Fort Ord Regional Trail and Greenway (FORTAG) Project

Paleontological Resources Assessment

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Executive Summary

Rincon Consultants, Inc. (Rincon) was retained by the Transportation Agency for Monterey County (TAMC) to conduct a paleontological resource assessment for the Fort Ord Regional Trail and Greenway Project ("FORTAG" or "Trail"), which includes a 28-mile multi-use trail in the County of Monterey. This study has been prepared in conformance with the California Environmental Quality Act (CEQA) and includes a records search, literature review, and paleontological sensitivity assessment consistent with the professional standards of the Society of Vertebrate Paleontology (SVP 2010). The purpose of the literature review and records search was to identify the geologic unit(s) underlying the project and to determine whether previously recorded paleontological localities occur either within the project boundaries or elsewhere in the same geologic unit(s). Using the results of the literature review and records search, the paleontological resource potential of the project corridor was determined in accordance with the 2010 SVP guidelines.

Results of Investigation

Published geologic mapping indicates that the project is underlain by older Quaternary (Pleistocene) dune sand (Qod), the Aromas Sand (Qae), and younger Quaternary (Holocene) alluvium and basin deposits (Q, Qb). A records search for paleontological locality data within the project and the vicinity indicates no vertebrate fossil localities have been previously recorded directly in the project boundary; however, multiple vertebrate fossil localities have been previously recorded nearby within deposits of older Quaternary aeolian deposits and the Monterey Formation (McLeod 2019; UCMP 2019). These localities yielded scientifically significant fossilized specimens of large terrestrial and marine mammals and reptiles. Based on this assessment, the surficial geology of the project corridor has a low paleontological sensitivity but increases with depth. Particularly, the geologic deposits of Pleistocene age immediately underlying the project (i.e., Qod, Qae) have a high potential to contain paleontological resources at moderate depth. As currently proposed, the majority of project ground disturbance would not exceed 12 inches below ground surface for the project corridor. Such minimal ground disturbance (i.e., shallow excavations) within intact (native) deposits would not likely cause significant impacts to paleontological resources. However, ground disturbing activities for the proposed overcrossings (i.e., bridges) and undercrossings (i.e., tunnels) along the Northern Loop, Canyon Del Rey/SR 218, and CSUMB Loop North segments would require extensive excavations within intact Pleistocene deposits underlying the project corridor, which could potentially result in significant impacts to paleontological resources.

Recommendations

Rincon recommends that a qualified paleontologist be retained to develop and implement a Paleontological Resources Mitigation Plan during project construction in areas of high paleontological sensitivity, including areas requiring extensive excavations (i.e., proposed overcrossings and undercrossings along the Northern Loop, Canyon Del Rey/SR 218, and CSUMB Loop North segments). This plan would include mitigation measures that have been proven to be effective in reducing or eliminating adverse impacts to paleontological resources and would satisfy the requirements of CEQA. The recommended mitigation measures include paleontological monitoring by a qualified paleontologist and preparation of a paleontological monitoring report, which should be submitted to the approved curation facility, accompanied by all significant fossils recovered during construction monitoring.

1 Introduction

Paleontological resources (i.e., fossils) are the remains or traces of prehistoric life. Fossils are typically preserved in layered sedimentary rocks and the distribution of fossils across the landscape is controlled by the distribution and exposure of the fossiliferous sedimentary rock units at and near the surface. Construction related impacts that typically affect or have the potential to affect paleontological resources include mass excavation operations, trenching/tunneling, and grading.

This Paleontological Resources Assessment provides a description of the geologic units mapped at the surface within the project corridor, including types of fossils known to occur within the units (if any), the paleontological sensitivity for each unit, a review of relevant agency regulation, an assessment of potential impacts from project development, and recommended mitigation measures for the protection and recovery of significant fossils that may be impacted. This study has also been conducted in accordance with the requirements of the California Environmental Quality Act (CEQA).

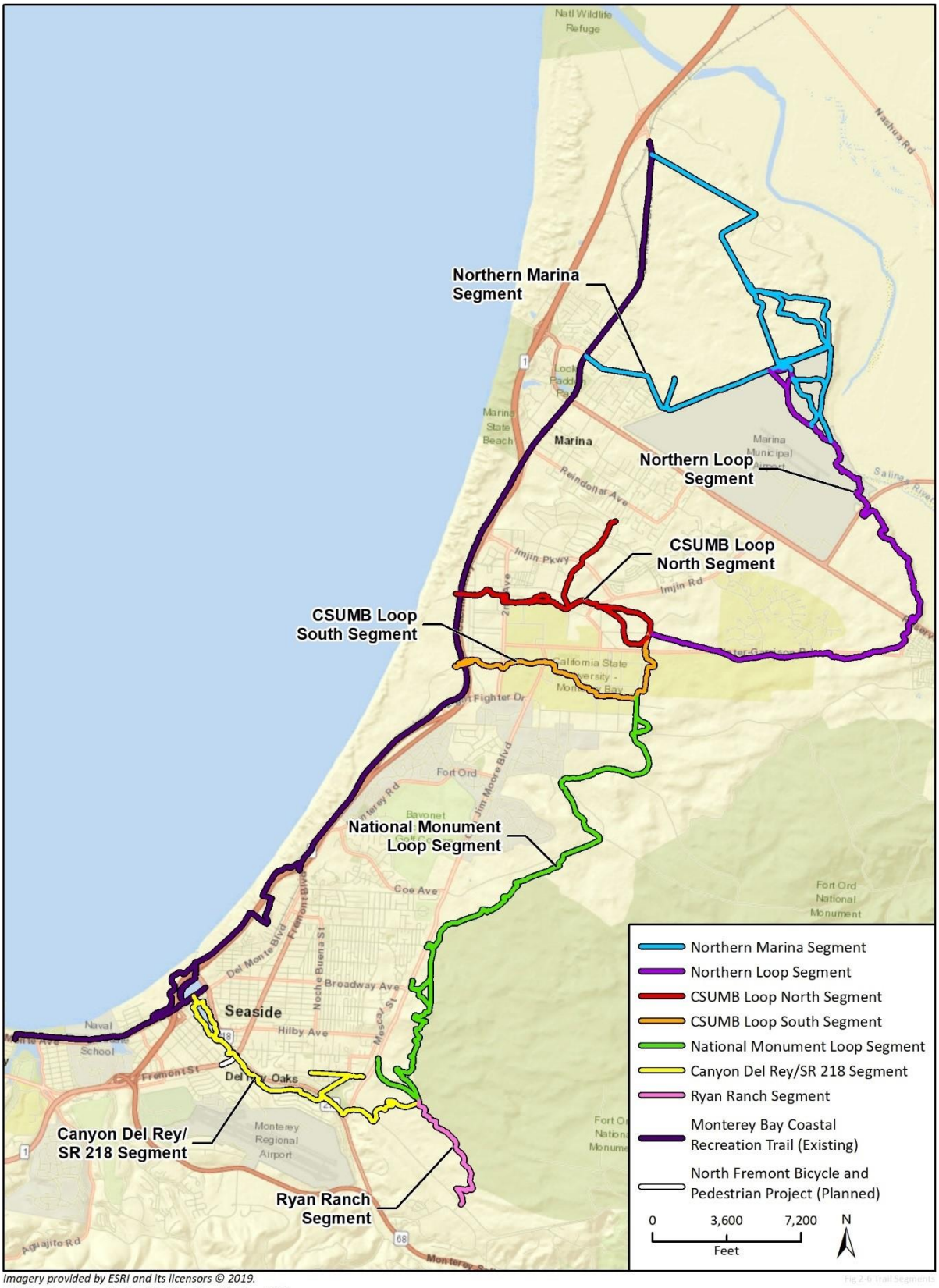
1.1 Project Location and Description

The Fort Ord Regional Trail and Greenway Project ("FORTAG" or "Trail") alignment is located in the southern Monterey Bay area in Monterey County (Figure 1). The project corridor includes seven multi-use trail segments and crosses the cities of Marina, Seaside, Del Rey Oaks, Monterey, unincorporated areas of Monterey County, and lands, properties, and rights-of-way under the jurisdiction of California State University Monterey Bay (CSUMB), Fort Ord Reuse Authority (FORA), California Department of Transportation (Caltrans), and Monterey Peninsula Regional Park District (**Error! Reference source not found.**). The trail would connect with the existing Monterey Bay Coastal Recreation Trail (Coastal Rec Trail) just west of State Route (SR) 1, and would extend through developed areas and across former Fort Ord lands to the east.

FORTAG includes approximately 28 miles of existing and newly constructed paved trails, primarily on the inland side of SR 1. The trail would accommodate pedestrians and bicyclists of all abilities. It would also accommodate equestrians in some segments. Dogs would be allowed on-leash throughout the system. The estimated number of trail users would be between 1,000 and 3,000 daily, with the highest usage occurring near the CSUMB campus and the Coastal Rec Trail (Powell 2019).

The majority of FORTAG would be a 12-foot-wide paved path, with a two-foot-wide unpaved shoulder on both sides. Project ground disturbance would not exceed 12 inches below ground surface. For approximately 1.3 miles of the Trail's 28-mile length (4.6 percent), FORTAG would include an adjacent four- to eight-foot wide side path, separated from the paved path. The side path would be composed of compacted native soil and separated from the paved path by a minimum of four feet. A small portion of the trail (approximately 2,000 feet or one percent) would be developed on existing paved roadways in two locations: in Del Rey Oaks on Angelus Way, between Rosita Road and Del Rey Gardens; and in Marina on Beach Road, between Del Monte Boulevard and De Forest Road. In these areas, the project would primarily involve restriping, sidewalk improvements, and the installation of an unpaved buffer adjacent to the trail. In the Frog Pond Wetland Preserve in Del Rey Oaks, the proposed trail width would be reduced to eight feet, and a stable, permeable surface would be used in lieu of impermeable pavement, due to the sensitive natural resources in the area. No buildings or structures are proposed to be demolished or altered as part of the project.

Figure 1 Proposed Alignment (Including Options)



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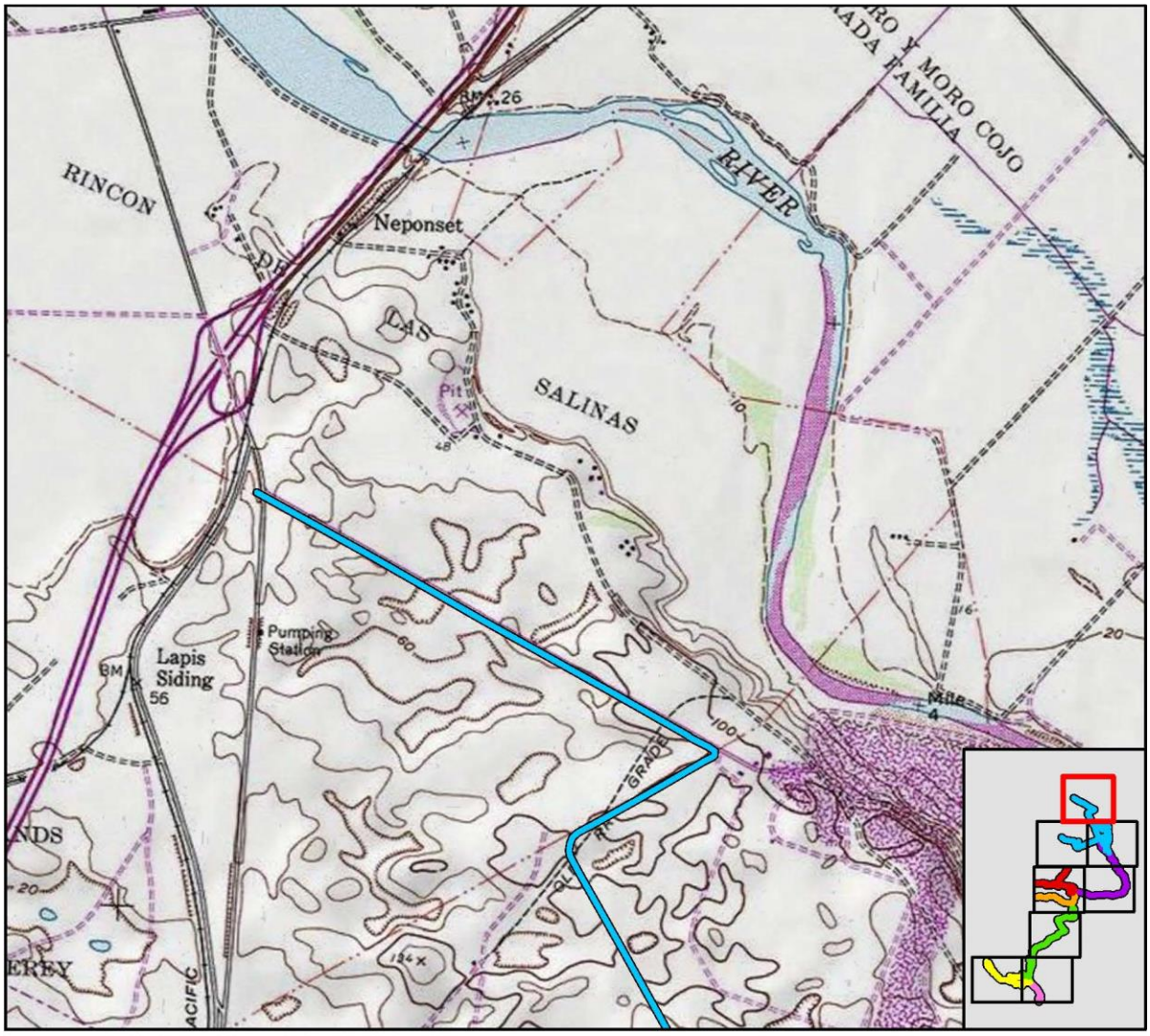
Additional data provided by Alta Planning + Design, 2019.

Figure 2a Project Alignment



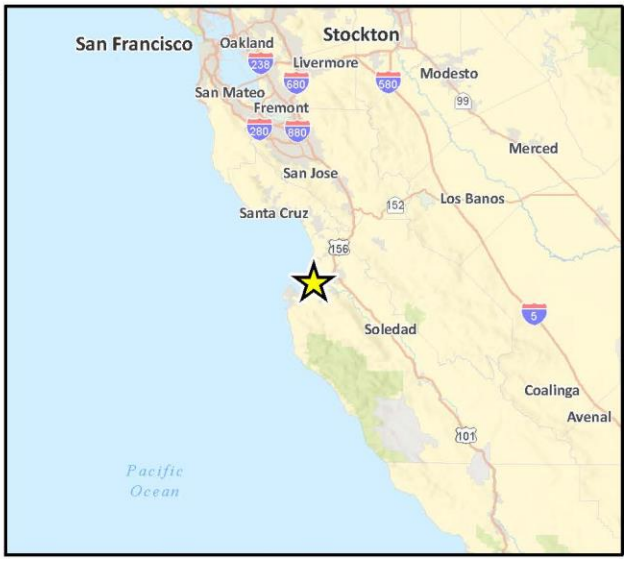


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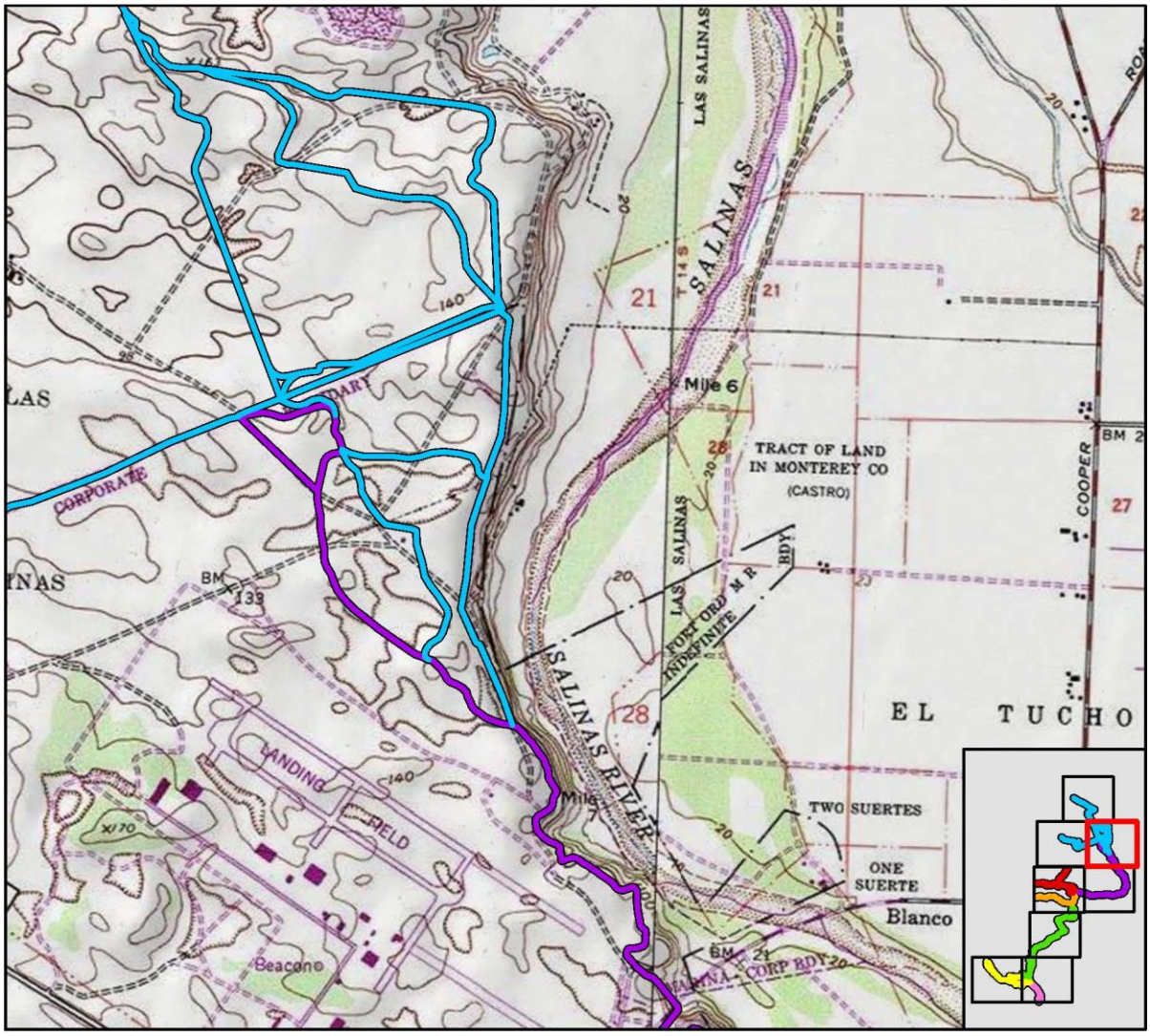
Figure 2b Project Alignment



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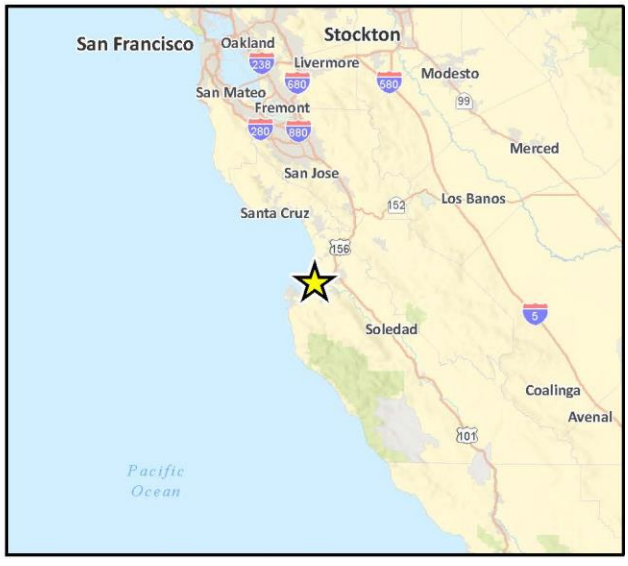
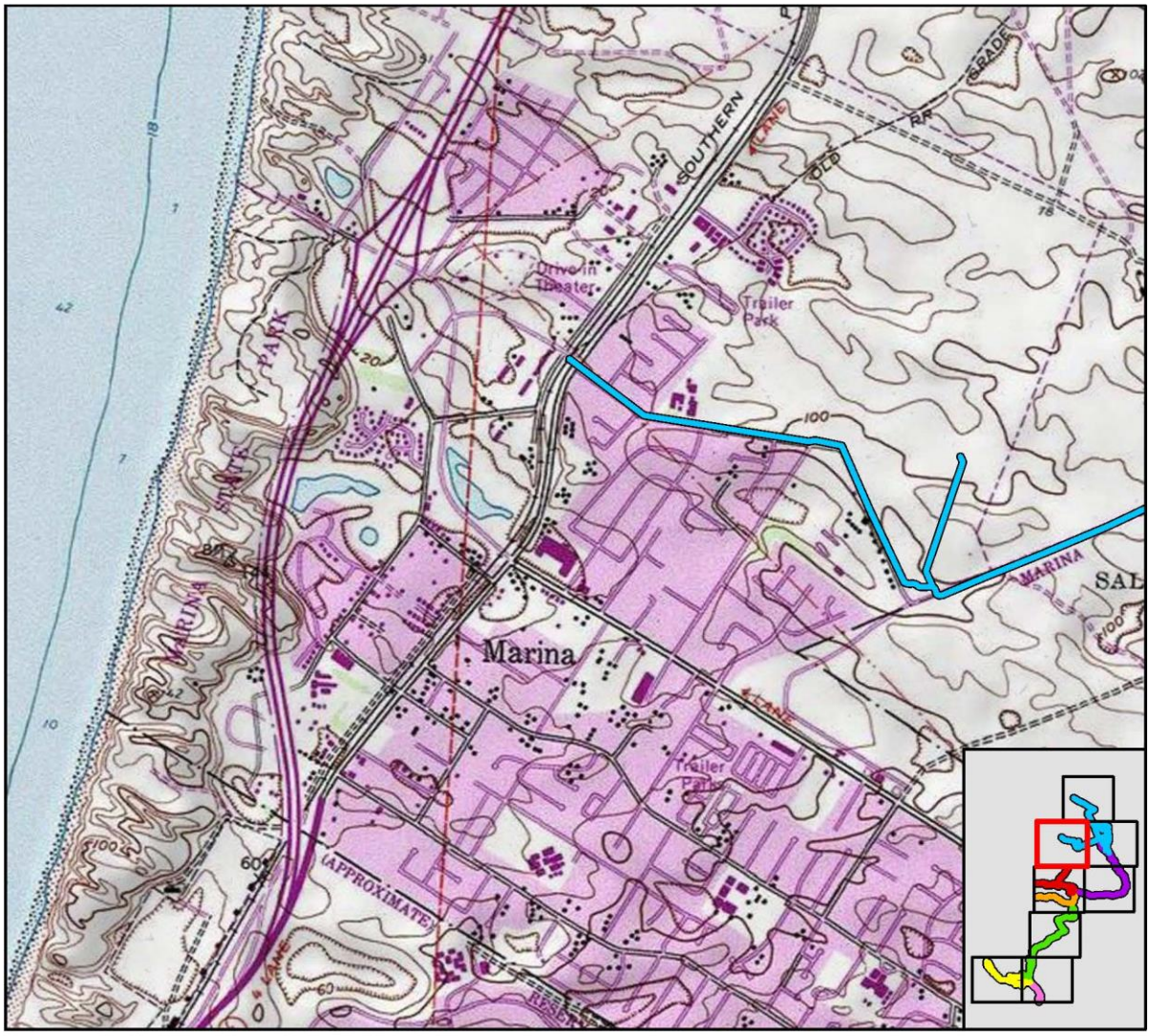


Figure 2c Project Alignment



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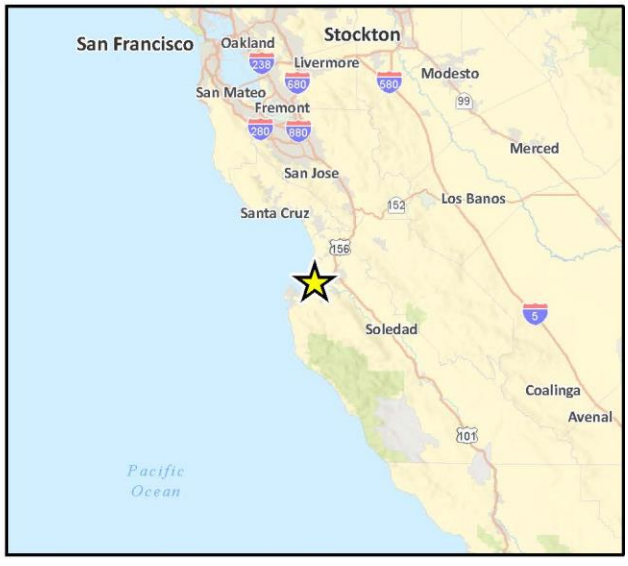
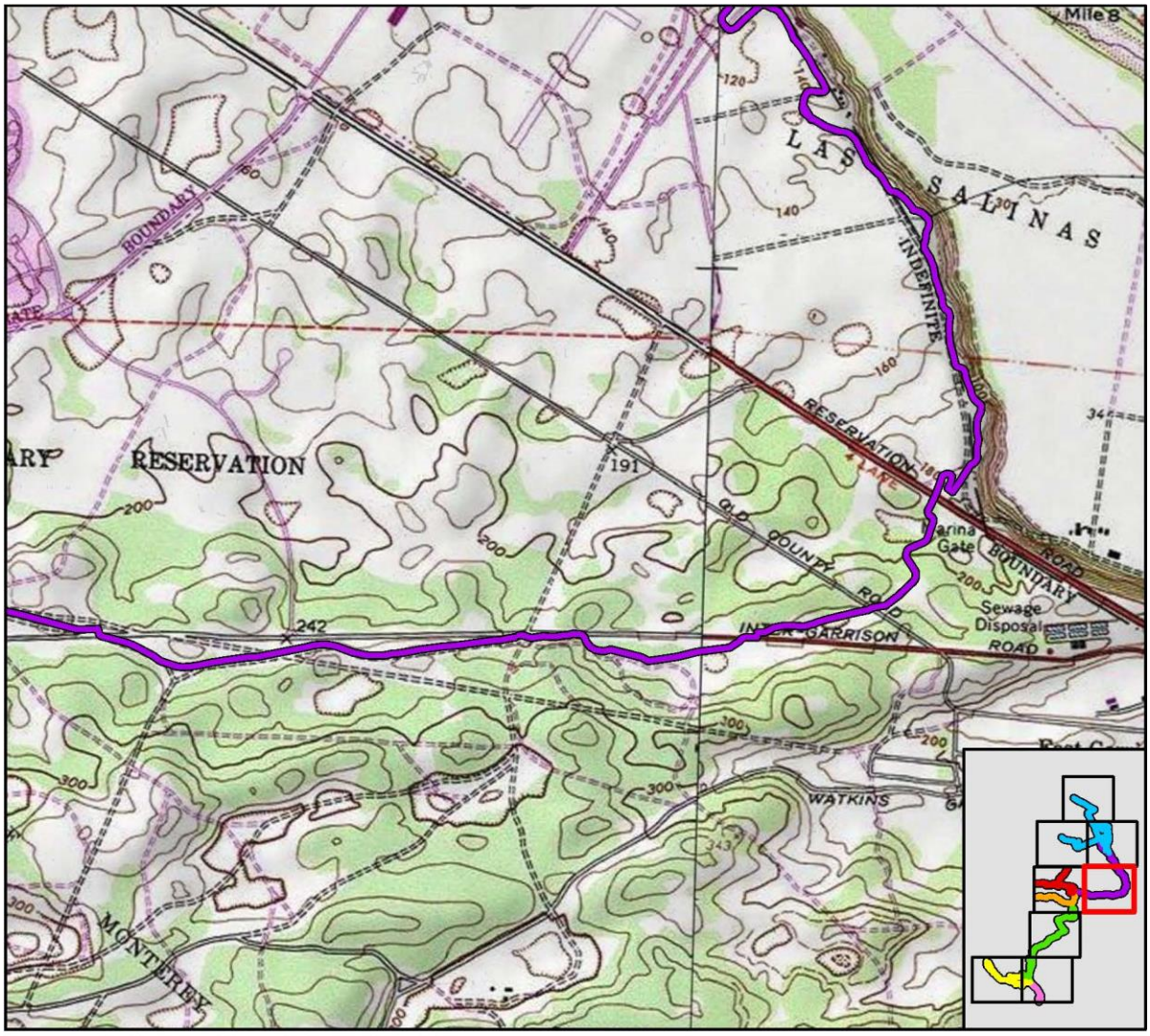


Northern Marina Segment

0 1,000 2,000 Feet

N

Figure 2d Project Alignment



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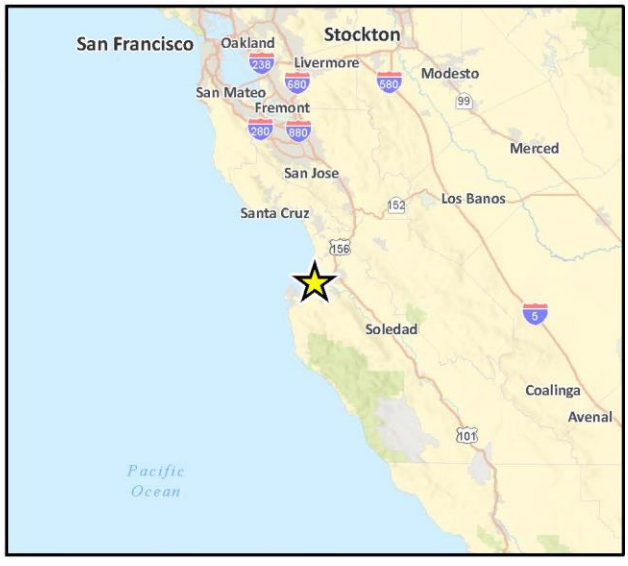
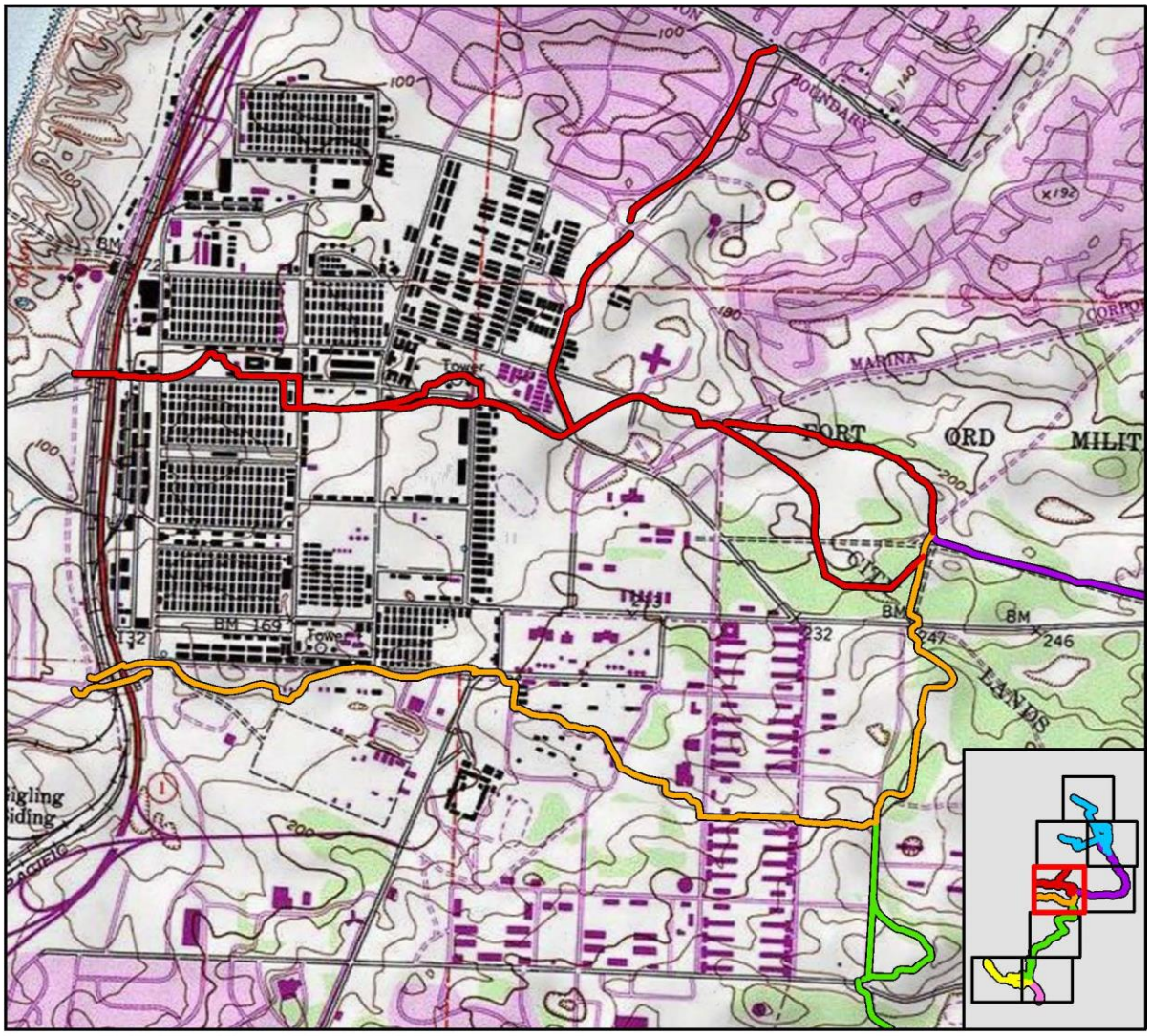


Northern Loop Segment

0 1,000 2,000 Feet

N

Figure 2e Project Alignment



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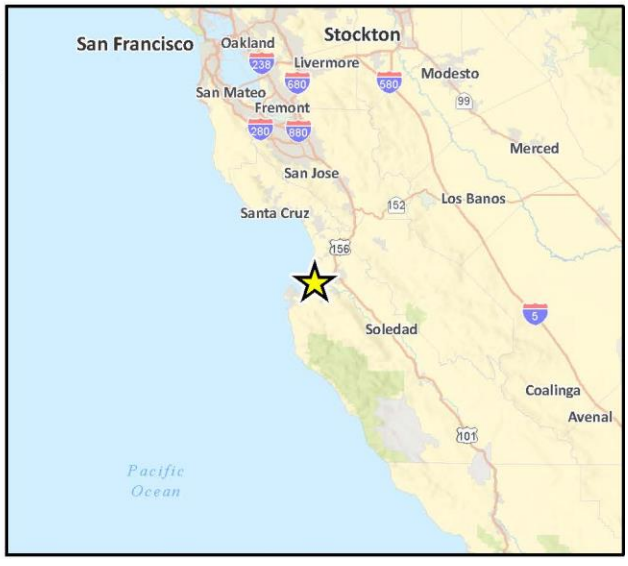
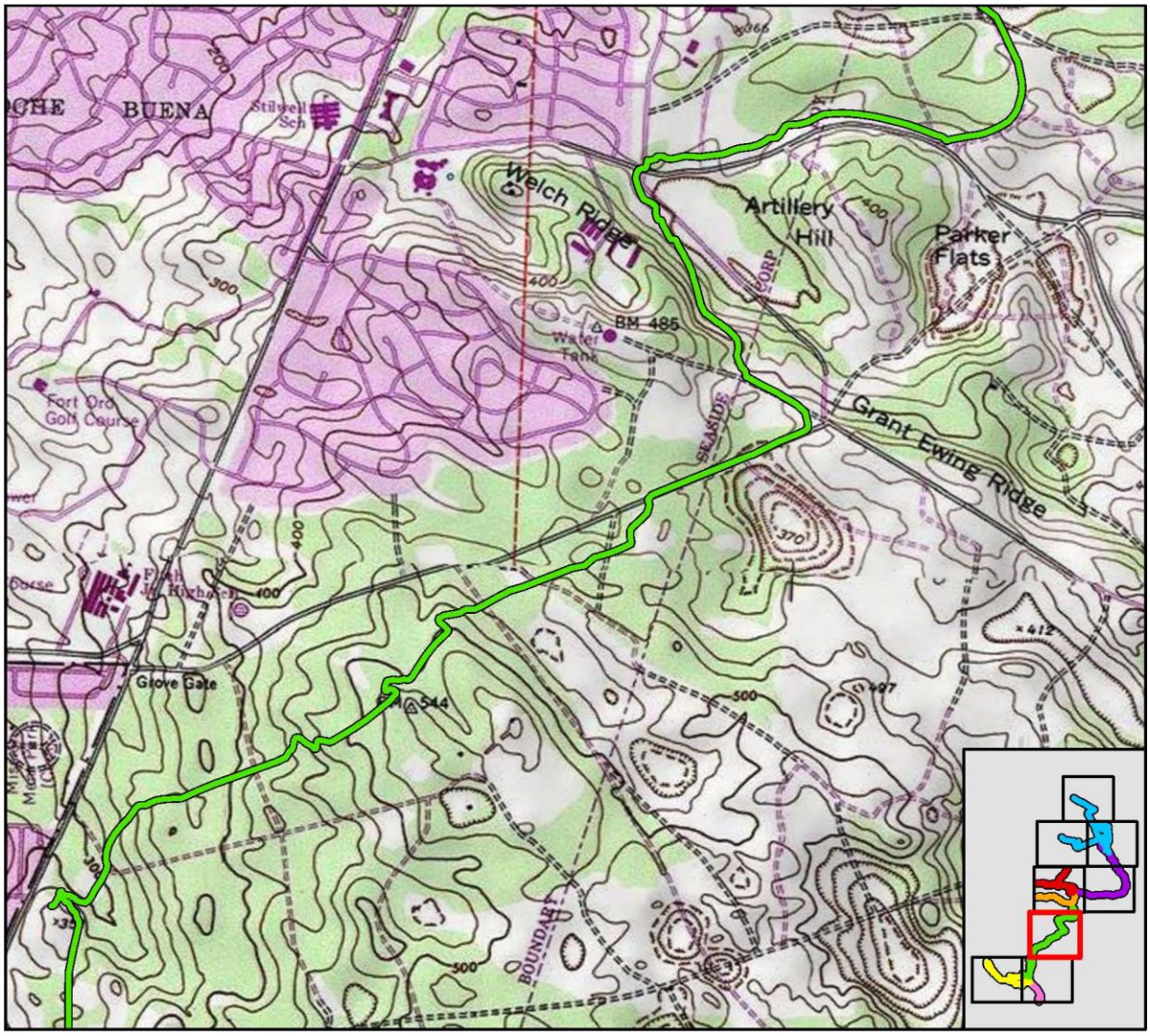


Figure 2f Project Alignment



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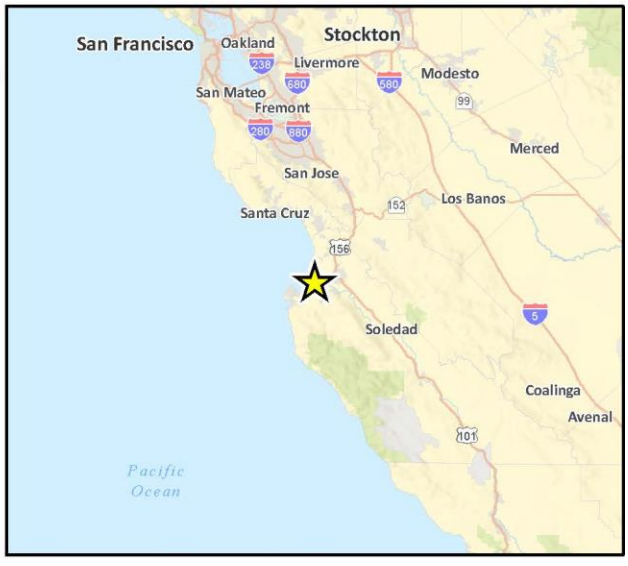
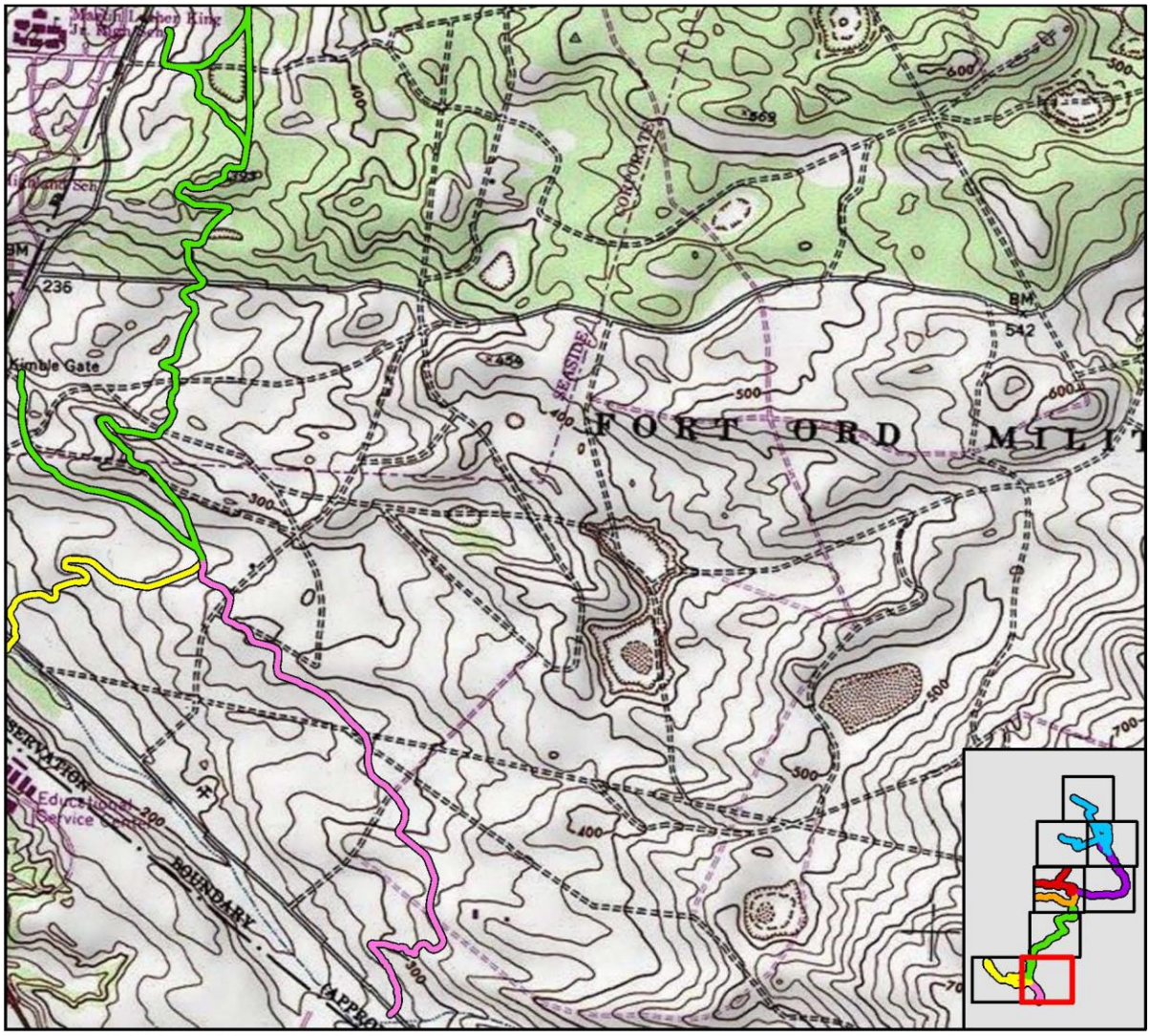


National Monument Loop Segment

0 1,000 2,000 Feet

N

Figure 2g Project Alignment



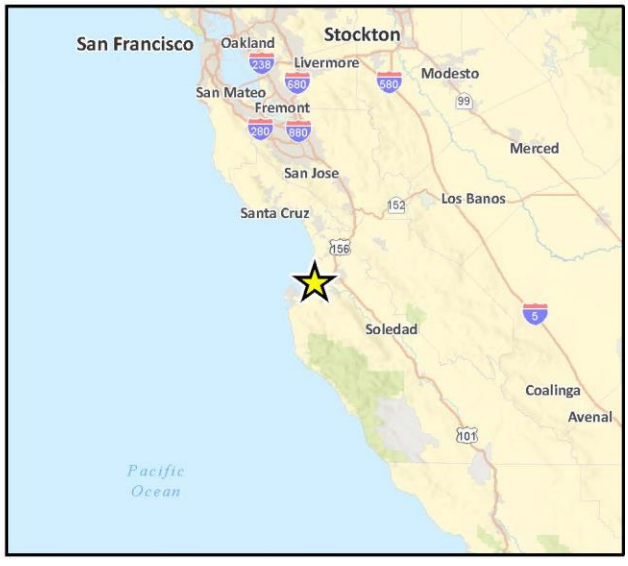


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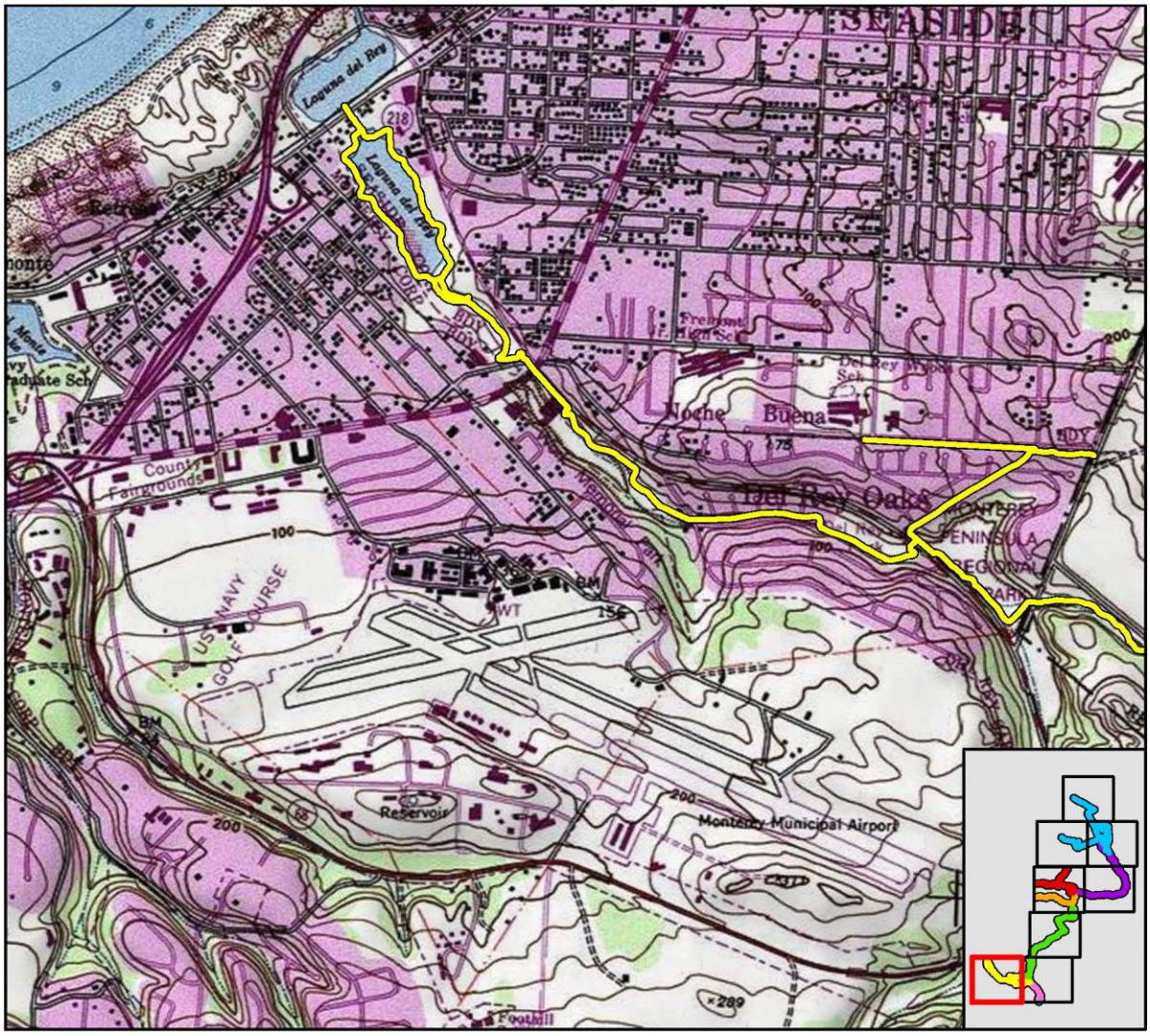
Figure 2h Project Alignment



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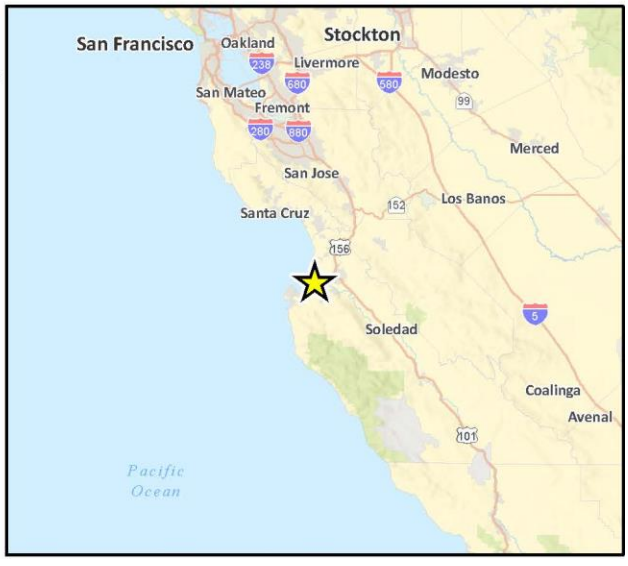

Canyon Del Rey/SR 218 Segment

0 1,000 2,000 Feet

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2 Regulatory Setting

Paleontological resources are considered nonrenewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under various federal, state, and local laws, ordinances, regulations, and standards. Regulations applicable to potential paleontological resources along the project corridor are summarized below.

2.1 State

2.1.1 California Environmental Quality Act

CEQA requires public agencies and private interests to identify the potential environmental consequences of their proposed projects on any object or site considered to be a historical resource of California (California Public Resources Code [PRC], section 21084.1, California Code of Regulations Title 14, section 15064.5). Appendix G of the *State CEQA Guidelines* (California Code of Regulations Title 14, Chapter 3) provides an Environmental Checklist of questions including a single question related to paleontological resources (Section VII.f) as follows: "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

CEQA does not define "a unique paleontological resource or site." However, the Society of Vertebrate Paleontology (SVP) has defined a "significant paleontological resource" in the context of environmental review. The SVP defines a Significant Paleontological Resource as:

> Fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. 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) [p. 11] (SVP 2010).

The loss of significant paleontological resources would be a significant impact under CEQA. The CEQA lead agency is responsible for ensuring that paleontological resources are protected in compliance with CEQA and other applicable statutes.

2.1.2 California Public Resources Code

Section 5097.5 of the Public Resources Code states:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

Here "public lands" means those owned by, or under the jurisdiction of, the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with Public Resources Code Section 5097.5 for their own activities, including construction and maintenance, and for permit actions (e.g., encroachment permits) undertaken by others.

2.2 Local

2.2.1 City of Seaside

2004 Seaside General Plan

The City of Seaside addresses Paleontological Resources within the *Conservation and Open Space Element* of the currently adopted City of Seaside General Plan. In areas of known paleontological resources, the Community Development and Planning departments would be responsible to address the preservation of these resources when feasible. The *Conservation and Open Space Element* of the City of Seaside General Plan contains the following policy and implementation plans relating to paleontological resources that are relevant and/or applicable to the current Project:

Policy COS-5.1. Identify and conserve archeological, architectural, and historic resources within Seaside.

Implementation Plan COS-5.1.1 Assess and Mitigate Impacts to Cultural Resources. Continue to assess development proposals for potential impacts to sensitive historic, archaeological, and paleontological resources pursuant to the California Environmental Quality Act (CEQA).

Implementation Plan COS-5.1.1b. Assess development proposals for potential impacts to significant paleontological resources pursuant to of the California Environmental Quality Act Guidelines. If the project involves earthworks, the City may require a study conducted by a professional paleontologist to determine if paleontological assets are present, and if the project will significantly impact the resources. If significant impacts are identified, the City may require the project to be modified to avoid impacting the paleontological materials, or require mitigation measures to mitigate the impacts.

Draft Seaside 2040

Draft Seaside 2040, currently available for public review, briefly mentions Paleontological Resources in *Chapter 7: Parks, Open Space, and Conservation*; however, goals or policies regarding the protection of these resources are not provided.

2.2.2 City of Monterey

The City of Monterey does not specifically address paleontological resources in the Monterey General Plan.

2.2.3 City of Marina

The City of Marina does not specifically address paleontological resources in the Marina General Plan.

2.2.4 City of Del Rey Oaks

The City of Del Rey Oaks does not specifically address paleontological resources in the Del Rey Oaks General Plan.

2.2.5 Fort Ord Reuse Authority

The Fort Ord Reuse Authority does not specifically address paleontological resources in the Fort Ord Base Reuse Plan.

2.2.6 County of Monterey

Monterey County addresses Paleontological Resources within the *Conservation and Open Space Element* of the Monterey County General Plan (Policies 7.1-7.5). In areas of known paleontological resources, the County is to address the preservation of these resources when feasible.

3 Resource Assessment Guidelines

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under CEQA. This assessment satisfies CEQA and Public Resource Code Section 5097.5 requirements, and follows guidelines and significance criteria specified by the SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010).

3.1 Paleontological Sensitivity

Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into geologic deposits (e.g., formations) within which fossils are buried and physically destroy the fossils. Because fossils are the remains of prehistoric animal and plant life, they are nonrenewable. Such impacts have the potential to be significant and, under CEQA guidelines, may require mitigation.

Significant paleontological resources are fossils or assemblages of fossils that are unique, unusual, rare, diagnostically important, or are common but have the potential to provide valuable scientific information for evaluating evolutionary patterns and processes, or which could improve our understanding of paleochronology, paleoecology, paleophylogeography, or depositional histories. New or unique specimens can provide new insights into evolutionary history; however, additional specimens of even well-represented lineages can be equally important for studying evolutionary pattern and process, evolutionary rates, and paleophylogeography. Even unidentifiable material can provide useful data for dating geologic units if radiocarbon dating is possible. As such, common fossils (especially vertebrates) may be scientifically important, and therefore considered significant.

Paleontological sensitivity is determined by rock type, history of the geologic unit in producing significant fossils, and previously recorded fossil localities from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from any one specific survey. The SVP system outlined in the SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* is the generally accepted paleontological sensitivity classification scheme for projects on non-federal lands in California. Rincon has characterized the paleontological sensitivity for the proposed project according to the SVP procedures, as described below.

The SVP describes sedimentary rock units as having high, low, undetermined, or no potential for containing significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. The SVP sensitivity categories are:

I. 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. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e. g., ashes or tephras), 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). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

II. **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.

III. **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.

IV. **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 or impact mitigation measures relative to paleontological resources.

4 Methods

Paleontological resources are not found in “soil” but are contained within the geologic deposits or bedrock that underlies the soil layer. Therefore, to determine whether a given project has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature to determine the geology and stratigraphy of the area. For this assessment, published geologic maps, fossil locality data, and literature were reviewed to identify the geologic units present at and below the surface within the project boundary, assess the paleontological sensitivity of the geologic units identified, and to determine the potential impacts to non-renewable paleontological resources from project development.

A formal paleontological locality search was requested at the Natural History Museum of Los Angeles County (NHMLAC) on January 31, 2019. In addition, Rincon reviewed the online paleontological collections database of the University of California Museum of Paleontology (UCMP) to identify known fossil localities in Monterey County from geologic formations similar to those identified in the project corridor.

Following the paleontological inventory and assessment, the paleontological sensitivity ratings of the geological units were assigned based on the findings of the record search and literature review. Based on the paleontological sensitivity findings, the potential impact to nonrenewable paleontological resources from project development was determined in accordance with the professional standards of the SVP (2010).

5 Description of Resources

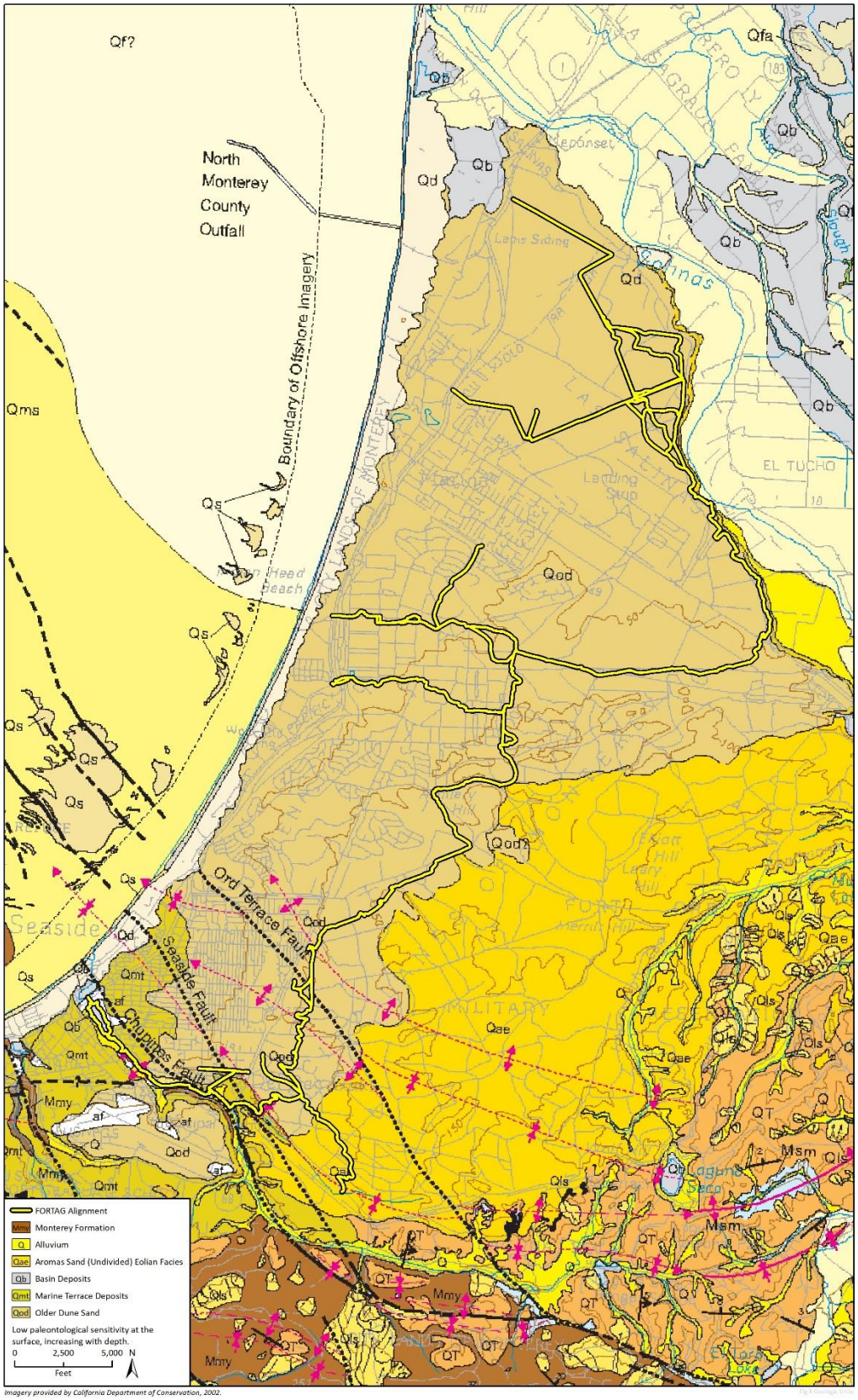
5.1 Regional Geology

The project corridor is situated within the Coast Ranges, one of eleven major geomorphic provinces in California (California Geological Survey 2002). A geomorphic province is a region of unique topography and geology that is readily distinguished from other regions based on its landforms and diastrophic history. The Coast Ranges extend about 600 miles from the Oregon border south to the Santa Ynez River in Santa Barbara County and are characterized by numerous north-south–trending peaks and valleys that range in elevation from approximately 500 feet above mean sea level (amsl) to 7,581 feet amsl at the highest summit. The basement rocks of the Coast Ranges include the Jurassic to Cretaceous rocks of the Franciscan Assemblage, which consist of over 55,000 feet of greywacke, greenstone, bluestone, metasedimentary rocks, and ophiolite sequences. During the Mesozoic and into the Cenozoic, the area of the present-day Coast Ranges was covered by marine waters, resulting in the thick accumulation of marine and nonmarine shale, sandstone, and conglomerate on the Franciscan basement rock (Bartow and Nilsen 1990). Later, these deposits were unconformably overlain by Paleocene to Pliocene continental shelf marine sedimentary rocks (Barron 1989). During the Late Miocene to the Late Pliocene, a mountain-building episode occurred in the vicinity of the present-day Coast Ranges, resulting in their uplift above sea level. Subsequently, from the Late Pliocene to Pleistocene, extensive deposits of terrestrial material, including alluvial fans and fluvial sediments, were deposited in the Coast Ranges (Norris and Webb 1990). Ongoing tectonic deformation and sea level change related to Pleistocene climate fluctuations continued through the Quaternary Period, resulting in the formation of marine terrace platforms along the Coast Ranges, including Monterey Bay (Jefferson et al. 1991). The project corridor is situated within a tectonically active region on the southern edge of Monterey Bay, east of the Monterey Peninsula and north of the Sierra de Salinas mountain range. Nearby faults include the Monterey Bay-Tularcitos fault zone, San Andreas fault zone approximately 20 miles northwest, and Sur-Nacimiento fault zone approximately 5 miles southwest (Clark et al. 1974).

5.1.1 Geology and Paleontology of the Project Corridor

The project corridor includes four (4) geologic units mapped at ground surface by Wagner et al. (2002): older Quaternary (Pleistocene) dune sand (Qod), the Aromas Sand (Qae), and younger Quaternary (Holocene) alluvium and basin deposits (Q, Qb) (Figure 3). Older Quaternary dune sand deposits (Qod) and Aromas Sands (Qae) underlie the majority of the surficial geology of the project corridor. These sediments date to the late Holocene or early Pleistocene, and consist of weakly-consolidated, well-sorted, wind-blown sand that has been stabilized through erosional action and soil formation (Dupre and Tinsley 1980). Because of the age of these aeolian sediments, it is possible they can preserve fossil resources, particularly at depth. Quaternary surficial deposits (Q, Qb) of Holocene age are exposed along drainages between terrace platforms along the southwestern portion of the project corridor. The Quaternary surficial deposits are composed of unconsolidated, poorly sorted clay, silt, sand, and gravel deposited in stream channels, flood basins, slopes, and coastal dunes (Clark et al. 1997). No previously recorded fossils have been documented in Quaternary surficial deposits in the vicinity of the project corridor.

Figure 3 Geologic Units and Paleontological Sensitivity in the Project Corridor



Holocene-age alluvial deposits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material, but they may overlie sensitive older deposits (i.e., Pleistocene marine terrace deposits and the Miocene Monterey Formation) at an unknown depth.

Although not mapped within the project corridor, it is important to note the adjacent bluff exposures of the Miocene Monterey Formation (Mmy) and Pleistocene marine terrace deposits (Qmt) mapped extensively near the southwestern portion of the project corridor (Clark et al. 1997). Pleistocene marine terrace deposits consist of marine sediments and terrestrial alluvium that accumulated on a series of wave-cut platforms formed during late Pleistocene (Clark 1981). Pleistocene terrace deposits have a record of vertebrate fossil preservation in coastal California and have yielded scientifically significant specimens from multiple localities. In central coastal California, Pleistocene marine terrace deposits have yielded vertebrate fossil specimens of camel, horse, ground sloth, whale, and dolphin, shark, and fish (Jefferson et al. 1991; Woodring et al. 1946). The Monterey Formation, also mapped adjacent to the southwestern project corridor, is well exposed along coastal California from San Francisco south to Los Angeles. These Miocene deposits are typically recognized by its pale buff to white fine-grained deposits, dark brown to black siliceous laminations, and common fossils (Berndmeyer et al. 2012). Numerous vertebrate localities have been documented from the Monterey Formation, which yielded specimens of large sea turtles, whale, dolphins, sea lions, shark bones and teeth, sea cows, desmostylians, fish, birds, and many other fauna (Bramlette 1946; Harden 1998; Koch et al. 2004)

5.2 Locality Record Search Results

A search of the paleontological locality records at the NHMLAC resulted in no previously recorded fossil localities within the project boundary; however, at least two vertebrate localities (LACM 4069 and 384) were identified within older Quaternary aeolian deposits and late Miocene Monterey Formation in the general vicinity of the project. The closest vertebrate locality, LACM 4069, produced fossil specimens of horse (*Equus)*, pronghorn antelope (Antilocapridae), and deer (Cervidae) north-northeast of the project in the San Benito River Valley. LACM (CIT) 384, located south-southwest of the project in the hills on the northern side of Carmel Valley, yielded fossil specimens of snake mackerel (*Thyrsocles kriegeri*) recovered from deposits of the Monterey Formation (McLeod 2019).

A supplemental review of the museum records maintained in the UCMP online collections database did not indicate any vertebrate fossil localities in the immediate vicinity of the project corridor. The closest UCMP vertebrate locality on record is V6279, which yielded pinniped (seal) limb bone fragments from the Miocene Monterey Formation approximately four miles south-southwest of the project corridor (UCMP 2019).

6 Evaluation, Impacts, and Recommendations

6.1 Paleontological Sensitivity Evaluation

Based on the literature review and records search results, the paleontological sensitivity of the geologic units underlying the project corridor were determined in accordance with criteria set forth by the SVP (2010). Holocene sedimentary deposits, particularly those younger than 5,000 years old, are generally too young to contain fossilized material. Therefore, the Holocene alluvial and basin (Q, Qb) and deposits mapped in the project corridor have been assigned a low paleontological sensitivity. Older Quaternary (Pleistocene) aeolian sediments (Qod, Qae) have the potential to contain buried intact paleontological resources at moderate depths because the unit has proven to yield significant vertebrate fossils near the project corridor (McLeod 2019; UCMP 2019). Consequently, these wind-blown sediments are assigned a low paleontological sensitivity at the surface, increasing to a high paleontological sensitivity with depth. The Miocene Monterey Formation (Mmy) and Pleistocene marine terrace deposits (Qmt), which may underlie the project corridor at depth, are assigned a high paleontological sensitivity due to their potential to preserve scientifically significant fossils.

6.2 Impacts

Paleontological resources are nonrenewable and are vulnerable to impacts from development related activities. Fossils provide important information for our understanding of past environments, the history of life, past species diversity, how species respond to climate change, and many other lines of scientific inquiry. Impacts to fossils and fossil localities, and loss of fossils from looting or other destructive activity at fossil sites results in the direct loss of scientific data and directly impacts the ability to conduct scientific research on evolutionary patterns and geological processes. Construction and grading activities associated with any development that will impact previously undisturbed, paleontologically sensitive geologic deposits have the potential for the destruction of significant paleontological resources.

The surficial geology of the project corridor has a low paleontological sensitivity, but increases with depth. Particularly, the geologic deposits of Pleistocene age underlying portions of every segment of the project corridor (i.e., Qod, Qae) have a high potential to contain paleontological resources at depth. Consequently, extensive ground disturbing activities within intact deposits underlying the project corridor could potentially result in significant impacts to paleontological resources under Appendix G of CEQA. Impacts would be significant if construction activities result in the destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data. As currently proposed, the majority of project ground disturbance would not exceed 12 inches below ground surface for the project corridor. Such minimal ground disturbance (i.e., shallow excavations) within intact (native) deposits would not likely cause significant impacts to paleontological resources. However, ground disturbing activities for the proposed overcrossings (i.e., bridges) and undercrossings (i.e., tunnels) along the Northern Loop, Canyon Del Rey/SR 218, and CSUMB Loop North segments would require extensive excavations within intact Pleistocene deposits underlying the project corridor, which could potentially result in significant impacts to paleontological resources.

6.3 Recommendations

The following recommended mitigation would address the potentially significant impacts relating to the potential discovery of paleontological resources during project implementation. These measures would only apply to project construction for the proposed overcrossings and undercrossings along the Northern Loop, Canyon Del Rey/SR 218, and CSUMB Loop North segments and would ensure that any significant fossils present on-site are preserved. Implementation of the following recommended mitigation measures would reduce potential project impacts to paleontological resources to a less than significant level pursuant to the requirements of CEQA.

- **Develop a Paleontological Resources Mitigation Plan.** Prior to the commencement of ground disturbing activities for overcrossings and undercrossings in the Northern Loop, Canyon Del Rey/SR 218, and CSUMB Loop North segments, a qualified professional paleontologist shall be retained to prepare and implement a Paleontological Resources Mitigation Plan (PRMP) for the project. A Qualified Paleontologist is an individual who meets the education and professional experience standards as set forth by the SVP (2010), which recommends the paleontologist shall have at least a Master's Degree or equivalent work experience in paleontology, shall have knowledge of the local paleontology, and shall be familiar with paleontological procedures and techniques. The PRMP shall describe mitigation recommendations in detail, including paleontological monitoring procedures; communication protocols to be followed in the event that an unanticipated fossil discovery is made during project development; and preparation, curation, and reporting requirements.
- **Paleontological Worker Environmental Awareness Program (WEAP).** Prior to the start of construction, the Qualified Paleontologist or his or her designee, shall conduct training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff. The WEAP shall be fulfilled at the time of a preconstruction meeting. In the event a fossil is discovered by construction personnel anywhere in the project area, all work in the immediate vicinity of the find shall cease and a qualified paleontologist shall be contacted to evaluate the find before re-starting work in the area. If it is determined that the fossil(s) is (are) scientifically significant, the qualified paleontologist shall complete the mitigation outlined below to mitigate impacts to significant fossil resources.
- **Paleontological Monitoring.** Initially, full-time monitoring shall be conducted during ground construction activities (i.e., grading, trenching, foundation work, and other excavations) where ground disturbance exceeds ten feet below ground surface within deposits of Older Quaternary dune sand (Qod) and Aromas Sand (Qae). Monitoring shall be conducted by a qualified paleontological monitor, who is defined as an individual who meets the minimum qualifications per standards set forth by the SVP (2010), which includes a B.S. or B.A. degree in geology or paleontology with one year of monitoring experience and knowledge of collection and salvage of paleontological resources. The duration and timing of the monitoring shall be determined by the Qualified Paleontologist and the location and extent of proposed ground disturbance. If the Qualified Paleontologist determines that full-time monitoring is no longer warranted, based on the specific geologic conditions at the surface or at depth, the Qualified Paleontologist may recommend that monitoring be reduced to periodic spot-checking or cease entirely.
- **Fossil Discovery, Preparation, and Curation.** If a paleontological resource is discovered, the monitor shall have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and collected. Typically, fossils can be safely salvaged quickly by a single paleontologist and not disrupt construction activity. In some cases, larger fossils (such as complete skeletons or large mammals) require more extensive excavation and longer salvage periods. In this case,

the paleontologist should have the authority to temporarily direct, divert or halt construction activity to ensure that the fossil(s) can be removed in a safe and timely manner.

Once salvaged, significant fossils shall be identified to the lowest possible taxonomic level, prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection (such as the UCMP) along with all pertinent field notes, photos, data, and maps. The cost of curation is assessed by the repository and is the responsibility of the project owner.

- **Final Paleontological Mitigation Report.** At the conclusion of laboratory work and museum curation, a final report shall be prepared describing the results of the paleontological mitigation monitoring efforts associated with the project. The report shall include a summary of the field and laboratory methods, an overview of the project geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. The final report shall be submitted to the implementing entity. If the monitoring efforts produced fossils, then a copy of the report shall also be submitted to the designated museum repository.

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