD adopted its 2015 UWMP in May 2016. The 2015 UWMPs project demands through the year 2040. The 2015 UWMPs do not specifically address the water demands of the proposed Project, which are analyzed in this WSA, but future water demands projected in those documents are consistent with this study. The SJMWS UWMP predicts system-wide industrial demand of 3,894 AFY in 2020, a 1,721 AFY increase over 2015. This study calculates a Project demand of 1,692 AFY, the majority of which will be met by recycled water. The City has stated that as of yet, no additional projects in North San Jose/Alviso other than those included in the 2015 UWMP have been approved for development.

Section 2 - Project Description and Water Demands

2.1 Project Description

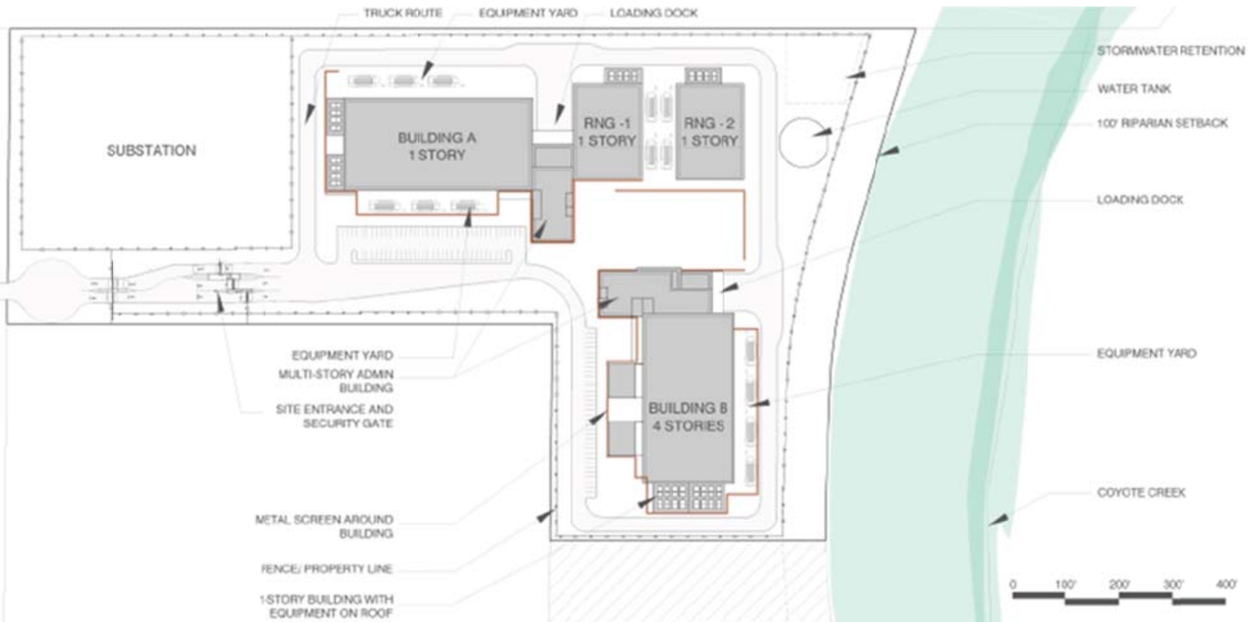
The proposed 237 Industrial Center project (Project) involves the development of a 66.5 acre parcel located to the north of Highway 237 in the North San Jose/Alviso area of the City of San Jose (Figure 2-1). The parcel is bounded to the north by McCarthy Lane, to the south by Alviso-Milpitas Road, to the west by Zanker Road and Thomas Foon Chew Way, and to the east by Coyote Creek. The parcel is currently vacant and is zoned for Light Industrial (LI) use. The proposed development includes a 436,880 square foot data center and associated PG&E substation on the northern portion of the site (approximately 26.5 acres, see Figure 2-2 below), and 728,000 square feet of light industrial development on the remaining 40 acres of the site. Zoning regulations require a Special Use Permit (SUP) for the data center component of the project.

Figure 2-1: Project Site Map



Potable domestic water in this portion of San Jose is provided by the San Jose Municipal Water System (SJMWS), in their North San Jose/Alviso service area. Recycled water produced by the South Bay Water Recycling (SBWR) system at the San Jose-Santa Clara Regional Wastewater Facility (RWF) is also available for use, as retailed by SJMWS. Because the data center is projected to require a significant quantity of water (1,643 AFY) to meet cooling demand, the use of recycled water is proposed for this component of the Project. The remainder of the project (728,000 sqft LI) will also be served by SJMWS.

Figure 2-2: Proposed Data Center Development



2.2 Project Water Demands

The light industrial development portion of the Project, located on the southern portion of the Project site, is expected to consist of approximately four buildings totaling 728,000 gross square feet of floor space. Projected potable water demands for commercial and industrial development in City of San Jose planning documents are calculated on a per-square-foot basis. Industrial demand is estimated to be 0.18 gallons/sqft/day, with 20% presumed to be for outdoor use (Program EIR, North San Jose Development Policies Update). The water demand for 728,000 sqft of LI development is thus projected to be 131,000 gpd, or 146.8 AFY. If recycled water is used to meet the outdoor (landscape irrigation) portion of this demand, then projected potable water demand for the LI development drops to 105,000 gpd, or 117.4 AFY.

The data center portion of the Project located on the northern portion of the Project site will consist of four buildings of varying sizes and heights, totaling 436,880 gross square feet of floor space. The 50 megawatt (MW) data center constitutes a Special Use of the site. At a peak rate of demand of 29,340 gal/day/MW (Navix Engineering), the data center's maximum daily water demand is expected to be 1,467,000 gal/day. Non-peak day demand will be lower, and the project is being designed such that cooling demand can be met entirely with recycled water under normal operating conditions. The use of potable water for cooling purposes will be limited to periods of interruption in the recycled water supply, and will not exceed nine days per year (maximum of three 3-day interruptions per year). A lesser amount of potable water than recycled water is required per megawatt of cooling: 10,500 gpd/MW versus 29,340 gpd/MW. Using potable water to cool for nine days at a maximum rate of 525,000 gpd yields a maximum annual demand of 14.5 AFY.

The data center will require an additional supply of potable water for non-cooling purposes (use by employees in restrooms, administration areas, etc). Project designers estimate a potable water demand of 10,800 gpd (12.1 AFY), based on a projected peak potable demand of 150 gpm. The administrative building plumbing fixtures have a demand of 65 gpm per building based on 90 WSFU (water supply fixture units); as well as 10 gpm for two wall hydrants. This is converted to a daily demand based on peak gpm for 4 hours and an applied demand factor of 0.3 to account for average daily consumption variations. Combined with 14.5 AFY of emergency cooling demand, total maximum potable water use for the data center is expected to be about 26.6 AFY. On a per-square-foot basis, this is 70% less water than a LI development of comparable size would require (78,638 gpd / 88.1 AFY).

A summary of potable and non-potable water demand for both the LI and data center components of the Project is provided in Table 2-1 below:

Table 2-1: Summary of Project Water Demands

Site Use		Basis for Demand Calculation	Demand Factor *(gal/day)*	Water Demand *(gal/day)*	Water Demand *(AFY)*	% Recycled	Potable Demand *(AFY)*	Recycled Demand *(AFY)*
LIGHT INDUSTRY		Building Area = 728,000 sqft	0.18 per sqft	131,040	146.8	20%	117.4	29.4
DATA CTR.	cooling	Electrical Power = 50 MW	29,340 per MW	1,467,000	1,643.3	100%	0	1,643.3
DATA CTR.	domestic	Engineer's estimate	*NA*	10,800	12.1	0%	12.1	0
			TOTALS:	**1,608,840**	**1,802**	**93%**	**129.5**	**1,673**

Table assumes normal operating conditions with no interruptions in recycled water supply.
Supply interruptions might result in additional potable water use of up to 14.5 AFY.

Section 3 - Current and Future Water Supply

3.1 Imported Water

Water purchased wholesale from the San Francisco Public Utilities Commission (SFUPC) is the primary source of potable supply for SJMWS's North San Jose service area. SFPUC's water supply consists primarily of diverted Tuolumne River flows conveyed through the Hetch Hetchy Project (approximately 85% of SFPUC supply), with local sources making up the remaining 15%. Total SFPUC system storage capacity is nearly one million acre-feet. During normal years, the SFPUC could supply an average of 256 mgd to its retail and wholesale customers, with 81 mgd for retail customers and 184 mgd for wholesale providers. In 2009, SJMWS entered into a Water Sales Contract with SFPUC to purchase 4.5 mgd (annual average, or 5,041 AFY). In 2015 the actual quantity of water purchased was 4,677 AF. The Water Sales Contract between SFPUC and SJMWS provides a supply of water that is both temporary and interruptible. For planning purposes, the 2015 UWMP assumes a continued supply of 4.5 mgd.

Note that in its other service areas (Evergreen, Edenvale, and Coyote Valley) SJMWS also purchases water wholesale from the SCVWD. There is no intertie between these service areas and North San Jose; therefore SCVWD water supply will not be considered in this WSA.

3.2 Local Groundwater

SJMWS maintains four groundwater wells located in the North San Jose area (two active and two backup). Hydrogeologically, these wells are located in the Santa Clara Plain subbasin of the Santa Clara Valley aquifer. Although these wells are not used regularly, they have the potential to serve as an additional or backup supply should service from SFPUC fall short or be interrupted. Groundwater could also serve as a backup source of supply for the data center portion of the Project, if recycled water service were to be interrupted. The existing wells have individual capacities of 1,500 gpm each (SJMWS 2015 UWMP), with a combined theoretical maximum capacity of 4,500 AFY. The maximum historical use of these wells was 924 AFY in 1991 (Envision San Jose 2040 WSA). SJMWS plans to construct additional wells in the North San Jose/Alviso service area to secure additional regular and backup supply sources.

Bulletin 118 describes groundwater level trends in the Santa Clara Plain as stable, having largely recovered from 1960s minima thanks to decreased pumping (many former pumpers now rely on imported surface water deliveries) and increased recharge. The SCVWD actively manages its water supply portfolio to ensure that groundwater use within the basin remains sustainable, employing methods such as managed groundwater recharge, conjunctive use, local surface water capture and storage, imported water, and recycled water to enhance and supplement groundwater supplies. SJMWS affirms in their 2015 UWMP that the basin has not been identified by the

DWR as one in a state of overdraft, and a sufficient supply of groundwater is available to supply the four SJMWS wells.

3.3 Recycled Water

Recycled water is produced at South Bay Water Recycling (SBWR), a system operated by the San Jose-Santa Clara Regional Wastewater Facility (RWF). Located less than one mile to the northeast of the Project site, the RWF is responsible for collecting and treating the sewage and other wastewater from six surrounding South Bay jurisdictions: SJMWS, San Jose Water Company, California Water Service, Great Oaks Water Company, and the Cities of Santa Clara and Milpitas.

SBWR delivers recycled water to four retail agencies: SJMWS, the San Jose Water Company, the Cities of Santa Clara and Milpitas. Demand for recycled water varies seasonally, ranging from a minimum of 8 mgd in winter to 25 mgd during the drier summer months. Over the course of a year, SBWR's recycled water deliveries average 15,000 AF. In 2015, SJMWS received 3,607 AF of recycled water, or about 24% of SBWR's total production. In the 2015 UWMP, SJMWS projects that production and sales of recycled water will approximately double between 2015 and 2040, increasing to 7,368 AFY.

Section 4 - Existing Water Demands

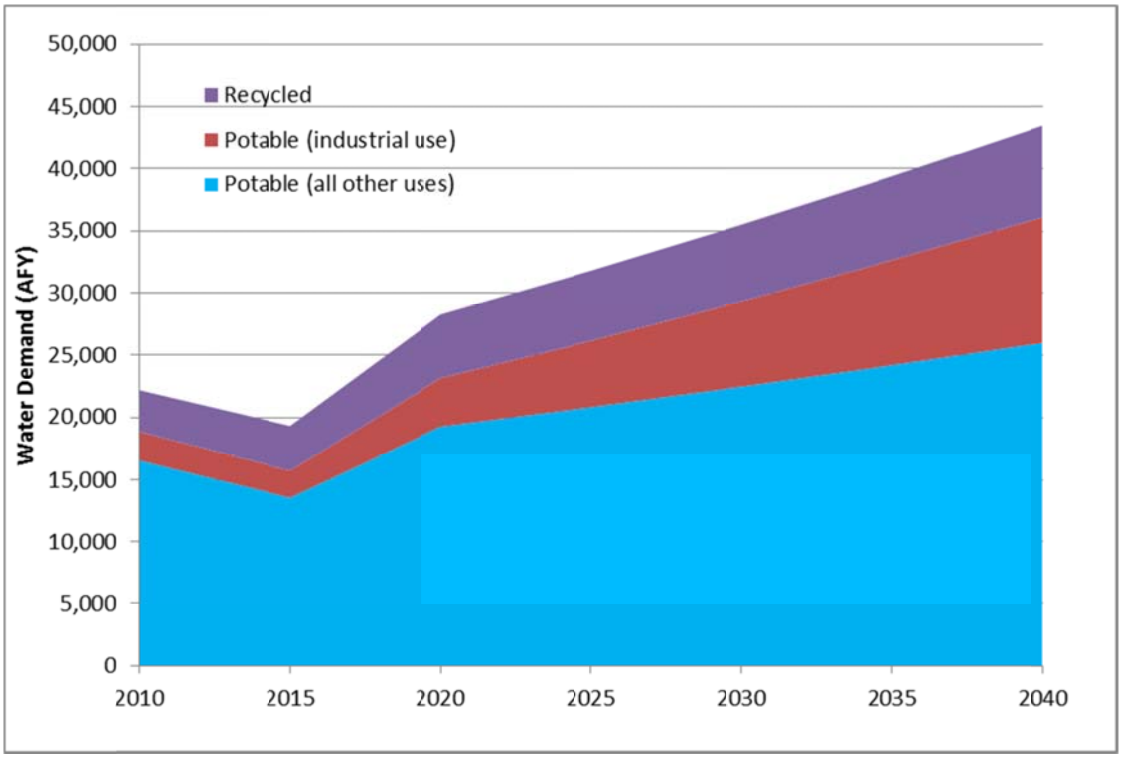
4.1 Current & Future Demands

According to their most recent UWMP, SJMWS in 2015 delivered 15,707 AF of potable water (system-wide deliveries, includes potable supplies from both SFPUC and SCVWD, plus groundwater from wells in three service areas). This represented a decrease from the 18,846 AF produced in 2010, attributable largely to the recent multiyear drought and other conservation measures. Between 2015 and 2040, demand is projected to gradually increase to 36,116 as the region experiences continued development and growth in all sectors. Industrial demand for potable water is currently 2,173 AFY, or about 14% of total. This figure is projected to increase to 10,110 AFY by 2040, a net increase of 365% and a doubling in share relative to use by other sectors. Industrial potable demands in the North San Jose/Alviso area are projected to increase to approximately 3,200 AFY by 2040.

As per the discussion in the previous section, recycled water demand by SJMWS customers in 2015 was 3,607 AFY. Of this quantity, 1,966 AF (55%) were used for landscape irrigation, and 1,641 AF (45%) went to industrial users. Total recycled water demand represented a 262 AFY increase over 2010 levels, but the rate of demand increase by customers was slower than expected. By 2040, SJMWS expects that sales of recycled water will approximately double over current (2015) levels to 7,368 AFY.

With a projected demand of 1,673 AFY (1,643 AFY for the data center, plus up to 30 AFY for outdoor/landscaping use associated with the LI development) the proposed Project would roughly double the amount of recycled water currently being used by industrial customers in SJMWS's service area. Total recycled water use would increase to 5,280 AFY, a 46% increase over current levels, bringing consumption approximately in line with UWMP demand projections for year 2021.

Figure 4-1: SJMWS Water Demands, 2010 - 2040



A summary of recent, current, and projected future water demands, broken down by relevant type and sector, is presented below in Table 4-1.

Table 4-1: SJMWS Water Demands, 2015 - 2040

Water Use Sectors (AFY)	2015	2020	2025	2030	2035	2040
Single Family	6,815	10,321	10,789	11,281	11,797	12,339
Multi-Family	2,689	2,556	2,835	3,130	3,439	3,763
Commercial	1,294	1,663	1,986	2,325	2,681	3,055
Industrial	2,173	3,894	5,335	6,850	8,442	10,110
Institutional/Governmental	219	295	309	324	340	357
Landscape/ Irrigation	2,262	3,835	4,239	4,664	5,110	5,577
Losses / Unaccounted	187	587	663	743	827	915
Total Potable	**15,707**	**23,151**	**26,156**	**29,317**	**32,636**	**36,116**
Recycled Water	3,607	5,117	5,638	6,187	6,764	7,368
Total Water Demand	**19,314**	**28,268**	**31,794**	**35,504**	**39,400**	**43,484**

All values in units of AFY. Source: SJMWS 2015 UWMP

4.2 Dry Year Demands

SFPUC's wholesale potable water system is deemed highly reliable. Storage and redundancy built into the SFPUC system ensure that even during periods of drought, the utility can usually provide its wholesale customers with their interim supply allocations. Nonetheless, SFPUC and its wholesale customers have adopted a Water Shortage Allocation Plan (WSAP) that allows for shortage reductions of up to 10% below normal year supplies for a single critical dry year (or the first year of a multi-year drought), and up to 22% for subsequent multiple dry years. Fiscal Year 2015 represented the third year of a multi-year drought, and SFPUC was still able to deliver 4,677 AF of potable water to SJMWS, but the possibility of more severe supply reductions should nonetheless be taken into account when planning future dry-year demand scenarios.

The most recent drought period (2013-2015) represents the multi-year drought of record for the San Francisco Bay region. Actual water usage data from this general period shows that total potable water use by SJMWS customers during this period decreased by 17%, from 18,846 AFY in 2010 to 15,707 in 2015. Industrial water usage declined from 2,303 AFY in 2010 to 2,173 AFY in 2015, or by about 6%. Despite continuing growth in the region, these decreases in overall water usage were achievable largely due to conservation measures implemented in response to the recent drought. If necessary, similar conservation targets could presumably be achieved in future drought scenarios.

If SFPUC were to be forced to cut customers' allocations by the advised 10%-22%, SJMWS could use its two active groundwater wells to temporarily supplement water supply in the NSJ/Alviso service area (see Table 4-1 below). Note that SJMWS would not be permitted to use its emergency standby wells for drought supply.

Table 4-2: SJMWS Water Demands, 2015 - 2040

Supply	Water Year Type				
	Normal Year	Single Dry Year	Multiple Dry Years		
			1	2	3
2015 Potable Supply					
SFPUC	5,041	4,985	4,985	3,416	3,416
groundwater	4,500	4,500	4,500	4,500	4,500
2040 Potable Supply					
SFPUC	5,041	4,985	4,985	3,416	3,416
groundwater	5,700	5,700	5,700	5,700	5,700
2040 Demands					
Potable Demand	9,887	9,887	9,887	9,887	9,887
met by SFPUC	5,041	4,985	4,985	3,416	3,416
met by groundwater	4,846	4,902	4,902	4,790	4,790
met by conservation	0	0	0	1,681	1,681

All values in units of AFY. SFPUC year 2040 supply based on SJMWS 2015 UWMP, Table 7-1. During multiple dry years, demand reduction measures are implemented to achieve 17% conservation, as was the case in the 2013-2015 drought.

Section 5 - Supply Sufficiency Analysis

5.1 Sufficiency of Water Supply for the Project

The projected potable demand for the proposed Project, 129.5 AFY, represents approximately 2.6% of the 5,041 AFY currently contracted to SJMWS for delivery by SFPUC during normal water years. SJMWS has the ability to meet increased demand in a variety of ways, such as purchasing additional water from SFPUC when available, relying more heavily on local groundwater resources, or encouraging conservation and recycled water use among its existing customers to reduce existing potable water demands. The potable demands of the proposed Project fall easily within growth forecasts for industrial water use put forth in SJMWS's 2015 UWMP (see Table 5-1 below). As potable industrial water demand in all SJMWS service areas is projected to increase by 7,937 AFY between 2015 and 2040, the 129.5 AFY needed for the Project represents less than 2% of this forecast growth.

The City has required, as a condition of approval for the project, the purchase and dedication of a 2,500 square foot property for SJMWS's future construction of a potable water well. This agrees with the 2015 UWMP plan Table 6-8 for future water projects to support future demands by the installation of groundwater wells in the NSJ/Alviso service area.

As currently proposed, the proposed data center component of the Project is forecast to use over 70% less potable water than a LI development of comparable size would demand. At 12.1 AFY, potable water use by the data center represents about 10% of total Project potable water demands. Although the recycled water demands of the project are significant, meeting these demands falls within SBWR's future projections for recycled water sales. The use of recycled water represents a reliable, sustainable, local and drought-proof supply of cooling water for the Project's operations.

Table 5-1: Project Impact on Systemwide Industrial Potable Demand Projections

	2015	2020	2025	2030	2035	2040
Projected Industrial Raw/Potable Demand	2,173	3,894	5,335	6,850	8,442	10,110
Existing Industrial Demand (2015)	2,173	2,173	2,173	2,173	2,173	2,173
237 Industrial Center	0	129.5	129.5	129.5	129.5	129.5
Available for Remaining Industrial Development	0	1,591	3,032	4,547	6,139	7,807

All values in units of AFY. Source: SJMWS 2015 UWMP

Table 5-2: Project Impact on Systemwide Recycled Water Demand Projections

	2015	2020	2025	2030	2035	2040
Projected Recycled Water Demand	3,607	5,117	5,638	6,187	6,764	7,368
Existing Recycled Water Demand (2015)	3,607	3,607	3,607	3,607	3,607	3,607
237 Industrial Center	0	1,673	1,673	1,673	1,673	1,673
Available for Remaining Development	0	-163	358	907	1,484	2,088

All values in units of AFY. Source: SJMWS 2015 UWMP

Appendix A: References

Bay Area Water Supply & Conservation Agency

Annual Survey – FY 2014-15, April 2016

California Department of Water Resources

Bulletin 118, Santa Clara Valley Groundwater Basin, Santa Clara Subbasin February 2004

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San Jose Municipal Water System

2015 Urban Water Management Plan, June 2016

2010 Urban Water Management Plan – Final, June 2011

Santa Clara Valley Water District

Urban Water Management Plan 2015, May 2016

South Bay Water Recycling

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