

BAYLANDS SPECIFIC PLAN

Paleontological Resources Assessment Report

Prepared for
Metis Environmental Group

August 2024



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Baylands Specific Plan Paleontological Resources Assessment Report

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EXECUTIVE SUMMARY

Baylands Specific Plan Paleontological Resources Assessment Report

Environmental Science Associates (ESA) has been retained by Metis Environmental Group to conduct a paleontological resources assessment report for the Baylands Specific Plan (Specific Plan) in support of an Environmental Impact Report (EIR) being prepared pursuant to the California Environmental Quality Act (CEQA) and its implementing regulations (the CEQA Guidelines). The Specific Plan would consist of a comprehensive plan for development of the 684.3-acre Baylands site, including goals, policies, and development standards and plans to guide future development actions. The Specific Plan proposes the development of 2,200 residential units and 6.5 million square feet of retail, commercial, office, conference, and research and development, and campus uses; 500,000 square feet of hotel use; acquisition of a water supply; construction of associated onsite and offsite infrastructure; and a school, open space, and parks and trails within the Specific Plan Area. The area analyzed in this report encompasses the Specific Plan Area and offsite areas proposed for Specific Plan-related infrastructure and improvements. The Specific Plan Area and offsite infrastructure is referred to herein as the Project Area.

Geologic mapping shows that nearly the entire surface of the Project Area is underlain by artificial fill. The Specific Plan also encroaches on young bay muds and bedrock of the Franciscan Formation. At depth, it is believed that the Pleistocene Colma and/or Pliocene-Pleistocene Merced formations underly the bay muds. In addition to the artificial fill and young bay muds, older (Pleistocene) slope and ravine deposits (Qsr) occur in the southwest.

A database search of the holdings of the University of California Museum of Paleontology (UCMP), the Paleobiology Database, and pertinent literature established that the Pleistocene Colma and Merced Pliocene-Pleistocene formations host significant fossils. The Franciscan Formation sandstone and shale are considered low significance, while exposures of Pleistocene ravine and slope deposits are of unknown significance. Ground disturbance associated with the Specific Plan is unlikely to impact paleontologically sensitive formations due to the relatively shallow anticipated depth of disturbance for most Project components. This report provides recommendations for paleontological resources awareness training for construction personnel involved in ground disturbing activities associated with the Specific Plan.

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CHAPTER 1

Introduction

Environmental Science Associates (ESA) has conducted a paleontological resources assessment for the Baylands Specific Plan (Specific Plan), which would consist of a comprehensive plan for development of the 684.3-acre Baylands site, including goals, policies, and development standards and plans to guide future development actions. The Specific Plan proposes the development of 2,200 residential units and 6.5 million square feet of retail, commercial, office, conference, and research and development, and campus uses; 500,000 square feet of hotel use; acquisition of a water supply; construction of associated onsite and offsite infrastructure; and a school, open space, and parks and trails within the Specific Plan Area. The Project also includes offsite improvements consisting of the relocation of Brisbane’s existing fire station from its current location at 3445 Bayshore Boulevard to 140 Valley Drive and acquisition of a water supply. The 684.3-acre Specific Plan site and the offsite improvement areas are analyzed in this report as the Project Area. The Project Area is shown on the U.S. Geological Survey (USGS) South San Francisco, California 7.5-minute topographic quadrangle (**Figures 1 and 2**) (USGS 1981). The Specific Plan is required to comply with the California Environmental Quality Act (CEQA), as amended. The City of Brisbane (City) is the lead agency for CEQA.

Russell Shapiro, PhD completed this report with support from Ashleigh Sims, MA, RPA. Sara Dietler, BA reviewed this report. Jaelyn Anderson provided GIS support.

1.1 Project Location and Description

The Project Area and the City of Brisbane lie within the nine-county San Francisco Bay area region in the northeastern corner of San Mateo County, immediately south of the City and County of San Francisco (see Figure 1). Municipalities adjoining Brisbane include San Francisco to the north, Daly City and an unincorporated portion of San Mateo County to the west, and South San Francisco to the south.

The Project Area is bounded on the east by United States Route 101 (U.S. 101) and on the west and south by Bayshore Boulevard (see Figure 2). The Project Area’s northern boundary is generally formed by the San Francisco County line and the portion of the existing Recology waste management facilities that is within the City of Brisbane. In addition to the 684.3-acre Specific Plan Area, offsite improvements include the installation of waterlines through Bayshore Boulevard and Guadalupe Canyon Drive¹ and relocation of the City’s existing fire station.

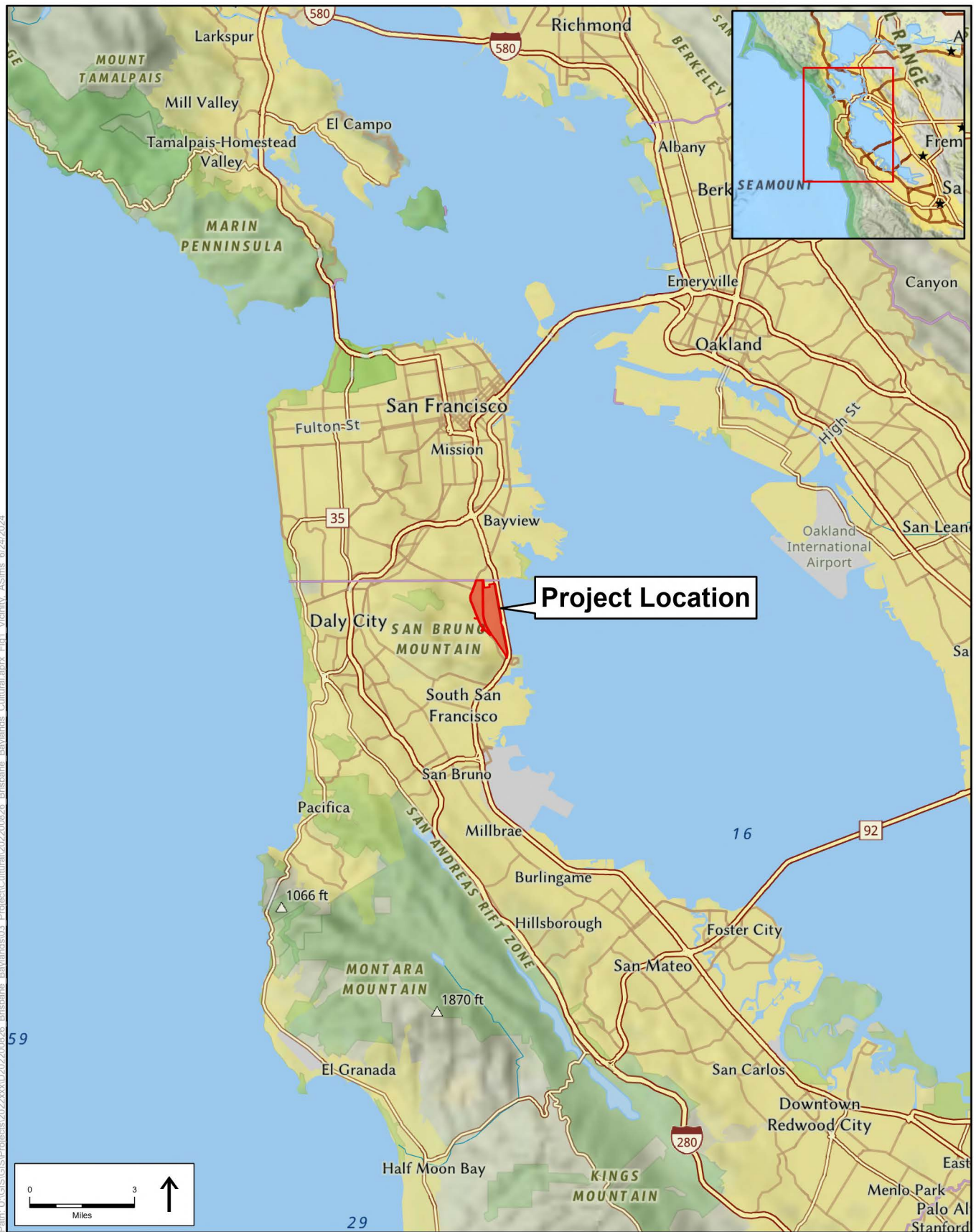
¹ Pipe #1: 16-inch diameter, Bayshore Boulevard, from Old County Road to Main Street (~6,200 feet). Pipe #2: 12-inch diameter, Bayshore Boulevard, from Main Street to Sunnydale, (~3,400 feet). Pipe #3: 12-inch diameter, Guadalupe Canyon Parkway from North Hill Drive to Bayshore Boulevard (~400 feet).

The applicant, Sunquest Properties Inc. (Sunquest) and its development manager, Baylands Development Inc. (BDI), collectively referred to as the “applicant,” are proposing development of 2,200 dwelling units, 6.5 million square feet of commercial office development, and an additional 500,000 square feet of hotel use; acquisition of a water supply; and construction of associated onsite and offsite infrastructure. To accomplish this development, the applicant is requesting approval of a General Plan Amendment and the Baylands Specific Plan.

Currently, the Project Area is split between the Baylands and Beatty General Plan Subareas. An amendment to the Brisbane General Plan is proposed to modify the General Plan land use map to include the entirety of the Baylands Specific Plan within the Bayland Subarea. The land use designation for the portion of the Baylands Specific Plan currently within the Beatty Subarea would be modified from Heavy Commercial to Baylands Planned Development, Residential Prohibited. In addition, the Brisbane General Plan Circulation Element is proposed to be amended to realign Lagoon Road to directly access the southbound U.S. 101 freeway ramps at Sierra Point Parkway and extend Sierra Point Parkway from its current terminus at the southbound U.S. 101 freeway ramps north to Geneva Avenue.

1.2 Project Area

For this study, the *Project Area* is defined as the maximum extent, both horizontally and vertically, of both direct and indirect potential impacts resulting from the Specific Plan and the offsite improvements. The Project Area encompasses the Specific Plan footprint, including areas of new construction and operations-related activities (e.g., construction staging areas) associated with the Specific Plan. The vertical extent of the Project Area consists of the maximum depth of ground disturbance proposed by the Specific Plan. Because detailed Specific Plan design is still underway, exact depths of ground disturbance have not been determined. However, the majority of ground disturbance will be fairly shallow (less than 15 feet below the existing ground surface) for the preparation of building pads, foundations, and utility trenching. This work will all be done in soil and will not impact rock formations. The only Project activity anticipated to impact rock formations is installation of pile foundations to support larger buildings. No other Project activities are anticipated to impact rock formations. The Project Area is depicted in **Figure 3**.

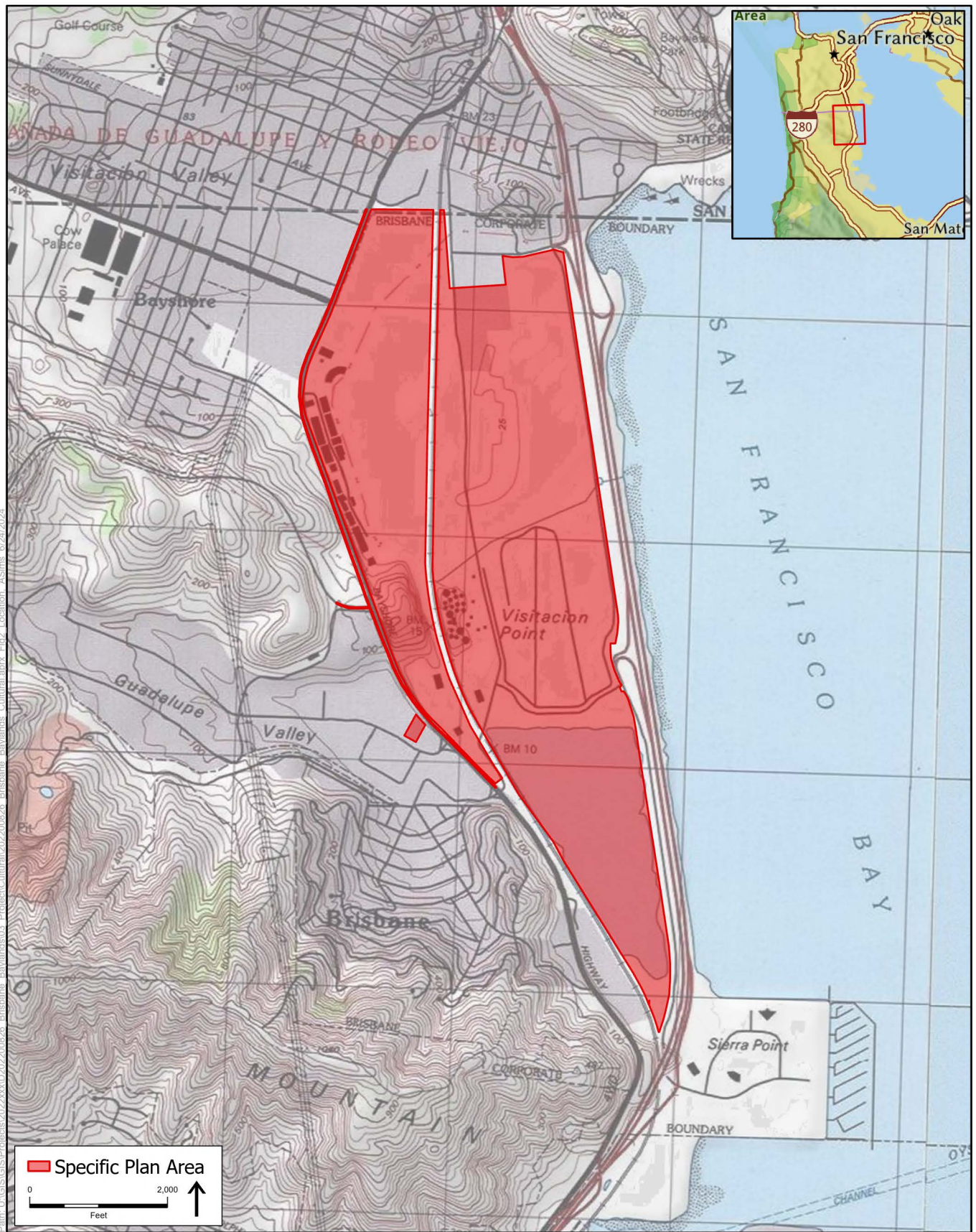


SOURCE: ESA, 2024; ESRI, 2024

D202200826. Baylands Specific Plan

Figure 1
Project Vicinity





SOURCE: ESA, 2024; USGS 7.5' Topographic Quadrangle (San Francisco South, CA)

D202200826. Baylands Specific Plan

Figure 2
Project Location



SOURCE: ESA, 2024; ESRI, 2024

D202200826. Baylands Specific Plan

Figure 3
Project Area



SOURCE: ESA, 2024; ESRI, 2024

D202200826. Baylands Specific Plan

Figure 3
Project Area

CHAPTER 2

Regulatory Framework

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value that are afforded protection under state laws and regulations. This section summarizes the applicable state laws and regulations, as well as professional standards provided by the Society of Vertebrate Paleontology (SVP 2010).

2.1 State Regulations

2.1.1 California Environmental Quality Act

The CEQA Guidelines (California Code of Regulations Title 14, Chapter 3, Section 15000 et seq.) are prescribed by the Secretary of Resources to be followed by state and local agencies in California in their implementation of CEQA. CEQA Guidelines Appendix G includes an Environmental Checklist with questions that may be used by public agencies in their assessment of impacts on the environment. The question within Appendix G that relates to paleontological resources asks: “Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” Fresno County uses this question as its threshold of significance for determining whether impacts of paleontological resources are significant. CEQA protects paleontological resources by requiring an assessment of a project’s potential paleontological impacts.

2.1.2 Public Resources Code Sections 5097.5 and 30244

Other state requirements for paleontological resource management are included in Public Resources Code Sections 5097.5 and 30244. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, district) lands.

2.2 Society for Vertebrate Paleontology

The SVP has established standard guidelines (SVP 1995, 2010) that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional vertebrate paleontologists adhere closely to the SVP’s assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological resource-

specific laws, ordinances, regulations, and standards accept and use the professional standards set forth by the SVP.

As defined by the SVP (1995:26), significant nonrenewable paleontological resources are:

Fossils and fossiliferous deposits here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate or paleobotanical fossils except when present within a given vertebrate assemblage. Certain invertebrate and plant fossils may be defined as significant by a project paleontologist, local paleontologist, specialists, or special interest groups, or by lead agencies or local governments.

As defined by the SVP (1995:26), a significant fossiliferous deposit is:

A rock unit or formation which contains significant nonrenewable paleontologic resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces, and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways, or nests and middens which provide datable material and climatic information). Paleontologic resources are considered to be older than recorded history and/or older than 5,000 years BP [before present].

Based on the significance definitions of the SVP (1995), all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate fossils are relatively uncommon, and only rarely will a fossil locality yield a statistically significant number of specimens of the same genus. Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment, and/or its distribution. Furthermore, all geologic units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by Project paleontologists, specialists, or local government agencies.

A geologic unit known to contain significant fossils is considered to be “sensitive” to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either directly or indirectly disturb or destroy fossil remains. Paleontological sites indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case (SVP 1995).

Fossils are contained within surficial sediments or bedrock and are therefore not observable or detectable unless exposed by erosion or human activity. Without natural erosion or human-caused exposure, paleontologists cannot know either the quality or quantity of fossils. As a result, even in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce significant fossils elsewhere within the same geologic unit (both

within and outside of the study area), a similar geologic unit, or based on whether the unit in question was deposited in a type of environment that is known to be favorable for fossil preservation.

2.2.1 Paleontological Sensitivity

Paleontological sensitivity is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its “Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontologic Resources,” the SVP (2010:1-2) defines four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential:

- **High Potential.** Rock 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. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcanoclastic formations (e. g., ashes or tephra), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.).
- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
- **Undetermined Potential.** Rock 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 rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
- **No Potential.** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

For geologic units with high potential, full-time monitoring is generally recommended during any Plan-related ground disturbance. For geologic units with low potential, protection or salvage efforts will not generally be required. For geologic units with undetermined potential, field surveys by a qualified vertebrate paleontologist should be conducted to specifically determine the paleontological potential of the rock units present within the study area.

2.2.2 Paleontological Resources Significance Criteria

Numerous paleontological studies have developed criteria for the assessment of significance for fossil discoveries (e.g., Eisentraut and Cooper 2002; Murphey and Daitch 2007; Scott and Springer 2003). In general, these studies assess fossils as significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

In summary, significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically important (Eisentraut and Cooper 2002; Murphey and Daitch 2007; Scott and Springer 2003). Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy. Assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, and paleoclimatology are also critically important (Scott and Springer 2003; Scott et al. 2004).

CHAPTER 3

Methods and Results

The Project Area was the subject of thorough background research and analysis to assess its paleontological sensitivity. The research included geologic map and literature reviews conducted by ESA Principal Paleontologist, Russell Shapiro, PhD.

3.1 Geologic Setting

San Francisco lies within an active tectonic zone, bound on the west by the main San Andreas Fault and on the east by the subparallel Hayward and Calaveras Faults. These faults have moved major blocks of geological terrane² along the coast while also forcing mountains to rise and basins to fall. The steep hills of San Francisco are remains of resistant bedrock of Jurassic to Cretaceous age that formed within a subduction zone offshore of North America. This complex mélange of sediments, volcanics, and metamorphic rocks is referred to as the “Franciscan Formation.” The uplift associated with bends and shifts in the faults throughout the San Francisco Bay not only exposed the metamorphosed Franciscan bedrock but younger marine sediments as well, such as the Merced Formation of Pliocene age. Overlying all these units are surficial deposits typically of erosion near a coast such as alluvium, marine terrace deposits, and beach sands. Additionally, because the basin to the east of the Franciscan headlands was dropped below sea level (San Francisco Bay proper), there are abundant deposits of bay mud and tidal sands. It is important to note that an urban area like San Francisco also has appreciable quantities of artificial fill, rising to the level of a geological unit. Specifically, many tracks of the shallow San Francisco Bay were turned into land by significant amounts of artificial fill. The Specific Plan is generally proposed upon such an artificial landscape (**Figure 4**).

3.2 Geologic Map and Literature Review

The Project Area lies mostly on artificial fill (Qaf) overlying bay muds (Qm), including historical fill deposits of debris following the 1906 earthquake (Bonilla 1965, 1998). Thus, the region north of Icehouse Hill is not a natural feature of the San Francisco Bay region. The closest outcrops, to the north, are tectonized slivers of Franciscan Formation chert, metasediments, and greenstone (KJc, KJs, and KJg). To the southwest, the Specific Plan partially intersects bedrock of sandstone and shale of the Franciscan Formation (Bonilla 1998) (KJsk). In addition to the artificial fill and young bay muds, Bonilla (1998) also defines older (Pleistocene) slope and ravine deposits (Qsr) and the Specific Plan crosses these units in the southwest. A review of the geotechnical reports prepared by Geosyntec in 2021 shows that no bedrock was encountered in any borehole to depths

² Terrane is a fault-bounded area or region with a distinctive stratigraphy, structure, and geological history.

Figure 4 Geology

of approximately 30 feet below ground surface (bgs). The artificial fill overlies bay mud to a depth of approximately 3 to 13 feet bgs (Geosyntec 2021a, 2021b). Geotechnical bores did not extend below these deposits, but Geosyntec anticipated that the Pleistocene aged Colma Formation sand (with some silt and clay) underlies the young bay muds and is approximately 30 feet thick. The Pliocene-Pleistocene aged Merced Formation sandstone and secondary siltstone potentially underlies the Project Area, with Franciscan bedrock at a depth of 50 to 60 feet below ground surface underneath the above layers (Geosyntec 2021a, 2021b).

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CHAPTER 4

Paleontological Sensitivity Analysis

The units anticipated to be impacted by the Specific Plan range in their paleontological sensitivity. Most of the surface of the Specific Plan impacts artificial fill which, by definition, has no potential for paleontological resources as any fossils found in the fill would be out of geological context. According to the available geotechnical reports, both fine and coarse fill extend from the surface down to approximately 10 feet below ground surface. Bay mud exposed at the surface is too young to host significant fossils. Surface exposures of Franciscan Formation sandstone and shale is unlikely to produce significant paleontological resources due to the paucity of known fossils, the lack of significant vertebrate fossils, and the low-grade of metamorphism. The Specific Plan crosses exposures of Pleistocene slope and ravine alluvium (Qsr) that ranges from silt and clay through gravel (Bonilla 1998). The paleontological potential is unknown for these deposits. Although they are of an age that has a potential for significant Pleistocene vertebrates and contain fine-grained sediments that typically preserve fossils well, the lack of a published record of fossils from such facies makes assignment a challenge.

Deep subsurface excavations (greater than approximately 25 to 30 feet bgs) may impact the Colma and Merced formations. These formations have a well-established record of hosting significant marine and terrestrial vertebrates (Clark and Twitchell 1915; Addicott 1969; Nations 1975; Boessenecker 2018; Rodda and Baghai 1993; Hunter et al. 1984). In addition, a search of the online holdings of the University of California Museum of Paleontology (UCMP; accessed March 2023) yielded a number of terrestrial Pleistocene vertebrates associated with the Colma and Merced formations, including sloths, horses, mammoths, mastodons, and camelids. Marine units of unlisted formation status but are likely to be the Merced formation based on age, yielded over 280 invertebrate fossils. An additional search of the Paleobiological Database (paleodb.org; accessed March 2023) provided a number of critical invertebrate and vertebrate fossils from the Merced Formation in San Mateo County. Based on this evidence, both the Colma and Merced formations are considered of high significance for paleontological resources.

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CHAPTER 5

Conclusions and Recommendations

Surficial and shallow excavations in the Project Area are anticipated to only impact artificial fill and Holocene bay muds and silts and, therefore, do not require mitigation. Similarly, excavations into the Franciscan Formation are not expected to impact significant paleontological resources as it has not demonstrated a sensitivity for significant fossil finds in this area.

The Specific Plan may significantly impact paleontological resources. Deep excavations for deep foundational support may reach the Pleistocene Colma or Pliocene-Pleistocene Merced Formations, which are ranked as having a high potential to host significant paleontological resources. Impacts to paleontological resources within the Pleistocene Colma or Pliocene-Pleistocene Merced Formations would be considered a significant impact due to their potential for impacting paleontological resources. However, the only deep excavations within these formations would be pile installation, which would render any potentially valuable specimens irretrievable due to the type of construction activity. Therefore, pile installation does not require mitigation. While not likely, there is the potential for paleontological resources to be identified during ground disturbing for other construction activities within the Pleistocene Colma or Pliocene-Pleistocene Merced Formations. Implementation of **MM-GEO-1, Paleontological Resources Awareness Training**, would **reduce potential impacts** to paleontological resources to a less-than-significant level by requiring training of construction personnel in paleontological resource identification and requiring a qualified paleontologist to be retained in the event that paleontological resources are identified in order to address any potential inadvertent discoveries. While highly unlikely that paleontological resources would be found in the landfill or disturbed portions of the Project Area because awareness training is required for construction personnel who are involved in ground disturbance in undisturbed areas of the Project Area, and consistent with standard industry practice, awareness training is proposed for all construction personnel for ease of mitigation measure implementation.

5.1 Paleontological Resource Mitigation Measures

MM-GEO-1: Paleontological Resources Awareness Training. Prior to the start of any ground disturbing activities, the Qualified Paleontologist, or a paleontological specialist under the supervision of the Qualified Paleontologist, shall conduct pre-construction worker paleontological resources sensitivity training. The Qualified Paleontologist, or a paleontological monitor under the supervision of the Qualified Paleontologist, shall contribute to any construction worker paleontological resources sensitivity training either in person or via a training module. The training shall include information on what types of paleontological resources could be encountered during excavations, what to do in case an unanticipated discovery is made by a worker, and laws protecting paleontological

resources. All construction personnel shall be informed of the possibility of encountering fossils and instructed to immediately inform the construction foreman or supervisor if any bones or other potential fossils are unexpectedly unearthed in an area where a paleontological monitor is not present. The Applicant shall ensure that construction personnel are made available for and attend the training and retain documentation demonstrating attendance.

MM-GEO-2: Inadvertent Discovery of Paleontological Resources. If a paleontological resource is discovered during construction, the paleontological monitor shall be empowered to temporarily divert or redirect grading and excavation activities in the area of the exposed resource to facilitate evaluation of the discovery. An appropriate buffer area shall be established by the Qualified Paleontologist around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. At the Qualified Paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing and evaluation of the find. All significant fossils shall be collected by the paleontological monitor and/or the Qualified Paleontologist. Collected fossils shall be prepared to the point of identification and catalogued before they are submitted to their final repository. Any fossils collected shall be curated at a public, non-profit institution with a research interest in the materials, such as the UCMP, if such an institution agrees to accept the fossils. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, photographs, and a technical report shall also be filed at the repository and/or school.

CHAPTER 6

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