Paleontological Resources Monitoring and Mitigation Plan

SDG&E TL6975 San Marcos to Escondido New 69kV Transmission Line San Diego County, California

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Executive Summary

This Paleontological Resources Monitoring & Mitigation Plan (PRMMP) was prepared for the San Diego Gas & Electric Company's (SDG&E) TL6975 San Marcos to Escondido 69kV project (Project), located in the cities of San Marcos, Carlsbad, Escondido, and unincorporated portions of San Diego County, California. The goals of the Project are to improve transmission reliability by providing a second circuit between the San Marcos Substation and the Escondido Substation. Completion of the Proposed Project will achieve a 137 MVA continuous/emergency rating, eliminate 69kV congestion at the San Marcos Substation, increase reliability at the San Marcos Substation, and eliminate potential Category B violations. The Project includes four segments:

- **Segment 1 -** Rebuilding of an approximately 1.8 mile segment of existing 69kV circuit between the San Marcos Substation and the existing SDG&E transmission corridor from a single circuit structure line to a double circuit structure line to support the existing TL680C and additional proposed TL6975, and installation of an alternating current (AC) interference mitigation system along this segment;
- **Segment 2 -** Construction of a new segment of single circuit 69kV overhead transmission line borne by proposed new steel poles along an approximately 2.8 mile long portion of the existing SDG&E transmission corridor;
- **Segment 3 -** Reconductoring of a 7.4 mile long segment of de-energized overhead conductor, located between Meadowlark Junction and the Escondido Substation; and
- **Substation Work –** At the San Marcos Substation, a new concrete circuit breaker pad, seven piers, and a 30-foot A-frame would be constructed to install a 69 kV SF_6 circuit breaker and two 69 kV 2,000-amp disconnects and to support connection to the new power line. At the Escondido Substation, the existing overhead conductor would be transferred from the 138 kV rack to an existing 69kV bay position and three existing 69kV circuits would be transferred to different bay positions to accommodate the new power line, and the existing oil circuit breaker would be replaced with a gas SF_6 circuit breaker.

The PRMMP summarizes the results of the previously completed paleontological resources records search and technical report, and outlines the specific Project components that may impact potentially fossil-bearing geologic units. In addition, the PRMMP presents a detailed plan containing specific steps to be implemented prior to the start of construction, during the ground disturbance phase of construction, and following completion of ground disturbance in the event that fossils either are or are not discovered and salvaged during Project construction.

The Project alignment is partially underlain by sedimentary rocks of the Eocene-age Santiago Formation, which has a high paleontological potential. Other geologic units that occur along the Project alignment include Holocene-age young alluvial flood plain deposits (low paleontological potential), Cretaceous-age intrusive igneous rocks (no paleontological potential), and Cretaceous- to Jurassic-age undivided metasedimentary and metavolcanic rocks (low paleontological potential). Only project components that require earthwork that will impact previously undisturbed deposits of the Santiago Formation will require paleontological mitigation.

Project components that will require paleontological mitigation (including monitoring and treatment of any recovered fossils) consist of: **Segment 1** – installation of 31 replacement poles in areas underlain at the surface by the Santiago Formation (monitoring at all depths), installation of 6 replacement poles in areas underlain at depth by the Santiago Formation (monitoring at depths >10 feet below ground surface), mud rotary drill excavation at all 5 deep well locations (complete monitoring of the first deep well, with the option to modify or discontinue monitoring of the remaining 4 deep wells based on initial results), trenching for copper wire placement at all 5 deep well locations (monitoring at all depths), and installation of 2 coupon test stations in areas underlain at the surface by the Santiago Formation (monitoring at all depths); and **Segment 2** – installation of 1 new pole and associated grading of access roads and maintenance pads in the vicinity of this pole located in an area underlain at the surface by the Santiago Formation (monitoring at all depths). Project components that will not involve excavations (e.g., overhead work), or will only involve excavations that impact young alluvial flood plain deposits, intrusive igneous rocks, or undivided metasedimentary and metavolcanic rocks are not recommended for paleontological mitigation.

Paleontological monitoring and treatment guidelines are divided into three phases:

- **Preconstruction:** retention of Qualified Project Paleontologist; designation of professional repository to receive any salvaged fossils; attendance of Project Paleontologist at pre-construction meetings as appropriate; completion of worker environmental awareness program for all excavation personnel; development of research design.
- **During Construction:** excavation monitoring in areas of concern by a qualified paleontological monitor; salvage of unearthed fossil remains.
- **Post Construction**: fossil preparation, curation, and storage of salvaged fossils (if any); completion of final paleontological monitoring & mitigation report.

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1.0 Introduction

1.1 Project Description

The San Diego Gas & Electric (SDG&E) Company's TL6975 San Marcos to Escondido New 69kV Transmission Line Project (Project) crosses through the cities of San Marcos, Vista, Carlsbad, Escondido, and unincorporated portions of San Diego County, California. The Project alignment extends from the San Marcos Substation to the Escondido Substation, following a southern route. From the San Marcos Substation, the alignment follows San Marcos Boulevard and Palomar Airport Road west to the existing 150-foot wide SDG&E transmission corridor, which it follows south to Meadowlark Junction. The alignment continues east through primarily undeveloped land in unincorporated San Diego County before reaching residential developments in Escondido. From there, the alignment continues north, approximately following Citracado Parkway, until entering the Escondido Substation. The goals of the Project are to improve transmission reliability by providing a second circuit between the San Marcos Substation and the Escondido Substation. Completion of the Proposed Project will achieve a 137 MVA continuous/emergency rating, eliminate 69kV congestion at the San Marcos Substation, increase reliability at the San Marcos Substation, and eliminate potential Category B violations.

The Project includes four primary components, as outlined below and depicted in Figure 1.

- **Segment 1 - Rebuild of existing 69kV circuit.** Rebuilding of an approximately 1.8 mile segment of existing 69kV circuit between the San Marcos Substation and the existing SDG&E transmission corridor from a single circuit structure line to a double circuit structure line to support the existing TL680C and additional proposed TL6975. A total of 37 poles will be replaced with new steel poles (11 to be installed on pier foundations and 26 to be installed by direct bury). Ten poles will be removed from service, and an additional 6 existing poles will be reconductored or require other overhead work. In addition, an alternating current (AC) interference mitigation system will be installed along this portion of the Project alignment. The mitigation system will include five (5) deep wells and solid state decouplers (SSD) and three (3) coupon test stations.
- **Segment 2 - Construction of new single circuit 69kV overhead transmission line.** Construction of a new segment of single circuit 69kV overhead transmission line borne by proposed new steel poles along an approximately 2.8 mile long portion of the existing SDG&E transmission corridor. The new transmission line segment will start at the west end of Segment 1 and travel south to the existing Meadowlark Junction. New single circuit 69kV steel poles will be located approximately 50 feet east of centerline of the existing structures along the transmission corridor, including a total of 11 poles to be installed on pier foundations and 5 poles to be installed by direct bury. One additional pole will require overhead work. In addition, graded roads and access/maintenance pads will be built in the vicinity of the new poles to facilitate construction and provide access for long-term maintenance.
- **Segment 3 - Reconductor of de-energized overhead conductor.** Reconductoring of a 7.4-mile long segment of de-energized overhead conductor, located between Meadowlark Junction and the Escondido Substation. Along this segment, a total of 2 new pier foundation poles will be installed, 2 replacement pier foundation poles will be installed, 1 replacement direct bury pole will be installed, 50 existing poles will require overhead work, 2 poles will require overhead work and anchor work, and 9 poles will be removed from service.

- **Substation Work.** At the San Marcos Substation, a new concrete circuit breaker pad, up to 7 feet by 7 feet in size, would be installed. Seven piers, up to 2 feet in diameter and 6 feet long, would be installed, as well as a 30-foot A-frame with two footings measuring up to 9 feet by 13 feet each. Maximum excavation for the circuit breaker pad would be approximately 1.5 feet and maximum excavation for the piers is 14 feet. A 69kV SF_6 circuit breaker and two 69kV 2,000-amp disconnects would be installed for the new line. The new power line would connect from the A-frame to the Tie Line 6975 power pole immediately outside the substation's west wall via a single conductor/phase. Required control and protection relays would be installed in the existing control shelter within the substation.

  At the Escondido Substation, the existing overhead conductor would be transferred from the 138kV rack to an existing 69kV bay position to accommodate the Project. Three existing 69kV circuits would be transferred to different bay positions to accommodate this new circuit and avoid power line crossings. The overhead spans of these existing power lines would be relocated to available bay positions within the substation. Also within the substation, an oil containment wall measuring approximately 14 feet by 12 feet and a concrete circuit breaker pad measuring approximately 8 feet by 8 feet would be removed, as the existing oil circuit breaker would be replaced with a gas (SF_6) circuit breaker, which does not require containment. A new, larger concrete circuit breaker pad measuring 10 feet by 10 feet would be installed, requiring up to 2 feet of excavation. Relay settings would be modified as required in the existing control shelter. New steel poles and replacement guys and anchors would be installed adjacent to and south of the southern corner of the substation.

1.1.1 Mitigation Measures Identified in the IS/MND

The following Mitigation Measures (MMs), as outlined in the Mitigation Monitoring, Reporting, and Compliance Program for the Project, will be implemented to reduce any potential impacts to paleontological resources to a less than significant level.

MM PALEO-1: Project Paleontologist. SDG&E or its contractor shall retain a qualified professional paleontologist (qualified paleontologist) meeting the Society of Vertebrate Paleontology (SVP) standards as set forth in the "Definitions" section of Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources (2010) prior to the approval of demolition or grading permits. The qualified paleontologist shall attend the Project kick-off meeting and Project progress meetings on a regular basis, shall report to the site in the event potential paleontological resources are encountered, and shall implement the duties outlined in Mitigation Measures PALEO-2 through PALEO-4.

MM PALEO-2: Worker Training. Prior to the start of any ground disturbing activity (including vegetation removal, pavement removal, etc.), the qualified paleontologist shall prepare paleontological resources sensitivity training materials for use during Project-wide Worker Environmental Awareness Training (or equivalent). The paleontological resources sensitivity training shall be conducted by a qualified environmental trainer (often the Lead Environmental Inspector [LEI] or equivalent position) working under the supervision of the qualified paleontologist. In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the Project site and the procedures to be followed if they are found, as outlined in the approved Paleontological Resources Monitoring and Mitigation Plan in Mitigation Measure PALEO-3. SDG&E and/or its contractor shall retain documentation demonstrating that all construction personnel attended the training prior to the start of work on the site, and shall provide the documentation to the CPUC Project Manager upon request.

MM PALEO-3: Paleontological Monitoring. The qualified paleontologist shall prepare, and SDG&E and/or its contractors shall implement, a Paleontological Resources Monitoring and Mitigation Plan (PRMMP). SDG&E shall submit the plan to the CPUC Project Manager for review and approval at least 30 days prior to the start of construction. This plan shall address specifics of monitoring and mitigation and comply with the recommendations of the SVP (2010), as follows.

- The qualified paleontologist shall identify, and SDG&E or its contractor(s) shall retain, qualified paleontological resource monitors (qualified monitors) meeting the SVP standards (2010).
- The qualified paleontologist and/or the qualified monitors under the direction of the qualified paleontologist shall conduct full-time paleontological resources monitoring for all ground-disturbing activities in previously undisturbed sediments in the Project site that have high paleontological sensitivity. This includes any depth of excavation into the Santiago Formation, as well as excavations that exceed 10 feet in depth in areas mapped as young alluvial floodplain deposits that overlie the Santiago Formation. The PRMMP shall clearly map these portions of the Project based on final design provided by SDG&E and/or its contractor(s).
- If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location will need to be individually monitored.
- Monitors shall have the authority to temporarily halt or divert work away from exposed fossils in order to evaluate and recover the fossil specimens, establishing a 50-foot buffer.
- If construction or other Project personnel discover any potential fossils during construction, regardless of the depth of work or location and regardless of whether the site is being monitored, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment.
- The qualified paleontologist shall determine the significance of any fossils discovered, and shall determine the appropriate treatment for significant fossils in accordance with the SVP standards. The qualified paleontologist shall inform SDG&E of these determinations as soon as practicable. See Mitigation Measure PALEO-4 regarding significant fossil treatment.
- Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The qualified paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort and any curation of fossils. SDG&E shall provide the daily logs to the CPUC Project Manager upon request, and shall provide the final report to the CPUC Project Manager upon completion.

MM PALEO-4: Significant Fossil Treatment. If any find is deemed significant, as defined in the SVP standards (2010) and following the process outlined in Mitigation Measure PALEO-3, the qualified paleontologist shall salvage and prepare the fossil for permanent curation with a certified repository with retrievable storage following the SVP standards.

1.2 Scope of Work

This Paleontological Resources Monitoring & Mitigation Plan (PRMMP) was prepared for the SDG&E's TL6975 San Marcos to Escondido New 69kV Transmission Line Project, in accordance with MM PALEO-3. The PRMMP is organized into a series of steps to be implemented in three phases: prior to the start of construction, during the ground disturbance phase of construction, and following completion of ground disturbance in the event that fossils either are, or are not discovered and salvaged from the Project site. All steps taken in the mitigation program are in accordance with industry standards (e.g., SVP, 2010; Murphey et al., 2019), as well as state and local laws, ordinances, and regulations (e.g., California Environmental Quality Act). Following of the PRMMP will fulfill all Mitigation Measures pertaining to paleontological resources (MM PALEO-1 through MM PALEO-4) outlined in the Mitigation, Monitoring, Compliance, and Reporting Plan for the Project, and will reduce all Project-related impacts to paleontological resources to less than significant levels.

This PRMMP was completed by Katie M. McComas and Dr. Thomas A. Deméré of the San Diego Natural History Museum (SDNHM) Department of PaleoServices. Work was performed under contract to kp environmental for Project Proponent (SDG&E) to fulfill the mitigation requirements of the CEQA lead agency, the California Public Utilities Commission (CPUC).

1.3 Definition of Paleontological Resources

As defined here, paleontological resources (i.e., fossils) are the buried remains and/or traces of prehistoric organisms (i.e., animals, plants, and microbes). Body fossils such as bones, teeth, shells, leaves, and wood, as well as trace fossils such as tracks, trails, burrows, and footprints, are found in the geologic units/formations within which they were originally buried. The primary factor determining whether an object is a fossil or not is not how the organic remain or trace is preserved (e.g., "petrified"), but rather the age of the organic remain or trace. Although typically it is assumed that fossils must be older than ~11,700 years (i.e., the generally accepted end of the last glacial period of the Pleistocene Epoch), organic remains older than recorded human history and/or older than middle Holocene (about 5,000 radiocarbon years) can also be considered to represent fossils (SVP, 2010).

Fossils are considered important scientific and educational resources because they serve as direct and indirect evidence of prehistoric life and are used to understand the history of life on Earth, the nature of past environments and climates, the membership and structure of ancient ecosystems, and the pattern and process of organic evolution and extinction. In addition, fossils are considered to be non-renewable resources because typically the organisms they represent no longer exist. Thus, once destroyed, a particular fossil can never be replaced.

Finally, paleontological resources can be thought of as including not only the actual fossil remains and traces, but also the fossil collection localities and the geologic units containing those localities. The locality includes both the geographic and stratigraphic context of fossils—the place on the earth and stratum (deposited during a particular time in earth's history) from which the fossils were collected. Localities themselves may persist for decades, in the case of a fossil-bearing outcrop that is protected from natural or human impacts, or may be temporarily exposed and ultimately destroyed, as is the case for fossil-bearing strata uncovered by erosion or construction. Localities are documented with a set of coordinates and a measured stratigraphic section tied to elevation detailing the lithology of the fossil-bearing stratum as well as that of overlying and underlying strata. This information provides essential context for any future scientific study and educational use of the recovered fossils.

1.3.1 Definition of Significant Paleontological Resources

The California Environmental Quality Act (CEQA, Public Resources Code Section 21000 et seq.) dictates that a paleontological resource is considered significant if it "has yielded, or may be likely to yield, information important in prehistory or history" (Section 15064.5, [a][3][D]). The Society of Vertebrate Paleontology (SVP) has further defined significant paleontological resources as consisting of "fossils and fossiliferous deposits[…]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" (SVP, 2010).

1.4 Regulatory Framework

As discussed above, paleontological resources are scientifically and educationally significant nonrenewable resources and as such are protected under federal, state, and local laws, regulations, and ordinances. The Project is located within San Diego County, California, with the California Public Utilities Commission (CPUC) serving as the lead agency. Therefore, state and local laws, ordinances, and regulations are applicable to the Project.

1.4.1 State

The California Environmental Quality Act (CEQA, Public Resources Code Section 21000 *et seq.*) protects paleontological resources on both state and private lands in California. This act requires the identification of environmental impacts of a proposed project, the determination of significance of the impacts, and the identification of alternative and/or mitigation measures to reduce adverse environmental impacts. The Guidelines for the Implementation of CEQA (Title 14, Chapter 3, California Code of Regulations: 15000 *et seq*.) outlines these necessary procedures for complying with CEQA. Paleontological resources are specifically included as a question in the CEQA Environmental Checklist (Section 15023, Appendix G): "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature." Also applicable to paleontological resources is the checklist question: "Does the project have the potential to… eliminate important examples of major periods of California history or pre-history."

Other state requirements for paleontological resource management are included in the Public Resources Code (Chapter 1.7), Section 5097.5 and 30244. These statutes prohibit the removal of any paleontological site or feature on public lands without permission of the jurisdictional agency, defines the removal of paleontological sites or features as a misdemeanor, and requires reasonable mitigation of adverse impacts to paleontological resources from developments on public (state) lands.

1.4.2 Local

The County of San Diego primarily addresses management of paleontological resources through CEQA. In addition, Section 87.430 of the County's Grading Ordinance specifically establishes procedures for the mitigation of potential impacts to paleontological resources during earthwork operations. Detailed guidelines for determining significance and mitigation procedures for paleontological resources are provided by the County's Department of Public Works (Stephenson et al., 2009).

The City of Carlsbad General Plan (2015) includes several policies that specifically address the management of paleontological resources. Policies 7-P.7 and 7-P.8 call for the implementation of the City of Carlsbad Cultural Resources Guidelines to "avoid or substantially reduce impacts to archaeological and paleontological resources" and for the monitoring of "grading, ground-disturbing, and other major earth-moving activities in previously undisturbed areas or in areas with known archaeological or paleontological resources." In addition, Policy 4-P.32 suggests that open space areas be designated that "preserve historic, archaeological, paleontological, and educational resources," where appropriate.

The Conservation and Open Space Element of the City of San Marcos General Plan (2012) addresses the management of paleontological resources through Policy CO-2.5, which calls for the continued review of "future development proposals to ensure that cultural resources (including […] paleontological […] resources) are analyzed and conserved in compliance with CEQA requirements." In addition, Goal COS-11 is to "continue to identify and evaluate cultural, historic, archeological, paleontological, and architectural resources for protection from demolition and inappropriate actions."

The City of Escondido addresses the management of paleontological resources in Chapter VII, the Resource Conservation Element, of the City's General Plan (2012). Goal 5 and Policies 5.2 and 5.3 specifically discuss paleontological resources:

- **Goal 5:** Preservation of important cultural and paleontological resources that contribute to the unique identity and character of Escondido.
    - **Cultural Resources Policy 5.2**—Preserve significant cultural and paleontological resources listed on the national, State, or local registers through: maintenance or development of appropriate ordinances that protect, enhance, and perpetuate resources; incentive programs; and/or the development review process.
    - **Cultural Resources Policy 5.3**—Consult with appropriate organizations and individuals (e.g., South Coastal Information Center of the California Historical Resources Information System, Native American Heritage Commission, Native American groups and individuals, and San Diego Natural History Museum) early in the development process to minimize potential impacts to cultural and paleontological resources.

2.0 Methods

2.1 Paleontological Records Search and Literature Review

A formal paleontological records search of the collections at the SDNHM was previously conducted in order to determine whether there are existing fossil localities in the vicinity of the Project alignment. A literature review of relevant published and unpublished geologic reports and paleontological literature was also performed. The results of the records search and literature review were summarized in a report (PaleoServices, 2017).

2.2 Resource Assessment Criteria: Paleontological Potential Ratings

In recognition of the fact that paleontological resources are considered to include not only actual fossil remains and traces, but also the fossil collecting localities and the geologic formations containing those fossils and localities, the Society of Vertebrate Paleontology (SVP) has developed a procedure for evaluating the paleontological potential of individual geologic units. This procedure assigns ranks to geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils (SVP, 2010), as outlined below and as applied in the paleontological resource assessment prepared for the project (PaleoServices, 2017). This procedure mirrors the guidelines set forth for San Diego County by Deméré and Walsh (1993) and Stephenson et al. (2009).

2.2.1 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 classified as having high potential include, but are not limited to, sedimentary rock units 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, etc.). Paleontological potential consists of both 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, as well as the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. 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.

2.2.2 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 geologic units have high or low potential to contain significant paleontological resources. A field survey to specifically determine the paleontological resource potential of these geologic 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.

2.2.3 Low Potential

Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some geologic units have low potential for yielding significant fossils. Such geologic 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. Geologic units with low potential typically will not require impact mitigation measures to protect fossils.

2.2.4 No Potential

Some geologic 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). Geologic units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

2.3 Paleontological Impact Analysis

Direct impacts to paleontological resources occur when earthwork activities (e.g., mass grading, utility trenching), cut into the geologic units within which fossils are buried, and physically destroy the fossil remains. As such, only earthwork activities that will disturb potentially fossil-bearing sedimentary deposits (i.e., those rated with a high or undetermined paleontological sensitivity) have the potential to significantly impact paleontological resources. Although impact avoidance is possible through relocation of a proposed action, paleontological monitoring during construction typically is recommended to reduce any negative impacts to paleontological resources to less than significant levels.

The purpose of the impact analysis is to determine which (if any) of the proposed Project-related earthwork activities may disturb potentially fossil-bearing geologic units, and where and at what depths this earthwork will occur. The paleontological impact analysis involved analysis of available project documents, and comparison with geological and paleontological data previously gathered during the records search and literature review.

3.0 Paleontological Resources

3.1 Summary of Project Geology and Paleontology

Published geologic mapping (Kennedy and Tan, 2007; Figure 1) indicates that the proposed Project components are underlain by four geologic units: primarily Holocene-age young alluvial flood plain deposits (Qya), the Eocene-age Santiago Formation (Tsa), Cretaceous-age intrusive igneous rocks (Kgb, Klh, and Kt), and Cretaceous- to Jurassic-age undivided metasedimentary and metavolcanic rocks (Mzu).

As determined in the site-specific paleontological resource assessment (PaleoServices, 2017), intrusive igneous rocks have no paleontological potential, Holocene-aged young alluvial flood plain deposits and undivided metasedimentary and metavolcanic rocks of this area have a low paleontological potential, and the Santiago Formation has a high paleontological potential (Table 1, Figure 2). The high potential assignment for the Santiago Formation is supported by an SDNHM institutional records search, which documented the occurrence of 42 recorded SDNHM fossil collection localities from the Santiago Formation within a one-mile radius of the Project site (PaleoServices, 2017). The Santiago Formation is exposed at the surface along portions of Segment 1 and Segment 2, and is likely also present at depths of 10 feet or more in the vicinity of the San Marcos Substation in the eastern portion of Segment 1 where young alluvial flood plain deposits are present at the surface (Figure 1).

Table 1. Summary of geologic units underlying the Project alignment.

Geologic Unit	Age	Paleontological Potential
Young alluvial flood plain deposits (Qya)	Holocene	Low Potential
Santiago Formation (Tsa)	middle Eocene	High Potential
Intrusive igneous rocks (Kx)*	Cretaceous	No Potential
Metasedimentary and metavolcanic rocks (Mzu)	Jurassic-Cretaceous	Low Potential

*Kx refers to: gabbro (Kgb), leucogranodiorite of Lake Hodges (Klh), and tonalite (Kt)

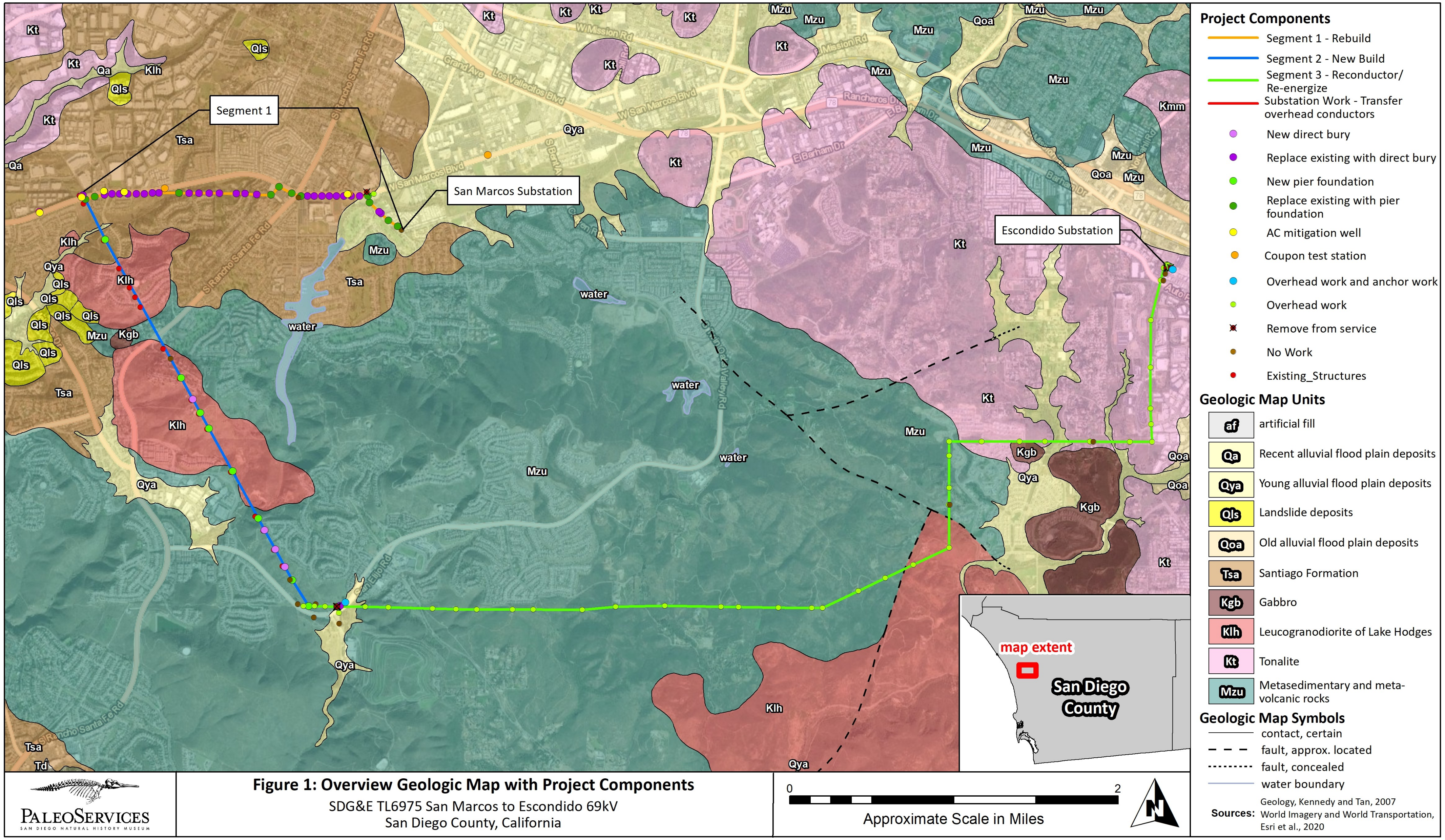
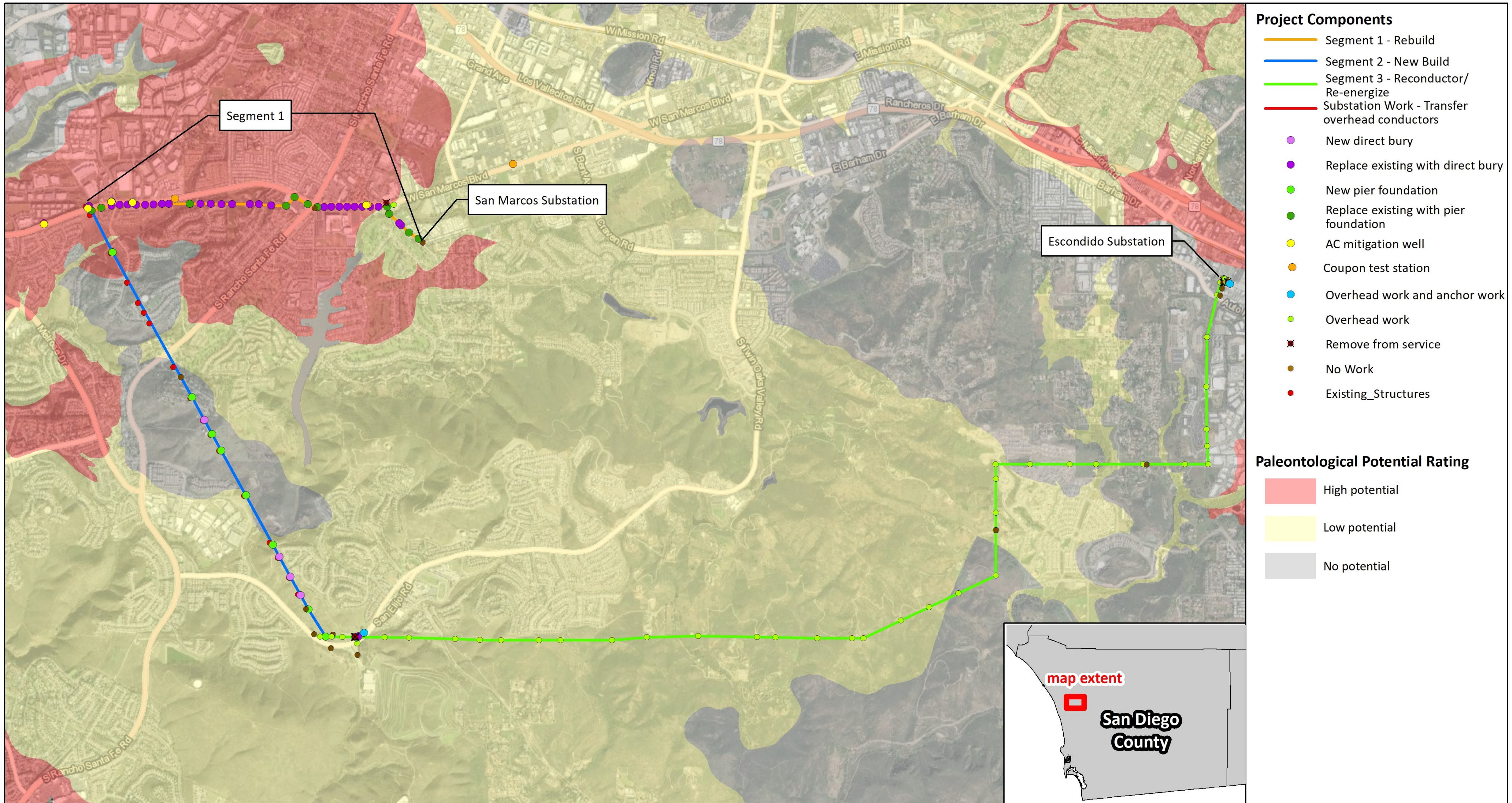


Figure 1: Overview Geologic Map with Project Components
SDG&E TL6975 San Marcos to Escondido 69kV
San Diego County, California



PALEOSERVICES
SAN DIEGO NATURAL HISTORY MUSEUM

Figure 2: Overview Paleontological Potential Map with Project Components
SDG&E TL6975 San Marcos to Escondido 69kV
San Diego County, California

0 — 2
Approximate Scale in Miles

N

Sources: Geology, Kennedy and Tan, 2007
World Imagery and World Transportation, Esri et al., 2020

3.2 Updated Project Components Analysis and Paleontological Monitoring Requirements

Only project components that will involve earthwork into previously undisturbed geologic units of high paleontological potential (i.e., the Santiago Formation) have the potential to impact paleontological resources. Such earthwork activities and the affected paleontological resources are outlined below for the four Project elements described in Section 1.1, and summarized in map and table format in Appendix A.

Segment 1 - Rebuild of existing 69kV circuit. Installation of replacement steel poles on pier foundations and by the direct bury method both require significant earthwork that can typically be successfully monitored for paleontological resources. Removal from service of existing poles typically takes place entirely within previously disturbed sediments, and therefore is not recommended for paleontological monitoring. Reconductoring on existing utility poles and other overhead work does not require significant earthwork, and is therefore not recommended for paleontological monitoring.

Installation of AC mitigation deep wells extending between 100 to 200 feet deep will be accomplished by hydrovac and/or mud rotary drill excavation methods (the exact method to be used has not yet been determined). The hydrovac excavation method uses a jet of high-pressure water to loosen soil materials and dig a hole. The fluidized sediment is then suctioned into a tanker truck and transported to a dump site. In the process, any fossils are likely either destroyed or damaged and intermixed with other fossils and all stratigraphic context is lost as the slurry is stockpiled. Sampling of spoils from this closed system is not practicable, and this excavation method is, therefore, not recommended for paleontological monitoring. The mud rotary drill method uses an approximately 6- to 8-inch-diameter drill bit mounted on the end of a rotating string of drill rods to bore a hole. A recirculating flow of drilling fluid is pumped into the advancing borehole to remove drill cuttings, lubricate the drill bit, and provide hydrostatic pressure in the borehole to keep it open and stable. The particle size of individual drill cuttings is dependent on the induration and lithology of the bedrock being drilled through and the size and spacing of the cutting teeth on the end of the drill bit. During the drilling process, macrofossils are typically pulverized, while microfossils surviving in the circulating drill cuttings have lost their precise stratigraphic context. Although it is possible during mud rotary drilling to collect potentially microfossil-bearing drill cutting samples from estimated borehole depths, the paleontological resource value of such activities is questionable. Therefore, mud rotary drill excavation of holes for the deep wells is recommended for adaptive paleontological monitoring, wherein the initial results of monitoring (i.e., recovery of scientifically significant fossils coupled with the ability to record at least some stratigraphic context) are used to determine whether further monitoring is warranted. In addition, trenching for the placement of copper wire connecting the grounding rods to SSDs at the deep well locations and trenching for the installation of coupon test stations will require significant earthwork that can be successfully monitored for paleontological resources.

- The locations of 7 replacement poles to be installed on pier foundations and 24 replacement poles to be installed by the direct bury method are underlain at the surface by the Santiago Formation, and will require full-time paleontological monitoring at all depths.
- The locations of 4 replacement poles to be installed on pier foundations and 2 replacement poles to be installed by the direct bury method are underlain at depth by the Santiago Formation, and will require full-time paleontological monitoring at depths greater than 10 feet below ground surface.
- The locations of all 5 deep wells are underlain at the surface by the Santiago Formation. Mud rotary drill excavation for the deep wells will require adaptive paleontological monitoring, wherein the first

deep well is monitored full-time and the results of this monitoring are used to determine whether further monitoring is warranted. Trenching earthwork (anticipated to extend 5 feet deep) at these locations will require full-time paleontological monitoring at all depths.

- The locations of 2 coupon test stations are underlain at the surface by the Santiago Formation, and will require full-time paleontological monitoring at all depths.
- The location of 1 coupon test station is underlain by a geologic unit with low paleontological potential, and is not recommended for paleontological monitoring.

Segment 2 - Construction of new single circuit 69kV overhead transmission line. Installation of new steel poles on pier foundations and by the direct bury method will require significant earthwork that can typically be successfully monitored for paleontological resources. Grading for access roads and maintenance pads in the vicinity of the new poles will also require significant earthwork that can be successfully monitoring for paleontological resources. Overhead work does not require significant earthwork, and is therefore not recommended for paleontological monitoring.

- The location of 1 new pole to be installed on a pier foundation is underlain at the surface by the Santiago Formation, and will require full-time paleontological monitoring at all depths, as well as the associated grading for access roads and a maintenance pad in the vicinity of this pole (Z100268).
- The locations of the remaining 15 new poles are underlain by geologic units with no or low paleontological potential, and are not recommended for paleontological monitoring.

Segment 3 - Reconductor of de-energized overhead conductor. Installation of new and replacement steel poles on pier foundations and by the direct bury method will require significant earthwork that can typically be successfully monitored for paleontological resources. Removal from service of existing poles typically takes place entirely within previously disturbed sediments, and therefore is not recommended for paleontological monitoring. Overhead work does not require significant earthwork, and is therefore not recommended for paleontological monitoring.

- The locations of the 5 new or replacement poles are underlain by geologic units with no or low paleontological potential, and are not recommended for paleontological monitoring.

Substation Work. At the San Marcos Substation, construction of a new concrete circuit breaker pad, seven concrete piers, and an A-frame will require significant earthwork that can typically be successfully monitored for paleontological resources. Installation of the 69kV SF_6 circuit breaker and two 69kV 2,000-amp disconnect, overhead connection of the new power line, and installation of required control and protection relays are not anticipated to require significant earthwork, and therefore are not recommended for paleontological monitoring.

- The San Marcos Substation is at underlain at depth by the Santiago Formation. Excavations for the A-frame and seven concrete piers (anticipated to extend to depths of 14 feet below ground surface) will require full-time paleontological monitoring at depths greater than 10 feet below ground surface. Shallow (1.5 feet deep) excavations associated with the construction of the new concrete circuit breaker pad are not recommended for paleontological monitoring.

At the Escondido Substation, construction of a new concrete circuit breaker pad and installation of new steel poles and replacement guys and anchors will require significant earthwork that can typically be successfully monitored for paleontological resources. Removal of an existing oil containment wall and existing concrete circuit breaker pad is anticipated to take place entirely within previously disturbed sediments, and therefore is not recommended for paleontological monitoring. The transfer and relocation of existing overhead conductor to existing 69kV bay positions will utilize existing structures, is not anticipated to require significant earthwork, and is therefore not recommended for paleontological monitoring.

- The Escondido Substation is underlain by geologic unit with no paleontological potential. Construction activities within and adjacent to the substation are not recommended for paleontological monitoring.

4.0 Paleontological Resources Monitoring & Mitigation Plan

4.1 Pre-Construction

Prior to commencement of construction activities, some or all of the following actions will be necessary.

4.1.1 Retention of Qualified Project Paleontologist

Prior to the approval of demolition or grading permits, a qualified Project Paleontologist (as defined below) shall be retained to oversee the PRMMP, including serving as supervisor to any retained qualified paleontological monitors (as defined below).

QUALIFICATIONS: The qualified Project Paleontologist will have a Master's Degree or Ph.D. in paleontology or related fields (e.g., geology), and will have proven knowledge of local paleontology and geology and professional experience with paleontological procedures and techniques.

4.1.2 Designation of Repository

The SDNHM shall serve as the designated repository for the Project to curate and store any fossils that may be recovered during construction.

QUALIFICATIONS: The SDNHM is an AAM-accredited museum with a permanent curator overseeing the paleontological collections, and is therefore qualified as a repository for the Project. As required, the SDNHM is capable of storing fossils in a facility with adequate security against theft, loss, damage, fire, pests, and adverse climate conditions.

4.1.3 Attendance at Pre-Construction Meeting

The Project Paleontologist shall attend the pre-construction meeting(s) to consult with the grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues.

4.1.4 Worker Environmental Awareness Program Training

Prior to the start of construction, all construction personnel shall participate in the the Worker Environmental Awareness Program (WEAP), which will include paleontological resource training materials prepared by the Project Paelontologist (refer to MM PALEO-2). This will ensure that all construction personnel understand paleontological monitoring requirements, the roles and responsibilities of paleontological monitors, and the appropriate action to be taken in the event of a discovery of paleontological resources. The penalties associated with the unauthorized collection of or intentional disturbance of any paleontological resources, as well as the penalties for noncompliance with paleontological mitigation requirements shall be clearly communicated. Training shall include a definition of paleontological resources and an overview of potential resources that could be encountered during ground disturbing activities, which will help to facilitate worker recognition, avoidance, and immediate notification to the Project Paleontologist, or paleontological monitor.

4.1.5 Submission of Paleontological Monitoring Exhibit and List of Monitors

This PRMMP shall be provided to SDG&E and its contractors to identify the Project work areas to be monitored (as depicted in the map book and table in Appendix A). The names of the qualified paleontological monitors that may work on the Project site shall also be submitted to SDG&E prior to beginning any earthwork.

QUALIFICATIONS: The qualified paleontological monitor(s) will have a B.A. or B.S. in geology or paleontology and a minimum of 1 year of monitoring experience in local sedimentary rocks. Other experience may be substituted at the discretion of the Project Paleontologist.

4.1.6 Research Design

There are specific research themes associated with the sedimentary rock units present within a given project, which will direct the types of data collected during paleontological mitigation. These research themes would be applied upon the discovery of significant paleontological resources (see Section 4.2.2.2), in order to determine the appropriate field methods (field data and fossil recovery) and lab methods (fossil preparation and curation) to collect sufficient scientific contextual data to enable their future scientific study. Research themes related to deposits of the Santiago Formation include:

- Eocene mammalian diversity, evolution, and systematics
- Biostratigraphy of Eocene marine invertebrate and vertebrate taxa
- Relationship between Eocene marine and non-marine paleoenvironments of coastal San Diego County
- Age, distribution, and stratigraphy of informally named members of the Santiago Formation
- Paleoecological structure of marine and terrestrial assemblages within the informally named members of the Santiago Formation

4.2 During Construction

Commencement of construction related excavation activities marks the time when potential impacts to paleontological resources will begin. To minimize these potential impacts, some or all of the following actions are required:

4.2.1 Excavation Monitoring: Duties and Areas to Be Monitored

A qualified paleontological monitor(s) working under the direction of the Project Paleontologist shall be present full-time during all relevant ground disturbing activities into deposits of high paleontological potential (refer to MM PALEO-1), as outlined in Section 3.2 and Appendix A. The monitor(s), under the direction of the Project Paleontologist, will coordinate with Construction Management to determine the timing for monitoring in these identified areas of concern. If earthwork requiring full-time paleontological monitoring is taking place simultaneously at diverse locations, each location will need to be individually monitored. It is suggested that monitoring locations separated by less than 0.5 mile can be monitored simultaneously, but that the Project Paleontologist may increase or decrease this distance threshold as indicated by monitoring conditions (e.g., the pace of construction excavation and the discovery of significant paleontological resources). It will be the paleontological monitor's responsibility to maintain communication and coordination with the construction team.

A paleontological monitor will observe and inspect any temporarily exposed outcrops (e.g., augering spoils, borehole walls) for paleontological resources. Ideally, inspection involves the examination of every newly exposed surface, but operationally this is often impossible. The pace and quantity of equipment in the cut may determine how often and where paleontological monitors can inspect. When active excavations are too dangerous to enter because of a narrow cut, heavy equipment traffic, or other reason, monitoring may be conducted from an elevated vantage point.

Based on conditions in the field, paleontological monitoring may be reduced or increased at the discretion of the Project Paleontologist. For example, if significant volumes of artificial fill are encountered during pole replacement earthwork, paleontological monitoring may be reduced to spot-checking in the area containing fill. Conversely, if deposits of high paleontological potential (e.g., the Santiago Formation) are discovered in areas previously thought to contain deposits of low or no paleontological potential, monitoring may be implemented on a part-time or full-time basis until conditions change.

Mud rotary drill excavation for the AC mitigation system deep well shall undergo adaptive monitoring. The first deep well shall be monitored by collecting small samples (e.g., 5 gallon bucket) of drilling spoils from the desander/shaker at regular intervals (e.g., every 10 feet), mechanically screening the wet sediment on site using 24 mesh (1 mm openings) steel screens, bagging the concentrate, transporting the samples to a laboratory setting to dry, and picking the concentrate for identifiable fossils. This work should be completed in a timely manner in order to make recommendations for modifying or discontinuing monitoring of the remaining deep wells. If no identifiable/significant fossils are recovered and/or the stratigraphic context of recovered fossils is determined to be poorly constrained, or if collecting and processing the samples is not feasible, the Project Paleontologist may recommend that monitoring be reduced or discontinued.

It is important to emphasize that paleontological monitors should avoid interference with, or delay of, construction operations. However, paleontological monitors shall have the authority to temporarily halt or divert work as discussed in Section 4.2.2.1 below.

4.2.1.1 Preparation of daily logs

Paleontological monitors shall prepare daily logs detailing the types of excavation activities and sedimentary deposits observed, and any fossil discoveries. These logs shall be submitted to SDG&E. SDG&E shall provide the daily logs to the CPUC Project Manager upon request.

4.2.1.2 Data recovery (stratigraphy)

Recording of stratigraphic data will be an on-going aspect of excavation monitoring to provide context for any eventual fossil discoveries, and to gain a greater understanding of how the exposed fossil-bearing deposits fit into the known stratigraphy and geology of coastal San Diego County. Outcrops exposed in active cuts and finished slopes should be examined and observed geologic features recorded on grading plans and field notes. The goal of this work is to delimit the nature of fossil-bearing sedimentary rock units along the proposed Project alignment, determine their areal distribution and depositional contacts, and record any evidence of structural deformation that may affect determination of the stratigraphic position of recovered fossils. Standard geologic and stratigraphic data collected include lithologic descriptions (color, sorting, texture, structures, and grain size), stratigraphic relationships (bedding type, thickness, and contacts), and topographic position. Measurement of stratigraphic sections will be routinely done and areas containing exposures of fossiliferous sedimentary deposits will be studied in detail and fossil localities recorded on measured stratigraphic sections.

4.2.1.3 Safety procedures

Safety of paleontological field personnel and other construction personnel is of paramount concern during the construction phase. Safety procedures to be followed by paleontological field personnel will include wearing appropriate clothing (e.g., high-visibility safety vests, hard hats, steel-toed boots), securing equipment operators attention before entering an active cut, notifying equipment operators before beginning a salvage excavation, marking fossil discovery sites with surveyor's flagging, and using caution while driving near the Project alignment. Attendance at the preconstruction meeting and daily or weekly tailgate meetings are important for discussing mutual safety issues between paleontological field personnel and construction personnel.

4.2.2 Procedures for Paleontological Discoveries

The goal of paleontological monitoring is to observe excavation activities and to be onsite in the event that fossils are unearthed by excavation activities. When fossils are discovered, the procedures outlined below will be followed. Recovery methods, as well as time needed for fossil recovery, may vary to some degree depending on the types of fossils discovered (e.g., macrofossils, microfossils, or plant fossils) and the nature of the enclosing sedimentary deposits.

4.2.2.1 Discovery process and work stoppage

In the event of a fossil discovery, the qualified paleontological monitor may immediately initiate recovery or choose to temporarily stop construction or grading work at the discovery location to consult with the Project Paleontologist. When work is stopped, the Project Paleontologist will notify the SDG&E Project management team, who will notify the appropriate CPUC representatives. The monitor, under direction of the Project Paleontologist, will divert, direct, or temporarily halt ground disturbing activities in the immediate area of discovery (establishing a 50-foot buffer) to allow for preliminary evaluation of potentially significant paleontological resources and to determine if additional measures (i.e., collection and curation) are required.

If construction or other Project personnel discover any potential fossils during construction, regardless of the depth of work or location and regardless of whether the site is being monitored, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment.

4.2.2.2 Determination of significance

The significance of the discovered paleontological resources will be determined by the Project Paleontologist. For significant paleontological resources, a data recovery program will be initiated that will follow the general steps outlined below with some refinements based on the type and nature of the specific discovery.

The data recovery program will largely be driven by the research themes (Section 4.1.6) and will incorporate appropriate field methods for data collection to answer specific questions, as well as develop plans for the preparation, curation, and storage of recovered fossils, and data collection and post-collection phases of fossil recovery.

4.2.2.3 Macrofossil recovery

Many fossil specimens discovered during excavation monitoring are readily visible to the naked eye and large enough to be easily recognized and recovered. Upon discovery of such macrofossils, the qualified paleontological monitor will temporarily flag the discovery site for avoidance and evaluation as described above. Actual recovery of unearthed macrofossils can involve several techniques including "pluck-and-run," hand quarrying, plaster-jacketing, and/or large-scale quarrying. The "pluck-and-run" technique will be used when equipment activity in the vicinity of the discovery area is heavy and immediate action is required to remove an isolated specimen so as not to slow the progress of construction operations. "Pluck-and-run" recovery involves exploratory probing around a partially exposed fossil specimen to determine its dimensions, the application of consolidants (Acryloid, Butvar, or Vinac) to stabilize any damaged or weakened areas of the fossil, and removal of the specimen in a block of matrix. Hand quarrying typically consists of site-specific "mining" of fossil-rich sedimentary layers without establishment of a geographic grid framework. Fragile fossils are stabilized as described above. Hand quarrying and the "pluck-and-run" techniques can typically be carried out in several minutes, to an hour, thus minimizing the duration of any work stoppage.

Particularly large and/or articulated vertebrate fossils (e.g., brontothere skeleton) require special handling because of their size and/or fragility and are typically recovered in a process called plaster-jacketing. The process begins by isolating a partially exposed specimen from the temporary exposure in a matrix-supported sedimentary pedestal. The pedestal is then slightly undercut at its base to form an overhanging lip and a layer of damp newsprint or tissue paper is placed on the upper surface of the block. Strips of burlap fabric are then soaked in a mixture of Plaster-of-Paris and laid across the matrix block to dry. Depending upon the volume of the block, one, two, or more layers of plaster-soaked burlap strips are formed on the block. Especially large blocks (over two feet in length) are reinforced with wooden or metal splints. Once the plaster hardens, the supporting pedestal is undercut and the block turned over. Hand tools are then used to remove any excess matrix from the bottom of the block and a plaster and burlap cap is constructed on the inverted side using the same methods described above. When all layers of plaster are dry and hard, the completed plaster jacket is then labeled with a field number and north arrow and removed from the field. Depending on the size, complexity, and number of plaster jackets, recovery may require several hours to several days to complete. The discovery of a concentration of large vertebrate fossils (e.g., a bone bed) would require more time (e.g., several days) for recovery.

4.2.2.4 Microfossil recovery

Many significant fossils often are too small to be readily visible in the field (e.g., small mammal teeth, fish otoliths, lizard limb bones), but are nonetheless significant and worthy of attention because of their potential to provide information concerning paleoenvironments, paleoclimates, and geologic age. If sedimentary horizons are observed that either contain micro-vertebrate fossils, or appear to have high potential to contain such fossils, these horizons shall be sampled by collecting bulk quantities of sedimentary matrix. These bulk matrix samples then undergo laboratory processing in order to isolate the microfossils, as outlined in Sections 4.3.1.2 and 4.3.1.3. Specific procedures for recovery of microfossils are described below. It should be emphasized that once a bulk matrix sample has been collected and removed from the Project site, construction activities can resume.

For micro-vertebrate fossils (e.g., small mammal, bird, reptile, amphibian, or fish remains) guidelines developed by the Society of Vertebrate Paleontology (SVP, 2010) define an adequate sample as comprising "…4.0 cubic meters (6,000 lbs. or 2,500 kg) of matrix for each site, horizon or paleosol." However, the "uniqueness of the micro-vertebrate fossils recovered may justify screen washing even larger amounts," as determined by the Project Paleontologist. It is understood that conditions in the field may be such that recovery of 6,000 lbs. matrix samples is not possible, and a smaller matrix sample may be warranted at the discretion of the Project Paleontologist. Ideally, micro-vertebrate fossil sites will occur within a layered sequence of strata from which several successive strata may yield individual micro-vertebrate fossil horizons. A maximum of one bulk matrix sample per fossil horizon shall be collected. This sample shall be assumed to contain a representative assemblage of fossils preserved in that fossil horizon. For each sample collected, it is recommended that a 200 lb. (90 kg) subsample be initially processed to determine the fossil productivity of the larger sample. Generally, if five or more complete mammal teeth are recovered from the subsample, the remainder of the sample should be processed. If fewer teeth are recovered, processing should cease.

There is also the possibility that sites may be discovered that preserve the fossil remains of micro-invertebrate organisms (e.g., ostracods, diatoms, micro-gastropods, and micro-bivalves). When micro-invertebrate sites are discovered they initially should be evaluated in terms of fossil preservation, specimen abundance, and taxonomic diversity to determine the level of sampling. For sites with good preservation and high abundance and diversity, an adequate sample would comprise 0.1 cubic meters (50 lbs. or 23 kg) of matrix from each fossil horizon. For micro-invertebrate sites with less than good preservation and relatively low abundance and diversity, an adequate sample would comprise 0.2 cubic meters (100 lbs. or 45 kg) of matrix from each fossil horizon. As with micro-vertebrate sites, micro-invertebrate sites ideally should occur within a layered sequence of strata from which several successive strata may yield individual micro-invertebrate fossil horizons. A maximum of one matrix sample per fossil horizon shall be collected.

4.2.2.5 Paleobotanical fossil recovery

Paleobotanical specimens typically occur in fine-grained, laminated strata and will require special recovery techniques. When fossil plant sites are discovered, they initially should be evaluated in terms of fossil preservation, specimen abundance, and taxonomic diversity to determine the level of sampling. For sites with well-preserved and relatively complete leaves, an adequate sample would aim to recover at least 20 specimens of each recognized leaf type (species or morphotypes). Large blocks (>2 feet in diameter) of sedimentary rock typically can be hand quarried from the temporary outcrop and then split along bedding planes to reveal compressed fossil plant material (e.g., leaves, stems, and flowers). Individual slabs are then wrapped in tissue paper or newsprint to minimize destruction of the fossils during desiccation. In some cases, specimens that are delaminating or flaking may need to be coated with special consolidants (e.g., Vinac or Butvar). It should be emphasized that once an adequate sample has been collected and removed from a paleobotanical discovery site, construction activities can resume. Suggested procedures for laboratory processing of fossil plant material are described below in Section 4.3.1.4.

4.2.2.6 Time required for fossil recovery

The vast majority of fossil salvages can be accomplished relatively quickly, requiring a few minutes to a few hours of focused recovery work to complete. However, recovery of large vertebrate fossils or concentrations of vertebrate fossils may require several days to weeks to complete. In many cases, fossil recovery may be expedited through the temporary use of one-site heavy equipment to remove sedimentary overburden, collect bulk matrix samples, and/or lift plaster jackets. It should also be emphasized that avoiding or minimizing construction delays can be achieved by diverting earthwork operations to other areas of the Project site while fossil recovery work is under way.

4.3 Post-Construction

In the event fossils are discovered and salvaged, the fossils shall be prepared, identified, catalogued, and stored in a recognized professional repository and a final monitoring and mitigation report written that summarizes the results of pre-construction, during-construction, and post-construction activities (if applicable) and findings. If no fossils are salvaged over the course of monitoring, an abbreviated final monitoring and mitigation report shall be prepared.

4.3.1 Fossil Preparation

Fossil remains collected during the monitoring and salvage portion of the Project will be cleaned, repaired, and/or screenwashed as described below. Fossil preparation shall follow the standards of the designated repository. Prior to commencement of work, an estimate of fossil preparation costs should be developed based on number and type of specimens, preparation labor rates, and preparation supply needs.

4.3.1.1 Specimen preparation

Preparation of fossil specimens will involve removal of extraneous and concealing sedimentary matrix from specimens using various mechanical methods including pneumatic air scribes, micro-sandblasters, and simple hand tools (hammers, chisels, X-acto knives, brushes, dental picks, and pin vises). Fossil preparation will also involve consolidation of weak or porous specimens by the application of specialized media including polyvinyl acetate resins (e.g., Vinac), acrylic resins (e.g., Acryloid), or polyvinyl butyral resins (e.g., Butvar). Repair of broken/damaged specimens will require the use of various adhesives including cyanoacrylate glues (e.g., Zap) polyvinyl acetate emulsions (e.g., carpenter's glue), and polyvinyl butyral resins (e.g., Butvar).

4.3.1.2 Screenwashing

Recovery of micro-vertebrate fossils will be accomplished by screenwashing bulk samples of fossil-bearing sedimentary matrix. The process begins by breaking large blocks into 2–3 cm cubes to facilitate air-drying of the matrix. Once dry, the matrix is placed into water-filled 5-gallon plastic buckets to soak for no less than 15 minutes with stirring. The slurry is then poured onto nested 20 (0.84 mm openings) and 30 (0.59 mm) mesh stainless steel screens placed in water-filled troughs. Manual agitation of the screens forces the fine clays and silts through the mesh and concentrates the coarser sand and fossil material on the screens. The screens are then placed at a tilt facing the sun to dry. Once dry, the coarse concentrate is transferred into plastic sample bags and labeled with all pertinent site locality data.

4.3.1.3 Heavy liquid floatation

Screenwashed concentrates can be further concentrated by the use of heavy liquids (e.g., zinc bromide and/or tetrabromoethane) to concentrate particles of equal density. Generally, fossil bones and teeth sink along with heavy mineral grains (e.g., magnetite) while lighter quartz and feldspar mineral grains float. This separation process produces a very rich concentration of fossil remains, typically isolated teeth of small mammals (e.g., rodents).

4.3.1.4 Paleobotanical preparation

Preparation of plant fossils will involve first splitting slabs of mudstone/siltstone matrix along laminations to reveal individual or composite leaf impressions. Any remaining matrix still obscuring the impressions will then be removed with X-acto knives. The exposed impressions may require stabilization with specialized media (e.g., Vinac or Butvar).

4.3.2 Fossil Curation

Following preparation of salvaged fossil remains the specimens will be sorted/picked, identified, and catalogued as described below. Fossil curation shall follow the standards of the designated repository. Prior to commencement of work, an estimate of fossil curation costs should be developed based on number and type of specimens, curation labor rates, and curation supply needs.

4.3.2.1 Sorting/picking

Fossils require sorting/picking to group together specimens of the same taxon (e.g., species and/or genus) into individual taxon lots.

4.3.2.2 Identification

Once sorted, individual taxon lots will then be identified to the lowest taxonomic level practical (e.g., family, genus, and/or species).

4.3.2.3 Cataloguing

Sorted and identified specimens are then assigned unique specimen catalogue numbers and entered into an electronic catalogue database. A specimen number may represent a single fossil specimen or a batch of specimens belonging to a single species. Catalogue numbers are written on individual specimens using India ink on a patch of white acrylic paint. Curation also involves placement of taxon lots into archival specimen trays with labels containing relevant taxonomic, geologic, and geographic information.

4.3.2.4 Locality data

Formal descriptions of fossil collection locality records, including geographic, geologic, taphonomic, and collection data, need to be compiled and stored electronically with the specimen catalogue data.

4.3.3 Fossil Storage

Prepared fossils will be professionally curated and adequately stored in the designated repository. Adequate storage shall include conservation of specimens in a stable environment away from flammable liquids, corrosive chemicals, organic materials subject to mildew, and sources of potential water damage. Typically, this is accomplished by placing curated specimens in archival quality, steel drawers and cabinets, which are housed in climate-controlled collection rooms. Specimens shall be available for study by future researchers, students, and citizen scientists, and thus shall be stored in a fashion that allows for retrieval of individual specimens and associated collection data. Specimen storage should be accompanied by supporting data (e.g., field notes, GPS data, photographs, geologic maps, stratigraphic reports), and fossil preparation data (e.g., description of preparation techniques and materials used for individual specimens).

The contracted repository may charge reasonable costs associated with curation and specimen storage. Such costs may include necessary curatorial supplies (e.g., archival specimen trays, glass vials, foam), as well as a one-time fee for initial specimen storage, which is generally calculated based on the actual or prorated purchase price of steel drawers and cabinets, and a prorated cubic foot volume charge for the collection room.

4.3.4 Final Monitoring and Mitigation Report

A final monitoring and mitigation report will be completed that presents the results of the monitoring and mitigation program. If fossils are recovered, the report will include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of the recovered fossils relative to the research themes and questions. A complete inventory of salvaged, prepared, and curated fossils will be included. If no fossils are recovered, an abbreviated technical report that summarizes the field methods used and stratigraphy exposed will be completed. The final report will be submitted to SDG&E, who will provide the final report to the CPUC Project Manager.

5.0 References

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Appendix A

Table and map book of paleontological monitoring requirements for the Project.

Segment	Loc	Structure ID	Proposed Work	Paleo Monitoring Requirements
Segment 1		Deepwell 1	Install deep well and SSD	Adaptive monitoring required for mud rotary drill excavation of well; full-time monitoring required for trenching
Segment 1		Deepwell 3	Install deep well and SSD	Adaptive monitoring required for mud rotary drill excavation of well; full-time monitoring required for trenching
Segment 1		Deepwell 5	Install deep well and SSD	Adaptive monitoring required for mud rotary drill excavation of well; full-time monitoring required for trenching
Segment 1		Deepwell 7	Install deep well and SSD	Adaptive monitoring required for mud rotary drill excavation of well; full-time monitoring required for trenching
Segment 1		Deepwell 11	Install deep well and SSD	Adaptive monitoring required for mud rotary drill excavation of well; full-time monitoring required for trenching
Segment 1		Coupon Test Station 1	Install coupon test station	Full-time monitoring required at all depths
Segment 1		Coupon Test Station 2	Install coupon test station	Full-time monitoring required at all depths
Segment 1		Coupon Test Station 3	Install coupon test station	Monitoring not recommended
Segment 1	1	TL6975 RACK	Rack	Monitoring not recommended
Segment 1	2	TL680 RACK	Rack	Monitoring not recommended
Segment 1	3	Z519522	Replace existing with pier foundation	Full-time monitoring required at depths >10 ft
Segment 1	4	Z114429	Replace existing with pier foundation	Full-time monitoring required at depths >10 ft
Segment 1	5	P205611S	Replace existing with direct bury	Full-time monitoring required at depths >10 ft
Segment 1	6	Z114430	Replace existing with direct bury	Full-time monitoring required at depths >10 ft
Segment 1	7	Z10567	Replace existing with pier foundation	Full-time monitoring required at depths >10 ft
Segment 1	8	Z817834	Replace existing with pier foundation	Full-time monitoring required at depths >10 ft
Segment 1	9	P819121	Overhead work	Monitoring not recommended
Segment 1	9.1	P253959	Overhead work	Monitoring not recommended
Segment 1	10	Z208017S	Remove from service	Monitoring not recommended

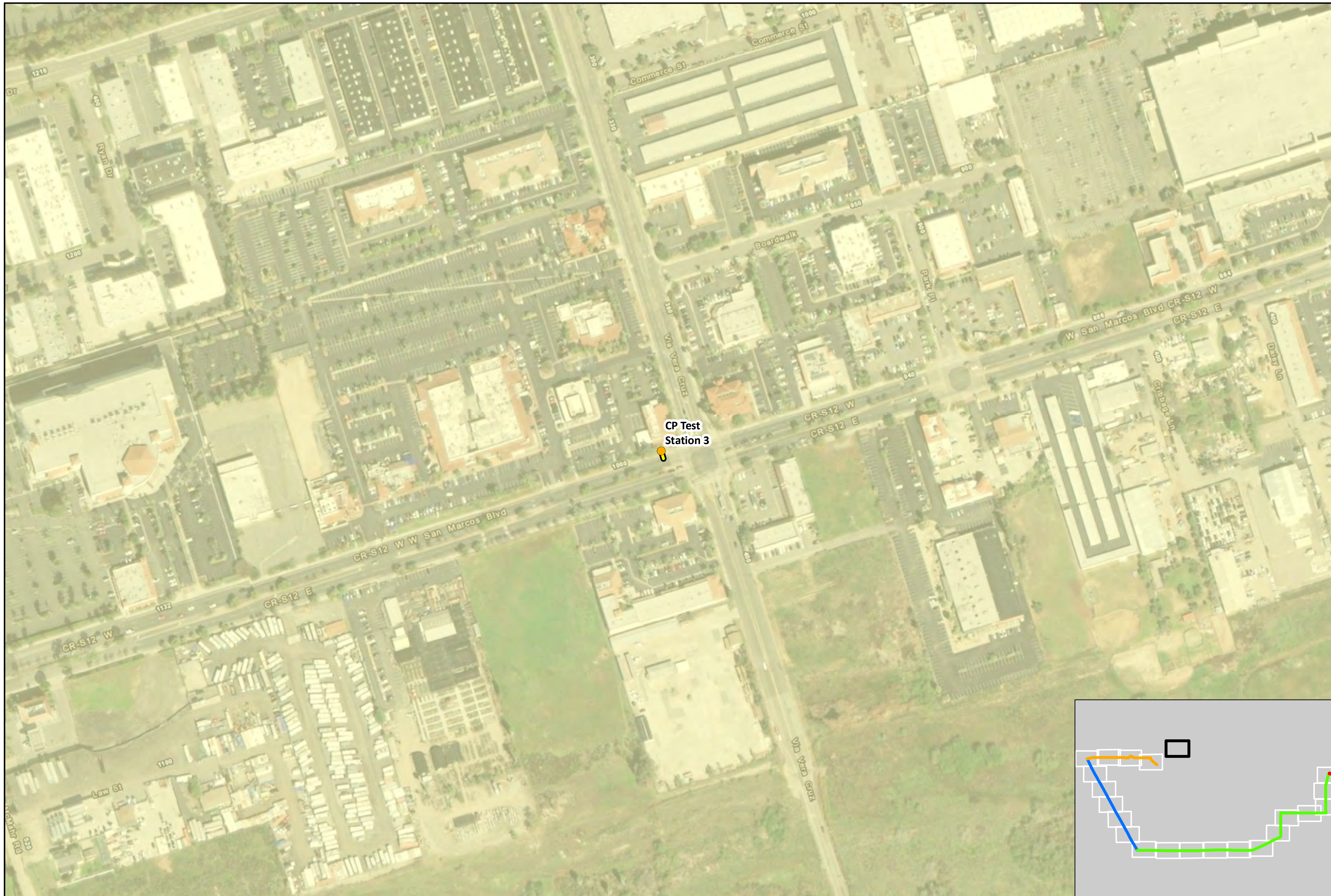
Segment 1	11	Z114431	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	12	Z815638	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	13	Z815639	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	14	Z815640	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	15	Z815641	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	16	Z815642	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	17	P205612	Remove from service	Monitoring not recommended
Segment 1	18	Z815643	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	19	Z815644	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	20	Z815645	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	21	Z815955	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	22	Z815956	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	23	P208014	Remove from service	Monitoring not recommended
Segment 1	24	P208015	Remove from service	Monitoring not recommended
Segment 1	25	Z815952	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	26	P114440	Remove from service	Monitoring not recommended
Segment 1	27	Z114441	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	28	Z114442	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	29	Z114443	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	30	Z114444	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	31	Z114445	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	32	Z114446	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	33	Z114447	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	34	P227423J	Remove from service	Monitoring not recommended
Segment 1	35	Z114448	Replace existing with pier foundation	Full-time monitoring required at all depths

Segment 1	36	Z114449	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	37	Z100993	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	38	Z208013	Overhead work	Monitoring not recommended
Segment 1	39	Z114450	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	40	Z114451	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	41	1025106H	Overhead work	Monitoring not recommended
Segment 1	42	Z100992	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	43	Z114452	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	44	P208012	Overhead work	Monitoring not recommended
Segment 1	45	Z114453	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	46	Z208011S	Overhead work	Monitoring not recommended
Segment 1	47	Z114454	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 1	48	Z208010S	Remove from service	Monitoring not recommended
Segment 1	49	Z114455	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	50	Z208009S	Remove from service	Monitoring not recommended
Segment 1	51	Z114456	Replace existing with pier foundation	Full-time monitoring required at all depths
Segment 1	52	P208007	Remove from service	Monitoring not recommended
Segment 1	53	P208008	Remove from service	Monitoring not recommended
Segment 1	54	Z100991	Replace existing with direct bury	Full-time monitoring required at all depths
Segment 2	55	Z100268	New pier foundation	Full-time monitoring required at all depths
Segment 2	56	Z100269	New pier foundation	Monitoring not recommended
Segment 2	57	Z100270	New pier foundation	Monitoring not recommended
Segment 2	58	Z100271	New direct bury	Monitoring not recommended
Segment 2	59	Z100272	New pier foundation	Monitoring not recommended
Segment 2	60	Z100273	New pier foundation	Monitoring not recommended

Segment 2	61	Z100274	New direct bury	Monitoring not recommended
Segment 2	62	Z100275	New pier foundation	Monitoring not recommended
Segment 2	63	Z100276	New pier foundation	Monitoring not recommended
Segment 2	64	Z100277	New pier foundation	Monitoring not recommended
Segment 2	65	Z100278	New pier foundation	Monitoring not recommended
Segment 2	66	Z100279	New direct bury	Monitoring not recommended
Segment 2	67	Z100280	New direct bury	Monitoring not recommended
Segment 2	68	Z100281	New direct bury	Monitoring not recommended
Segment 2	69	Z100282	New pier foundation	Monitoring not recommended
Segment 2	70	Z100283	New pier foundation	Monitoring not recommended
Segment 2	71	Z119772	Overhead work	Monitoring not recommended
Segment 3	72	Z119773	Overhead work	Monitoring not recommended
Segment 3	73	Z414906	Overhead work	Monitoring not recommended
Segment 3	74	Z100284	Replace existing with pier foundation	Monitoring not recommended
Segment 3	75	Z101768	Remove from service	Monitoring not recommended
Segment 3	76	Z200897	Overhead work	Monitoring not recommended
Segment 3	77	P254291	Replace existing with pier foundation	Monitoring not recommended
Segment 3	78	P254289	Replace existing with direct bury	Monitoring not recommended
Segment 3	79	P168851	Overhead work and anchor work	Monitoring not recommended
Segment 3	80	Z414907	Overhead work	Monitoring not recommended
Segment 3	81	Z414908	Overhead work	Monitoring not recommended
Segment 3	82	Z414909	Overhead work	Monitoring not recommended
Segment 3	83	z414910	Overhead work	Monitoring not recommended
Segment 3	84	Z414911	Overhead work	Monitoring not recommended
Segment 3	85	Z414912	Overhead work	Monitoring not recommended

Segment 3	86	Z414913	Overhead work	Monitoring not recommended
Segment 3	87	Z414914	Overhead work	Monitoring not recommended
Segment 3	88	Z414915	Overhead work	Monitoring not recommended
Segment 3	89	Z414916	Overhead work	Monitoring not recommended
Segment 3	90	Z414917	Overhead work	Monitoring not recommended
Segment 3	91	Z414918	Overhead work	Monitoring not recommended
Segment 3	92	Z414919	Overhead work	Monitoring not recommended
Segment 3	93	Z414920	Overhead work	Monitoring not recommended
Segment 3	94	Z414921	Overhead work	Monitoring not recommended
Segment 3	95	Z414922	Overhead work	Monitoring not recommended
Segment 3	96	Z414923	Overhead work	Monitoring not recommended
Segment 3	97	Z414924	Overhead work	Monitoring not recommended
Segment 3	98	Z414925	Overhead work	Monitoring not recommended
Segment 3	99	Z250083	Overhead work	Monitoring not recommended
Segment 3	100	Z414926	Overhead work	Monitoring not recommended
Segment 3	101	Z414927	Overhead work	Monitoring not recommended
Segment 3	102	Z414928	Overhead work	Monitoring not recommended
Segment 3	103	Z414929	Overhead work	Monitoring not recommended
Segment 3	104	Z414930	Overhead work	Monitoring not recommended
Segment 3	105	Z414931	Overhead work	Monitoring not recommended
Segment 3	106	Z414932	Overhead work	Monitoring not recommended
Segment 3	107	Z414933	Overhead work	Monitoring not recommended
Segment 3	108	Z414934	Overhead work	Monitoring not recommended
Segment 3	109	Z202016	Existing structure / re-energize conductors	Monitoring not recommended
Segment 3	110	Z202017	Existing structure / re-energize conductors	Monitoring not recommended

Segment 3	111	Z202018	Existing structure / re-energize conductors	Monitoring not recommended
Segment 3	112	Z202019	Existing structure / re-energize conductors	Monitoring not recommended
Segment 3	113	Z202020	Existing structure / re-energize conductors	Monitoring not recommended
Segment 3	114	Z202116	Overhead work	Monitoring not recommended
Segment 3	115	TL6975 RACK	Rack	Monitoring not recommended
Segment 3	116	TL689 BAY 12	Rack	Monitoring not recommended
Segment 3	117	Z184825	Remove from service	Monitoring not recommended
Segment 3	118	Z257431	New pier foundation	Monitoring not recommended
Segment 3	119	Z362570	Remove from service	Monitoring not recommended
Segment 3	120	Z248572S	Remove from service	Monitoring not recommended
Segment 3	121	Z618839	Remove from service	Monitoring not recommended
Segment 3	122	TL6934 BAY 13	Rack	Monitoring not recommended
Segment 3	123	TL6908 BAY 16	Rack	Monitoring not recommended
Segment 3	124	TL696 BAY 18	Rack	Monitoring not recommended
Segment 3	125	Z257432	New pier foundation	Monitoring not recommended
Segment 3	126	Z618840	Remove from service	Monitoring not recommended
Segment 3	127	Z718523	Overhead work	Monitoring not recommended
Segment 3	128	Z718524	Overhead work and anchor work	Monitoring not recommended
Segment 3	130	Z101769	Remove from service	Monitoring not recommended
Segment 3	131	P249868	Remove from service	Monitoring not recommended
Segment 3	132	P181373	Remove from service	Monitoring not recommended
Substation Work		San Marcos Substation	Construction of new circuit breaker pad, seven concrete piers, and A-frame	Full-time monitoring required at depths >10 ft
Substation Work		Escondido Substation	Construction of new circuit breaker pad, and new steel poles, guys, and anchors	Monitoring not recommended



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PALEOSERVICES
SAN DIEGO NATURAL HISTORY MUSEUM

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SDG&E TL6975 San Marcos to Escondido 69kV
San Diego County, California

0 1,000
Approximate Scale in Feet

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Sources: Geology, Kennedy and Tan, 2007
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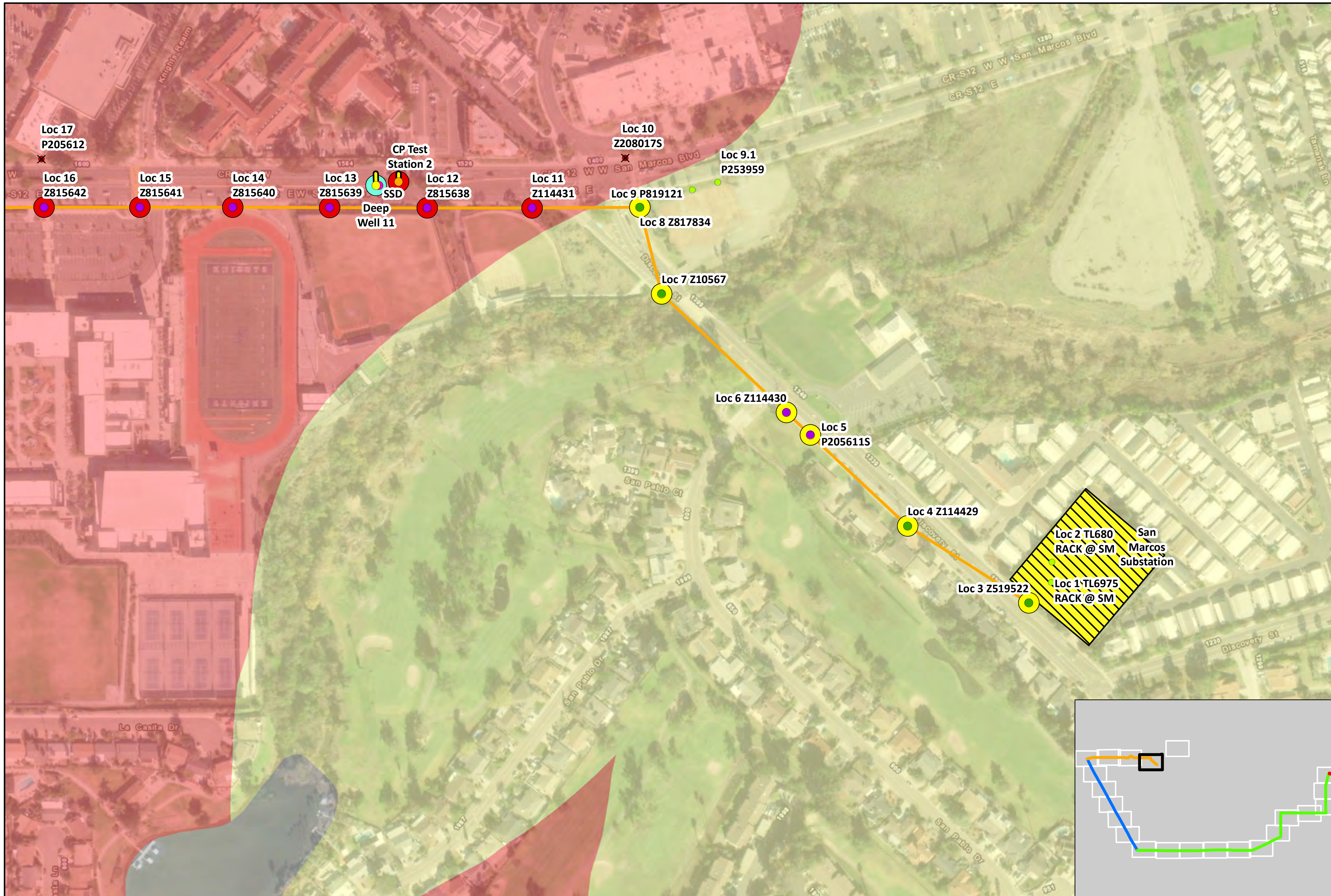

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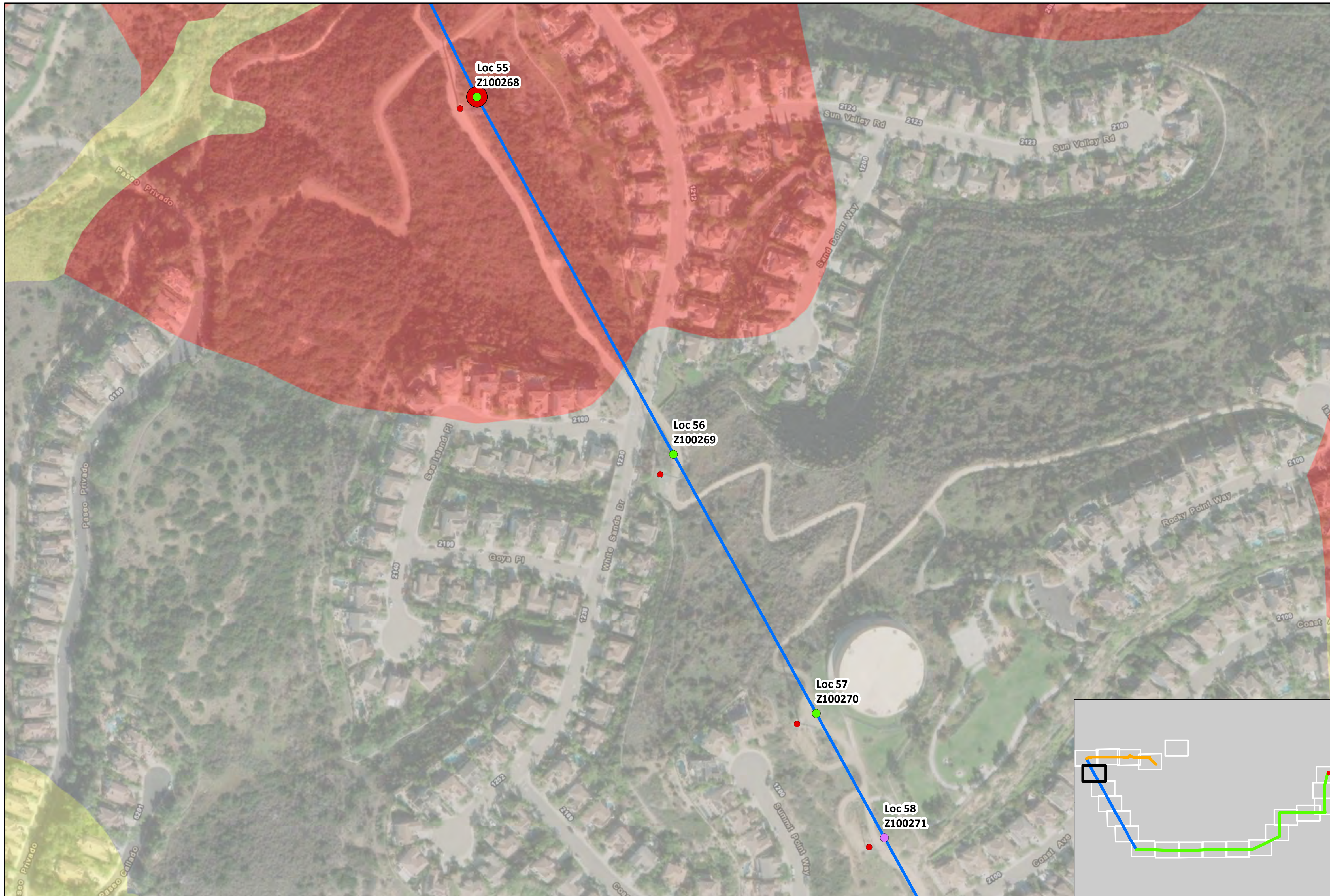

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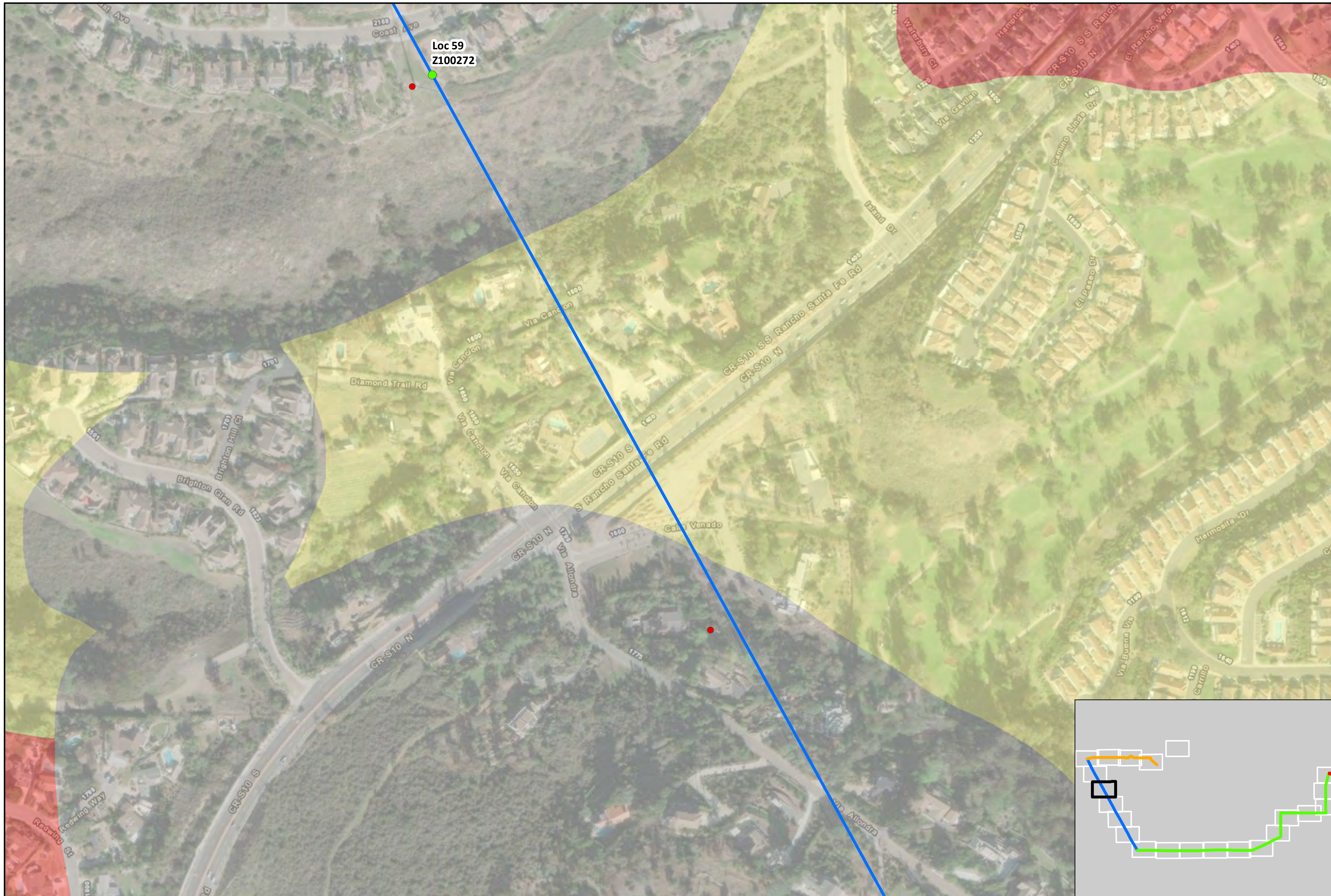

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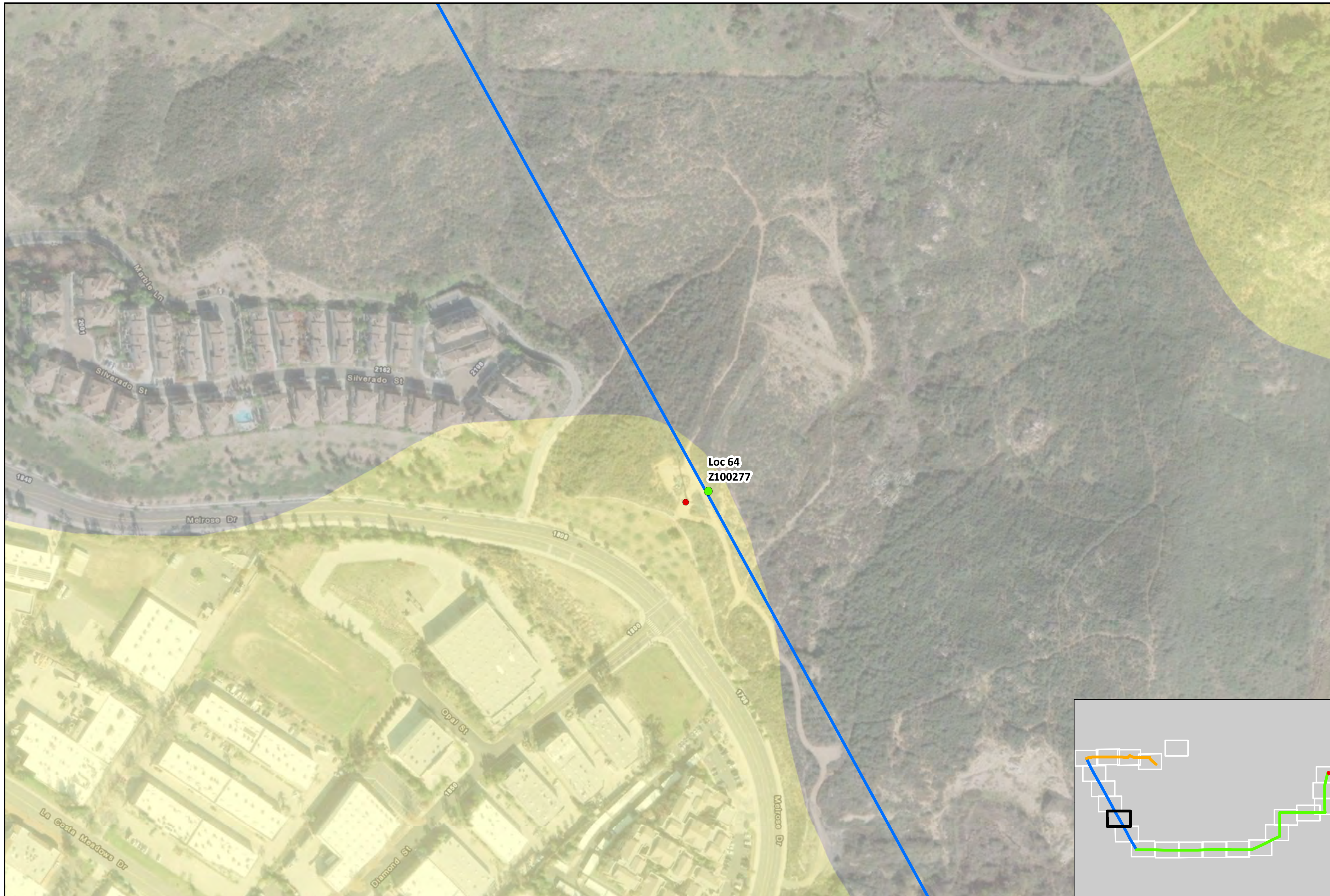

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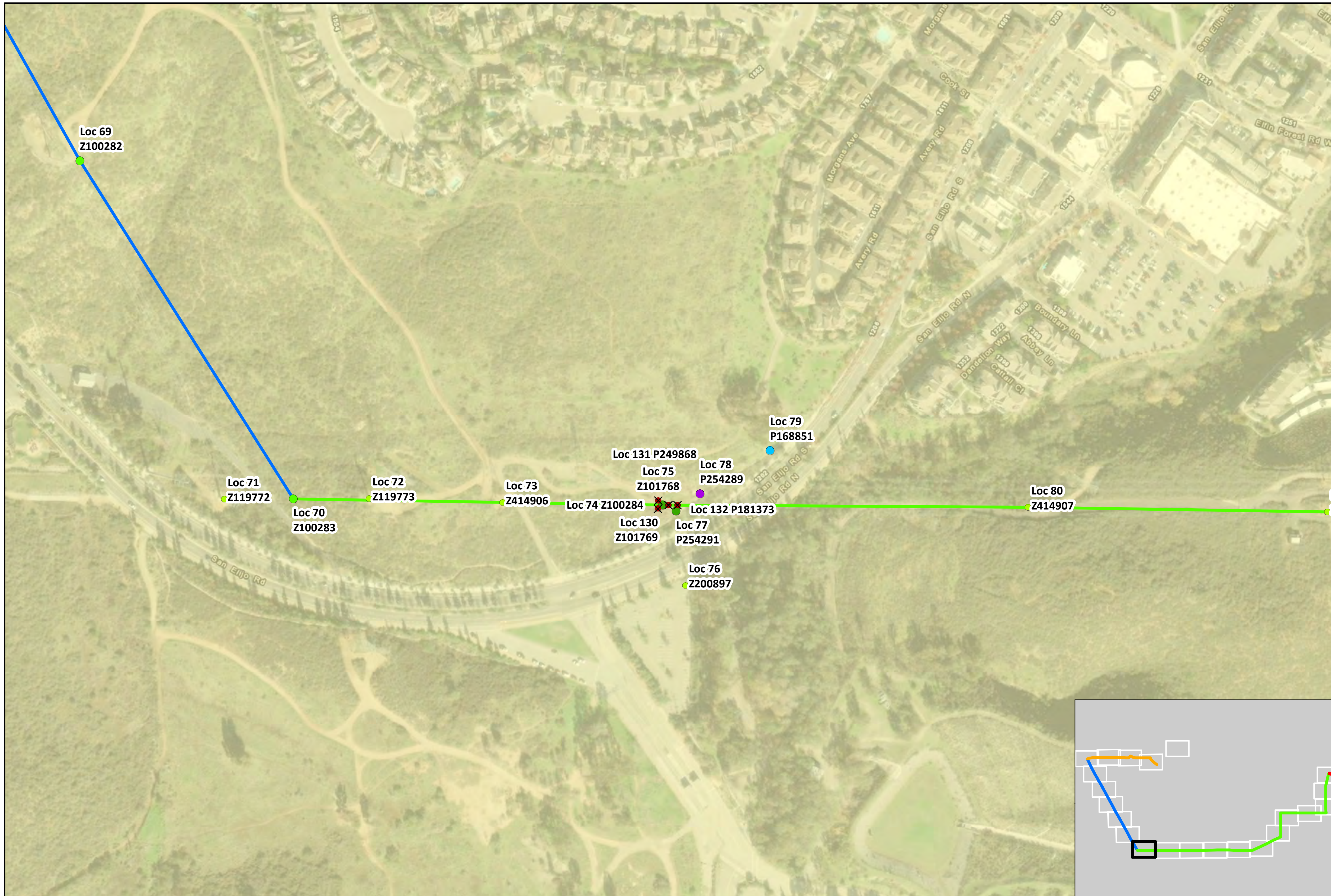

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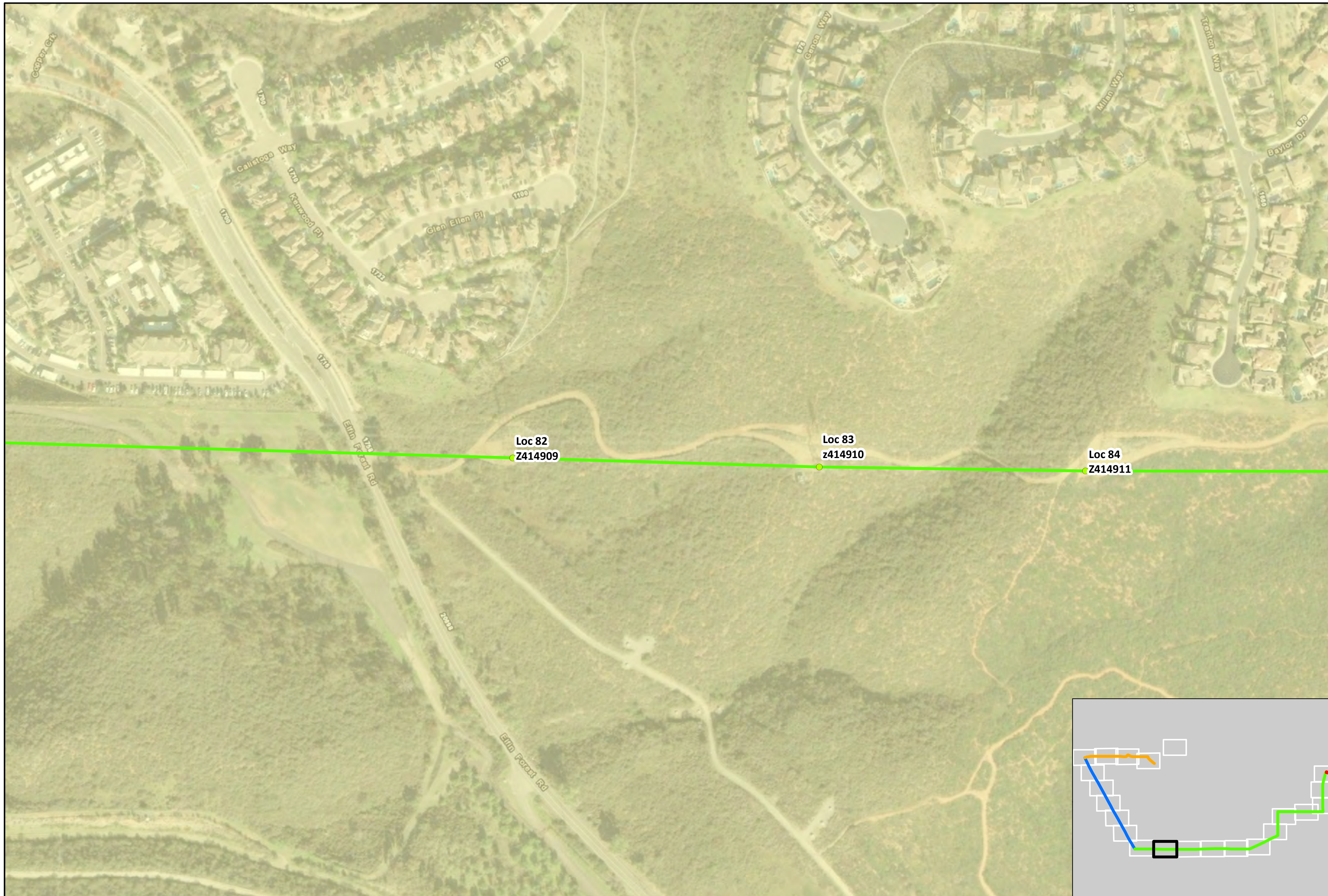

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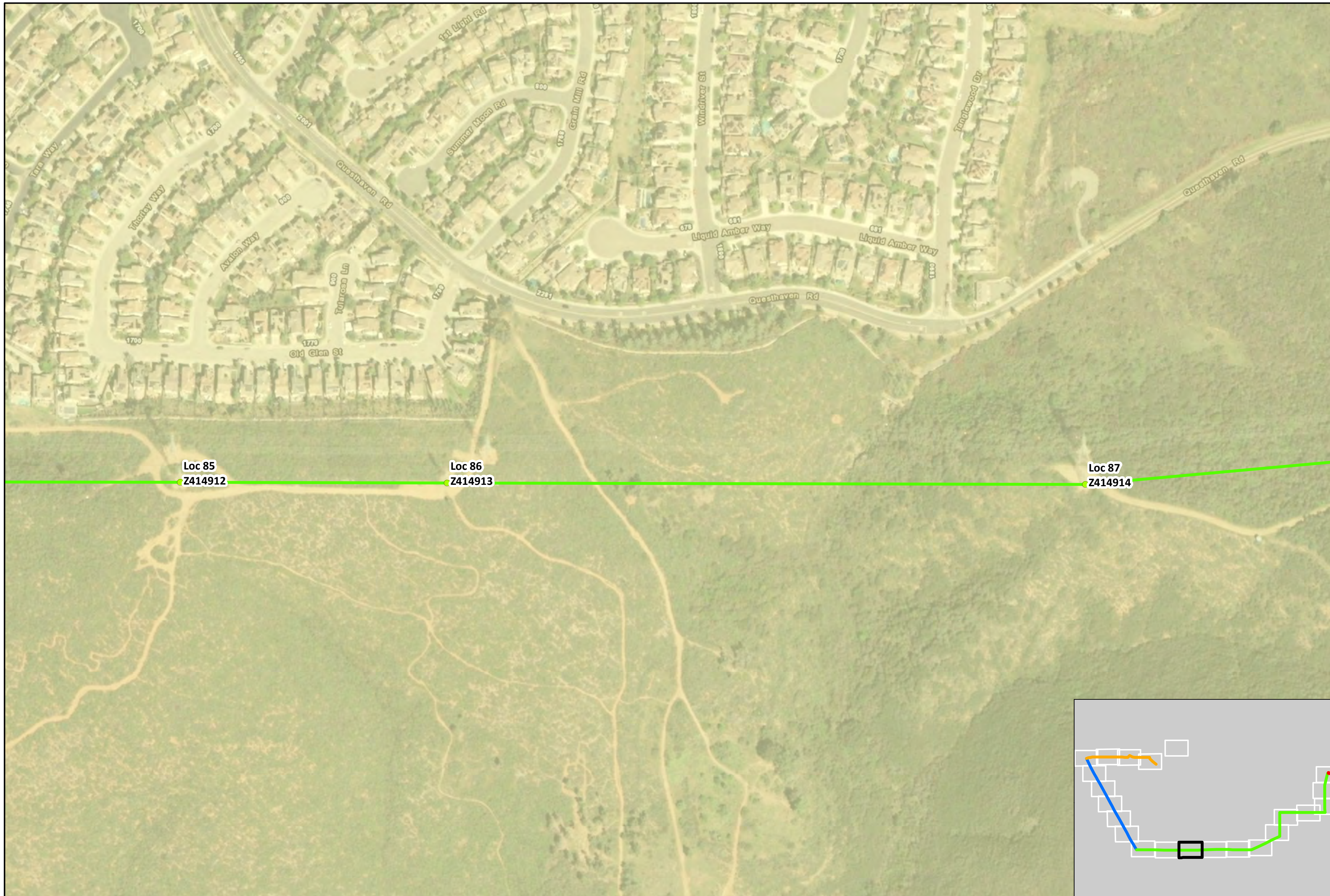

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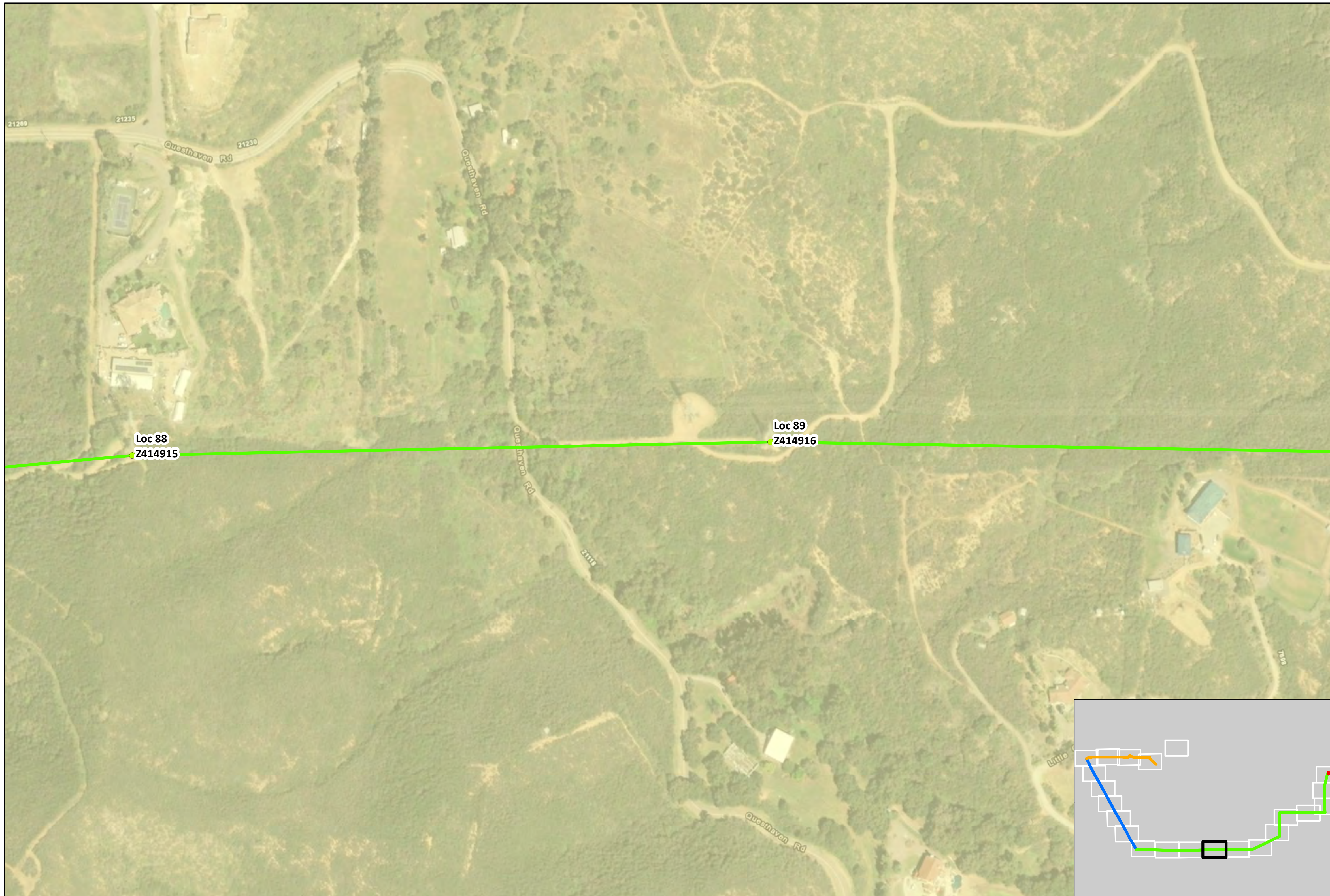

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- monitoring required at all depths
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Paleontological Potential Rating

- High potential
- Low potential
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Sources: Geology, Kennedy and Tan, 2007; World Imagery and World Transportation, Esri et al., 2020

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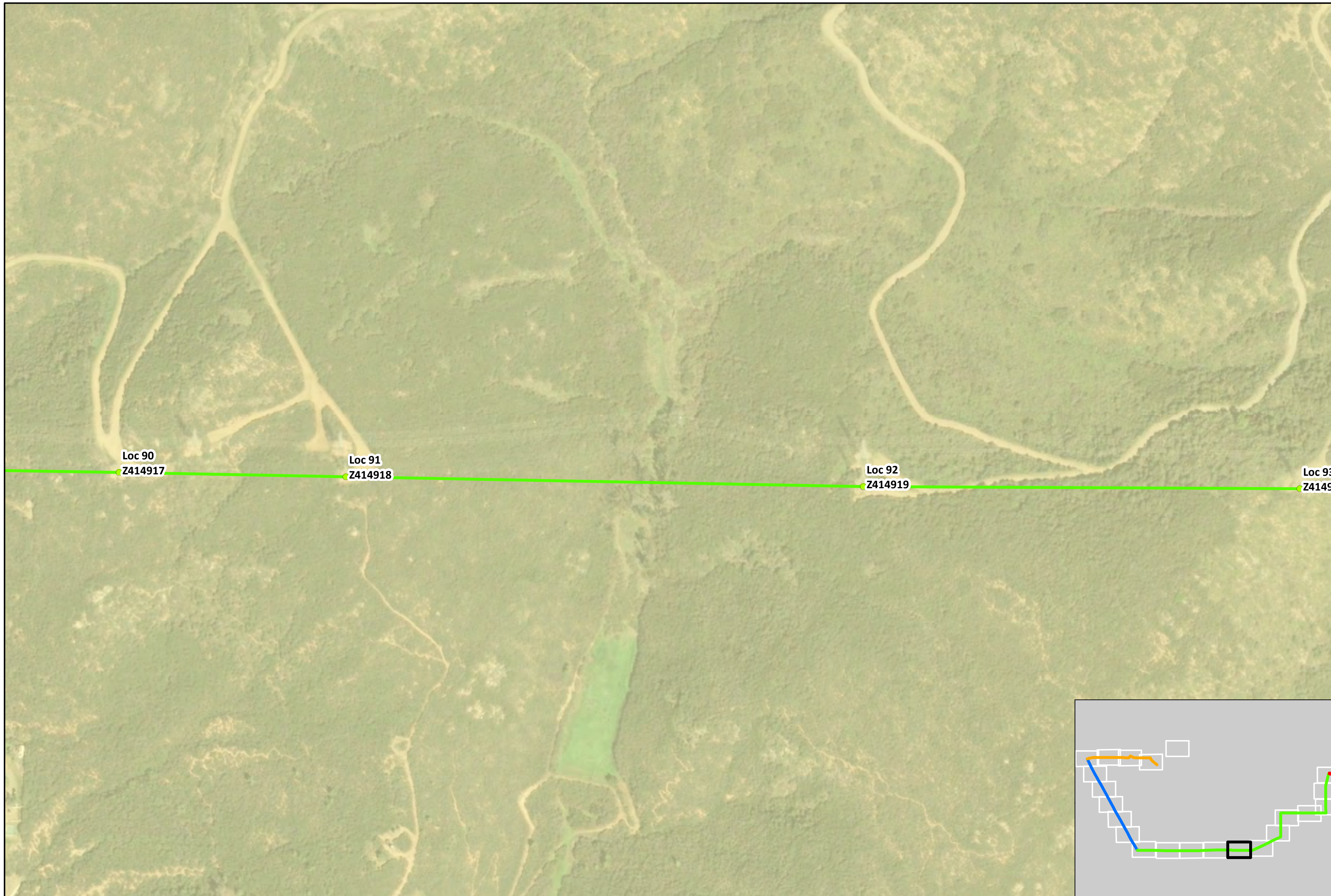
SAN DIEGO NATURAL HISTORY MUSEUM

Appendix A: Paleontological Potential Map with Project Components
SDG&E TL6975 San Marcos to Escondido 69kV
San Diego County, California

0 — 1,000
Approximate Scale in Feet

N



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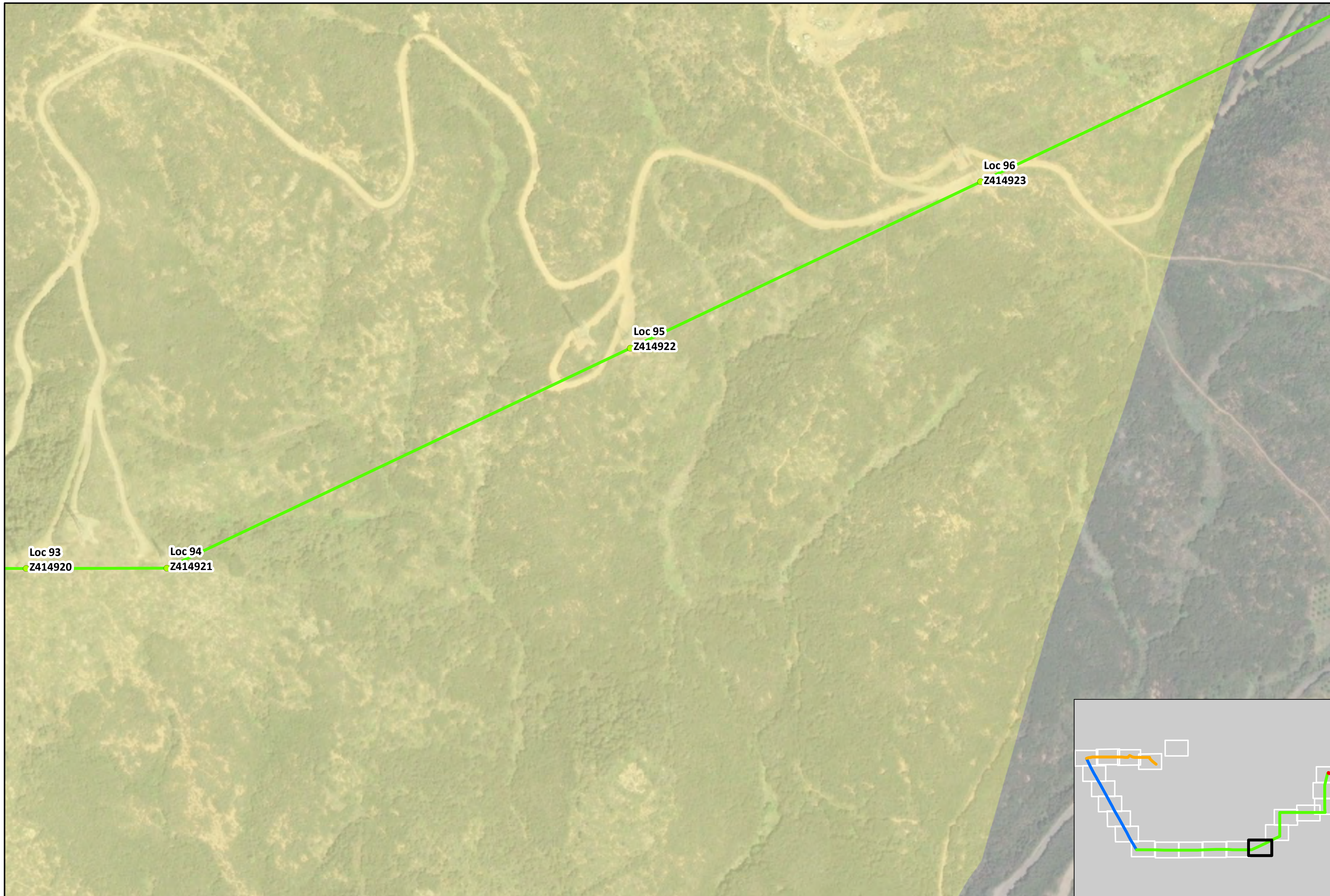

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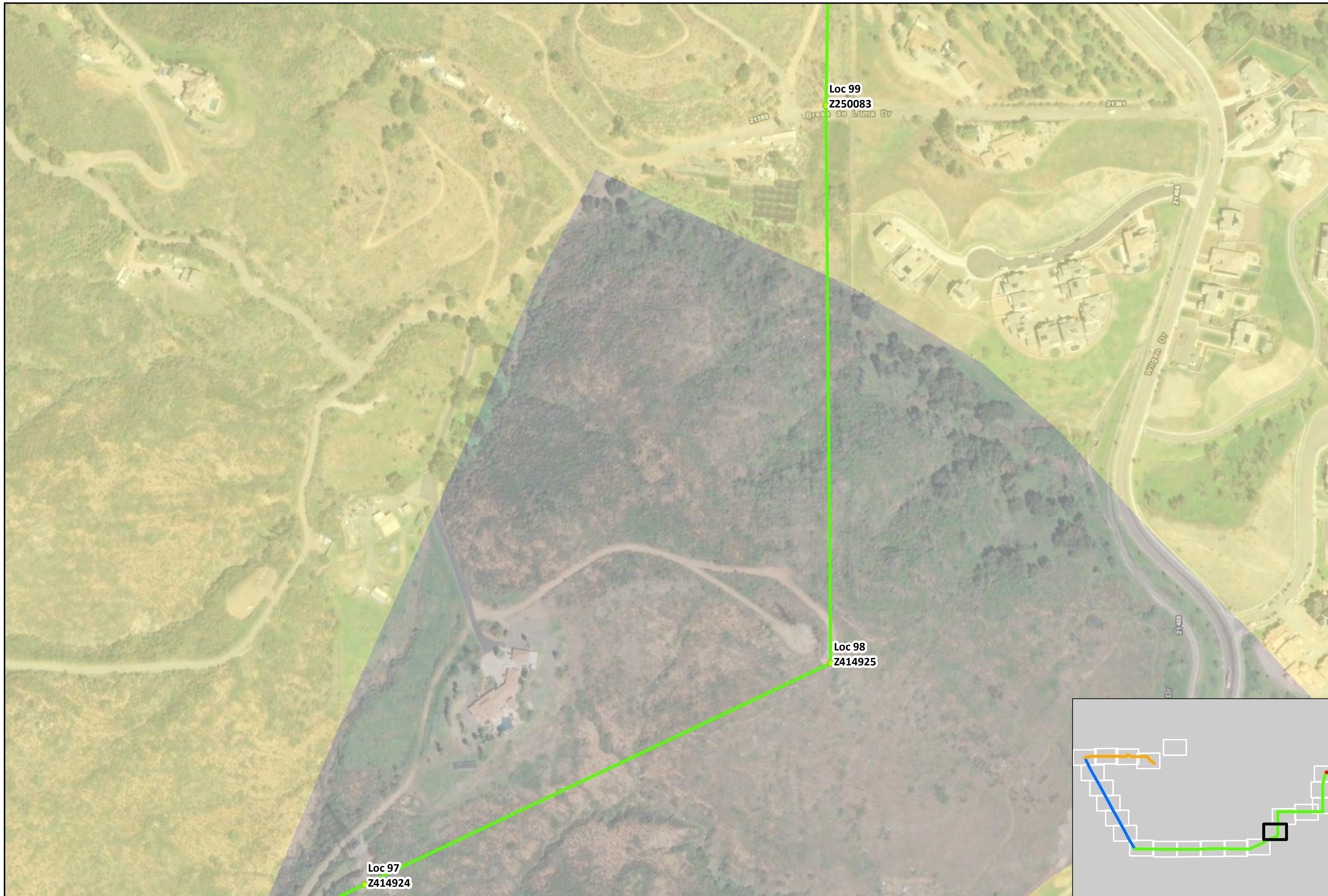

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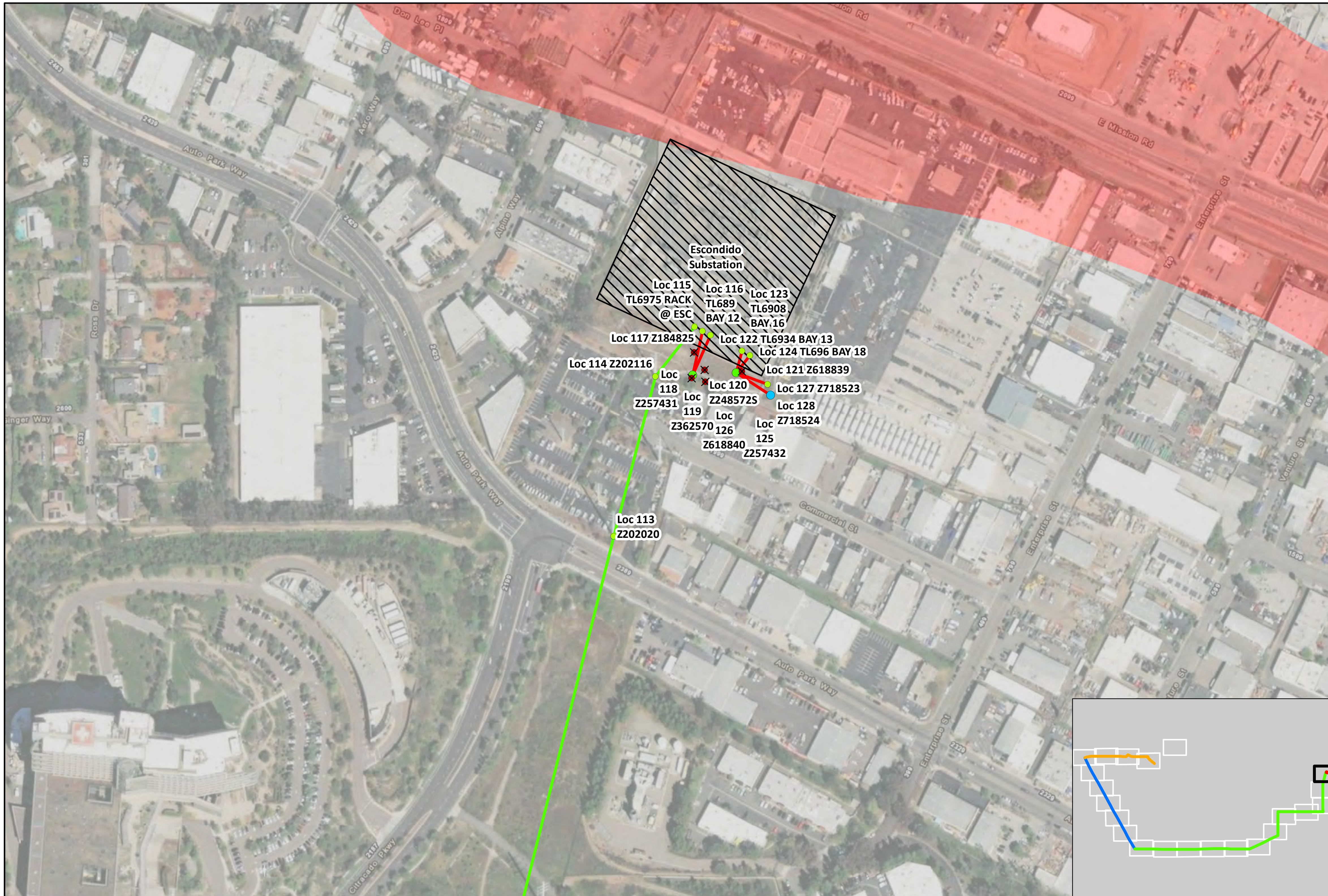

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