Paleontological Evaluation and Inventory Report

TRANSMISSION LINE RATING REMEDIATION LICENSING – CONTROL-SILVER PEAK 55 KV TRANSMISSION LINE PROJECT

Southern California Edison Company

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PSI Report: CA19InyoMonoARC01R

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1.0 EXECUTIVE SUMMARY

This report presents the results of the paleontological technical study conducted by Paleo Solutions, Inc. (Paleo Solutions) in support of the Southern California Edison Company (SCE) Transmission Line Rating Remediation Licensing (TLRR) – Control-Silver Peak 55 Kilovolt (kV) Transmission Line Project (TLRR Control Silver Peak Project) located in Inyo and Mono counties, California. The TLRR – Control Silver Peak Project is located on land managed by the Bureau of Land Management (BLM) Bishop and Ridgecrest Field Offices, United States Forest Service (USFS) Inyo National Forest, and Los Angeles Department of Water and Power (LADWP); and private lands. This work was required by the BLM to fulfill their role as the lead agency. All paleontological work was completed in compliance with the National Environmental Policy Act (NEPA), the Federal Land Management and Policy Act (FLMPA), Paleontological Resources Preservation Act (PRPA), California Environmental Quality Act (CEQA), local regulations, and best practices in mitigation paleontology (Murphey et al., 2014). This report was prepared in accordance with BLM procedures (BLM Instruction Memorandum [IM] 2016-124 [2016] and BLM Manual and Handbook H-8270-1 [1998]). All paleontological work was conducted under California BLM Paleontological Use Permit CA-16-03P (expiration March 16, 2019); a BLM Fieldwork Authorization approved by the BLM Ridgecrest and Bishop Field Offices on October 11, 2018; and a USFS Paleontological Permit approved by the Inyo National Forest District Ranger on November 2, 2018.

The Project consists of reconstructing existing 55 kV subtransmission line elements. The purpose of the Project is to ensure compliance with the California Public Utilities Commission (CPUC) General Order (GO) 95 by remediating discrepancies identified through SCE's TLRR Program. The Project area consists of 104.4 linear miles of existing transmission lines and associated access roads. It is located north of and within the City of Bishop along US Highway 6, approximately six miles north of Chalfant Valley, approximately five miles southwest of the City of Bishop to the Control Substation along California Highway 168, approximately 25 miles across the White Mountains from the communities of Laws and Oasis, and approximately two miles north of Deep Springs College.

The Project area was evaluated based on an analysis of existing paleontological data and a paleontological field survey. The three components of the analysis included a geologic map review, a literature search, and two institutional record searches. Geologic mapping indicates that the Project is underlain by the Precambrian Deep Spring Formation and Wyman Formation; Precambrian to Cambrian Campito Formation and Reed Dolomite; Cambrian hornfels, Poleta Formation, Harkless Formation, Saline Valley Formation, Mule Spring Limestone and Emigrant Formation; Mesozoic igneous rocks; Cenozoic igneous rocks; Pliocene or Miocene unnamed sedimentary deposits; Pleistocene Bishop Tuff and older Quaternary alluvial deposits; and younger Quaternary (Holocene) deposits (Bateman, 1964; Crowder and Sheridan, 1972; McKee and Nelson, 1967; Nelson, 1966; see Appendix A). According to the record searches, there are no previously recorded fossil localities within the Project area or vicinity; however, there are several fossil localities recorded from sedimentary deposits similar to those that occur within the Project area (Finger, 2017; McLeod, 2018; see Appendix B).

The Potential Fossil Yield Classification (PFYC) system was applied to the results of the analysis of existing data. No significant fossils have been recorded from the Precambrian Wyman Formation, Precambrian or Cambrian Reed Dolomite, or Pleistocene Bishop Tuff; and they are therefore assigned a low paleontological potential (PFYC 2). Scientifically significant invertebrate fossils have been recovered from the Precambrian Deep Spring Formation, Precambrian to Cambrian Campito Formation, and Cambrian Saline Valley, Mule Spring Limestone, and Emigrant formations; therefore, they are assigned a moderate paleontological potential (PFYC 3). The Cambrian Poleta Formation is considered to have an undetermined potential (PFYC U) where undivided, moderate potential (PFYC 3) in the upper and lower members, and high potential (PFYC 4) in the middle member based on the abundance and quality of the invertebrate fossils reported from each member. Due to the diversity and excellent preservation of important Cambrian invertebrates, the Harkless

Formation is considered to have high paleontological potential (PFYC 4). Cambrian hornfels and Mesozoic and Cenozoic igneous rocks, with the exception of tuff, have a very low paleontological potential (PFYC 1) due to the high heat and pressure under which they formed. The Cenozoic tuff has a low paleontological potential (PFYC 2) since fossils can be preserved in these sediment types, but none have been reported from tuff deposits in the Project vicinity. The paleontologic content of the unnamed Pliocene to Pleistocene sedimentary deposits are unknown since this unit has not been assigned to a specific formation, therefore, it has an unknown paleontological potential (PFYC U). Older Quaternary (Pleistocene) alluvial deposits are known to preserve significant vertebrate and invertebrate fossils and are assigned a moderate paleontological potential (PFYC 3). Quaternary younger (Holocene) sedimentary deposits are estimated to be less than 10,000 years old and have a low paleontological potential (PFYC 2), because they are typically too young to contain *in situ* fossils. However, these younger deposits often overlie older geologic units with higher paleontological potential, which may be impacted at shallow depth.

There is the potential for adverse impacts to scientifically significant paleontological resources during ground disturbance within the Precambrian Deep Spring Formation; Precambrian to Cambrian Campito Formation; Cambrian Poleta, Harkless, Saline Valley, Mule Spring Limestone, and Emigrant formations; unnamed Pliocene to Pleistocene sedimentary deposits; or older Quaternary (Pleistocene) alluvial deposits (PFYCs U, 3, and 4). Prior to the start of construction, a paleontological resource monitoring and mitigation plan (PRMMP) should be prepared. The PRMMP should provide detailed recommended monitoring locations including locations mapped as unknown, moderate, and high potential (PFYC U, 3, and 4); a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by paleontological monitors or other project personnel. A curation agreement with a BLM-approved repository should also be obtained. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist.

2.0 INTRODUCTION

This report presents the results of the paleontological technical study conducted by Paleo Solutions in support of the SCE TLRR Control Silver Peak Project located in Inyo and Mono counties, California. The TLRR – Control Silver Peak Project is located on land managed by the BLM Bishop and Ridgecrest Field Offices, USFS Inyo National Forest, and LADWP; and private lands. This work was required by the BLM to fulfill their role as the lead agency. All paleontological work was completed in compliance with NEPA, FLMPA, PRPA, CEQA, local regulations, and best practices in mitigation paleontology (Murphey et al., 2014). This report was prepared in accordance with BLM procedures (BLM IM 2016-124 [2016] and BLM Manual and Handbook H-8270-1 [1998]). All paleontological work was conducted under California BLM Paleontological Use Permit CA-16-03P (expiration March 16, 2019); a BLM Fieldwork Authorization approved by the BLM Ridgecrest and Bishop Field Offices on October 11, 2018; and a USFS Paleontological Permit approved by the Inyo National Forest District Ranger on November 2, 2018. A project summary is provided in Table 1.

2.1 Project Description

The Project consists of reconstructing existing 55 kV subtransmission line elements; no new substations would be constructed as part of the Proposed Project. The purpose of the Project is to ensure compliance with the CPUC GO 95 by remediating discrepancies identified through SCE's TLRR Program. The Project is not proposed to expand electrical service to areas not currently served by SCE or increase the capacity of the existing lines. The components of the Project include remediating identified discrepancies by:

- Rebuilding approximately 43 linear miles of the existing single-circuit Control-Silver Peak A 55 kV Subtransmission Line;
- Rebuilding approximately 43 linear miles of the existing single-circuit Control-Silver Peak C 55 kV Subtransmission Line;
- Rebuilding approximately 16 linear miles of the existing single-circuit Zack Tap; and
- Rebuilding approximately 2.4 linear miles of the existing single-circuit Deep Springs Tap.

For each of the subtransmission lines and taps to be rebuilt, existing wood poles and wood H-frames would be replaced with new lightweight steel (LWS) poles (or functional equivalent) and LWS H-frames (or functional equivalent) in the existing alignments. New conductor and a new overhead optical ground wire (OPGW) would be installed on the new poles and H-frames, and the existing poles and conductor would be removed.

2.2 Project Location

The Project is mapped on the USGS Bishop (1994), Blanco Mountain (1994), Chalfant Valley (1994), Chidago Canyon (1994), Chocolate Mountain (1988), Crooked Creek (1994), Fish Slough (1994), Laws (1994), Soldier Pass (1994), and Sylvania Canyon (2015) 7.5' Topographic Quadrangles. California 7.5 minute topographic quadrangles. The Project area consists of 104.4 linear miles of existing transmission lines and associated access roads. It is located north of and within the City of Bishop along US Highway 6, approximately six miles north of Chalfant Valley, approximately five miles southwest of the City of Bishop to the Control Substation along California Highway 168, approximately 25 miles across the White Mountains from the communities of Laws and Oasis, and approximately two miles north of Deep Springs College (see Figure 1). The terrain consists of the steep White Mountain Range and associated hills, alluvial fans and plains of low to moderate topographic relief, and active and inactive stream channels.

Table 1. SCE TLRR – Control Silver Peak Project Summary

<table>
<tr><td>Project Name</td><td colspan="4">Southern California Edison Company Transmission Line Rating Remediation Licensing – Control-Silver Peak 55 Kilovolt Transmission Line Project</td></tr>
<tr><td>Project Description</td><td colspan="4">The Project consists of reconstructing existing 55 kV subtransmission line elements. The purpose of the Project is to ensure compliance with the CPUC GO 95 by remediating discrepancies identified through SCE's TLRR Program. The Project is not proposed to expand electrical service to areas not currently served by SCE or increase the capacity of the existing lines.</td></tr>
<tr><td>Project Area</td><td colspan="4">The Project area is located north of and within the City of Bishop along US Highway 6, approximately six miles north of Chalfant Valley, approximately five miles southwest of the City of Bishop to the Control Substation along California Highway 168, approximately 25 miles across the White Mountains from the communities of Laws and Oasis, and approximately two miles north of Deep Springs College.</td></tr>
<tr><td>Total Mileage</td><td colspan="4">104.4 linear miles</td></tr>
<tr><td rowspan="2">Location (PLSS)</td><td>Quarter-Quarter</td><td>Section</td><td>Township</td><td>Range</td></tr>
<tr><td colspan="4">See Appendix C</td></tr>
<tr><td>Surface Management Agency/Land Owner</td><td colspan="4">Federal (BLM, USFS), Local (LADWP), Private</td></tr>
<tr><td>Topographic Map(s)</td><td colspan="4">USGS Bishop (1994), Blanco Mountain (1994), Chalfant Valley (1994), Chidago Canyon (1994), Chocolate Mountain (1988), Crooked Creek (1994), Fish Slough (1994), Laws (1994), Soldier Pass (1994), and Sylvania Canyon (2015) 7.5' Topographic Quadrangles.</td></tr>
<tr><td>Geologic Map(s)</td><td colspan="4">Geologic Map of the Bishop 15-Minute Quadrangle, California (Bateman, 1964); Geologic Map of the White Mountain Quadrangle, Mono County, California (Crowder and Sheridan, 1972); Geologic Map of the Soldier Pass Quadrangle, California and Nevada (McKee and Nelson, 1967); Geologic map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California (Nelson, 1966)</td></tr>
<tr><td rowspan="15">Mapped Geologic Units and Age*</td><td>Geologic Unit</td><td colspan="2">Age</td><td>Paleontological Potential (PFYC)</td></tr>
<tr><td>Quaternary young alluvium</td><td colspan="2">Holocene</td><td>2 (Low)</td></tr>
<tr><td>Quaternary young alluvial fan deposits</td><td colspan="2">Holocene</td><td>2 (Low)</td></tr>
<tr><td>Quaternary young valley fill</td><td colspan="2">Holocene</td><td>2 (Low)</td></tr>
<tr><td>Quaternary young dune sand deposits</td><td colspan="2">Holocene</td><td>2 (Low)</td></tr>
<tr><td>Quaternary older alluvium</td><td colspan="2">Pleistocene</td><td>3 (Moderate)</td></tr>
<tr><td>Quaternary older alluvial fan deposits</td><td colspan="2">Pleistocene</td><td>3 (Moderate)</td></tr>
<tr><td>Quaternary older terrace gravels</td><td colspan="2">Pleistocene</td><td>3 (Moderate)</td></tr>
<tr><td>Bishop Tuff</td><td colspan="2">Pleistocene</td><td>2 (Low)</td></tr>
<tr><td>Intrusive basalt</td><td colspan="2">Pleistocene</td><td>1 (Very low)</td></tr>
<tr><td>Unnamed sedimentary deposits</td><td colspan="2">Pliocene or Pleistocene</td><td>U (Unknown)</td></tr>
<tr><td>Basalt</td><td colspan="2">Miocene or Pliocene</td><td>1 (Very low)</td></tr>
<tr><td>Tuff</td><td colspan="2">Miocene or Pliocene</td><td>2 (Low)</td></tr>
<tr><td>Monzonite</td><td colspan="2">Cretaceous</td><td>1 (Very low)</td></tr>
<tr><td>Tungsten Hills Quartz Monzonite</td><td colspan="2">Cretaceous</td><td>1 (Very low)</td></tr>
</table>

	Aplite and granite	Cretaceous	1 (Very low)
	Diorite	Jurassic	1 (Very low)
	Quartz Monzonite of Beer Creek	Jurassic	1 (Very low)
	Hornblende-Augite Monzonite of Joshua Flat	Jurassic	1 (Very low)
	Monzonite of Eureka Valley	Jurassic	1 (Very low)
	Emigrant Formation	Cambrian	3 (Moderate)
	Mule Spring Limestone	Cambrian	3 (Moderate)
	Saline Valley Formation	Cambrian	3 (Moderate)
	Harkless Formation	Cambrian	4 (High)
	Poleta Formation – Upper Member	Cambrian	3 (Moderate)
	Poleta Formation – Middle Member**	Cambrian	4 (High)
	Poleta Formation – Lower Member	Cambrian	3 (Moderate)
	Poleta Formation – Undivided	Cambrian	U (Unknown)
	Hornfels	Cambrian	1 (Very low)
	Reed Dolomite	Precambrian or Cambrian	2 (Low)
	Campito Formation	Precambrian to Cambrian	3 (Moderate)
	Wyman Formation	Precambrian	2 (Low)
	Deep Spring Formation	Precambrian	3 (Moderate)
Permits	All paleontological work was conducted under California BLM Paleontological Use Permit CA-16-03P (expiration March 16, 2019); a BLM Fieldwork Authorization approved by the BLM Ridgecrest and Bishop Field Offices on October 11, 2018; and a USFS Paleontological Permit approved by the Inyo National Forest District Ranger on November 2, 2018.		
Previously Documented Fossil Localities within the Project area	The University of California Museum of Paleontology and Natural History Museum of Los Angeles County record searches yielded no fossil localities recorded within the Project area or vicinity, although there are several fossil localities recorded from sedimentary deposits similar to those that occur within the Project area (Appendix B).		
Recommendations	A paleontological resource monitoring and mitigation plan (PRMMP) should be prepared prior to the start of construction. It should provide detailed recommended monitoring locations including locations mapped as unknown, moderate, and high potential (PFYC U, 3, and 4); a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by paleontological monitors or other project personnel. A curation agreement with a BLM-approved repository should also be obtained. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist.		

*Tables showing the Project Acreage by Geologic Unit and Acreage by PFYC Value are provided in Appendix D.
** Middle Member of the Poleta Formation is not mapped within the Project area, but may be present in areas mapped as undivided Poleta Formation.

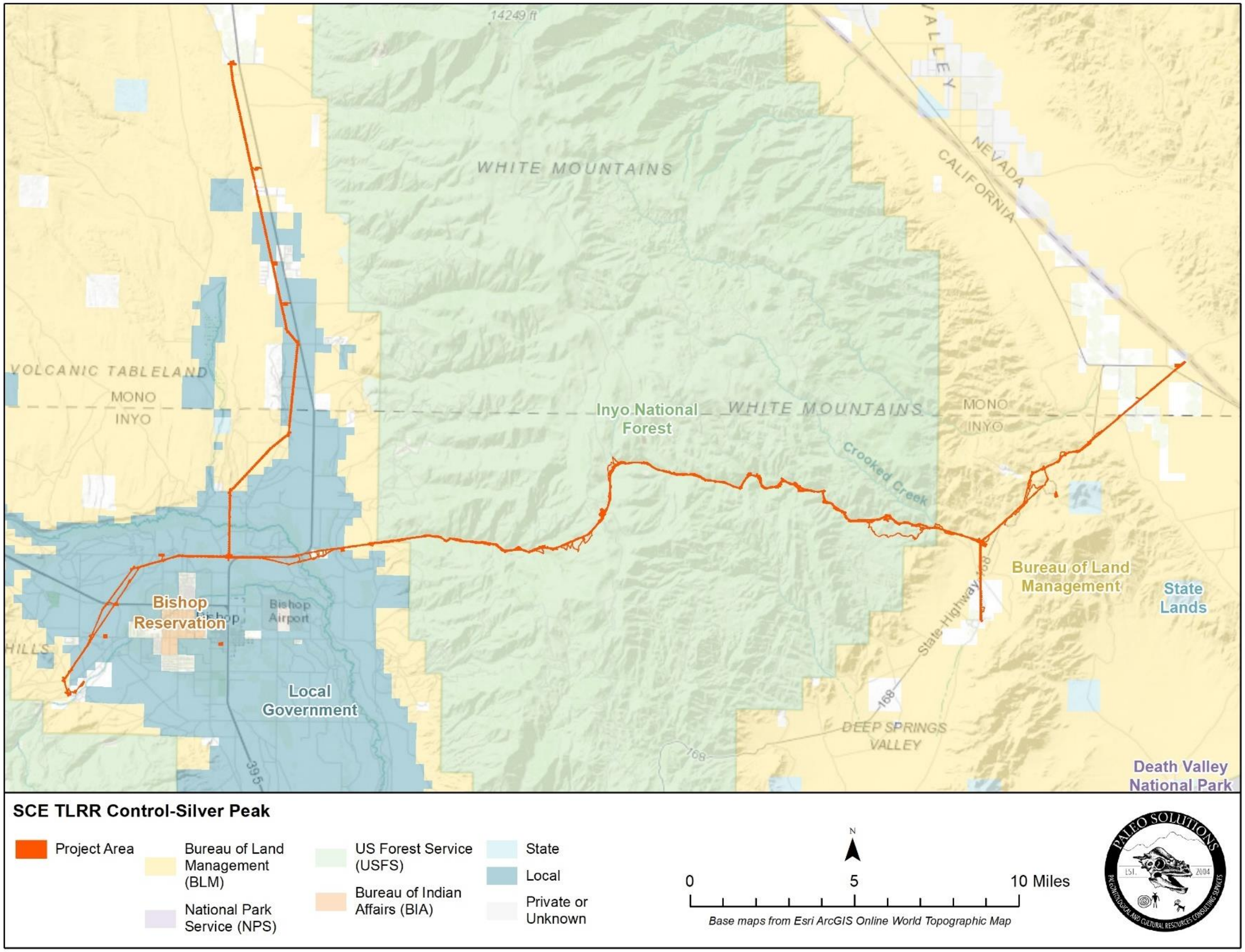

Figure 1. Project Location Map.

3.0 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

As defined by Murphey and Daitch (2007): "Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils' associated sedimentary matrix.

The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are used to:

- Study the phylogenetic relationships amongst extinct organisms, as well as their relationships to modern groups;
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record;
- Reconstruct ancient environments, climate change, and paleoecological relationships;
- Provide a measure of relative geologic dating that forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for isotopic dating;
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time;
- Study patterns and processes of evolution, extinction, and speciation; and
- Identify past and potential future human-caused effects to global environments and climates."

Fossil resources vary widely in their relative abundance and distribution and not all are regarded as significant. According to the BLM IM 2009-011, a "Significant Paleontological Resource" is defined as:

> "Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be of scientific interest if it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has an identified educational or recreational value. Paleontological resources that may be considered not to have scientific significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities" (BLM, 2008).

Vertebrate fossils, whether preserved remains or track ways, are classified as significant by most state and federal agencies and professional groups (and are specifically protected under the California Public Resources

Code). In some cases, fossils of plants or invertebrate animals are also considered significant and can provide important information about ancient local environments.

The full significance of fossil specimens or fossil assemblages cannot be accurately predicted before they are collected, and in many cases, before they are prepared in the laboratory and compared with previously collected fossils. Pre-construction assessment of significance associated with an area or formation must be made based on previous finds, characteristics of the sediments, and other methods that can be used to determine paleoenvironmental and taphonomic conditions.

4.0 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

This section of the report presents the regulatory requirements pertaining to paleontological resources that apply to this Project.

4.1 Federal Regulatory Setting

If any federal funding is used to wholly or partially finance a project, it is sited on federal lands, involves a federal permit, and/or includes a perceived federal impact, federal laws and standards apply, and an evaluation of potential impacts on paleontological resources may be appropriate and/or required. The management and preservation of paleontological resources on public and federal lands are prescribed under various laws, regulations, and guidelines.

4.1.1 National Environmental Policy Act (16 USC Section 431 et seq.)

NEPA, as amended, requires analysis of potential environmental impacts to important historic, cultural, and natural aspects of our national heritage (United States Code [USC], Section 431 et seq.; 40 Code of Federal Regulations [CFR], Section 1502.25). NEPA directs federal agencies to use all practicable means to "Preserve important historic, cultural, and natural aspects of our national heritage..." (Section 101(b) (4)). Regulations for implementing the procedural provisions of NEPA are found in 40 CFR 1500 1508.

4.1.2 Antiquities Act of 1906

The Antiquities Act of 1906 (16 USC 431-433) states, in part:

> That any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Act itself, or in the Act's uniform rules and regulations (43 CFR 3), the term "objects of antiquity" has been interpreted to include fossils by the National Park Service (NPS), the BLM, the USFS, and other federal agencies. Permits to collect fossils on lands administered by federal agencies are authorized under this Act. However, due to the large gray areas left open to interpretation due to the imprecision of the wording, agencies are hesitant to interpret this act as governing paleontological resources.

4.1.3 Federal Land Management and Policy Act (FLMPA) (43 USC 1701)

Federal law including FLMPA of 1976 (43 USC 1701) includes objectives such as the evaluation, management, protection and location of fossils on BLM-managed lands, defines fossils, and lays out penalties for the destruction of significant fossils. Also, NEPA requires the preservation of "historic, cultural, and natural aspects of our national heritage." Most recently, the Omnibus Public Lands Act refines NEPA and FLMPA guidelines and strictures, as well as outlines minimum punishments for removal or destruction of fossils from federal/public lands (see below).

4.1.4 Paleontological Resources Preservation Act (PRPA)

Paleontological Resources Preservation, Title VI, Subtitle D in the Omnibus Public Lands Act of 2009, Public Law 111-011 Purpose: The Secretary (Interior and Agriculture) shall manage and protect paleontological resources on federal land using scientific principles and expertise. With the passage of the PRPA, Congress officially recognizes the importance of paleontological resources on federal lands (US Department of the Interior, US Department of Agriculture) by declaring that fossils from federal lands are federal property that must be preserved and protected using scientific principles and expertise. The PRPA provides:

- Uniform definitions for "paleontological resources" and "casual collecting";
- Uniform minimum requirements for paleontological resource use permit issuance (terms, conditions, and qualifications of applicants);
- Uniform criminal and civil penalties for illegal sale and transport, and theft and vandalism of fossils from Federal lands; and
- Uniform requirements for curation of federal fossils in approved repositories.

4.1.5 Code of Federal Regulations, Title 43

Under the Title 43, Code of Federal Regulations, Section 8365.1-5, the collection of scientific and paleontological resources, including vertebrate fossils, on federal land is prohibited. The collection of a "reasonable amount" of common invertebrate or plant fossils for non-commercial purposes is permissible (43 CFR 8365.1-5 [United States Government Printing Office, 2014]).

4.1.6 BLM Procedures and Policies for Managing Paleontological Resources

The PFYC system was developed by the BLM (2016) and provides an estimate of the potential that significant paleontological resources will be discovered within a particular mapped geological unit. The system is used to determine potential impacts to paleontological resources for federal actions involving surface disturbance, land use planning, or land tenure adjustment. Implementation of the PFYC system does not require changes to existing land use plans, project plans, or other completed efforts. However, integration into plans presently being developed is recommended. The IM 2016-124 revision is an update to the guidance that was introduced in IM 2008-009 (2007).

The BLM Manual and Handbook H-8270-1 [1998] provides policies and direction for the BLM's Paleontological Resource Management Program as well as detailed procedures and standards for implementing policies. According to Section 6 of the BLM Manual and Handbook H-8270-1 [1998], it shall be BLM's policy to:

1) Actively work with other Federal, State, and Local Government Agencies, professional organizations, private land owners, educational institutions, and other interested parties to enhance and further the BLM's and the public's needs and objectives for paleontological resources.
2) Consider paleontological resource management a distinct BLM program, to be given full and equal consideration in all its land use planning and decision making actions.
3) Maintain a staff of professional paleontologists to provide BLM decision makers with the most current and scientifically sound paleontological resource data and advice.

4) Mitigate adverse impacts to paleontological resources as necessary.
5) Facilitate appropriate public and scientific use of and interest in paleontological resources.
6) Utilize the additional skills and resources of the Bureau's recreation and minerals programs to develop and implement interpretation strategies and products to enhance public understanding, appreciation, and enjoyment of paleontological resources.
7) Vigorously pursue the protection of paleontological resources from theft, destruction, and other illegal or unauthorized uses.
8) Authorize land tenure adjustments, when appropriate, as means to protect paleontological localities.

4.2 State Regulatory Setting

4.2.1 California Environmental Quality Act (CEQA)

The procedures, types of activities, persons, and public agencies required to comply with CEQA are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations) and further amended January 4th, 2013. One of the questions listed in the CEQA Environmental Checklist is: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines Section 15064.5 and Appendix G, Section V, Part C).

4.2.2 State of California Public Resources Code

The State of California Public Resources Code (Chapter 1.7), Sections 5097 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, and define the excavation, destruction, or removal of paleontological "sites" or "features" from public lands without the express permission of the jurisdictional agency as a misdemeanor. As used in Section 5097, "state lands" refers to lands owned by, or under the jurisdiction of, the state or any state agency. "Public lands" is defined as lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

4.3 Local Regulatory Setting

4.3.1 Mono County

Paleontological resources are briefly mentioned in the Cultural Resources section of the Conservation and Open Space element in the Mono County General Plan (Mono County, 2009). Action 22.C.1.a includes disrupting or adversely affecting a paleontological site, except as a part of a scientific study, as an example of a potentially significant impact to cultural resources. This action requires that future development projects with the potential to significantly impact cultural resources provide an analysis of the potential impacts prior to project approval. Action 22.C.1.a further requires that the analysis be funded by the project applicant; be prepared by a qualified person under the direction of Mono County; assess the cultural resources in the general project vicinity; describe impacts of the proposed development on these resources; and recommend project alternative or measures to avoid or mitigation impacts, which will be included as a condition of approval for the project.

4.3.2 Inyo County

Inyo County's General Plan (2001) has no mention of paleontological resources.

4.4 Permits

All paleontological work was conducted under California BLM Paleontological Use Permit CA-16-03P (expiration March 16, 2019); a BLM Fieldwork Authorization approved by the BLM Ridgecrest and Bishop Field Offices on October 11, 2018; and a USFS Paleontological Permit approved by the Inyo National Forest District Ranger on November 2, 2018 (Appendix E). Geraldine Aron, M.S., Principal Investigator, oversaw all work as the permit holder and administrator.

5.0 METHODS

This paleontological analysis of existing data included a geologic map review, a literature search, and two museum record searches. The analysis of existing data was supplemented with a pedestrian field survey. The goal of this report is to identify the paleontological potential of the Project area and make recommendations for the mitigation of adverse effects on paleontological resources that may occur as a result of the proposed construction. Kate Zubin-Stathopoulos, M.S., Nathan Dickey, M.S., and Madeline Weigner, M.S. performed the background research and co-authored this report with Courtney Richards, M.S., Matthew Carson, M.S., and Betsy Kruk, M.S. Courtney Richards, M.S., performed the technical review of this report. GIS maps were prepared by Nathan Dickey, M.S. Geraldine Aron, M.S., oversaw all aspects of the Project as the Paleontological Principal Investigator.

Paleo Solutions will retain an archival copy of all Project information including field notes, maps, and other data. The Project data is the property of the Department of the Interior (DOI)/BLM and will not be shared without BLM consent. In addition, BLM shall be notified and referenced in any subsequent use of the data, including in any publications, posters, or presentations.

5.1 Analysis of Existing Data

Paleo Solutions reviewed geologic mapping of the Project area and 0.5-mile buffer by Bateman (1964), Crowder and Sheridan (1972), McKee and Nelson (1967), and Nelson (1966). The literature reviewed included published and unpublished scientific papers. Paleontological museum record searches were conducted at the University of California Museum of Paleontology (UCMP) and the Natural History Museum of Los Angeles County (LACM). Ken Finger, Ph.D. performed the UCMP search, and Samuel McLeod, Ph.D., performed the LACM search. The results of the UCMP and LACM museum record searches (dated March 7, 2017 and September 25, 2018, respectively) are attached as Appendix B. Additional record searches of online databases were completed by Paleo Solutions staff.

5.2 Field Survey

The field survey was conducted by Paleo Solutions staff members Madeline Weigner, M.S., and Betsy Kruk, M.S., on November 26-28, 2018. The paleontological survey was performed in order to determine the paleontological potential of the geologic deposits underlying the Project area. The survey was conducted after a review of aerial photographs indicated the Project area included areas of undisturbed native sediment. The pedestrian survey included inspection of the Project area with the majority of focus occurring in areas with native rock and sediment exposures. Rock and sediment exposures as well as the surrounding areas were photographed and documented. Reference points were acquired using a GPS unit. Sediment and bedrock lithologies were recorded and analyzed and used to better interpret the Project's paleontological potential, and thus better understand the Project's potential impact.

5.3 Criteria for Evaluating Paleontological Potential

The PFYC system was developed by the BLM (BLM, 2016). Because of its demonstrated usefulness as a resource management tool, the PFYC has been utilized for many years for projects across the country, regardless of land ownership. It is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of 1 (very low potential) to 5 (very high potential). This system is intended to aid in predicting, assessing, and mitigating paleontological resources. The PFYC ranking system is summarized in Table 2.

Table 2. Potential Fossil Yield Classification (BLM, 2016)

BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
1 = Very Low Potential	Geologic units are not likely to contain recognizable paleontological resources.
	Units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
	Units are Precambrian in age.
	Management concern is usually negligible, and impact mitigation is unnecessary except in rare or isolated circumstances.
2 = Low Potential	Geologic units are not likely to contain paleontological resources.
	Field surveys have verified that significant paleontological resources are not present or are very rare.
	Units are generally younger than 10,000 years before present.
	Recent eolian deposits.
	Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.
	Management concern is generally low, and impact mitigation is usually unnecessary except in occasional or isolated circumstances.
3 = Moderate Potential	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
	Marine in origin with sporadic known occurrences of paleontological resources.
	Paleontological resources may occur intermittently, but these occurrences are widely scattered.
	The potential for authorized land use to impact a significant paleontological resource is known to be low-to-moderate.
	Management concerns are moderate. Management options could include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Opportunities may exist for hobby collecting. Surface-disturbing activities may require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action and whether the action could affect the paleontological resources.
4 = High Potential	Geologic units that are known to contain a high occurrence of paleontological resources.
	Significant paleontological resources have been documented but may vary in occurrence and predictability.
	Surface-disturbing activities may adversely affect paleontological resources.
	Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
	Illegal collecting activities may impact some areas.
	Management concern is moderate to high depending on the proposed action. A field survey by a qualified paleontologist is often needed to assess local conditions. On-site monitoring or spot-checking may be necessary during land disturbing activities. Avoidance of known paleontological resources may be necessary.
5 = Very High Potential	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources.
	Significant paleontological resources have been documented and occur consistently.
	Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.

BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
	Unit is frequently the focus of illegal collecting activities.
	Management concern is high to very high. A field survey by a qualified paleontologist is almost always needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.
U = Unknown Potential	Geologic units that cannot receive an informed PFYC assignment.
	Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is unknown.
	Geologic units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.
	Scientific literature does not exist or does not reveal the nature of paleontological resources.
	Reports of paleontological resources are anecdotal or have not been verified.
	Area or geologic unit is poorly or under-studied.
	BLM staff has not yet been able to assess the nature of the geologic unit.
	Until a provisional assignment is made, geologic units with unknown potential have medium to high management concerns. Field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

6.0 ANALYSIS OF EXISTING DATA RESULTS

The Project area is within California's Basin and Range Geomorphic Province. Within California, the Basin and Range Geomorphic Province is bordered on the west by the Sierra Nevada, on the southeast by the Mojave Desert, and on the northeast by the Nevada border (Harden, 2004).

The oldest rocks in the Basin and Range Geomorphic Province consist of a complex of early to middle Proterozoic schists and gneisses of sedimentary origin with associated granitic rocks, some of which date to 2.5 to 1.7 billion years ago (Hall, 2007; Norris and Webb, 1990). The overlying younger Proterozoic rocks consist of regularly bedded conglomerates, sandstones, siltstones, shales, limestones, and dolomites deposited as nearshore marine sediments near the continental shelf edge as subsidence and supercontinental divergence occurred at this time (Hall, 2007; Norris and Webb, 1990).

The Basin and Range contains thick sections of marine siliciclastic and carbonaceous sedimentary rocks of latest Proterozoic to Paleozoic age, particularly in the Death Valley and Inyo mountains, the latter of which contains the thickest Paleozoic section in California's Basin and Range, with an aggregate thickness of approximately 7,010 meters (23,000 feet), nearly half of which is of Cambrian age (Norris and Webb, 1990). Deposition of thick strata representative of most Paleozoic periods implies relatively continuous sedimentary deposition in a tectonically stable setting, with the deposition of limestone and dolomite implying shallow, warm paleoenvironments throughout the Paleozoic (Hall, 2007; Harden, 2004; Norris and Webb, 1990). Thick Paleozoic rock sections, specifically those of Cambrian age in the Basin and Range Geomorphic Province, have been important for understanding the adaptation and evolution of shelled forms and the rapid evolution and diversification of marine life during the "Cambrian Radiation" and metazoan evolution during the early to middle Paleozoic.

Throughout the Paleozoic and into the early Mesozoic, shallow seas and low lands persisted in the area (Hall, 2007). Shallow seas transgressed and regressed repeatedly over mudflat low lands throughout the Triassic. By the late Triassic and early Jurassic, the seas had regressed to the northwest during orogenic and volcanic activities associated with the Sierra Nevada, Owens Valley, and Inyo Mountains in the Basin and Range

Geomorphic Province (Norris and Webb, 1990). Throughout the middle of the Mesozoic era, erosion and nondeposition persisted until the middle to late Cretaceous when granitic intrusions developed due to tectonic subduction and subsequently caused contact metamorphism of the rocks surrounding the intrusions (Hall, 2007; Norris and Webb, 1990).

Widespread erosion and/or nondeposition persisted from the late Cretaceous to the Oligocene representing a significant unconformity (Hall, 2007; Norris and Webb, 1990). However, by the Oligocene, sediment deposition resumed in the Basin and Range Geomorphic Province, with nonmarine sediments deposited in the savanna-type environment with moderately moist climates, water-retaining vegetation, and numerous vertebrate fossils (Norris and Webb, 1990). From the Oligocene to the Miocene, the provinces became increasingly more arid, and nonmarine basinal deposition became widespread. In addition, it became increasingly more tectonically active, with structural extension and faulting increasing throughout the Miocene. Structural extension caused the creation of basins and ranges, as well as volcanoes in the southern Nevada (Hall, 2007). Within the Basin and Range Geomorphic Province, crustal extension occurred simultaneously with the transition from oblique subduction near the continental margin to transform faulting along the San Andreas fault system (Hall, 2007; Norris and Webb, 1990). Tectonic extension during the Miocene resulted in the formation of detachment faults (Hall, 2007; Harden, 2004; Norris and Webb, 1990). Tectonic extension and periods of subduction at the continental margin increased volcanic activity from the Miocene and into the Plio-Pleistocene, with basins filled with tuff, ash, andesites, rhyolites, volcanic flows, and flow breccias often interbedded with lacustrine, playa, and evaporite deposits (Norris and Webb, 1990). Within the Basin and Range Geomorphic Province, erosion had reduced the ancestral Sierra Nevada to a range of low hills, allowing grasslands to be more widespread in the area (Norris and Webb, 1990). During the late Pliocene and Holocene, volcanic activity was abundant, with several cinder cones and flow deposits present today at the surface (Hall, 2007; Norris and Webb, 1990). Throughout the Pleistocene and into the Holocene, lakes, playas, dune fields, and lava flows continued to fill basins, with lacustrine environments occurring during cooler periods with less evaporation (Harden, 2004; Norris and Webb, 1990). During the Pleistocene, snowmelt from the Sierra Nevada drained to the Owens Valley, Mono Lake, and Owens Lake areas within the Basin and Range before draining to the lower Lake Manly along the floor of Death Valley (Norris and Webb, 1990). However, by the late Pleistocene and Holocene, the entire region became hotter and drier, resulting in more noticeable climate gradients between mountainous ranges and intermontaine basins and the reduction of lakes in the region (Norris and Webb, 1990).

The regional geology of the Basin and Range Geomorphic Province is characteristic of crustal extension, giving the characteristic north-south–trending peaks, valleys, and detachment faults; volcanic eruptions from crustal extension; and filling of dropped basins with alluvial and colluvial sediments eroded and transported downslope from ranges of higher relief (Harden, 2004). The Basin and Range Geomorphic Province has prominent north-south–trending ranges, basins, and faults from consistent east-west crustal extension over the past 16 million years to the present (Harden, 2004; Norris and Webb, 1990).

6.1 Literature Search

Geologic mapping indicates that the Project is underlain by the Precambrian Deep Spring Formation (ds, dl, dm, du) and Wyman Formation (w, wl); Precambrian to Cambrian Campito Formation (Cc, Cca, Ccm) and Reed Dolomite (r, rh, rl, ru); Cambrian hornfels (Cho), Poleta Formation (Cp, Cpl, Cpu), Harkless Formation (Ch), Saline Valley Formation (Cs), Mule Spring Limestone (Cms) and Emigrant Formation (Cel, Ceu); Mesozoic igneous rocks (Jme, Jmj, Jmb, Jmbi, Kdc, Kt, Ka); Cenozoic igneous rocks (Qob, Tb, Tt); Pliocene or Miocene unnamed sedimentary deposits (Ts); Pleistocene Bishop Tuff (Qba, Qbf, Qbn, Qbp, Qbs, Qbu, Qbv, Qbw) and older Quaternary alluvial deposits (Qg1, Qg2, Qg3, Qoa, Qof); and younger Quaternary (Holocene) deposits (Qa, Qal, Qf, Qs, Qvf, Qyf) (Bateman, 1964; Crowder and Sheridan, 1972; McKee and Nelson, 1967; Nelson, 1966). The geographic distributions of the geologic units in the Project area, as mapped by Bateman (1964), Crowder and Sheridan (1972), McKee and Nelson (1967), and Nelson (1966), are provided in Appendix A.

6.1.1 Deep Spring Formation – Precambrian (ds, dl, dm, du)

The Deep Spring Formation is a Precambrian unit first named by Edwin Kirk in 1918, likely from the outcrops on the west side of the Deep Spring Valley, and described by Adolph Knopf (1918) (Nelson, 1962). This formation is mapped in the western portion of the Great Basin in the White and Inyo mountains and Last Chance Range area in California and in Esmeralda County, Nevada. It is between 1,100 and 1,600 feet thick and is equivalent to the Wood Canyon Formation in the southern Great Basin (Stewart, 1970; Nelson, 1962). The Deep Spring Formation is located stratigraphically below the Campito Formation and above the Reed Dolomite (Stewart, 1970). There are three informal members of the Deep Spring Formation distinguished by their lithologies and all mapped within the Project area. These include from oldest to youngest: 1) a lower member composed mostly of limestone with dolomite, quartzite, and calcareous sandstone; 2) a middle member composed of quartzite overlain by blue-gray limestone, with laminations and occasional cross-beds; 3) an upper member composed of a dark gray to black, fine-grained quartzite sandstone overlain by massive, fine-grained, gray dolomite (Nelson, 1962, 1966; Stewart, 1970). The Deep Spring Formation was likely deposited in a shallow, subtidal, carbonate and siliciclastic environment.

Fossils in the Deep Spring Formation are not abundant. Stewart (1970) records trace fossils including worm borings and possible arthropod scratches, sitz-marks, and crawltracks, *Rusophycus* and *Cruziana*, but no trilobite body fossils. Algal material is present, likely stromatolites, enigmatic fossils similar to *Pteridinium* in the middle member of the formation, and one mollusk-like fossil called *Wyattia*. Oliver (1990) extensively documented the shapes, growth patterns/morphologies, and development of the stromatolites found in middle member of the Deep Spring Formation in Mount Dunfree, Esmeralda County, Nevada. While Oliver made no attempt to identify the stromatolites, she did compare them to similar morphologies documented in younger strata than the Precambrian (Oliver, 1990). Oliver does, however, take note that the sediment composition the stromatolites were preserved in was siliciclastic instead of the more typical carbonate lithology. There are abundant modern examples of stromatolites building in siliciclastic rich environments, but not in other parts of the geologic record (Oliver, 1990). Oliver argues that the lack of carbonate cementation and abundant quartz reduces the possibility of preservation, making the stromatolites in the Deep Spring Formation unique (Oliver, 1990). The fossils found in the Deep Spring Formation are not easily identifiable or abundant, but they play an important role in understanding Precambrian organisms, therefore this formation has a moderate paleontological potential (PFYC 3).

6.1.2 Wyman Formation – Late Precambrian (w, wl)

The upper Precambrian Wyman Formation was named by Maxson (1935) for a section exposed in Wyman Canyon, located in the Blanco Mountain Quadrangle. Maxson originally called the bottom portion of the section the “Roberts Formation” but later studies showed that no unconformity or lithologic difference existed between the two units, so the Roberts Formation was dropped as a stratigraphic unit and the entire section is referred to as the Wyman Formation (Nelson, 1962). This unit consists of phyllitic siltstone and silty claystone, argillite, mudstone, quartzite, sandstone and lesser amounts of carbonate, and within the Project area there are two units mapped: 1) thin-bedded brown to dark-gray agrilllite with fine grained brown quartz sandstone and gray to brown siltstone (w); 2) lenticular grayish-blue oolitic limestone that locally transitions to coarse-grained buff dolomite (wl) (Nelson, 1966; Stewart, 1970; Moore, 1973). It is over 9,000 feet thick in the Inyo and White mountains and is laterally equivalent to the Johnnie Formation and the lower portion of the Stirling Quartzite (Stewart, 1970). This correlation is uncertain since exposures of the formations are over 35 miles apart, and there are no fossils to provide diagnostic age correlations. It unconformably underlies the Reed Dolomite, but its base is not exposed at any of the known sections, so the underlying formation is not known (Stewart, 1970). The age determination for this formation is based on its stratigraphic location well below lower Cambrian faunal zones in overlying units (Stewart, 1970; Nelson, 1962). The Wyman Formation is unfossiliferous and is considered to have low paleontological potential (PFYC 2).

6.1.3 Campito Formation – Precambrian to Early Cambrian (Cc, Cca, Ccm)

The Campito Formation is a Precambrian to lower Cambrian unit first named by Edwin Kirk (IN Knopf, 1918) after outcrops located on the Campito Mountain in the northwest corner of the Blanco Mountain Quadrangle (Nelson, 1962). The Andrews Mountain Member of the Campito Formation occurs both below and above the lowest occurrence of olenellid trilobites and archeocyathids, which gives the formation an age range of Precambrian to early Cambrian (Stewart, 1970). The Campito Formation crops out in California and Nevada and is equivalent to the middle part of the Wood Canyon Formation of the central region of the southern Great Basin (Stewart, 1970). It is located stratigraphically below the Poleta Formation and above the Deep Spring Formation (Stewart 1970). It is up to 3,500 feet thick and has two members, the lower Andrews Mountain Member and the upper Montenegro Member, both mapped within the Project area (Nelson 1962, 1966). The Andrews Mountain Member (2,500 to 2,800 feet thick) is a dark gray, greenish-gray, black, very fine- to fine-grained quartzite, inter-bedded with layers of dark greenish-gray siltstone. The quartzite contains grains of quartz and feldspar in a matrix of muscovite, chlorite, biotite, and magnetite. Cross-beds, ripple marks, and small channel scours have been noted locally in this member (McKee, 1968; Stewart, 1970). The Montenegro Member (~1,000 feet thick) is a dark greenish-gray, thin-bedded siltstone that contains grains of quartz, muscovite, and chlorite.

The majority of the fossils in the Campito Formation are found in the finer grained siltstone of the Montenegro Member. Towards the top of the formation, thin beds of limestone contain archeocyathid fossils (McKee, 1968; Stewart, 1970; Nelson, 1962). Olenellid trilobites are the most common fossil found throughout the Montenegro Member and include *Fallotaspis* sp., *Daguinaspis* sp., *Nevadia weeksi*, *Holmia* (*Esmeraldina*), and *Nevadella* cf. *N. addeyensis* (McKee, 1968; Stewart, 1970; McKee and Moiola, 1962). Other fossils include abundant archeocyathids identified as *Ethmophyllum whitneyi* by McKee (1968) and trace fossils including worm borings, animal trails, and possible trilobite scratches noted in both members (McKee, 1968; Stewart, 1970; McKee and Moiola, 1962). The Campito Formation has the stratigraphically lowest occurrence of trilobites in the western region, making this assemblage unique and paleontologically significant (Stewart, 1970). The Campito Formation has moderate paleontological potential (PFYC 3).

6.1.4 Reed Dolomite – ?Precambrian or Early Cambrian (r, rh, rl, ru)

The Reed Dolomite, also referred to as the Reed Formation, was named for exposures at Reed Flat in the Blanco Mountain Quadrangle, where its type section has been designated (Knopf, 1918). It was originally determined to be Precambrian in age by Taylor (1966) based on the stratigraphic positioning below known early Cambrian fossils, but later was described as early Cambrian in age (Signor and Mount, 1986a). Stewart (1970) considers the Reed Dolomite to be Precambrian in age since it occurs 2,000 to 3,000 feet below the lowest occurrence of index fossils for the Precambrian-Cambrian boundary. The age of this formation is still not officially determined. At the type section, it is composed entirely of dolomite and ranges from coarse-grained dolomite with oolitic beds, to fine-grained dolomite in the upper portion (Knopf, 1918; Nelson, 1962). The Reed Dolomite has informally been divided into three members, which are mapped within the Project area and vicinity, and include, from oldest to youngest, the lower member (rl), Hines Tongue Member (rh), and upper member (ru) (Nelson, 1966, 1962). The lower member is composed of massive, coarse-grained, gray to buff, oolitic dolomite; the Hines Tongue Member is composed of lenticular thin- to medium-bedded, gray to buff-brown, fine- to medium-grained quartzite, buff sandy dolomite, and calcareous sandstone; and the upper member is a massive, fine-grained, light-gray to cream dolomite (Nelson, 1966). It is up to 200 feet thick, and in the middle of the Blanco Mountain Quadrangle close to where the Project area crosses, the Reed Dolomite is approximately 50 feet thick (Nelson, 1966, 1962). The Reed Dolomite unconformable overlies the Wyman Formation and conformably underlies the Deep Spring Formation (Signor and Mount, 1986a, 1986b; Taylor, 1966).

Fossils are very uncommon in the Reed Dolomite, consisting of "mollusk-like" shell fragments found 3 meters below the top of the formation, and are thought to likely be molluscan fossils (Taylor, 1966). Due to the scarcity of fossils, the Reed Dolomite is considered to have low paleontological potential (PFYC 2).

6.1.5 Hornfels – Early Cambrian (Cho)

Hornfels mapped within the Project area lie on top of Campito Formation and are likely metamorphosed Poleta and Harkless formations (Nelson, 1966). This unit is composed of gray calc-silicate hornfels and brown siliceous hornfels. This unit has very low paleontological potential (PFYC 1).

6.1.6 Poleta Formation – Early Cambrian (Cp, Cpl, Cpu)

The Poleta Formation is Cambrian in age and was named by Nelson (1962) after its exposure in Poleta Canyon on the east-central edge of the Bishop 15-Minute Quadrangle. The exposed section in Poleta Canyon is incomplete and highly deformed, but a type locality can be found in the Waucoba Spring section described by Walcott (1908), located east of Waucoba Spring, on the Saline Valley Road, east of the Inyo Range in Inyo County, California. Walcott (1908) originally referred to this portion of the section as the Silver Peak Group, but this name was not recognized elsewhere. The Poleta Formation is exposed primarily in eastern California and southwestern Nevada and consists of a succession of an up to 1,200-foot-thick series of limestone, shale, and quartzite that is divided into three members, the lower, middle, and upper. These three members have been interpreted to represent shifts in depositional environments from shallow marine (lower member) to deep marine (middle member) and back to shallow marine (upper member) (English and Babcock, 2010). The lower member consists primarily of massive gray limestone with orange dolomite. The middle member consists primarily of thin-bedded block quartzite and dark-green siliceous siltstone, and the upper member consists primarily of massive blue-gray limestone (McKee, 1968). The lower and upper members are mapped within the Project area (Cpl, Cpu), and it is possible the middle member is included in a unit mapped as "Poleta Formation undivided" (Cp) (McKee and Nelson, 1967). Although the formation is over 1,000 feet thick in the Waucoba Spring section, it is less than half as thick elsewhere in the same Waucoba Spring Quadrangle (Nelson, 1962). Fortunately, the units are consistent throughout the formation despite this extreme variability in thickness. The Poleta Formation conformably overlies the Precambrian to lower Cambrian Campito Formation and conformably underlies the lower Cambrian Harkless Formation.

The Poleta formation is paleontologically rich and is most well-known for exceptionally preserved trilobites in the middle member. The Indian Springs beds within the middle member are internationally recognized as a "lagerstätte" or "Burgess Shale-type" deposit of exceptional preservation, and is one of about 30 in the world to be recognized as such (English and Babcock, 2010). This deposit is of particular importance because it is considered one of the oldest known fauna of this preservation quality, and the taxa described provide important paleoecological and evolutionary information about the significant change in earth's biosphere during the early Cambrian (English and Babcock, 2010). Each member of the Poleta Formation is described individually below and assigned separate PFYC designations.

Lower Member
Fossils from the lower member consist primarily of abundant and well-preserved archaocyathids such as the taxa *Renalcis* found in limestone beds that also contain ooids and pellets (Stewart, 1970; Nelson, 1962; Marenco, 2006). These fossils form reefs and reef-like structures that represent growth on back-shoal, bank margin as well as subtidal open marine environments (Marenco, 2006; Rowland and Gangloff, 1988). This member has moderate paleontological potential (PFYC 3).

Middle Member
The middle member of the Poleta Formation is the most well-known and currently is only documented in Esmerelda County, Nevada. While this member is not mapped within the Project area, it is possible that it currently undiscovered in this area since both the upper and lower members are preserved. Fossils from the middle member within the internationally known Indian Springs Lagerstätte are exceptionally well-preserved,

and have been the subject of many paleontological, paleoecological and evolutionary studies (English and Babcock, 2010; Butler et al., 2015; Firby and Durham, 1974; Hagadorn and Fedo., 2000; Hollingsworth, 2006). The most common taxa are biomineralizing (hard exoskeleton or shell) organisms including trilobites, helicoplacoids, hyolithids, and inarticulate brachiopods (English and Babcock, 2010). Trace fossils are also exceptionally well-preserved, in addition to non-biomineralizing organism like sponges, algae, and cyanobanteria. Trilobite taxa include, among many more, *Nevadia parvoconia*, *N. eucharis* and *Geraldinella*. *N. parvoconia* is the most common taxa in the lower portion allowing correlation to the Nevadella trilobite zone (Montezuma Stage), and *N. eucharis* is the most common trilobite in the upper portion allowing correlation to the Olenellus trilobite zone (Dyeran Stage) (English and Babcock, 2010). Brachiopods described include three types within the class inarticulata including *Mickwitzia occidens*, obolellids, and lingulids (English and Babcock, 2010; Butler et al., 2015). The early echinoderm *Helicoplacus gilberti* is commonly very well preserved, with over 19 specimens being completely articulated, and some in life position providing important paleoecological information about this organism (English and Babcock, 2010). The beds that contain exceptionally preserved fossils like this early echinoderm are composed of green, brown, gray and red shale at several intervals within the middle member.

These fossils were deposited in an offshore shelf setting where fine siliciclastics were dominantly deposited, and is interpreted to represent an obrution event, or a period of rapid burial. Dysoxic or anoxic muds provided an environment where animals were pristinely persevered due to the lack of scavenging, bioturbation and general decomposition (English and Babcock, 2010). The middle member of the Poleta Formation has high paleontological potential (PFYC 4).

Upper Member
This member contains poorly preserved archaeocyathids as well as bioclastic limestone containing pellets that were deposited in a carbonate-bank depositional system (Marenco, 2006). In addition, one specimen from an animal with unknown taxonomic affinities was discovered and is described as a large valve-shaped organism. It has been described as the new genus and species *Westgardia gigantean* n. gen., n. sp. (Rowland and Carson, 1983). Further discoveries of similar specimens would provide important evolutionary information. This member has a moderate paleontological potential (PFYC 3).

6.1.7 Harkless Formation – Early Cambrian (Ch)

The Harkless Formation is an early Cambrian unit exposed in the western region of the southern Great Basin. The name "Harkless" was first used by Resser and Bridge (IN Reeside, 1933) for the basal portion of the formation, but they were unable to define boundaries for the top and bottom (Nelson, 1962). The Harkless Formation was officially named and defined by Nelson for the exposures on the divide south of Harkless Flats in the southern half of the Waucoba Mountain Quadrangle (Nelson, 1962). It lies conformably below the Saline Valley Formation and above the Poleta Formation and is laterally equivalent to the upper Wood Canyon Formation and the lower and middle parts of the Zabriskie Quartzite (Stewart, 1970). The Harkless Formation was deposited in a tropical shallow water, subtidal environment, likely during a transgression, which is represented in its wide range of lithologies. It is commonly composed of light green siltstone (with muscovite and chlorite), gray to white vitric quartzite, blocky siliceous siltstone, thin lenticular limestone, and purple pisolitic limestone (Savarese and Signor, 1989; McKee, 1968; Stewart, 1970). Recorded in both California and Nevada, the Harkless Formation is 2,000 to 3,600 feet thick (Stewart, 1970).

The fossil assemblages from the Harkless Formation are marine invertebrates found almost exclusively in the base and the top of the formation (McKee, 1968). The most significant fossils documented in the Harkless Formation are archaeocyathids found in the limestone beds. Taxa described include *Archaeocyathus constrictus, Cambrocyathus occidentalis,* regular archeocyathid *Diplocyathellus* sp., and irregular archeocyathids including *Arrythmocricus* sp., *Metaldetes* sp., and *Retilamina debrennei* (McKee, 1968; Savarese and Signor, 1989). Also noted by Savarese and Signor (1989) was the presence of an algae, *Renaleis,* found within the archaeocyathid fossils, interpreted to have inhabited the natural cavities. The Harkless Formation also has a large assemblage of trilobites including *Olenellus* cf. *O. gilberti, Fremontia* cf. *F. fremonti, Paedeumias* cf. *P. clarki, Holmia* sp., *Ogygopsis* sp., *Onchocephalus* sp., *Paedumias nevadensis* (Stewart, 1970; McKee, 1968). Other fossils include brachiopods, *Kyrshabaktella* sp., *Eothele spurri* (?), and *Hadrotreta primaea* (?), tubular fossils *Hyolithellus insolitus* and *Sphenothallus* sp., the unusual fossil *Salterella* sp., trace fossils *Scolithus*, worm borings, trilobite tracks and trails, echinoderm sclerites, and sponge spicules (Skovsted and Holmer, 2006; McKee, 1968; Stewart, 1970). Due to the diversity and excellent preservation of important Cambrian invertebrates, the Harkless Formation is considered to have high paleontological potential (PFYC 4).

6.1.8 Saline Valley Formation – Early Cambrian (Cs)

The Saline Valley Formation is an early Cambrian formation originally named by Nelson (1962), located in the western portion of the Great Basin in the White and Inyo mountains and Last Chance Range area in California and in Esmeralda County, Nevada near the state boarder (Stewart, 1970). The type locality is an exposure in the Waucoba Spring section near Saline Valley (Nelson, 1962). The Saline Valley Formation lies above the Harkless Formation and below the Mule Spring Formation. It correlates to the upper part of the Zabriskie Quartzite and the lower part of the Carrara Formation in the central Great Basin (Stewart, 1970). The Saline Valley Formation is a marine deposit, about 850 feet thick and contains a wide variety of lithologies, including limestone, sandstone, siltstone, and shale. The lower portion of the formation is a medium- to coarse-grained quartzitic sandstone, followed by a blue-gray arenaceous limestone, topped by quartzitic sandstone, limestone, and a gray-green and black shale (Nelson, 1962; Stewart 1970). Within the Project area, the lithology consists of brown thin- to medium-bedded, fine- to medium-grained siltstone and quartz sandstone that has partially transformed to siliceous hornfels in areas (Nelson, 1966).

Fossils from the Saline Valley Formation were originally discovered by J. P. Albers and J. H. Stewart while describing the geology of Esmeralda County, Nevada, and were described and identified by Palmer (1964). There are at least 12 different species of trilobites, which include *Zacanthopsina eperephes, Zacanthopsis contractus, Zacanthopsis levis, Stephanaspis* (?) *avitus, Syspacephalus* (?) sp., *Ogygopsis batis, Olenoides* spp., *Bonnia caperata, Paedeumias granulatus, Wanneria* cf. *W. walcottana,* and *Goldfieldia pacifica.* The fossils were found predominately in the lower portion of the formation. Another species of trilobite, *Bristolia* sp., has been identified in the upper section of the Saline Valley (Palmer, 1964). This assemblage of trilobites from the lower Cambrian is the largest in North America. The Saline Valley Formation is considered to have moderate paleontological potential (PFYC 3).

6.1.9 Mule Spring Limestone – Early Cambrian (Cms)

The early Cambrian Mule Spring Limestone has a type section east of Waucoba Spring on Saline Valley Road, east of the Inyo Range, Inyo County, California, and was named for exposures at Mule Spring on the west side of the Inyo Mountains, Waucoba Mountain Quadrangle, California (Nelson, 1962). It is composed of distinctly bedded blueish-gray limestone that contains abundant oncoids and fenestral structures throughout the formation; some areas contain more abundant shale and siltstone interbeds, and some portions of the limestone have been dolomitized (Nelson, 1962; Hollingsworth et al., 2011; McKee and Nelson, 1967). The Mule Spring Limestone is structurally complex, so the thickness is hard to determine, though it is likely 700 to 1,000 feet thick in the White and Inyo mountains (Stewart, 1970). The Mule Spring Limestone is found throughout the Great Basin province in California and Nevada. It conformably overlies the Harkless Formation, and the contact between the two is often gradational and hard to define, and is conformably overlain by the Monola Formation. It is equivalent to part of the Carrara Formation in the central portion of the southern Great Basin and to the Bright Angel Shale in the eastern portion of the southern Great Basin (Stewart, 1970; Palmer and Halley, 1979). This formation was deposited in a dominantly shallow subtidal and intertidal carbonate bank environmental on a distal shelf (Hollingsworth et al., 2011).

The Mule Spring Limestone is most well-known for the algae *Grivanella*, which gives the formation its characteristic fenestral texture. Trilobites are also very common in the Mule Spring Limestone, mostly occurring in the lower part of the formation in the silty beds (Stewart, 1970). Trilobite taxa include *Bristolia*, *Paedeumias*, *Fremontia*, *Bonnia* and *Peachella*. The trilobite *Bristolia* provides correlation to other units within the Great Basin (Stewart, 1970). The Mule Spring Limestone is considered to have moderate paleontological potential (PFYC 3).

6.1.10 Emigrant Formation – Middle to Late Cambrian (Cel, Ceu)

The Emigrant Formation is a middle to late Cambrian formation named by H. W. Tuner in 1902 for an outcrop exposed to the south of Emigrant Pass in the northern part of the Silver Peak Range, Esmeralda County, Nevada (McKee and Moiola, 1962). It lies stratigraphically between the Mule Spring Limestone below and the Palmetto Formation above. The formation is estimated to be about 2,500 feet thick in Nevada and California and is composed of mostly limestone with some shale, mudstone, and chert (McKee and Moiola, 1962; McKee, 1968). The Emigrant Formation is divided into two members: 1) the lower member is a light gray to green siliceous shale with very thin-bedded mudstones, interbedded with very thin beds of chert and laminated, platy limestone approximately 500 feet thick; 2) the upper member is a thin-bedded, blue to gray limestone, alternating with bluff to black bands of chert. Orange to reddish gray calcareous shale and sandstone occur near the top of this unit. In addition, there are several distinct beds of limestone breccia that occur throughout the formation (McKee and Moiola, 1962; McKee, 1968). The Emigrant Formation was deposited in an outer-shelf marine environment during a period of sea-level rise (Sundberg and McCollum, 2003, and Skovsted, 2006).

Fossils found in the Emigrant Formation are exclusively marine invertebrates from outer-shelf environments that are not abundant and are not well studied. Trilobites are the most common fossils documented. McKee (1968) originally described the trilobite fauna of the Emigrant Formation, which included the taxa *Syspacephalus* sp., *Ehmaniella* sp., *Oryctocephalus* sp., *Alokistocare* cf. *A. agnesensis*, *Richardsonella* sp., *Drumaspis*, sp., *Homagnostus* sp., *Idahoia* (?) sp., *Pseudoagnostus* sp., *Eupychaspis* sp., and *Eurekia* sp. Sundberg and McCollum (2003) later identified more species of trilobites from the Emigrant Formation, these include *Oryctocephalus indicus, Oryctocephalus orientalis, Oryctocephalus runcinatus, Oryctocephalus americanus, Mircoryctocara nevadensis, Paraantagmus latus, Tonopahella goldfieldensis, Onchocephalites claytonensis,* and *Syspacephalus various*. These trilobite species show an age range of middle to late Cambrian, with the boundary between these ages lying somewhere in the Emigrant Formation. Other fossils include a brachiopod species, *Nisusia festinata*, and miscellaneous shelly fossils, *Anabarella chelata, Costipelagiella nevadense, Parkula esmeraldina*, echinoderm fragments, and sponge spicule (Skovsted, 2006; McKee, 1968). The Emigrant Formation is considered to have moderate paleontological potential (PFYC 3).

6.1.11 Igneous Rocks – Mesozoic (Jme, Jmj, Jmb, Jmbi, Kdc, Kt, Ka)

The Project area is underlain by seven Mesozoic igneous rock units (Jme, Jmj, Jmb, Jmbi, Kdc, Kt, Ka) all of which have very low potential to produce scientifically important paleontological resources (PFYC 1).

Igneous rocks are crystalline or non-crystalline rocks that form through the cooling and subsequent solidification of lava or magma. Intrusive (plutonic) igneous rocks form below the earth's surface, and extrusive (volcanic) rocks form on the earth's surface. Lava and magma are formed by the melting of pre-existing plutonic rocks in the earth's crust or mantle due to increases in temperature, changes in pressure, or changes in geochemical composition. Extreme temperatures in the environments in which intrusive igneous rocks form prevent the preservation of fossils. The formation of extrusive igneous rocks as a result of volcanic processes is associated with extremely high temperatures that also generally prevents the preservation of fossils.

The following Mesozoic igneous rocks are present within the Project area (Bateman, 1964; McKee and Nelson, 1967; Nelson, 1966):

- Monzonite of Eureka Valley (Jme) – Jurassic: dark, medium-grained augite and olivine bearing monzonite with small diabase masses;

- Hornblende-Augite Monzonite of Joshua Flat (Jmj) – Jurassic: medium-grained hornblende-augite monzonite in the Joshua Flat pluton and Beer Creek pluton;
- Quartz Monzonite of Beer Creek (Jmb) – Jurassic: medium- to coarse-grained porphyritic quartz monzonite in the Beer Creek pluton and Joshua Flat pluton;
- Diorite (Jmbi) – Jurassic: large, fine-grained dioritic inclusions in the Quartz Monzonite of Beer Creek;
- Aplite and Granite (Ka) – Cretaceous: fine-grained small masses and dikes;
- Tungsten Hills Quartz Monzonite (Kt) – Cretaceous; and
- Monzonite (Kdc) – Cretaceous: rocks similar to the Cathedral Peak granite, quartz monzonite.

6.1.12 Igneous Rocks – Cenozoic (Qob, Tb, Tt)

The Project area is underlain by three Cenozoic igneous rock units that have not been formally named (Bateman, 1964; McKee and Nelson, 1967):

- Intrusive Basalt (Qob) – Pleistocene: dikes, necks and dissected flows;
- Basalt (Tb) – Miocene or Pliocene: olivine basalt that is locally scoriaceous; and
- Tuff (Tt) – Miocene or Pliocene: buff and gray rhyolitic tuff and soft pumiceous air-fall tuffs.

The intrusive basalt (Qob) and basalt (Tb) have very low potential to produce scientifically important paleontological resources (PFYC 1). See Igneous Rocks – Mesozoic for a full discussion on these types of rocks. Fine-grained tuffs form under conditions that may under certain geologic conditions permit scientifically important fossils to be preserved, however, no fossils were reported from tuff deposits in the Project vicinity. Therefore, the unnamed tuff (Tt) is assigned a low paleontological potential (PFYC 2).

6.1.13 Unnamed Sedimentary Deposits – Pliocene or Pleistocene (Ts)

There is one unnamed sedimentary deposit mapped within the Project area. This consists of tuffaceous sandstone, sandstone, and conglomerate (Ts) (McKee and Nelson, 1967). Since this unit has not been assigned to a specific formation, the general geology and paleontologic content of the unit is unknown, though sedimentary deposits, especially sandstone, often have the potential to contain fossils. Due to the potential to find fossils in unnamed sedimentary deposits mapped within the Project area, this unit is considered to have unknown paleontological potential (PFYC U).

6.1.14 Bishop Tuff – Pleistocene (Qba, Qbf, Qbn, Qbp, Qbs, Qbu, Qbv, Qbw)

The Bishop Tuff is a type of igneous rock that forms by the consolidation of ash after a volcanic eruption that has several different sub-units mapped within the Project area that have varying degrees of welding (adhering of volcanic particles) (Qba, Qbf, Qbn, Qbp, Qbs, Qbu, Qbv, Qbw) (Bateman, 1964; Crowder and Sheridan, 1972). This unit is described as a welded rhyolitic ash-flow tuff with a radiometric age of 0.7 million years that created the Long Valley Caldera with outcrops in Inyo and Mono counties, California (Crowley et al., 2007; Crowder and Sheridan, 1972). While tuff in general has been reported to occasionally contain fossils, the Bishop Tuff does not have any record of paleontological resources, therefore the Bishop Tuff has low paleontological potential (PFYC 2).

6.1.15 Older Quaternary Deposits – Pleistocene (Qg1, Qg2, Qg3, Qoa, Qof)

Several unnamed older Quaternary deposits (middle to late Pleistocene; 780,000 to 11,000 years old) are exposed throughout the Project area and consist of terrace gravels (Qg1, Qg2, Qg3), older alluvium (Qoa) and older alluvial fan deposits (Qof) (Bateman, 1964; McKee and Nelson, 1967). Terrace gravels are composed of thin veneers of river deposits that cap elevated terraces and include well-rounded clasts that range in size from sand to cobbles that are 6 inches or more in diameter. Clast composition is primarily metamorphic and igneous sourced from neighboring highlands. Older alluvium is composed of a variety of material that ranges from clay to cobble sized clasts, but on a whole is finer grained than terrace deposits. It was deposited primarily on flood plains by streams and in ephemeral ponds. Older alluvial fan deposits are composed of gravel and sand of elevated and dissected older fans.

Ice Age taxa have been recovered from Pleistocene deposits of Inyo County, including specimens of horse (*Equus, Pliohippus*), rabbit (*Lepus*), camel (*Camelops*), mammoth (*Mammuthus*), and rodents (*Peromyscus* sp.) (Jefferson, 1991; UCMP, 2017). The Pleistocene Tecopa Lake Beds Formation in Inyo County contains fossil mammals including rodents (*Peromyscus*), hares (*Lepus*), horse (*Equus*), mammoth, and camel (Jefferson, 1991; Hillhouse, 1987). One study describes Pleistocene bivalves (*Rangia*) in Mono County found in the Mono Basin at Lake Russell that give insight into the paleogeographic extent and evolution of these organisms (Hershler and Jayko, 2009). Older alluvium and older alluvial fan deposits (Qoa, Qof) can be of a similar age and depositional environment to other fossil bearing formations, and therefore have the potential to have the same preservation style of similar taxa.

Some Pleistocene alluvial deposits are composed of coarse-grained material, which is not typically conducive to the preservation of fossils. For example, coarse-grained surficial older Quaternary deposits derived from the local plutonic igneous rocks have a low probability to contain fossils; however, finer grained alluvial sediments may contain significant paleontological resources. Older Quaternary deposits are assigned moderate paleontological potential (PFYC 3).

6.1.16 Younger Quaternary Deposits – Holocene (Qa, Qal, Qf, Qs, Qvf, Qyf)

Younger Quaternary deposits within the Project area are Holocene in age and typically consist of variable compositions of unconsolidated clay, silt, sand, gravel, and larger clasts that have variable sorting and angularity of clasts. Holocene sediments within the Project area consist of alluvium (Qa, Qal), alluvial fan deposits (Qf, Qyf), dune sand (Qs), and alluvium-valley fill deposits (Qvf) (Bateman, 1964; Nelson, 1966; Crowder and Sheridan, 1972). Holocene age (less than 11,000 years old) sediments are typically too young to contain fossilized material (Society of Vertebrate Paleontology [SVP], 2010), but they may overlie sensitive older (e.g., Pliocene and Pleistocene age) deposits at variable depth. Younger Quaternary deposits are assigned low paleontological potential (PFYC 2) at the surface using BLM (2016) guidelines. However, they have an unknown paleontological potential in the subsurface since there is potential for these deposits to be conformably underlain by older, paleontologically sensitive geologic units.

6.2 Paleontological Records Search Results

Paleontological records searches were requested from LACM and UCMP in order to identify if there are any known fossils within the Project boundaries. UCMP responded on March 7, 2017 that they have no record of vertebrate localities within the Project area (Finger, 2017; Appendix B). LACM responded on September 25, 2018 that they have no previously recorded fossil localities within the Project area or vicinity; however, they have several fossil localities recorded from sedimentary deposits similar to those that occur within the Project area (McLeod, 2018; Appendix B). Exact fossil locations were not provided by the museum, but general locations with regard to the Project area are provided in the discussion below where available.

LACM reported six Pleistocene localities within Owens Valley from areas mapped at the surface as fine-grained younger alluvium. The six localities are located approximately 60 miles south of the Project area near the current Owens Lake. Locality LACM 4691, to the north of Owens Lake near State Highway 136, produced fossil elephant (Proboscidea) and mountain lion (*Felis concolor*); Locality LACM 7716-7719, to the east of Owns Lake near Swansea, produced fossil specimens of bony fish (Teleostei), bird (Aves), jack rabbit (*Lepus*), pocket gopher (*Thomomys*), and even-toed ungulate (Artiodactyla); Locality LACM 4538, to the south of Owens Lake near the mouth of Summit Creek, produced a Columbian mammoth (*Mammuthus columbi*) that was recovered during construction of the Los Angeles aqueduct (McLeod, 2018). In addition, LACM has two localities (LACM 7717 and 7718) from lacustrine deposits of the formerly expanded Owens Lake that produced specimens of bony fish (Teleostei), bird (Aves), and even-toed ungulate (Artiodactyla) from depths of 2 to 3 feet below the surface (McLeod, 2018).

The closest locality from tuff deposits is LACM 3513, which was recovered near Oakdale in Stanislaus County, over 100 miles west-northwest of the northern portion of the Project area. The locality produced fossil specimens of mammoth (*Mammuthus columbi*), horse (*Equus*), and camel (*Camelops*) from tuff deposits possibly belonging to the Pliocene Tehama Formation (McLeod, 2018), which is not mapped within the vicinity of the Project area (Bateman, 1964; Crowder and Sheridan, 1972; McKee and Nelson, 1967; Nelson, 1966).

7.0 FIELD SURVEY

Paleo Solutions conducted a paleontological survey of the Project area on November 26-28, 2018. The terrain consists of the steep White Mountain Range and associated hills, alluvial fans and plains of low to moderate topographic relief, and active and inactive stream channels. Existing ground disturbances include paved and unpaved graded roads, substations, and electrical towers. Additionally, most of the low to moderate relief areas of the Project area are covered in patchy grasses and bushes or shrubs. Geologic exposures were observed along the surface and as steep ridges or canyons within the White Mountain Range.

7.1 Geology

The Precambrian Deep Spring Formation (ds, dl, dm, du) is mapped in the White Mountains, outcropping along the Right-of-Way (ROW), including the existing transmission poles. The Deep Spring Formation, middle member (dm) consisted of well lithified, grayish-brown calcareous quartzite (Figure 2). Only the middle member of the Deep Spring Formation (dm) was observed during the survey; the lower (dl), upper (du), and undivided (ds) members were not observed by Paleo Solutions staff during the survey.

The late Precambrian Wyman Formation (w, wl) is mapped in the White Mountains from Water Canyon to White Mountain Road, underlying existing roads and transmission poles. The Wyman Formation (w) consisted of a dark to light gray and tan slaty siltstone, with planar laminations, tilted bedding, and crenulations (Figure 3). The Wyman Formation, lenticular limestone (wl) consisted of gray, oolitic limestone (Figures 4 and 5).

The Precambrian to early Cambrian Campito Formation (Cc, Cca, Ccm) is mapped across the White Mountains into Silver Canyon, underlying existing roads and transmission poles. The Campito Formation, undivided (Cc) consisted of dark to medium gray, slaty claystone and siltstone, which experienced contact-metamorphism and folding (Figure 6 and 7). Calcite veins within this formation were also noted during the survey. The Campito Formation, Montenegro Member (Ccm) consisted of dark brown siltstone with light brown beds and planar laminations, with some beds exhibiting contact-metamorphism (Figures 7, 8, and 9). The Campito Formation, Andrews Mountain Member (Cca) consisted of light brown and moderate gray siltstone, with a flaky and slaty texture, and also exhibited partial contact-metamorphism (Figures 11 and 12).

The Precambrian(?) or early Cambrian Reed Dolomite (r, rh, rl, ru) is mapped across the White Mountains; though, it is not observed at the most western and eastern extents of the White Mountains. The Reed Dolomite, undivided (r) consisted of well lithified, light gray and light brown dolomite (Figure 13). The Reed Dolomite, Hines Tongue Member (rh) consisted of medium to light gray, fine-grained, massive sandstone, with planar laminations and cross beds, the latter of which is bedded in clean quartzite (Figure 14). Only the Reed Dolomite, undivided (r) and the Hines Tongue Member were observed during the survey; the lower (rl) and upper (ru) members were not observed during the survey.

The early Cambrian Poleta Formation (Cp, Cpl, Cpm, Cpu) is mapped in the western extent of the White Mountains, mainly inside Silver Canyon. The Poleta Formation, undivided (Cp) consisted of dark gray limestone and orange dolomite with quartz veins (Figures 15 and 16). The Poleta Formation, lower member (Cpl) consisted of dark to light gray, blocky and platy limestone with planar laminations, which become thinner down-section (Figures 17 and 18). Only the lower (Cpl) and undivided (Cp) members of the Poleta Formation were observed during the survey; the middle (Cpm) and upper (Cpu) members were not observed during the survey.

The early Cambrian Harkless Formation (Ch) is mapped in the western White Mountains only in Silver Canyon, and it represents a sea transgression. The Harkless Formation (Ch) consists of dark brown and dark to light gray, platy, massive, and blocky shale, sandstone, and siltstone, which varies between blocky, platy, and chalky (Figures 19 and 20).

The unnamed Pliocene or Pleistocene tuffaceous sandstone and conglomerate (Ts) is mapped north of Deep Springs College at the foot of the eastern White Mountains. It was not observed *in situ*; however, clasts eroded from the unit were observed as float on a hill three miles north of Deep Springs College. The tuffaceous sandstone and conglomerate (Ts) consists of moderate to light gray sandstone, composed of coarse- to very coarse-grained sand, with granules and pebbles, subangular to subrounded, well sorted, and poorly lithified (Figure 21).

The older Quaternary (Pleistocene) deposits (Qg1, Qg2, Qg3, Qoa, Qof) are mapped on the flat plains to the west and east of the White Mountain Range. The terrace gravels (Qg1, Qg2, Qg3) are mapped along the ROW closest to US Highway 6 and along the ROW to the Control Substation. The older alluvial fan deposits (Qof) are mapped at the entrance to Silver Canyon and partially into the alluvial fan. The older alluvium (Qoa) is mapped only east of the White Mountain Range along the ROW. The youngest of the terrace gravels (Qg1) consisted of light to tan brown, bedded, fine- to very coarse-grained sand, with granules and pebbles, subangular to subrounded, moderately sorted and moderately compacted (Figures 22 and 23). The middle terrace gravels (Qg2) consisted of tan to light pink, fine- to very coarse-grained sand with granules, subangular to subrounded, poorly sorted and poorly compacted (Figures 24 and 25). The oldest of the terrace gravels (Qg3) consisted of dark tannish-brown, medium- to very coarse-grained sand with granules and pebbles, subrounded to rounded, moderately sorted and moderately compacted (Figure 26). The older alluvial fan deposits (Qof) were observed as three informal facies: a "lower unit" (Figure 27), an "upper unit" (Figure 28), and a "single unit" (Figure 29), the latter of which may be correlative to one of the other two units. The older alluvial fan deposits, "lower unit" (Qof) consisted of dark brown, clay, coarse- to very coarse-grained sand with granules, pebbles, and cobbles, angular clasts, moderately sorted, and well compacted. Constituent clasts of the "lower unit" were derived from older geologic units, mainly the Andrew Mountain Member of the Campito Formation (Cca) (Figure 12). The older alluvial fan deposits, "upper unit" (Qof) consisted of moderate brown, medium- to very coarse-grained sand with granules, pebbles, and cobbles, subrounded to rounded, moderately sorted and well compacted. These two "units" have a sharp contact between them. The older alluvial fan deposits "single unit" (Qof) consisted of light brownish-tan with dark clasts, composed of clay, silt, very fine- to very coarse-grained sand with granules, pebbles, and cobbles, angular, very poorly sorted, and well compacted, with calcium carbonate mineralization (Figures 28 and 29). Older alluvium (Qoa) was not observed during the survey.

Younger Quaternary (Holocene) deposits (Qa, Qal, Qf, Qs, Qvf, Qyf) are mapped in washes, stream channels, alluvial fans, and plains that occur in the Project area (Figures 31, 32, 33, 34, 35, and 36). Younger alluvium (Qa/Qal) consisted of light brownish-tan, clay to cobble-sized clasts with graded bedding, angular to subangular, very poorly sorted, and moderately compacted (Figures 31 and 37). Younger alluvial fan deposits (Qf) consisted of tan and medium gray, coarse-grained sand to boulder-sized clasts with graded bedding, angular to subangular, moderately sorted, and well compacted (Figures 32 and 38). Younger alluvial fan deposits (Qyf) consisted of light brownish-tan, coarse- to very coarse-grained sand with granules, pebbles, cobbles, and boulders, subangular to subrounded, poorly sorted, and moderately compacted (Figures 34 and 39). Dune sand (Qs) and valley-fill deposits (Qvf) were not observed during the survey.

7.2 Paleontology

No paleontological resources were observed or collected during this survey. However, there are several formations that were observed and are conducive to fossil preservation: Deep Spring Formation, middle member (dm); Campito Formation, undivided, Andrews Mountain, and Montenegro Members (Cc, Cca, Ccm); Poleta Formation undivided and lower member (Cp, Cpl); Harkless Formation (Ch), unnamed tuffaceous sandstone and conglomerate (Ts); and older Quaternary deposits including terrace gravels and older alluvial fan deposits (Qg1, Qg2, Qg3, Qof).

Figure 2. Outcrop of the Deep Spring Formation, middle member (dm). View east.

Figure 3. Outcrop of the Wyman Formation (w). View north.

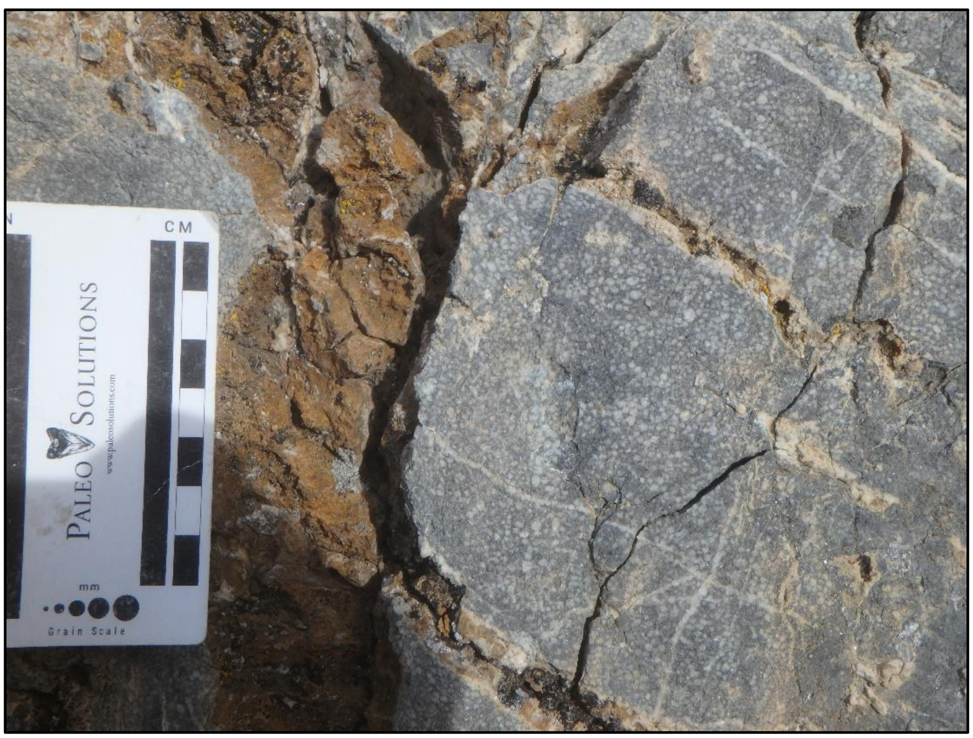

Figure 4. Plan view of the Wyman Formation, lenticular limestone (wl), consisting of oolitic limestone.

Figure 5. Canyon with exposures of the Wyman Formation, lenticular limestone (wl). View northeast.

Figure 6. Outcrop of the Campito Formation, undivided (Cc). View north.

Figure 7. Plan view of the Campito Formation, undivided (Cc); note the quartz veins.

Figure 8. Plan view of the Campito Formation, Montenegro Member (Ccm).

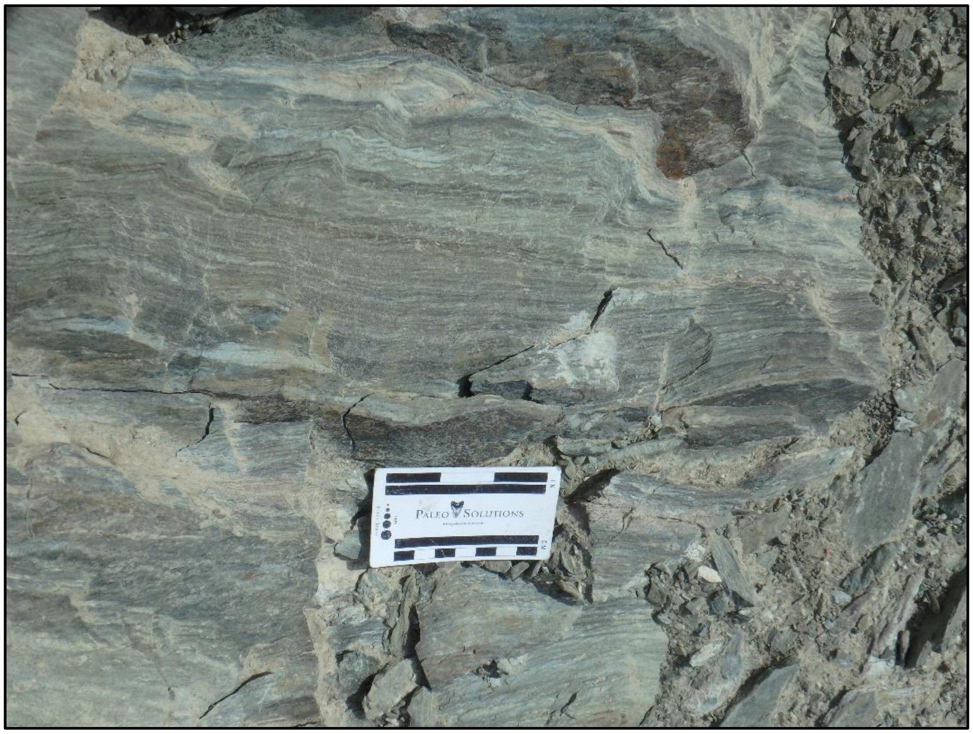

Figure 9. Plan view of the Campito Formation, Montenegro Member (Ccm) in Silver Canyon.

Figure 10. Overview of Project area near the intersection of White Mountain Road and Silver Canyon Road. Campito Formation, Montenegro Member (Ccm) outcrops in the foreground. View east.

Figure 11. Outcrop of the Campito Formation, Andrews Mountain Member (Cca). View southeast.

Figure 12. Contact between older Quaternary alluvial fan deposits (Qof) on the left and Campito Formation, Andrews Mountain Member (Cca) on the right. View northwest.

Figure 13. Plan view of the Reed Dolomite, undivided (r).

Figure 14. Plan view of the Reed Dolomite, Hines Tongue Member (rh); note the sandstone bedded in quartzite.

Figure 15. Plan view of the Poleta Formation, undivided (Cp); note the orange dolomite within the dark gray limestone.

Figure 16. Overview of Project area in Silver Canyon with outcrops of the Poleta Formation, undivided (Cp). View west.

Figure 17. Outcrop of the Poleta Formation, lower member (Cpl). View east.

Figure 18. Overview of Project area at the eastern extent of Silver Canyon with outcrops of the Poleta Formation, lower member (Cpl). View east.

Figure 19. Outcrop of the Harkless Formation (Ch), which represents a sea transgression. View south.

Figure 20. Closer view of the Harkless Formation (Ch) outcrop. Note the changes in texture. View south.

Figure 21. Plan view of the unnamed tuffaceous sandstone and conglomerate (Ts), which was only seen as float.

Figure 22. Road cut exposing older Quaternary terrace gravels, youngest (Qg1). View southeast.

Figure 23. Plan view of the older Quaternary terrace gravels, youngest (Qg1).

Figure 24. Plan view of the older Quaternary terrace gravels, middle age (Qg2).

Figure 25. Overview of Project area on an alluvial plain, older Quaternary terrace gravels, middle age (Qg2) is partly cover by vegetation. View east.

Figure 26. Plan view of the older Quaternary terrace gravels, oldest (Qg3).

Figure 27. Outcrop of the older Quaternary alluvial fan deposits (Qof); note the two distinct layers. View north.

Figure 28. Closer view of the two layers of the older Quaternary alluvial fan deposits (Qof).

Figure 29. Outcrop of the "single" unit of the older Quaternary alluvial fan deposits (Qof).

Figure 30. Plan view of the "single unit" of the older Quaternary alluvial fan deposits (Qof); note the calcium carbonate layer.

Figure 31. Overview of the eastern extent of the Project area, low relief alluvial plain mapped as younger Quaternary alluvium (Qa/Qal). View south.

Figure 32. Overview of Project area on an alluvial fan mapped as younger Quaternary alluvial fan deposits (Qf), looking back at Silver Canyon. View east.

Figure 33. Overview of the Project area in the north, mapped as younger Quaternary valley-fill deposits (Qvf). View north.

Figure 34. Overview of Project area from Control Substation, area mapped as younger Quaternary alluvial fan deposits (Qyf). View north.

Figure 35. Overview of Project area from a canyon within the White Mountains. View west.

Figure 36. Overview of Project area from Deep Springs College, low relief alluvial fan. View north.

Figure 37. Road cut of younger Quaternary alluvium (Qa/Qal); note the graded bedding. View southeast.

Figure 38. Outcrop of younger Quaternary alluvial fan deposits (Qf); note graded bedding. View south.

Figure 39. Exposure of younger Quaternary alluvial fan deposits (Qyf). View west.

8.0 IMPACTS ON PALEONTOLOGICAL RESOURCES

Impacts on paleontological resources can generally be classified as either direct, indirect or cumulative. Direct adverse impacts on surface or subsurface paleontological resources are the result of destruction by breakage and crushing as the result of surface disturbing actions including construction excavations. In areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact surface and subsurface paleontological resources of scientific importance. Without mitigation, these fossils and the paleontological data they could provide if properly recovered and documented, could be adversely impacted (damaged or destroyed), rendering them permanently unavailable to science and society.

Indirect impacts typically include those effects which result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given project area. They also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting. Human activities that increase erosion also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative impacts can result from incrementally minor but collectively significant actions taking place over a period of time. The incremental loss of paleontological resources over time as a result construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact because it would result in the destruction of non-renewable paleontological resources and the associated irretrievable loss of scientific information.

Excavations in the Project area that impact the Precambrian Deep Spring Formation; Precambrian to Cambrian Campito Formation; Cambrian Poleta, Harkless, Saline Valley, Mule Spring Limestone, and

Emigrant formations; unnamed Pliocene to Pleistocene sedimentary deposits; or older Quaternary (Pleistocene) alluvial deposits (PFYCs U, 3, and 4), either at the surface or at depth beneath previously disturbed sediments or younger Quaternary (Holocene) alluvial deposits, may well result in adverse direct impacts on scientifically important paleontological resources. Excavations entirely within previously disturbed sediments or younger Quaternary (Holocene) alluvial deposits (PFYC 2) are unlikely to uncover significant fossil remains; furthermore, any recovered resources from these surficial sediments will lack stratigraphic context. However, younger deposits may shallowly overlie older *in situ* sedimentary deposits. Excavations in Precambrian Wyman Formation, Precambrian or Cambrian Reed Dolomite, Cambrian hornfels, Mesozoic and Cenozoic igneous rocks, or Pleistocene Bishop Tuff (PFYCs 1 and 2) are unlikely to uncover significant fossil remains.

9.0 CONCLUSIONS AND RECOMMENDATIONS

There is the potential for adverse impacts to scientifically significant paleontological resources during ground disturbance within the Precambrian Deep Spring Formation; Precambrian to Cambrian Campito Formation; Cambrian Poleta, Harkless, Saline Valley, Mule Spring Limestone, and Emigrant formations; unnamed Pliocene to Pleistocene sedimentary deposits; or older Quaternary (Pleistocene) alluvial deposits (PFYCs U, 3, and 4). A paleontological resource monitoring and mitigation plan should be prepared prior to the start of construction. The PRMMP should provide detailed recommended monitoring locations including locations mapped as unknown, moderate, and high potential (PFYC U, 3, and 4); a description of a worker training program, detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by paleontological monitors or other project personnel. A curation agreement with a BLM-approved repository should also be obtained. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist.

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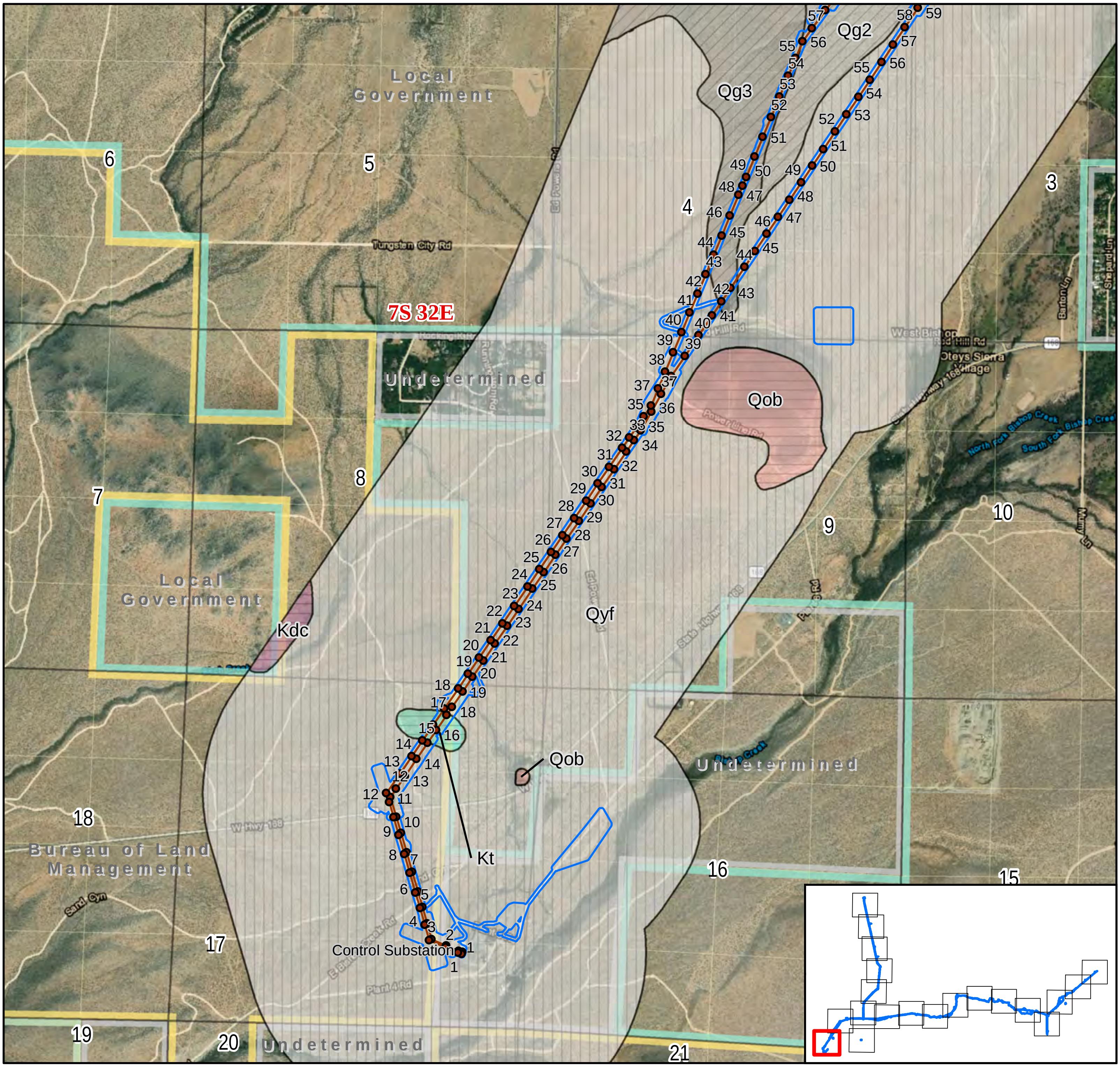
APPENDIX A: Geologic Maps



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- Local
- Private or Unknown

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class 3: Moderate

Geology

- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qob: Intrusive Basalt (Pleistocene)
- Qg2: Terrace Gravels, middle age (Pleistocene)
- Qg3: Terrace Gravels, oldest (Pleistocene)
- Kt: Tungsten Hills Quartz Monzonite (Cretaceous)
- Kdc: Cathedral Peak Quartz Monzonite (Cretaceous)

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Feet

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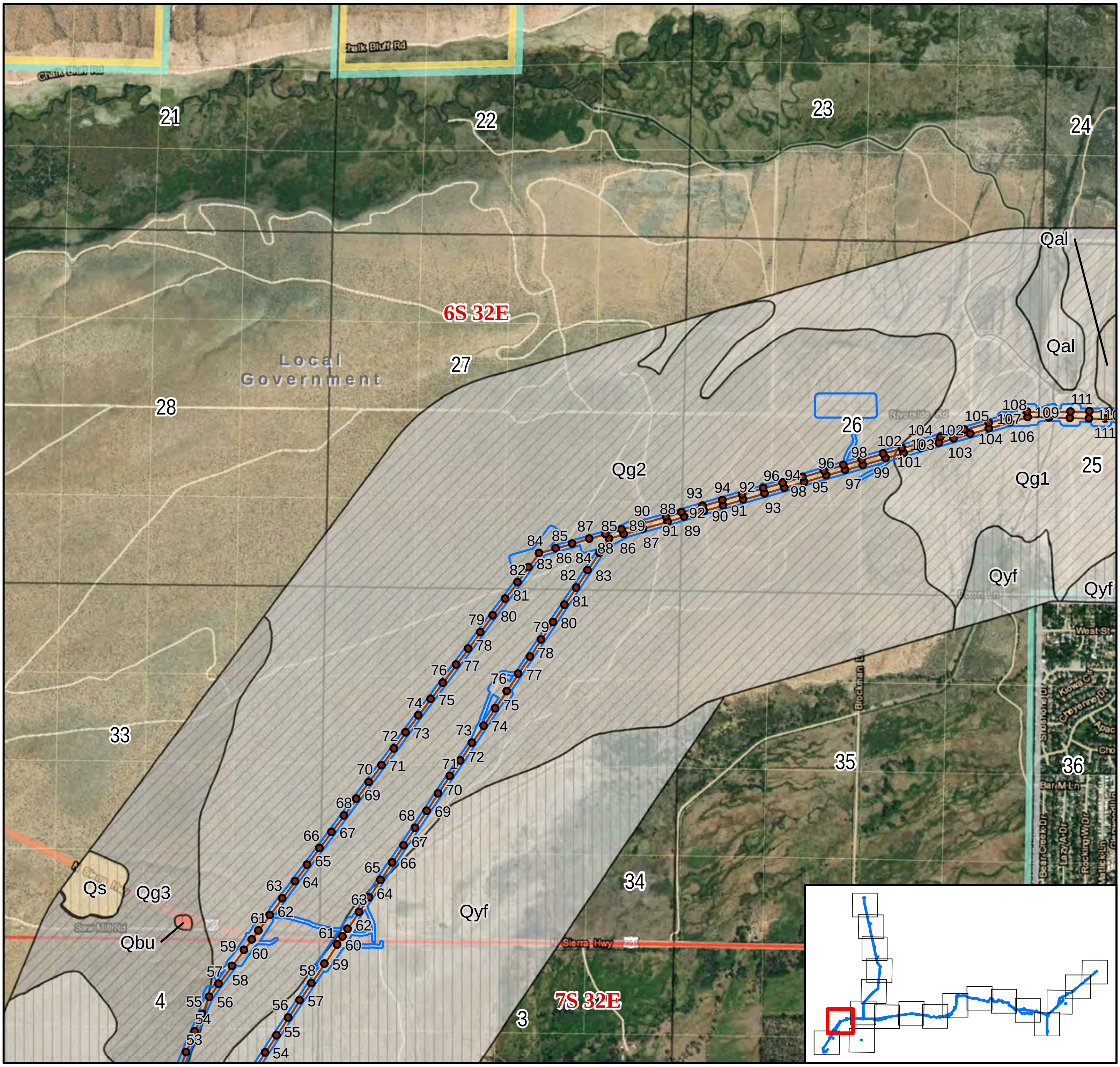
Basemaps from ESRI Online; Geology from:
Bateman, Paul C., (1964). Geologic Map of the Bishop 15-Minute Quadrangle, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Indian Affairs (BIA)
- Bureau of Land Management (BLM)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qs: Dune Sand (Holocene)
- Qg1: Terrace Gravels, youngest (Pleistocene)
- Qg2: Terrace Gravels, middle age (Pleistocene)
- Qg3: Terrace Gravels, oldest (Pleistocene)
- Qbu: Bishop Tuff, soft with rounded pumice (Pleistocene)

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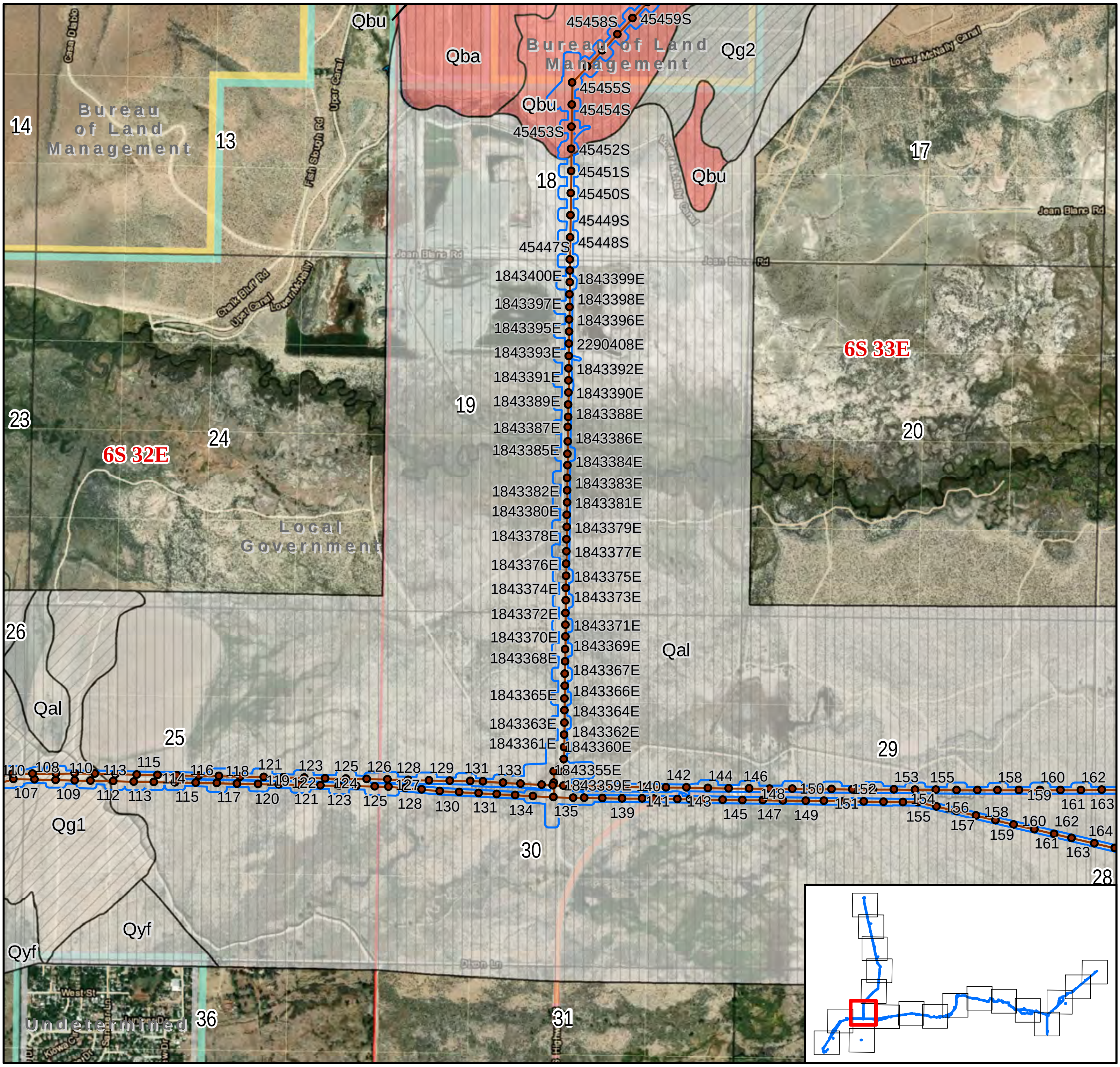
Basemaps from ESRI Online; Geology from:
Bateman, Paul C., (1964). Geologic Map of the Bishop 15-Minute Quadrangle, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qg1: Terrace Gravels, youngest (Pleistocene)
- Qg2: Terrace Gravels, middle age (Pleistocene)
- Qbu: Bishop Tuff, soft with rounded pumice (Pleistocene)
- Qba: Bishop Tuff, hard & consolidated (Pleistocene)

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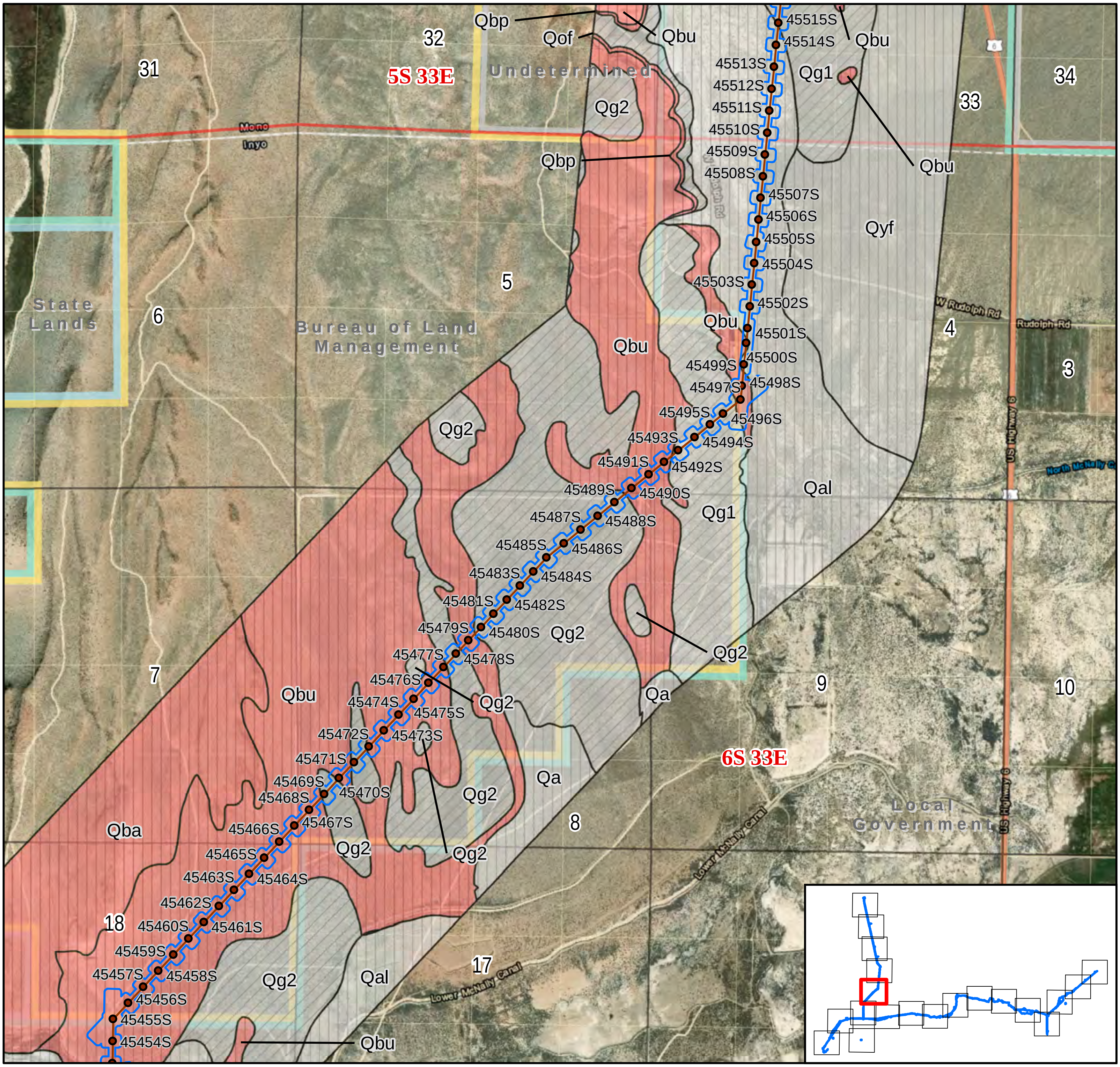
Basemaps from ESRI Online; Geology from:
Bateman, Paul C., (1964). Geologic Map of the Bishop 15-Minute Quadrangle, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Local
- State
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qa: Alluvium (Holocene)
- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qof: Older Alluvial Fan Deposits (Pleistocene)
- Qg1: Terrace Gravels, youngest (Pleistocene)
- Qg2: Terrace Gravels, middle age (Pleistocene)
- Qbu: Bishop Tuff, soft with rounded pumice (Pleistocene)
- Qbp: Bishop Tuff, basal pumice (Pleistocene)
- Qba: Bishop Tuff, hard & consolitated (Pleistocene)

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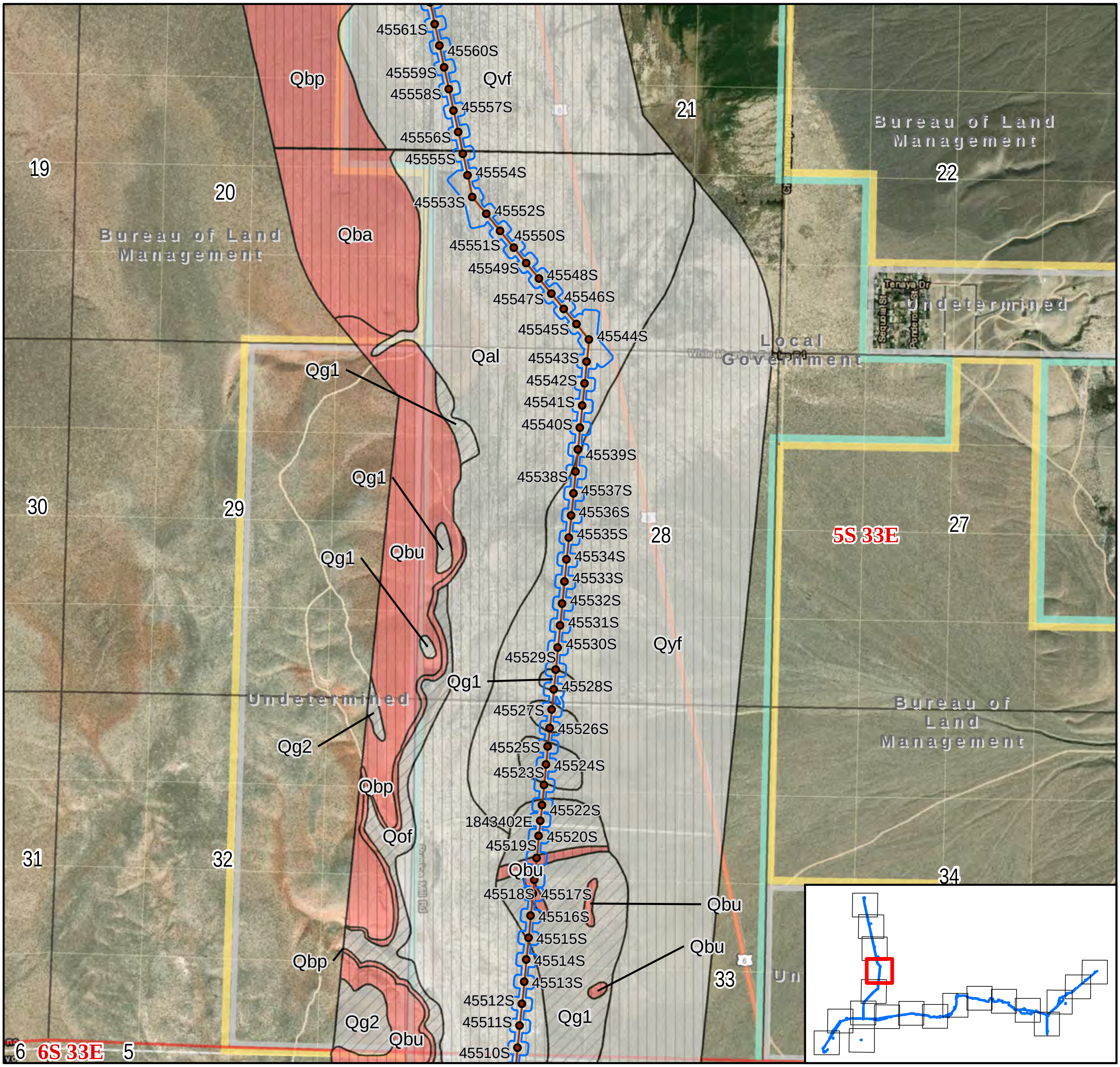

SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qvf: Alluvium, valley fill deposits (Holocene)
- Qof: Older Alluvial Fan Deposits (Pleistocene)
- Qg1: Terrace Gravels, youngest (Pleistocene)
- Qg2: Terrace Gravels, middle age (Pleistocene)
- Qbu: Bishop Tuff, soft with rounded pumice (Pleistocene)
- Qbp: Bishop Tuff, partly welded (Pleistocene)
- Qbp: Bishop Tuff, basal pumice (Pleistocene)
- Qba: Bishop Tuff, hard & consolidated (Pleistocene)

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Basemaps from ESRI Online; Geology from:

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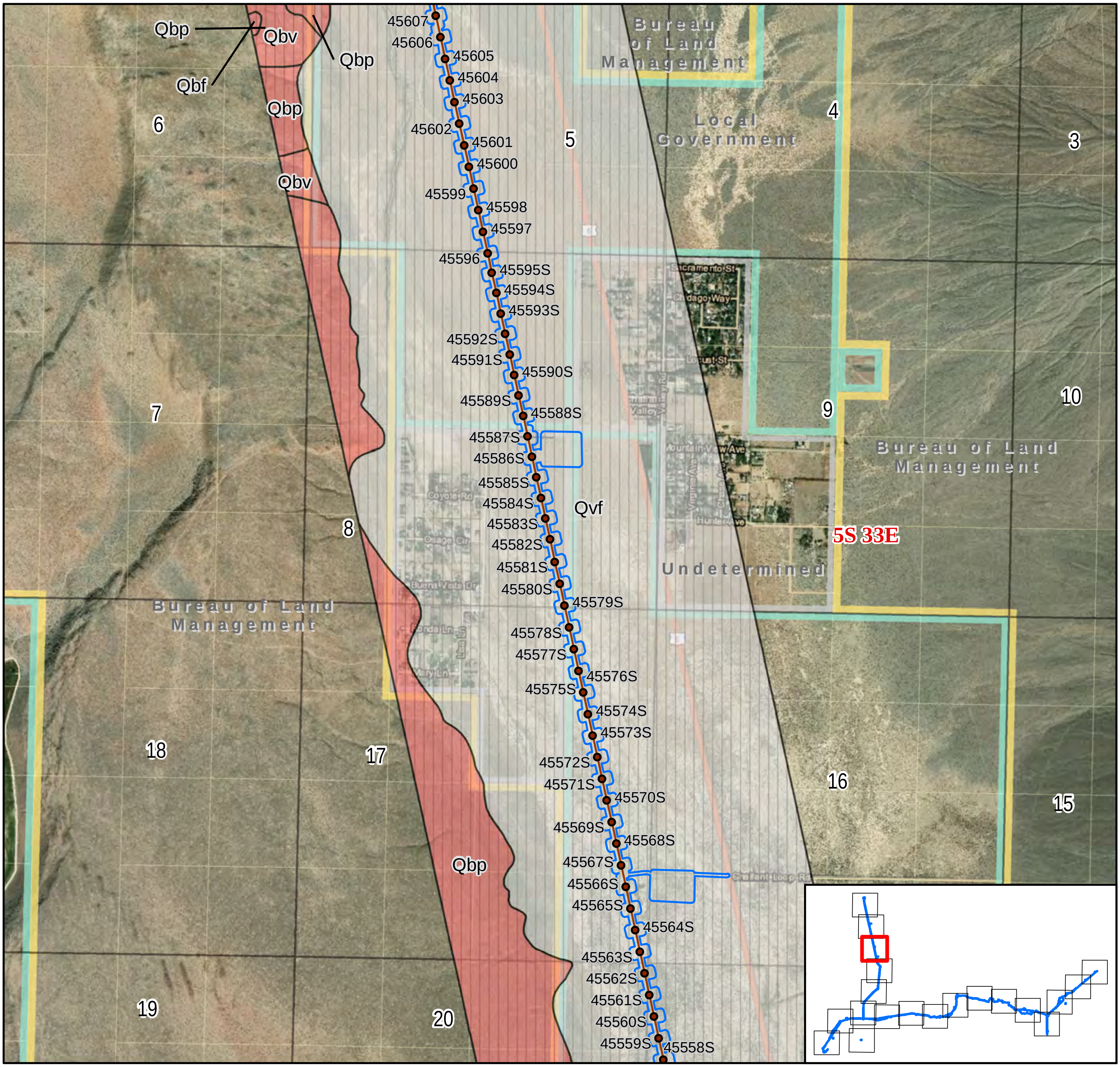

SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low

Geology

- Qvf: Alluvium, valley fill deposits (Holocene)
- Qbv: Bishop Tuff, vapor-phase crystallized (Pleistocene)
- Qbp: Bishop Tuff, partly welded (Pleistocene)
- Qbf: Bishop Tuff, fumarolic mounds and ridges (Pleistocene)

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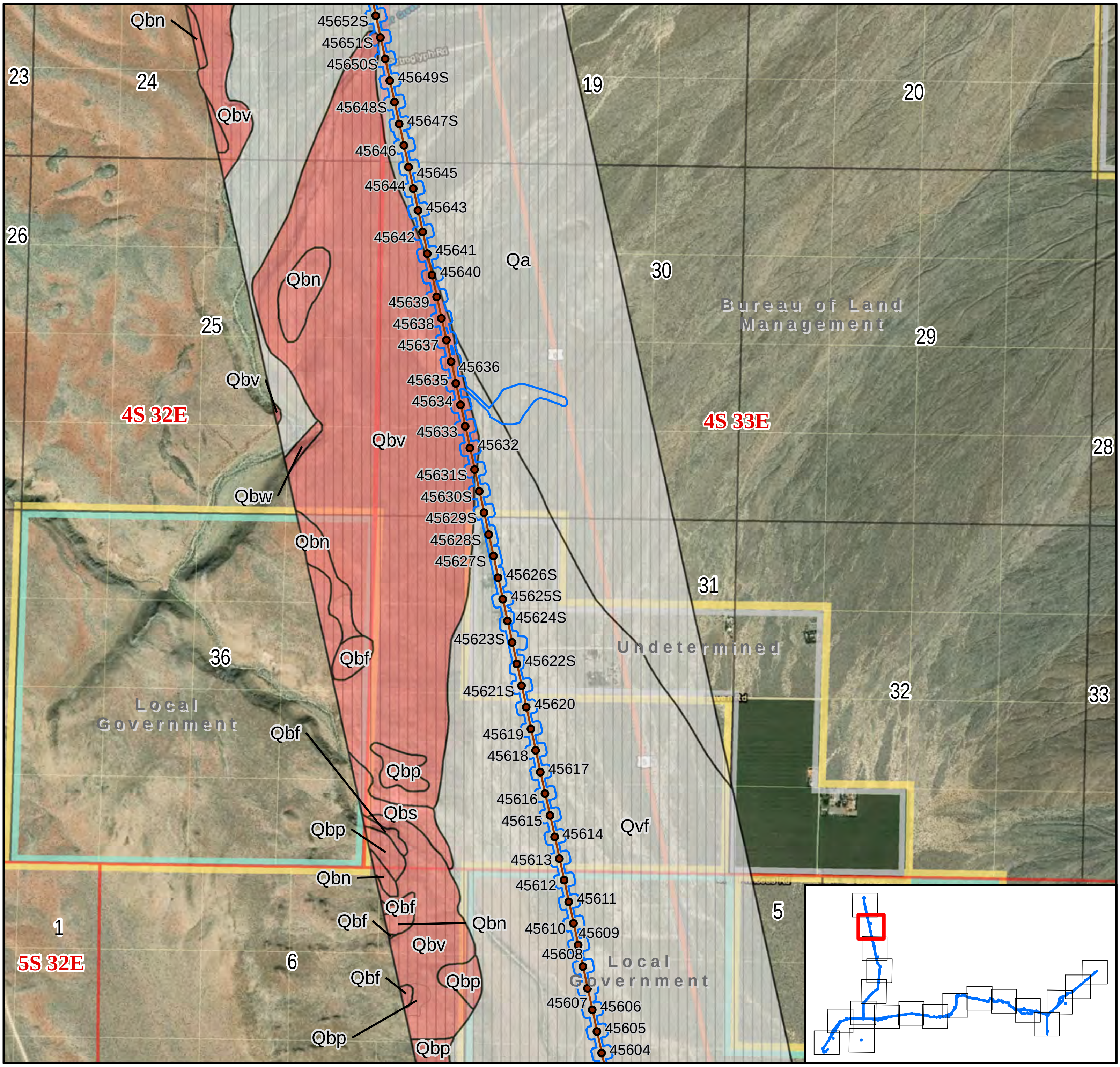
Basemaps from ESRI Online; Geology from: Crowder, D. F., and Sheridan, M. F., (1972). Geologic Map of the White Mountain Quadrangle, Mono County, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low

Geology

- Qa: Alluvium (Holocene)
- Qvf: Alluvium, valley fill deposits (Holocene)
- Qbw: Bishop Tuff, densely welded (Pleistocene)
- Qbv: Bishop Tuff, vapor-phase crystallized (Pleistocene)
- Qbs: Bishop Tuff, sandy partings (Pleistocene)
- Qbp: Bishop Tuff, partly welded (Pleistocene)
- Qbn: Bishop Tuff, nonwelded (Pleistocene)
- Qbf: Bishop Tuff, fumarolic mounds and ridges (Pleistocene)

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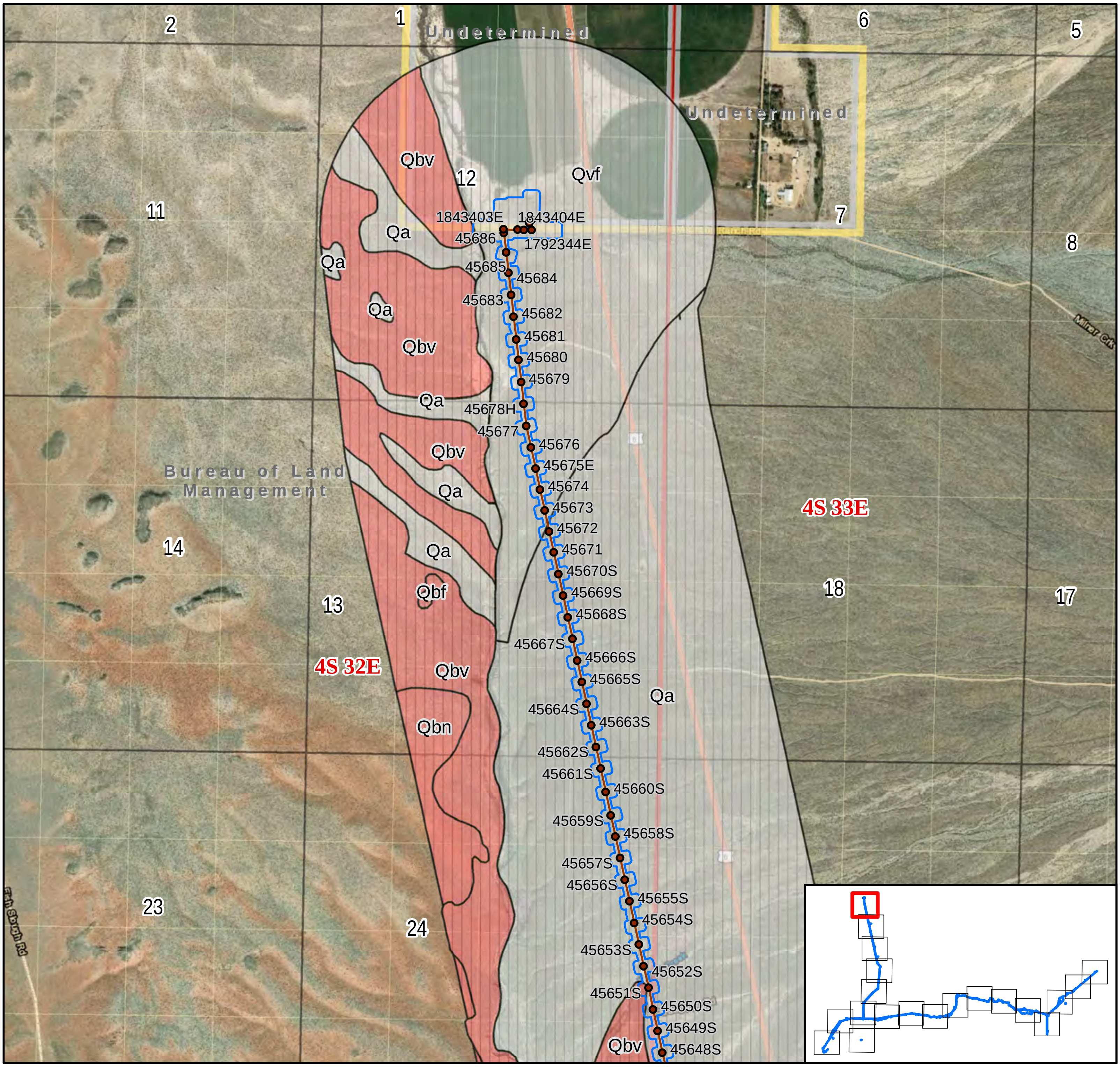

SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Private or Unknown

Paleosensitivity

- Class 2: Low

Geology

- Qa: Alluvium (Holocene)
- Qvf: Alluvium, valley fill deposits (Holocene)
- Qbv: Bishop Tuff, vapor-phase crystallized (Pleistocene)
- Qbn: Bishop Tuff, nonwelded (Pleistocene)
- Qbf: Bishop Tuff, fumarolic mounds and ridges (Pleistocene)

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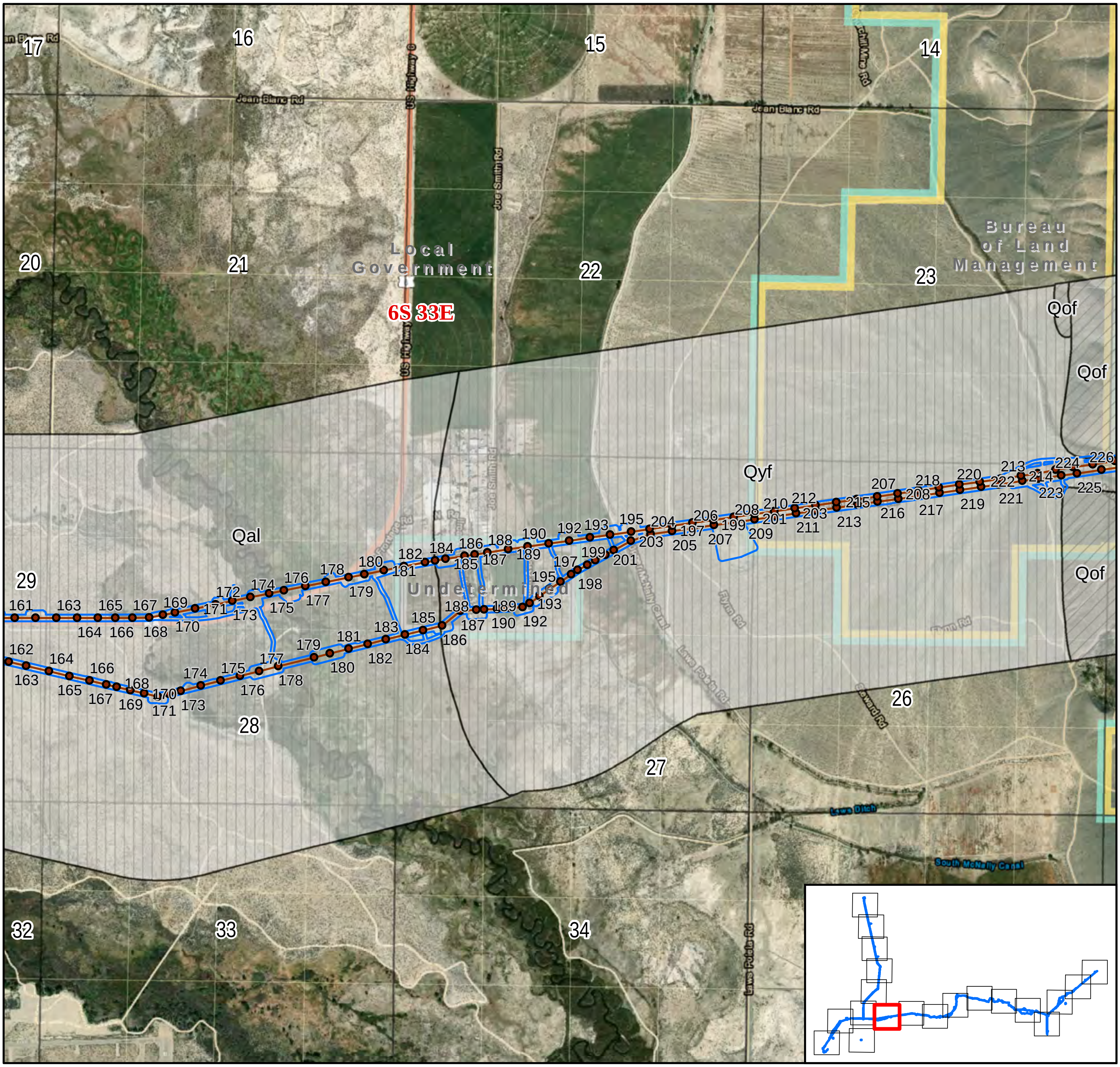

SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qof: Older Alluvial Fan Deposits (Pleistocene)

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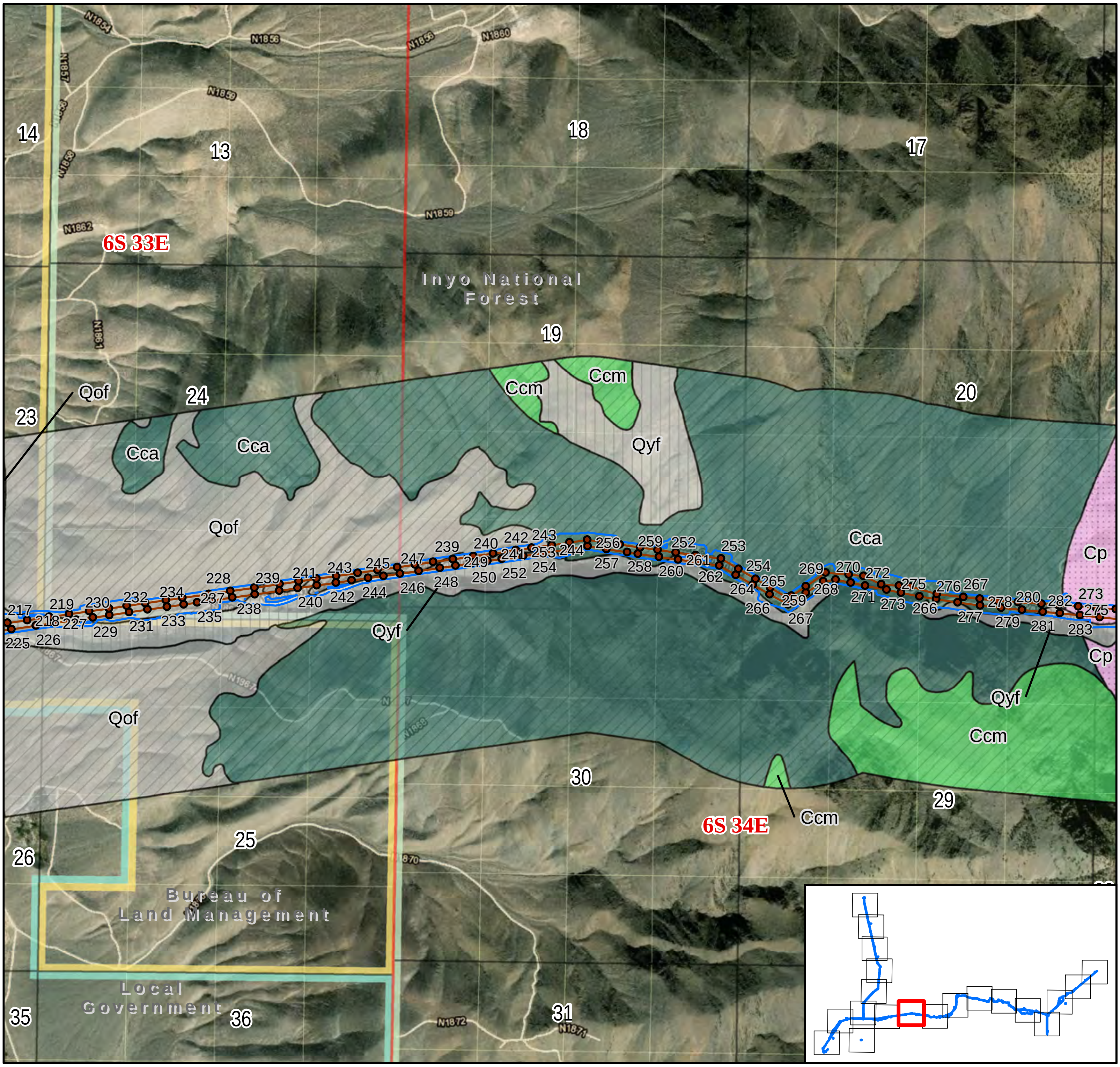

SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- Local

Paleosensitivity

- Class 2: Low
- Class 3: Moderate
- Class U: Unknown

Geology

- Qyf: Younger Alluvial Fan Deposits (Holocene)
- Qof: Older Alluvial Fan Deposits (Pleistocene)
- Cp: Poleta Formation, undiv. (Cambrian)
- Ccm: Campito Fm, Montenegro Member (Cambrian)
- Cca: Campito Fm, Andrews Mtn Member (Cambrian)

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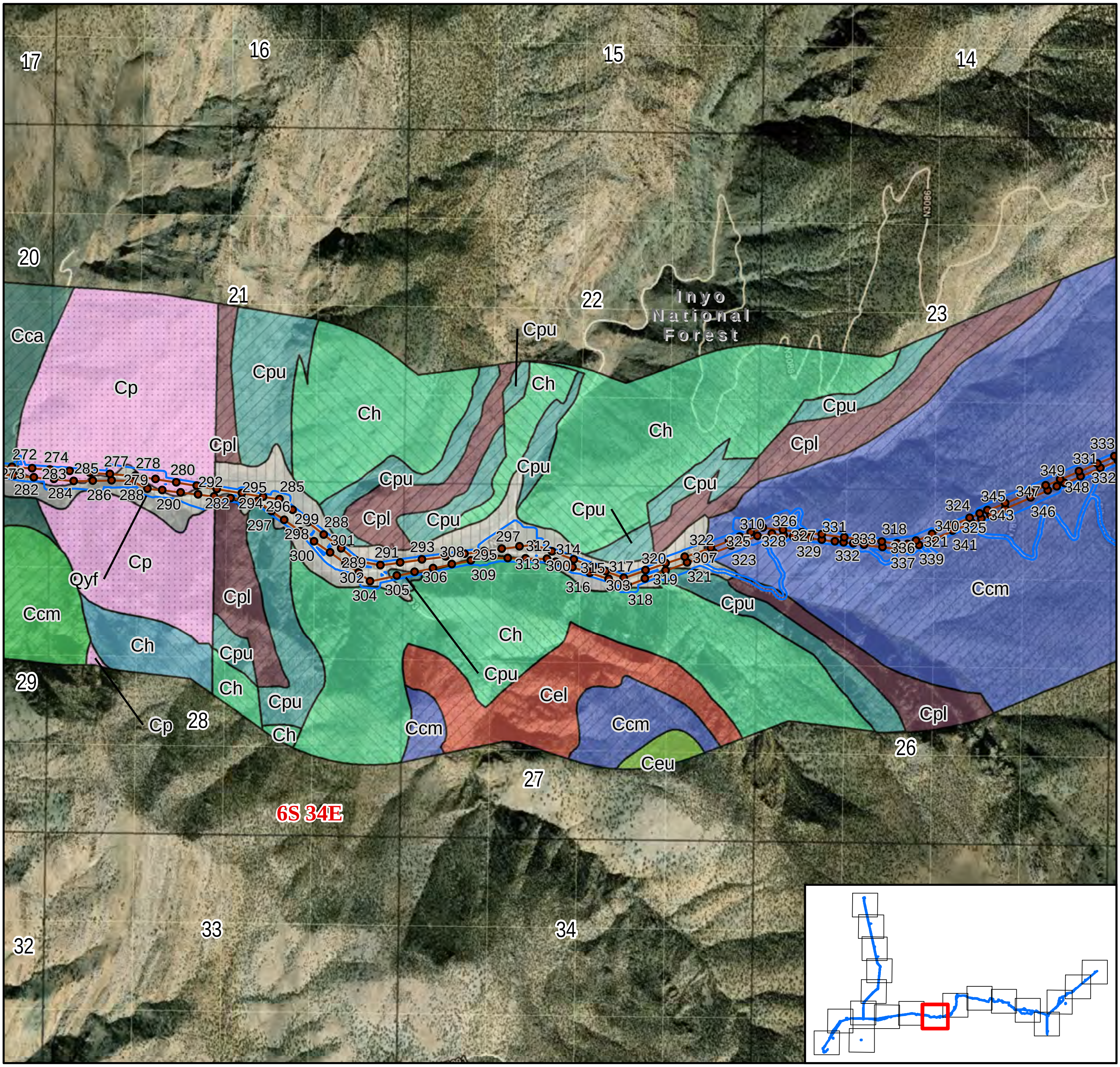

SCE TLRR Control-Silver Peak

Structures

Survey Area

PLSS Township

PLSS Section

PLSS Second Division

Surface Management

US Forest Service (USFS)

Paleosensitivity

Class 2: Low

Class 3: Moderate

Class 4: High

Class U: Unknown

Geology

Qa: Alluvium (Holocene)

Qyf: Younger Alluvial Fan Deposits (Holocene)

Cpu: Upper Member of Poleta Formation (Lower Cambrian)

Ceu: Upper Limestone Member of Upper Part of Emigrant Formation (Upper Cambrian)

Cel: Lower Shale Member of Upper Part of Emigrant Formation (Upper Cambrian)

Cpl: Lower Member of Poleta Formation (Lower Cambrian)

Cp: Poleta Formation, undiv. (Cambrian)

Ch: Harkless Formation (Cambrian)

Ccm: Campito Fm, Montenegro Member (Cambrian)

Ch: Harkless Formation (Lower Cambrian)

Ccm: Campito Fm, Montenegro Member (Lower Cambrian)

Cca: Campito Fm, Andrews Mtn Member (Cambrian)

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Basemaps from ESRI Online; Geology from:

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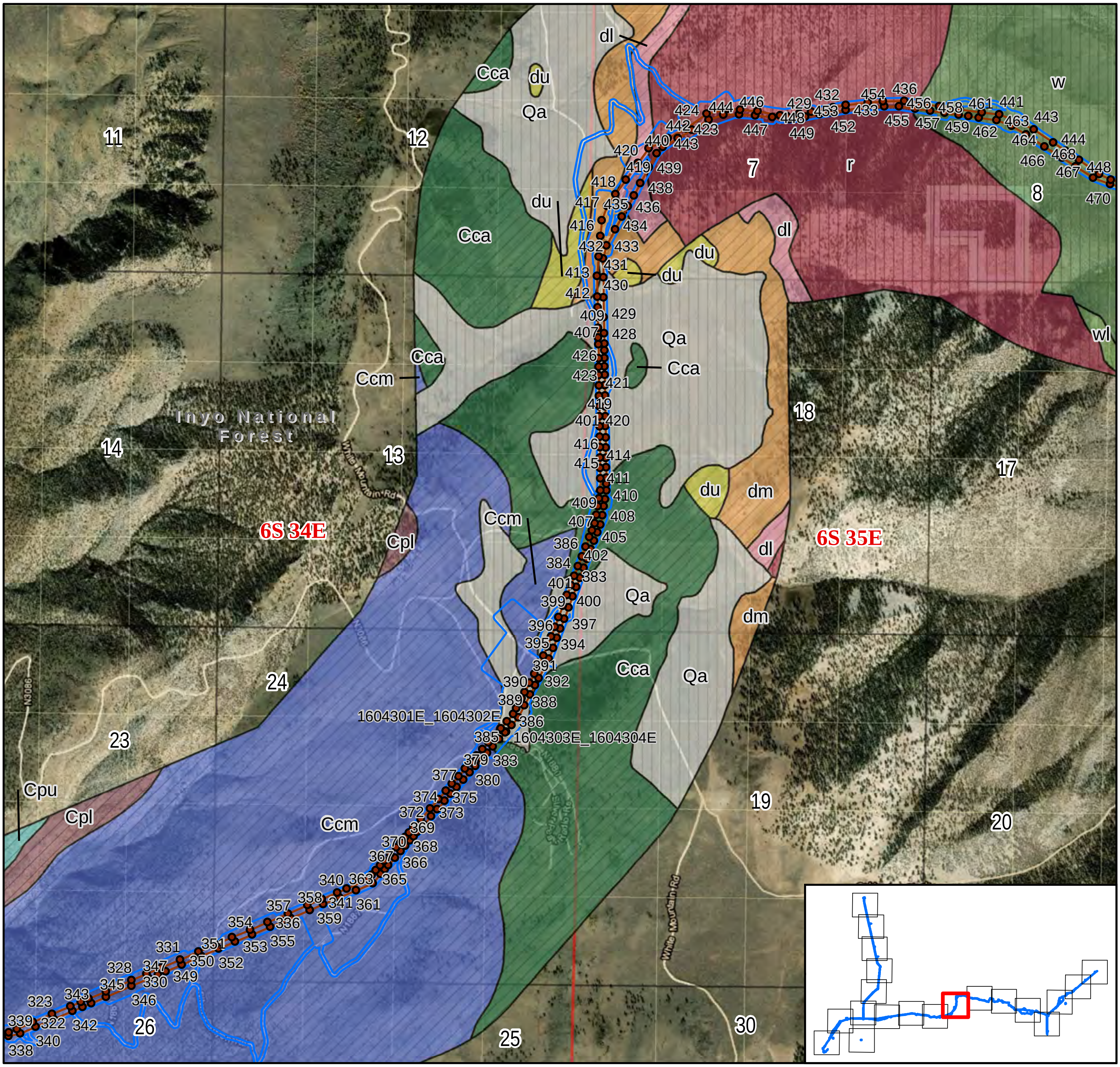


SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- US Forest Service (USFS)
- Private or Unknown

Paleosensitivity

- Class 2: Low
- Class 3: Moderate

Geology

- Qa: Alluvium (Holocene)
- Cpu: Upper Member of Poleta Formation (Lower Cambrian)
- Cpl: Lower Member of Poleta Formation (Lower Cambrian)
- Ccm: Campito Fm, Montenegro Member (Lower Cambrian)
- Cca: Campito Fm, Andrews Mtn Member (Lower Cambrian)
- dm: Middle Member of Deep Spring Formation (Precambrian)
- dl: Lower Member of Deep Spring Formation (Precambrian)
- r: Reed Dolomite, undiv. (Precambrian)
- w: Wyman Formation (Precambrian)
- wl: Lenticular Limestone in Wyman Fm. (Precambrian)
- du: Upper Member of Deep Spring Formation (Precambrian)

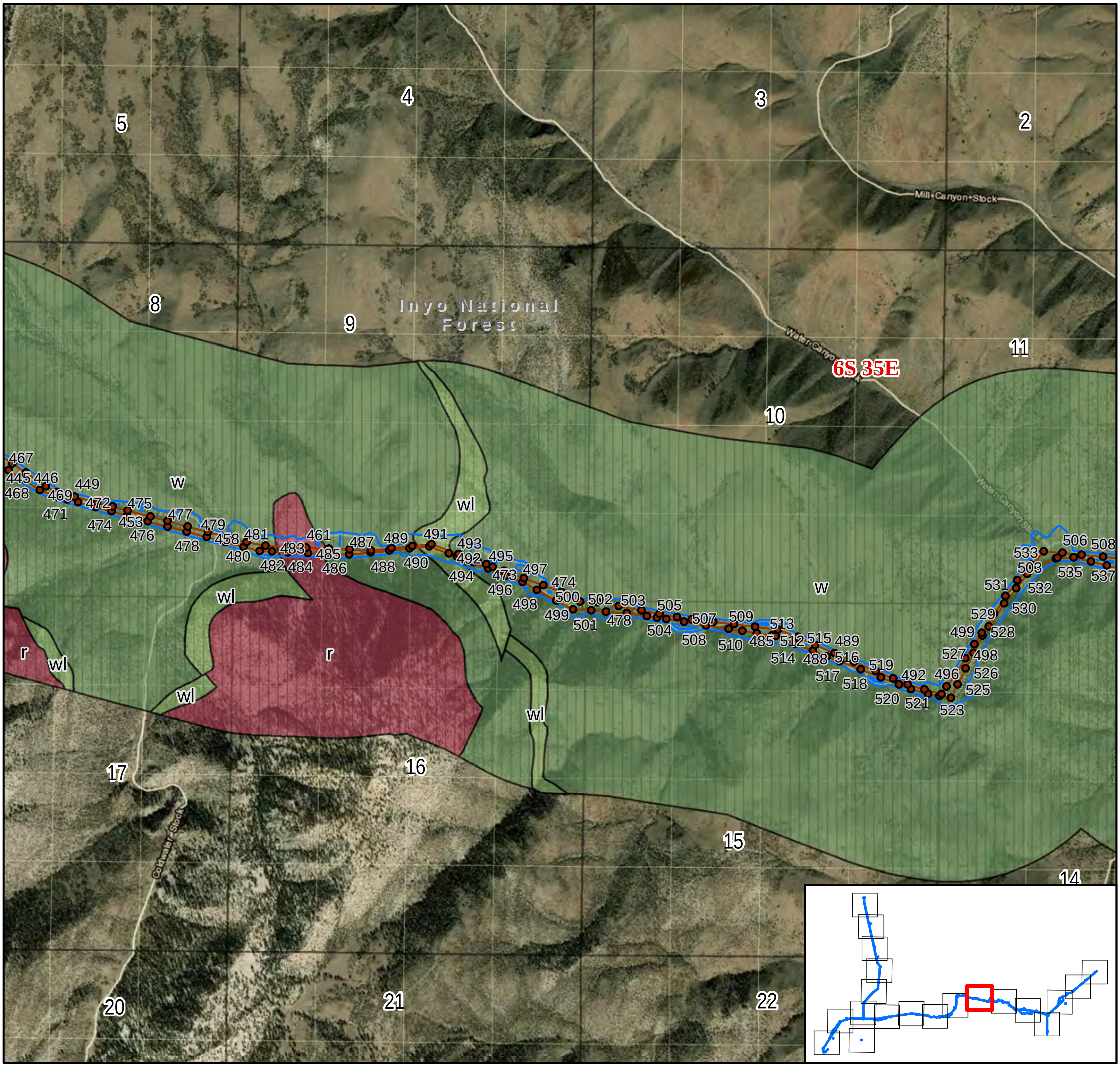
0 1,000 2,000 3,000 4,000

Feet

N

1:24,000

Basemaps from ESRI Online; Geology from: Nelson, C. A., (1966). Geologic Map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- US Forest Service (USFS)

Paleosensitivity

- Class 2: Low

Geology

- r: Reed Dolomite, undiv. (Precambrian)
- w: Wyman Formation (Precambrian)
- wl: Lenticular Limestone in Wyman Fm. (Precambrian)

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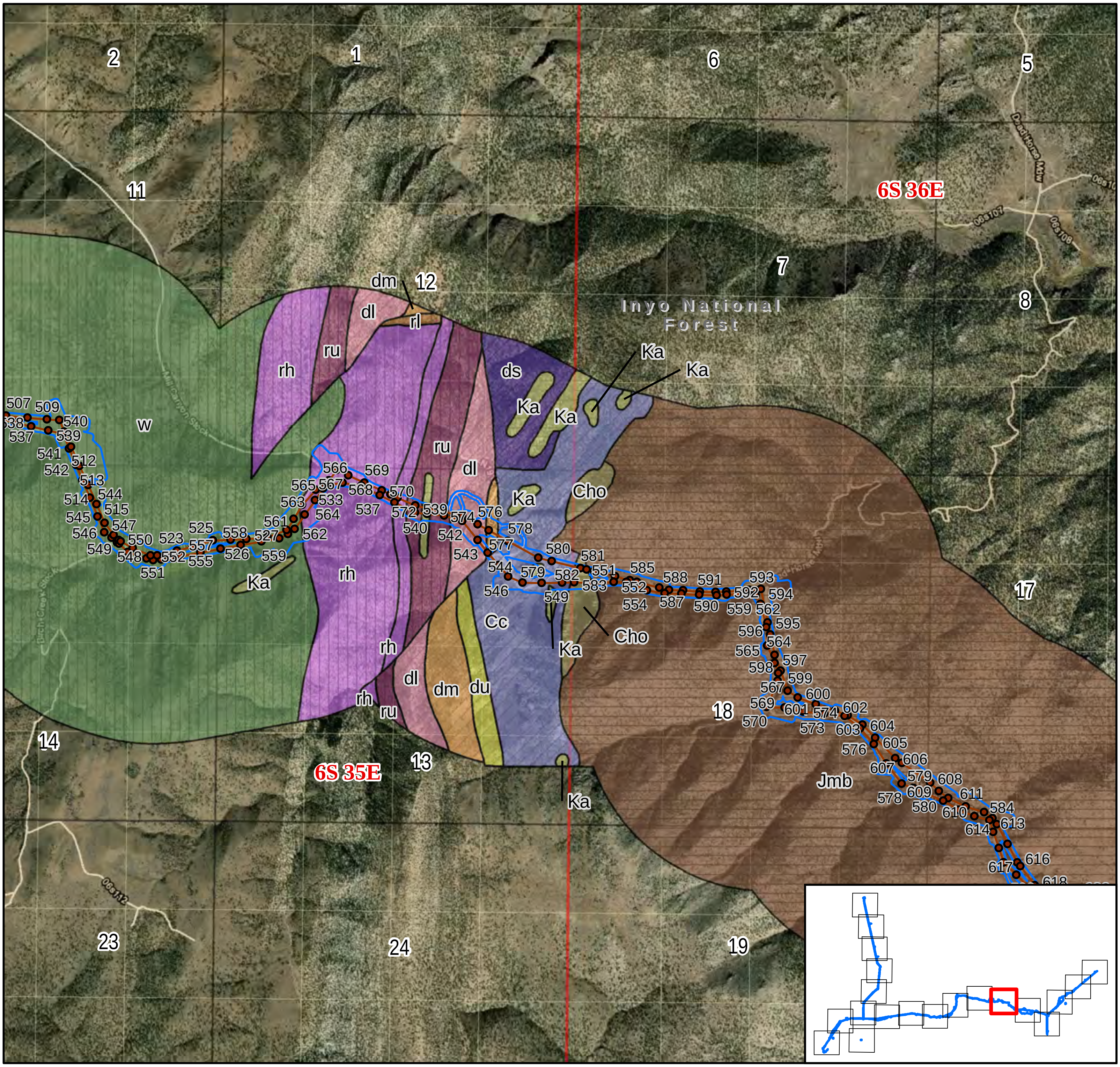
Basemaps from ESRI Online; Geology from:
Nelson, C. A., (1966). Geologic Map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- US Forest Service (USFS)

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class 3: Moderate

Geology

- Ka: Aplite and Fine-Grained Granite (Cretaceous)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)
- Cho: Hornfels (Lower Cambrian)
- Cc: Campito Formation, undiv. (Lower Cambrian)
- ds: Deep Spring Formation, undivided (Precambrian)
- dm: Middle Member of Deep Spring Formation (Precambrian)
- dl: Lower Member of Deep Spring Formation (Precambrian)
- rh: Hines Tongue of Reed Dolomite (Precambrian)
- ru: Upper Member of Reed Dolomite (Precambrian)
- rl: Lower Member of Reed Dolomite (Precambrian)
- w: Wyman Formation (Precambrian)
- du: Upper Member of Deep Spring Formation (Precambrian)

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Feet

Page 14 of 20

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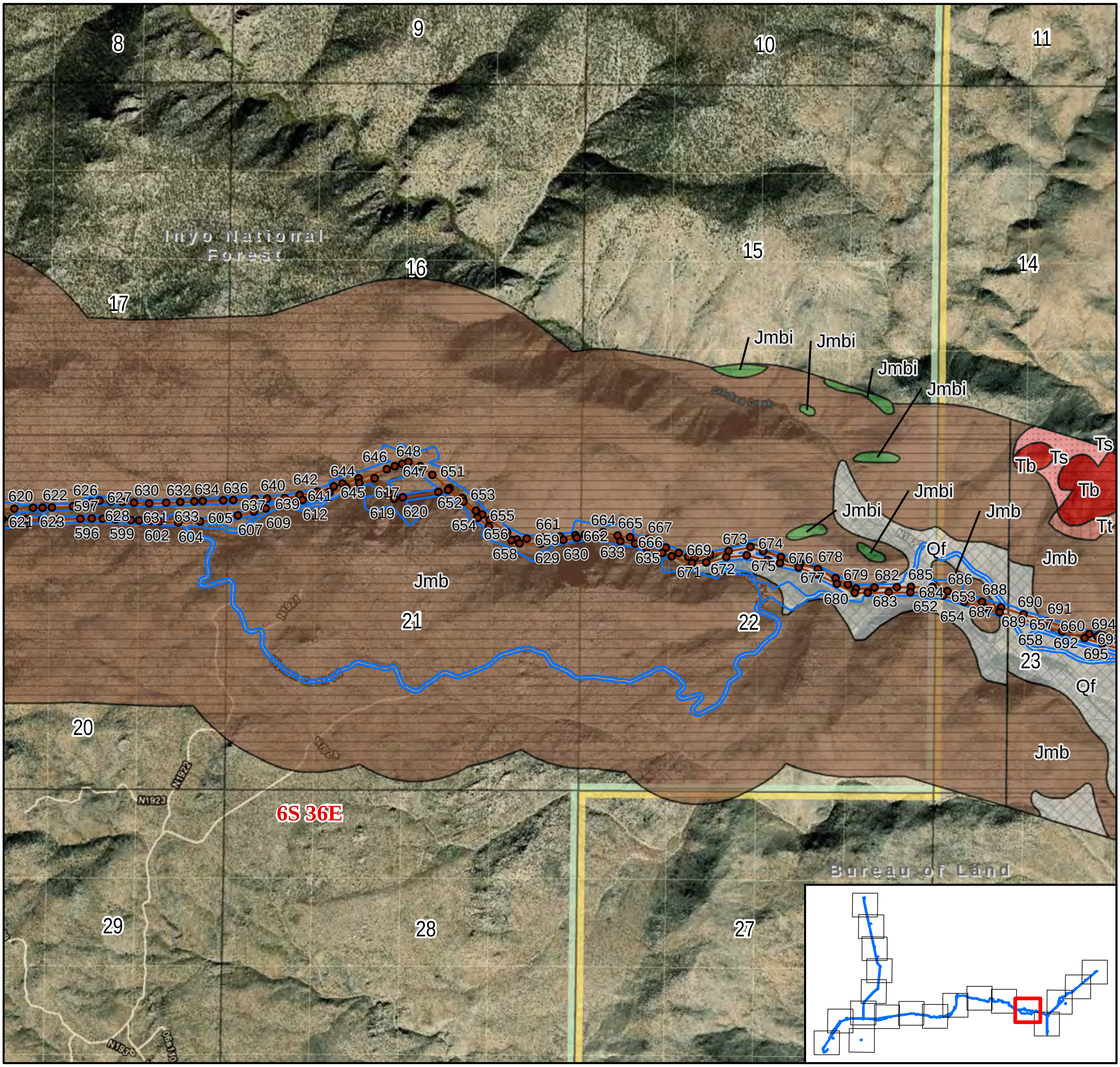
Basemaps from ESRI Online; Geology from: Nelson, C. A., (1966). Geologic Map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- US Forest Service (USFS)

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class U: Unknown
- Class U-3: Unknown to Moderate

Geology

- Qf: Alluvial Fan Deposits (Holocene)
- Tb: Basalt (Miocene or Pliocene)
- Ts: Tuffaceous Sandstone & Conglomerate (Miocene or Pliocene)
- Tt: Tuff (Miocene or Pliocene)
- Jmbi: Diorite inclusion in Jmb (Jurassic)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)

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Feet

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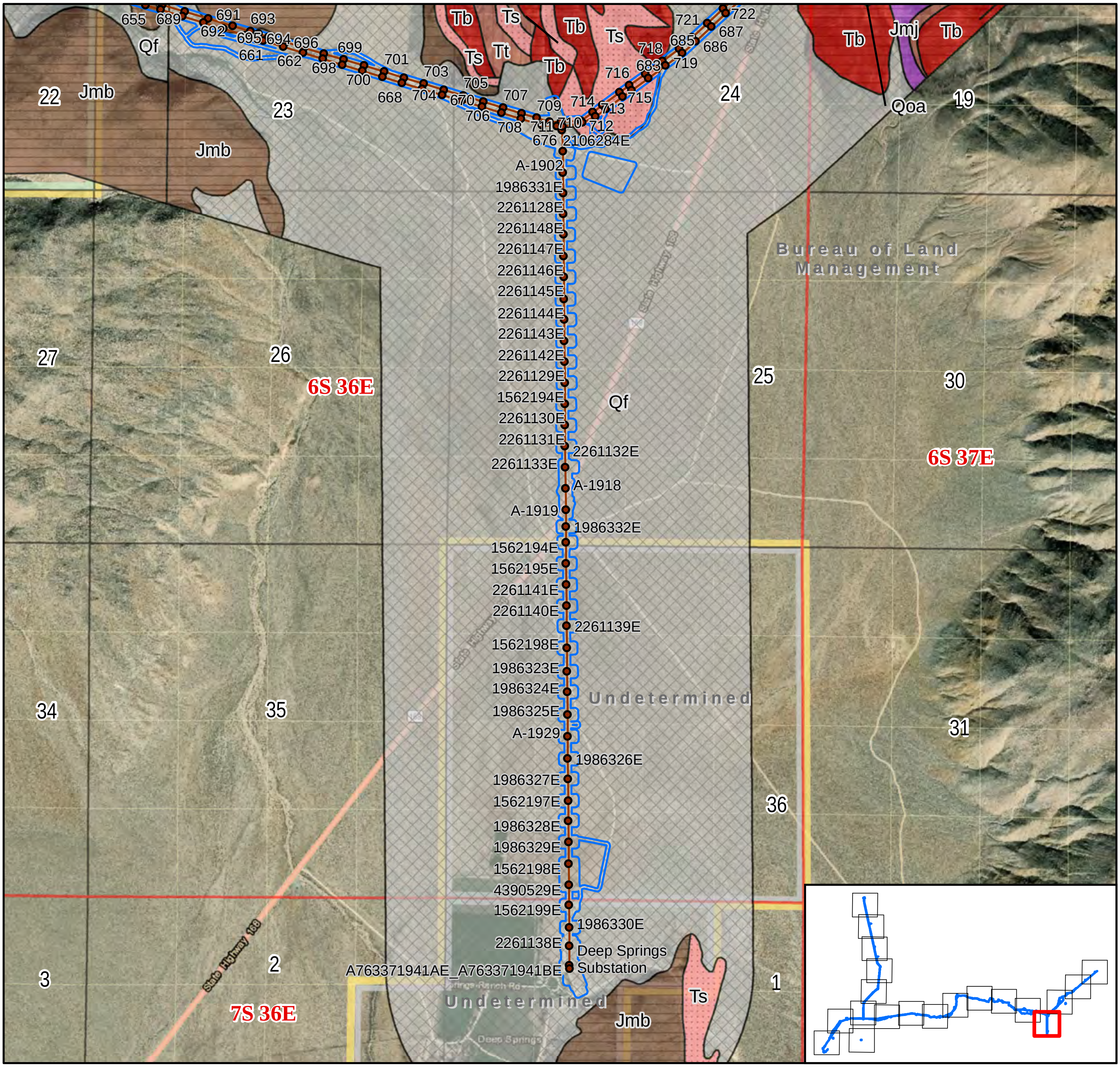
Basemaps from ESRI Online; Geology from:

McKee, E. H., and Nelson, C. A., (1967). Geologic Map of the Soldier Pass Quadrangle, California and Nevada. 1:62,500.

Nelson, C. A., (1966). Geologic Map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- US Forest Service (USFS)
- Private or Unknown

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class 3: Moderate
- Class U: Unknown
- Class U-3: Unknown to Moderate

Geology

- Qoa: Older Alluvium (Pleistocene)
- Qf: Alluvial Fan Deposits (Holocene)
- Tb: Basalt (Miocene or Pliocene)
- Ts: Tuffaceous Sandstone & Conglomerate (Miocene or Pliocene)
- Tt: Tuff (Miocene or Pliocene)
- Jmj: Hornblende-Augite Monzonite of Joshua Flat (Jurassic)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)

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Feet

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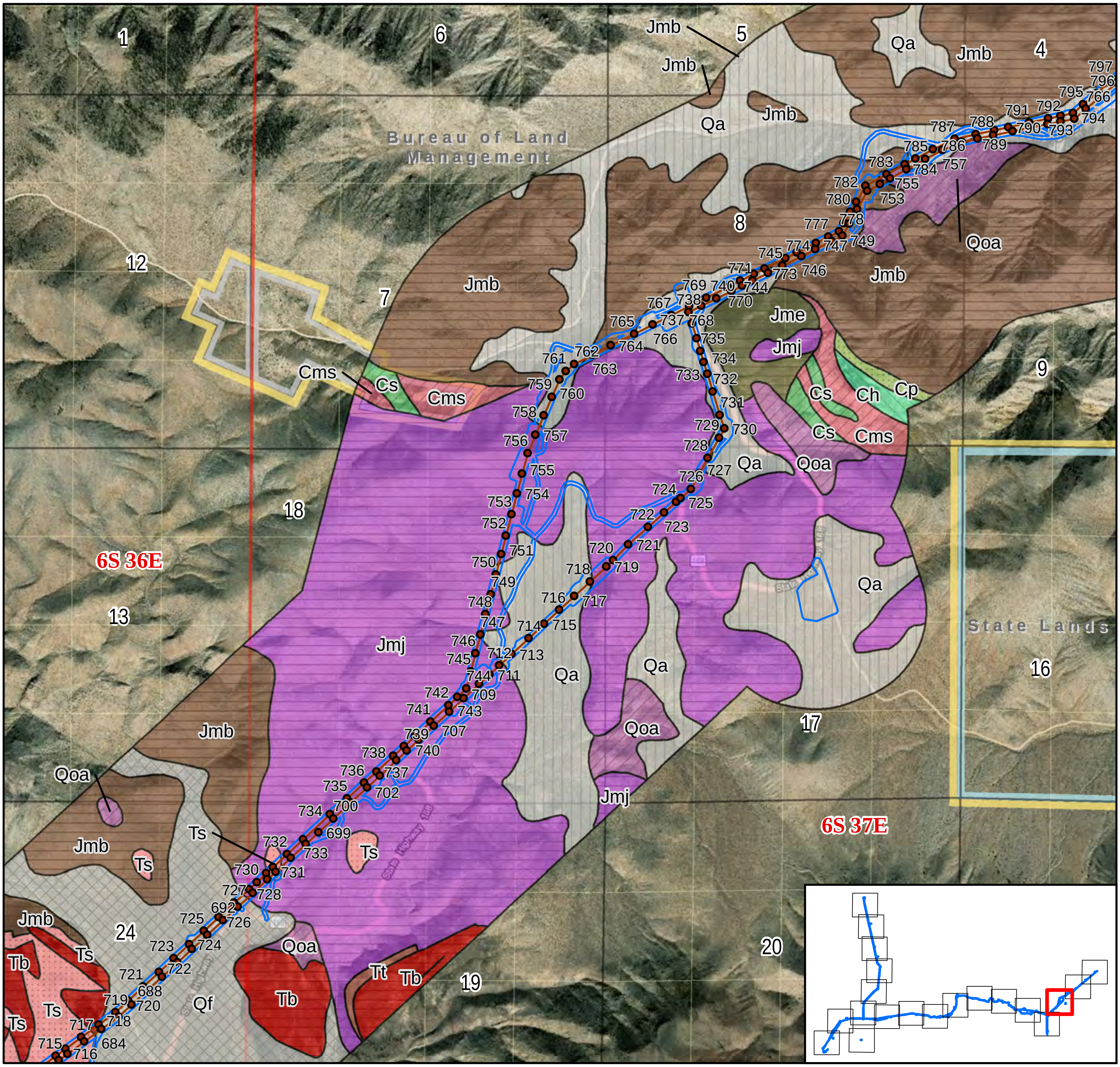
Basemaps from ESRI Online; Geology from:

McKee, E. H., and Nelson, C. A., (1967). Geologic Map of the Soldier Pass Quadrangle, California and Nevada. 1:62,500.

Nelson, C. A., (1966). Geologic Map of the Blanco Mountain Quadrangle, Inyo and Mono Counties, California. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- State
- Private or Unknown

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class 3: Moderate
- Class 4: High
- Class U: Unknown
- Class U-3: Unknown to Moderate

Geology

- Qa: Alluvium (Holocene)
- Qoa: Older Alluvium (Pleistocene)
- Qf: Alluvial Fan Deposits (Holocene)
- Tb: Basalt (Miocene or Pliocene)
- Ts: Tuffaceous Sandstone & Conglomerate (Miocene or Pliocene)
- Tt: Tuff (Miocene or Pliocene)
- Jmj: Hornblende-Augite Monzonite of Joshua Flat (Jurassic)
- Jme: Monzonite of Eureka Valley (Jurassic)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)
- Cs: Saline Valley Formation (Lower Cambrian)
- Cp: Poleta Formation, undiv. (Lower Cambrian)
- Cms: Mule Spring Limestone (Lower Cambrian)
- Ch: Harkless Formation (Lower Cambrian)

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Feet

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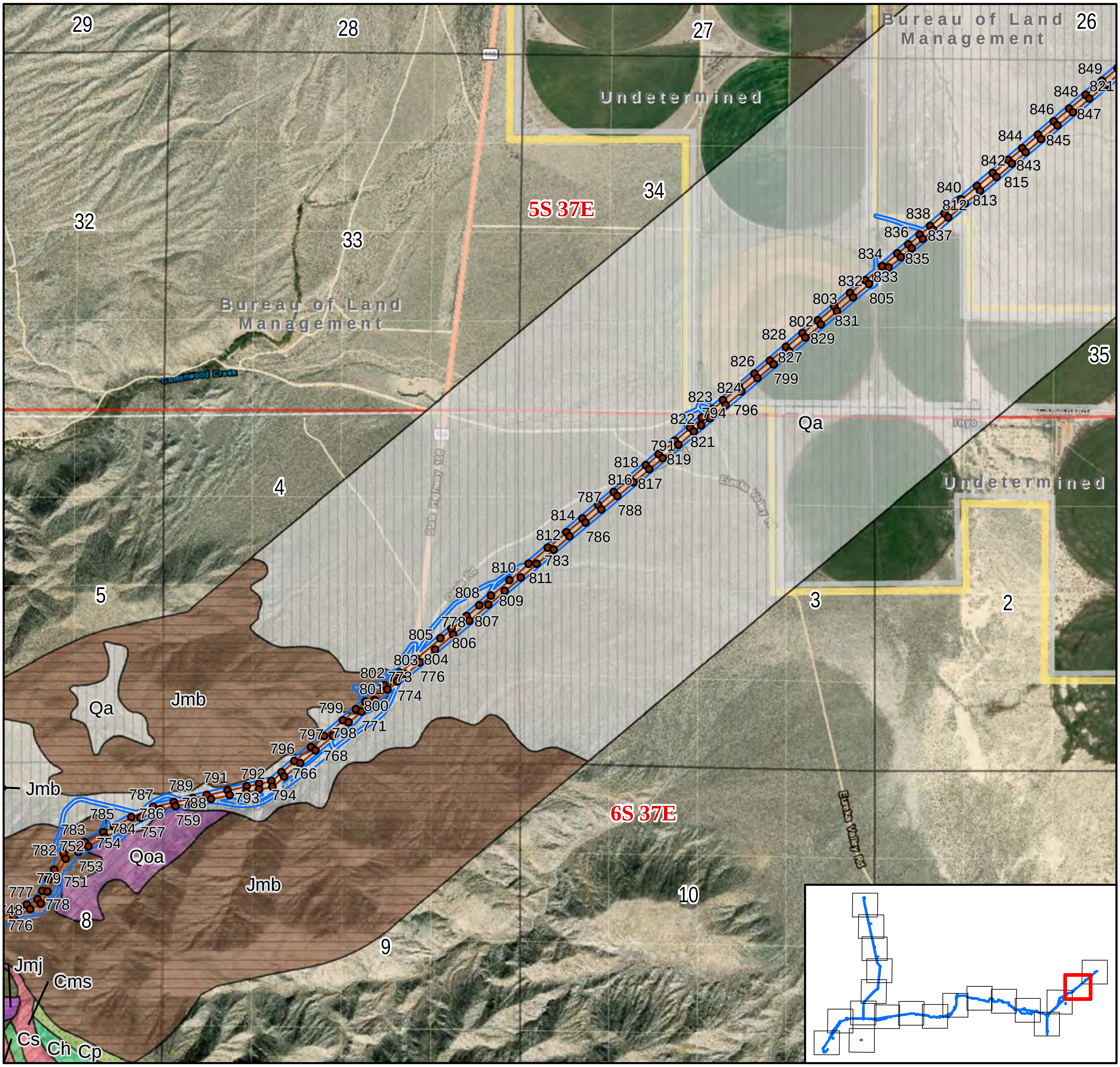
Basemaps from ESRI Online; Geology from:
McKee, E. H., and Nelson, C. A., (1967). Geologic Map of the Soldier Pass Quadrangle, California and Nevada. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Private or Unknown

Paleosensitivity

- Class 1: Very Low
- Class 2: Low
- Class 3: Moderate
- Class 4: High
- Class U: Unknown

Geology

- Qa: Alluvium (Holocene)
- Qoa: Older Alluvium (Pleistocene)
- Jmj: Hornblende-Augite Monzonite of Joshua Flat (Jurassic)
- Jme: Monzonite of Eureka Valley (Jurassic)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)
- Cs: Saline Valley Formation (Lower Cambrian)
- Cp: Poleta Formation, undiv. (Lower Cambrian)
- Cms: Mule Spring Limestone (Lower Cambrian)
- Ch: Harkless Formation (Lower Cambrian)

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Feet

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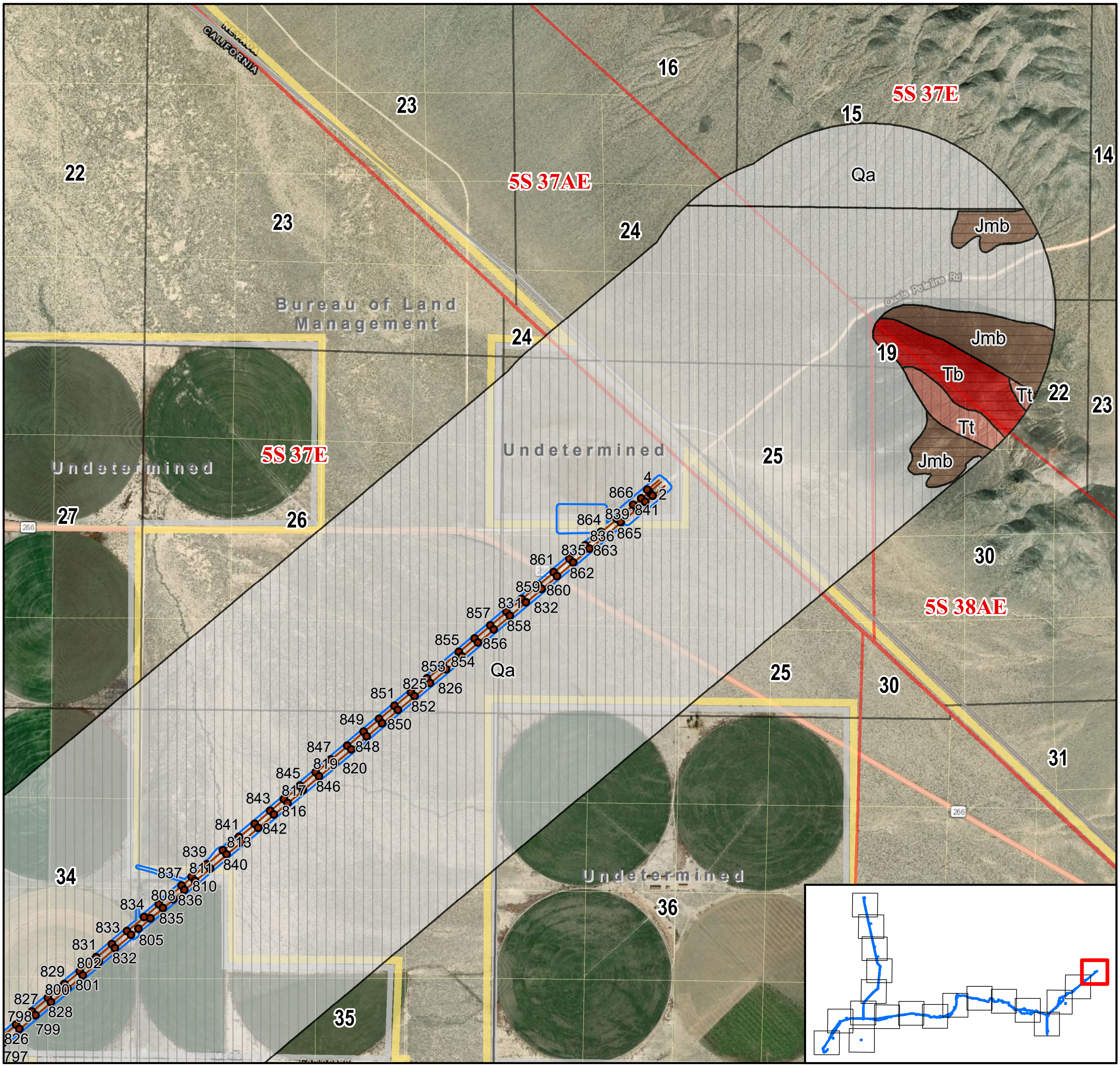
1:24,000

Basemaps from ESRI Online; Geology from: McKee, E. H., and Nelson, C. A., (1967). Geologic Map of the Soldier Pass Quadrangle, California and Nevada. 1:62,500.



SCE TLRR Control-Silver Peak

- Structures
- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Land Management (BLM)
- Private or Unknown

Paleosensitivity

- Class 1: Very Low
- Class 2: Low

Geology

- Qa: Alluvium (Holocene)
- Tb: Basalt (Miocene or Pliocene)
- Tt: Tuff (Miocene or Pliocene)
- Jmb: Quartz Monzonite of Beer Creek (Jurassic)

0 1,000 2,000 3,000 4,000

Feet

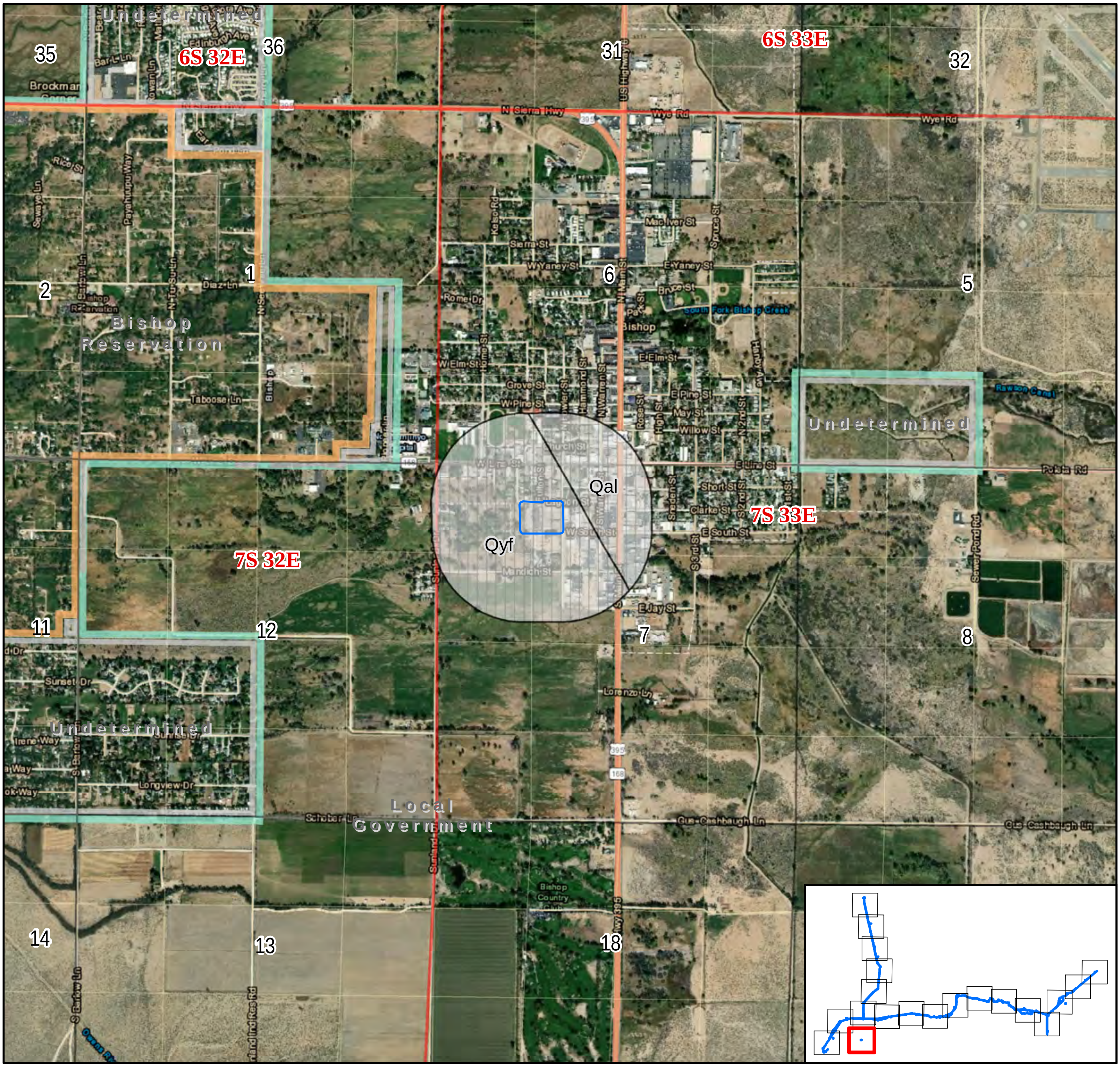
N

1:24,000

Basemaps from ESRI Online; Geology from:

McKee, E. H., and Nelson, C. A., (1967). Geologic Map of the Soldier Pass Quadrangle, California and Nevada. 1:62,500.

Stewart, J. H., Robinson, P. T., and Albers, J. P., (1974). Geologic Map of the Piper Peak Quadrangle, Nevada-California. 1:62,500.



SCE TLRR Control-Silver Peak

- Survey Area
- PLSS Township
- PLSS Section
- PLSS Second Division

Surface Management

- Bureau of Indian Affairs (BIA)
- Local
- Private or Unknown

Paleosensitivity

- Class 2: Low

Geology

- Qal: Alluvium (Holocene)
- Qyf: Younger Alluvial Fan Deposits (Holocene)

0 1,000 2,000 3,000 4,000

Feet

N

1:24,000

Basemaps from ESRI Online; Geology from: Bateman, Paul C., (1964). Geologic Map of the Bishop 15-Minute Quadrangle, California. 1:62,500.

APPENDIX B: Paleontological Record Searches

Land Management	Quarter Quarter Section	Section	Township/Range
Unknown/Private, BLM	SWNE, SENW, NWSE, NESW, SWSE	12	T4S R32E
BLM	NWNE, SWNE, NESE, NWSE, SESE, SWSE	13	
BLM	NENE, SENE, NESE, SESE	24	
BLM	SWSW, NWSW	19	T4S R33E
Unknown/Private, BLM	SESW, SWSW, NWSW, NESW, NWSE, SWNW, NWNW	30	
Unknown/Private, BLM, Local Government	SENW, NENW, SWSE, SESW, NESW	31	
Local Government	SWSE, SESW, NESW, SENW, NENW, NWNW	5	T5S R33E
Unknown/Private, Local Government	SWSE, NWSE, SWNE, SESE, NESE, SWNE, NWNE, NENW	8	
Local Government	SWSW, NWSW	16	
Unknown/Private, Local Government	NWNE, SESE, NESE, SENE, NENE	17	
Local Government	NENE	20	
Local Government	SWSE, SESW, NESW, NWSW, SWNW, NWNW	21	
Local Government	SESW, NESW, SENW, NWNE, NENW	28	
Local Government	SESW, NESW, SENW, NENW	33	
Unknown/Private, BLM	SENW, SWNW, SWSW, NESW, NWSW	25	T5S R37E
BLM	SESE, SWSE, NESE	26	
Unknown/Private, BLM	SESE, SWSE, NESE, SESW, SENE	34	
Unknown/Private, BLM	NWSW, SWNW, SENW, NENW, NWNE	35	
Local Government	NWSW, NESW, NWSE, NESE, SENE, SWNE, SENW, SWNW	25	T6S R32E
Local Government	SWSW, NESE, NWSE, NESW, NWSW, SENE, SWNE, SENW	26	
Local Government	SWSE, SESE	27	
Local Government	SESE, NESE	33	
Local Government	SWSW, NWSW, NESW, SWNW, SENW, SWNE, NENW, NWNE	34	
Local Government, BLM	SESW, SWSW, NESW, NWSW, SENW, SWNW, NENW	4	T6S R33E
BLM	SESE	5	
BLM	SESE	7	
BLM	SWSW, NESW, NWSW, SWNE, SENW, NENE, NWNE	8	
Local Government, BLM	SESW, SWSE, NESW, NWSE, SENW, SWNE, SENE, NWNE, NENE	18	
Local Government	SESW, SWSE, NESW, NWSE, SENW, SWNE, NENW, NWNE	19	
BLM, Inyo National Forest	SESE	23	
BLM, Inyo National Forest	SWSW, SESW, SWSE, SESE	24	
BLM	NWNW, NENW	25	
Local Government, BLM	SWNW, NWNE, NENE, NENW, NWNW	26	
Unknown/Private, Local Government, BLM	SENW, SWNW, NENW, NWSW, SENE, SWNE, NENE, NWNE	27	
Unknown/Private, Local Government	SENE, NESE, NWSE, NESW, NWSW, SWNE, SENW, SWNW	28	
Local Government	NWSW, NESW, NWSE, NESE, SWNW, SENW, SWNE, SENE	29	
Local Government	NWSW, NESW, NWSE, NESE, SWNW, SENW, SWNE, SENE, NENW, NWNE	30	

Land Management	Quarter Quarter Section	Section	Township/Range
Inyo National Forest	NESE, SESE	12	T6S R34E
Inyo National Forest	NENE, NESE, SESE	13	
Inyo National Forest	SWSW, SESW, SWSE, SESE	19	
Inyo National Forest	SWSW, SESW, SWSE, SESE	20	
Inyo National Forest	SWSW, SESW	21	
Inyo National Forest	SWSE, SESE	23	
Inyo National Forest	NWNE, NENE, SWNE, SENE, NESW, NWSE, SWSW, SESW, SWSE	24	
Inyo National Forest	NWNW	25	
Inyo National Forest	NWNW, NENW, NWNE, NENE, SWNW	26	
Inyo National Forest	NWNW, NENW, NWNE, NENE, SWNW, SWNE, SENE	27	
Inyo National Forest	NWNW, NENW, NWNE, NENE, SENE	28	
Inyo National Forest	NWNE, NENE	29	
Inyo National Forest	SENE, SWNE, SENW, NESE, NWSE, NESW, SWNW, NWSW, SWSW, SWNW	7	T6S R35E
Inyo National Forest	SWNW, NESE, NWSE, NESW, NWSW, SESE, SWSE	8	
Inyo National Forest	SESE, SWSE, SESW, SWSW	9	
Inyo National Forest	SWSW	10	
Inyo National Forest	SWSE, SESW, SWSW	11	
Inyo National Forest	SESW	12	
Inyo National Forest	NWNW, NENW, NWNE, NENE, SWNW, SENE	13	
Inyo National Forest	NENE, NWNE, NWNW, SENE, SWNE, SWNW	14	
Inyo National Forest	NENE, NWNE, NENW, NWNW, SESE	15	
Inyo National Forest	NENE	16	
Inyo National Forest	NWNW, SWNW, NWSW, SWSW	18	
Inyo National Forest	SWSW	17	T6S R36E
Inyo National Forest	SENW, SWNE, NWSE, NESE, SESE, SWNW	18	
Inyo National Forest	NENE, NWNE, NENW, NWNW, SENE, SWNE, SENW	20	
Inyo National Forest	NENE, NWNE, NENW, NWNW, SENE, SWNE, SWNW, NESE, NWSE, NESW, NWSW	21	
Inyo National Forest, BLM	NWNW, SENE, SWNE, SENW, SWNW, NWSE, NESW, NWSW, SESW	22	
BLM	SENW, SWNW, NESE, NWSE, NESW, NWSW, SESE	23	
BLM	NENE, SENE, SWNE, NESE, NWSE, NESW, NWSW, SWSE, SESW, SWSW	24	
Unknown/Private, BLM	SESW, NENW, SENW, NESW	25	
Unknown/Private	NENW, SENW, NESW, SESW	36	
BLM	SENW, SWNW, NWNE, NENW, NWNW	3	T6S R37E
BLM	SESW, SWSE, NWSE, NESE, SENE	4	
BLM	SESE, NESE	7	
BLM	SESW, NWSW, NESW, SENW, SWNE, SENE, NWNE, NENE	8	
BLM	NWNW, NENW	9	
BLM	SWNW, SWNE, NWNW, NENW	17	
BLM	SWSW, SESW, SWSE, NWSE, NESE, SWNE, SENE, NWNE, NENE	18	
BLM	SWNW, NWNW, NENW	19	

Land Management	Quarter Quarter Section	Section	Township/Range
Local Government	NWNW	3	T7S R32E
Local Government	SESE, SWSE, SESW, NWSE, NESW, SENE, SWNE, NWNE, NENE	4	
Local Government	SESE, NESE	8	
Local Government	NWSW, SENW, SWNW, NENE, NWNE, NENW, NWNW	9	
Unknown/Private	NWSW, SWNW	16	
Unknown/Private, BLM, Local Government	SESE, NESE, SESE, SWSE, NESE, NWSE, SWNE, NENE, NWNE	17	
Local Government	NWNW, NENW	7	T7S R33E
Unknown/Private	SENW, NENW	1	

APPENDIX D: PFYC Table

SCE TLRR Control-Silver Peak Survey Area Acreage by Geology				
Geol_Sym	Geology	Age	Paleosensitivity	Acreage
Cc	Campito Formation, undiv.	Lower Cambrian	3	14.195
Cca	Campito Fm, Andrews Mtn Member	Cambrian	3	44.029
Cca	Campito Fm, Andrews Mtn Member	Lower Cambrian	3	8.630
Ccm	Campito Fm, Montenegro Member	Lower Cambrian	3	89.222
Ch	Harkless Formation	Lower Cambrian	4	3.320
Cho	Hornfels	Lower Cambrian	1	2.211
Cp	Poleta Formation, undiv.	Cambrian	U	11.492
Cpl	Lower Member of Poleta Formation	Lower Cambrian	3	1.484
Cpu	Upper Member of Poleta Formation	Lower Cambrian	3	2.460
dl	Lower Member of Deep Spring Formation	Precambrian	3	12.417
dm	Middle Member of Deep Spring Formation	Precambrian	3	13.897
du	Upper Member of Deep Spring Formation	Precambrian	3	1.299
Jmb	Quartz Monzonite of Bear Creek	Jurassic	1	179.668
Jmj	Hornblende-Augite Monzonite of Joshua Flat	Jurassic	1	52.084
Ka	Aplite and Fine-Grained Granite	Cretaceous	1	0.996
Kt	Tungsten Hills Quartz Monzonite	Cretaceous	1	2.689
Qa	Alluvium	Holocene	2	310.480
Qal	Alluvium	Holocene	2	233.777
Qbu	Bishop Tuff, soft with rounded pumice	Pleistocene	2	54.879
Qbv	Bishop Tuff, vapor-phase crystallized	Pleistocene	2	16.244
Qf	Alluvial Fan Deposits	Holocene	2	149.941
Qg1	Terrace Gravels, youngest	Pleistocene	3	40.526
Qg2	Terrace Gravels, middle age	Pleistocene	3	95.538
Qg3	Terrace Gravels, oldest	Pleistocene	3	9.863
Qoa	Older Alluvium	Pleistocene	3	2.360
Qof	Older Alluvial Fan Deposits	Pleistocene	3	30.879
Qvf	Alluvium, valley fill deposits	Holocene	2	173.527
Qyf	Younger Alluvial Fan Deposits	Holocene	2	217.145
r	Reed Dolomite, undiv.	Precambrian	2	29.396
rh	Hines Tongue of Reed Dolomite	Precambrian	2	14.157
ru	Upper Member of Reed Dolomite	Precambrian	2	3.110
Tb	Basalt	Miocene or Pliocene	1	0.485
Ts	Tuffaceous Sandstone & Conglomerate	Miocene or Pliocene	U	9.451
w	Wyman Formation	Precambrian	2	151.153
wl	Lenticular Limestone in Wyman Fm.	Precambrian	2	4.296

SCE TLRR Control-Silver Peak Survey Area Acreage by PFYC	
Paleosensitivity	Acreage
1	309.2541
2	1388.985
3	366.7872
4	3.319891
U	20.94259

APPENDIX E: BLM and USFS Permits and Fieldwork Authorizations

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

California State Office
2800 Cottage Way, Suite W1623
Sacramento, CA 95825
www.blm.gov/ca

March 16, 2016

In Reply Refer To:
CA930 8151(P)

Geraldine Aron
Paleo Solutions, Inc.
911 S. Primrose Ave, Unit N
Monrovia, CA 91016

Dear Ms. Aron:

The Bureau of Land Management (BLM) is pleased to issue a 3-year Scientific Paleontological Permit (*CA-16-03P*) to Paleo Solutions, Inc. for use on Public Lands managed by California BLM as specified in your permit. This permit is issued under the authority of the Federal Land Policy and Management Act (FLPMA) and the Antiquities Act of 1906. Keep a copy with you at all times in the field.

This permit authorizes the permit holder to conduct and collect paleontological resources pertaining to both scientific research and commercial projects. BLM would like to emphasize a few points. First, this permit assigns to your firm the responsibility to submit reports and other documents in a timely fashion and such submittal will be a major point of review of your firm's performance under this permit. Second, you are required to contact the appropriate Field Office to obtain a Field Use Authorization before you begin any fieldwork. Please allow the Field Office sufficient lead-time to process your application for a Field Use Authorization. The Field Office may impose additional conditions and stipulations at that time. Third, please be mindful that it is your firm's responsibility to ensure assignment of supervisory field personnel (crew chiefs) to projects that have at least four months' local experience and who otherwise meet the standards of the Bureau.

Our office is enclosing a map of California BLM Field Offices with phone numbers of cultural heritage staff and a copy of your permit with attached National special permit conditions. BLM draws your attention to these stipulations and encourages you to read and understand them. Please sign page 5, as indicated, and **return a copy of this signature page to the California BLM State Office within 30 days of your receipt of the permit**. Your permit will be valid after your signature is received.

Should you have any questions contact James Barnes at email jjbarnes@blm.gov or by phone 916-978-4676.

Sincerely,

Tom Pogacnik
Deputy State Director
Natural Resources Division

Enclosures as stated

DI Form 1991 (Rev Sept 2004)
OMB No. 1024-0037
Exp. Date (01/31/2008)

United States Department of the Interior

PERMIT FOR PALEONTOLOGICAL INVESTIGATIONS

To conduct archeological work on Department of the Interior lands and Indian lands under the authority of:

- ☐ The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7).
- ☒ The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
- ☐ Supplemental regulations (25 CFR 262) pertaining to Indian lands.
- ☒ Bureau-specific statutory and/or regulatory authority: Federal Land Policy and Management Act of 1976 (Public Law 94-570), and Section 302 of Public Law 94-4579

Please use this number when referring to this permit
No.: CA-16-03P

1. Permit issued to Paleo Solutions, Inc.	2. Under application dated January 21, 2016
3. Address 911 S. Primrose Ave., Unit N, Monrovia, CA 91016	4. Telephone number(s) (562) 818-7713 5. E-mail address(es) geraldine@paleosolutions.com
6. Name of Permit Administrator Geraldine Aron Telephone number(s): (562) 818-7713 Email address(es): geraldine@paleosolutions.com	7. Name of Principal Investigator(s) Geraldine Aron, Paul Murphy, Jennifer Kelly, Courtney Richards Telephone number(s): GA: (562) 818-7713, PM: (303) 514-1095, JK: (714) 206-5433, CR: (626) 716-2000 Email address(es): geraldine@paleosolutions.com, pmurphy@paleosolutions.com, jkelly@paleosolutions.com, crichards@paleosolutions.com
8. Name of Field Director(s) authorized to carry out field projects	Telephone number(s): Email address(es):
9. Activity authorized Survey and limited surface collection	
10. On lands described as follows All lands managed by the Bureau of Land Management-California	
11. During the duration of the project From March 16, 2016 To March 16, 2019	
12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government. Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007	
13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.	
14. Signature and title of approving official Tom Pogacnik, Deputy State Director, Natural Resources Division	15. Date 03/17/2016

15. Standard Permit Conditions

a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.

b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.

c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.

d. This permit may not be assigned.

e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.

f. This permit is issued for the term specified in 11 above.

g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.

h. The permittee shall obtain all other required permit(s) to conduct the specified project.

i. Archeological project design, literature review, development of the regional historic context framework, site evaluation, and recommendations for subsequent investigations must be developed with direct involvement of an archeologist who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation; fieldwork must be generally overseen by an individual who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation.

j. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.

k. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.

l. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.

m. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).

n. Prior to beginning any fieldwork under the authority of this permit, the permittee, following the affected bureau's policies and procedures, shall contact the field office manager responsible for administering the lands involved to obtain further instructions.

o. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.

p. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

q. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, an approved site form for each newly recorded archeological site, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.

r. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.

s. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.

t. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at http://www.ntis.gov/pdf/rdpform.pdf, and a completed NADB-Reports Citation Form, available at http://www.cr.nps.gov/aad/tools/nadbform_update.doc, will be submitted to the office issuing the permit.

u. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.

v. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.

w. Permittee shall provide the approving official with a confirmation that museum collections described in v. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.

x. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying archeological site information that could compromise the Government's protection and management of archeological sites.

y. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at http://www.osha.gov.

z. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

☒ a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.

☒ b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.

☒ c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.

☒ d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.

☒ e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.

☒ f. Permittee shall not conduct any flint knapping or lithic replication experiments at any archeological site, aboriginal quarry source, or non-site location that might be mistaken for an archeological site as a result of such experiments.

☒ g. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.

☒ h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.

☒ i. Permittee shall keep disturbance to the minimum area consistent with the nature and purpose of the fieldwork.

☒ j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.

☒ k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.

☒ l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.

☒ m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.

☒ n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.

☒ o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.

☐ p. Permittee shall submit the preliminary report within ____________ days/weeks of completion of any episode of fieldwork..

☐ q. Permittee shall submit the final report within ____________ days/weeks/months after completion of fieldwork..

☐ r. Permittee shall submit progress reports every ____________ months over the duration of the project.

☒ s. California special permit conditions are attached.

Special Permit Conditions Continuation Sheet: California Conditions

- a. Work under this permit is limited to specific service approved for each permit. This may consist of non-collection survey, limited testing to determine site content and limits or extensive testing emergency excavation and/or salvage projects. Testing/ excavation projects may be conducted under the authority of this permit only upon completion of ARPA consultation with Native American Groups and written approval from the Bureau for such work. (CARIDAPs for the purpose of the identification of archaeological resources are authorized under a FLPMA/ARPA Permit).
- b. Permittees shall verbally and subsequently in writing contact the appropriate BLM Field Manager prior to the beginning of each of his field operations (with follow-up written notification) to inform the BLM of specific work to be conducted. At this time, the BLM Field Manager may impose additional stipulation as deemed necessary to provide for the protection and management of resource values in the general site or project area.
- c. All cultural artifacts and other related materials such as notes, photographs, etc., acquired under the provisions of this permit **remain the property of the United States Government and may be recalled at any time for the use of the Department of the interior or other agencies of the Federal Government.** Cultural materials collected under the provisions of this permit must be curated at a repository approved by the BLM. Curation shall be at a local qualified repository, if feasible, and an approved curation facility shall be designated prior to all field projects. An itemized list of all materials with accession numbers, curated at the repository will be submitted to the State Office and to the appropriate Field Office within 180 days of the completion of individual field projects. A copy of a receipt from the curation facility must be submitted with the list or catalogue.
- d. Permittees shall acquire a primary number from the appropriate Information Center for each cultural resource documented while undertaking work authorized by this permit.
- e. The BLM Field Manager or authorized representative may require a monthly letter progress report outlining what was accomplished. This report, if required, is due by the fifth day of the following month, unless different arrangements are approved.
- f. The individual(s) in direct charge must be academically qualified and possess adequate field experience. At least two weeks prior to initiation field work, the permittees must provide the BLM Field Manager with the vitae of individuals proposed to be in direct charge if not approved at the time of permit issuance. A list of field crew members should be submitted at the same time. Only the individual(s) listed in Item No. 8 of the permit is/are authorized to be in direct charge of field work conducted under this permit.
- g. The person(s) in direct charge of field work, shall be on site at all times when work is in progress. Failure to comply with permit stipulations will result in removal of subject's name(s) from the approved list of person-in-direct-charge.
- h. Care should be exercised to avoid directly or indirectly increasing access or potential vandalism to sensitive sites.
- i. All National Permit Stipulations are binding. The authority for issuing permits in the Bureau of Land Management rests solely with the State Director as Delegated by the Secretary of the Interior and all further delegation is prohibited by Secretarial Order. No Modification of National Permit Conditions 8 or 9 or of the California Special Permit Conditions may occur except by written decision of the State Director.
- j. The Bureau of Land Management shall be cited in any report of work done under this permit, including publications such as books, news articles and scientific publications, as well as oral reports, films, television programs, and presentations in other media.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Archeological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title:	Date: 03/17/2016

United States Department of the Interior
FIELDWORK REQUEST AND AUTHORIZATION
PALEONTOLOGICAL INVESTIGATIONS

DI Form 1991 (BLM Rev July 2005)

Authorization to conduct Paleontological studies on public lands managed by the Bureau of Land Management under the authority of:

☒ The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
☒Bureau-specific statutory and/or regulatory authority: Federal Land Policy and Management Act of 1976 (Public Law 94-570), and Section 302 of Public Law 94-4579

Please use this number when referring to this permit

No.: CA-16-03P; amended 09/05/2018

1. Applicant (Business/Firm) and BLM State Permit Number Paleo Solutions, Inc.	**2. Application date:** 10/04/2018
3. Address 911 S Primrose Ave, Unit N Monrovia, CA 91016	**4. Telephone number(s)** 562-818-7713 **5. E-mail address(es)** geraldine@paleosolutions.com
6. Name of Permit Administrator Geraldine Aron **Telephone number(s):** 562-818-7713 **Email address(es):** geraldine@paleosolutions.com	**7. Name of Principal Investigator(s)** Geraldine Aron, Courtney Richards, Paul Murphey, and John Foster **Telephone number(s):** 562-818-7713; 626-716-2000; 303-882-8048; 435-790-5747 **Email address(es):** geraldine@paleosolutions.com, crichards@paleosolutions.com; paul@paleosolutions.com; john@paleosolutions.com
8. Name of Field Director(s) authorized to carry out field projects Matt Carson, Jeff Hathaway, Betsy Kruk, Joey Raum, Madeline Weigner	**Telephone number(s):** 714-305-3326; 312-533-8841; 240-446-8435; 770-880-1521 **Email address(es):** mcarson@paleosolutions.com; jhathaway@paleosolutions.com; bkruk@paleosolutions.com; jraum@paleosolutions.com; mweigner@paleosolutions.com

9. Nature of paleontological fieldwork proposed:

☒ **Survey and limited surface collection.** ☐ **Excavation**

Briefly describe: This field work authorization request is for the SCE Subtransmission Line Rating Remediation Licensing – Control-Silver Peak 55 kV TL Project (Project) in Inyo and Mono counties, California. The Project consists of reconstructing existing 55 kV subtransmission line elements; no new substations would be constructed as part of the Project. For each of the subtransmission lines and taps to be rebuilt, existing wood poles and wood H-frames would be replaced with new lightweight steel (LWS) poles (or functional equivalent) and LWS H-frames (or functional equivalent) in the existing alignments. Project construction involves the grading of temporary staging areas, laydown areas, excavation areas, and associated access roads. The Project crosses privately owned lands, local government-administered lands, U.S. Bureau of Land Management (BLM)-administered lands, and U.S. Forest Service (USFS)-administered lands. A Paleontological Resources Survey Work Plan, which includes a desktop inventory assessment, has been completed for the Project. This request is to conduct a paleontological field reconnaissance survey within geologic units of paleontological potential classes PFYC U, 3, 4, and 5.

10. Location of proposed work (attach topographic map copy with project boundaries)
Please see the attached maps.

11. Dates of proposed work: From: 10/8/2018 To: 12/31/2018

12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government.
Natural History Museum of Los Angeles County (LACM), 900 Exposition Blvd., Los Angeles, CA 90007

13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.	
14. Signature and title of applicant: Principal Investigator	15. Date 10/04/2018
16. Signature and title of approving official:	17. Date 10/11/2018

From: **Haverstock, Gregory** ghaverst@blm.gov
Subject: Re: [EXTERNAL] SCE TLRR Control Silver Peak Project-Paleo FWA
Date: November 6, 2018 at 2:04 PM
To: Geraldine Aron geraldine@paleosolutions.com

HG

I just heard from Ridgecrest that this permit is good for both Field Offices. Good to go!

Best,

Greg

On Fri, Oct 5, 2018 at 10:57 AM Geraldine Aron <geraldine@paleosolutions.com> wrote:

> Hi Greg,
>
> Attached is our FWA request for the SCE TLRR Control Silver Peak Project.
>
> Paleo Solutions has identified PFYC 3 and U areas that require a paleontology survey for this project.
>
> Please let us know when we get a notice-to-proceed, as we would like to try attempt to be out there by the end of October at the latest.
>
> Last request, if you wouldn't mind also confirming that you have received the paleontology work plan for this project, and if you could approve the plan before our field work is initiated to make sure we address any changes in our plan that could effect our field work.
>
> As always, please do not hesitate to contact Courtney or myself if you have any questions.
>
> Thanks again,
>
> **Geraldine Aron, MS** CEO & Program Director, Paleo Solutions, Inc.
>
> PALEO SOLUTIONS EST. 2004 PALEONTOLOGICAL AND CULTURAL RESOURCE CONSULTING SERVICES
>
> Phone: (562) 818-7713
> Email:geraldine@paleosolutions.com
> Website: www.paleosolutions.com
> Address: 911 S. Primrose Ave., Unit N., Monrovia, CA 91016
> Branches: Denver, CO; Dana Point, CA; Oceanside, CA; Bend, OR
> Certifications: DBE • SBE • WBE • SDB • WOSB • EDWOSB

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Greg Haverstock
Archaeologist/ Program Lead
Bureau of Land Management, Bishop Field Office
(760) 872-5030

Office Use Only
Authorization Number:
R5-INF-MGM-FY19-001

FS-2800-22B (REV-02/17)
OMB 0596-0082

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Authorization to Conduct Paleontological Resources Research or Collection

Authorities: 16 U.S.C. §470aaa through 16 U.S.C. §470aaa-11; Organic Administration Act June 4, 1897; 36 CFR 291.13-291.23

Geraldine L. Aron of **Paleo Solutions, Inc.**, hereinafter called the permittee, is hereby authorized to use, subject to the terms and conditions of this permit, National Forest System land identified within the: **Inyo National Forest**. The permittee is authorized to conduct activities as specified below in the permitted area described as: Section 23, 6S 33E; Section 24, 6S 33E; Section 12, 6S 34E; Section 13, 6S 34E; Section 19, 6S 34E; Section 20, 6S 34E; Section 21, 6S 34E; Section 23 6S 34E; Section 24, 6S 34E; Section 25, 6S 34E; Section 26, 6S 34E; Section 27, 6S 34E; Section 28, 6S 34E; Section 29, 6S 34E; Section 19, 6S 34E; Section 7, 6S 35E; Section 8, 6S 35E; Section 9, 6S 35E; Section 10, 6S 35E; Section 11, 6S 35E; Section 12, 6S 35E; Section 13, 6S 35E; Section 14 Section 15, 6S 35E; Section 16, 6S 35E; Section 18, 6S 35E; Section 17, 6S 36E; Section 18, 6S 36E; Section 20, 6S 36E; Section 21, 6S 36E; Section 22, 6S 36E.

The permittee is authorized to conduct the following activities in the permitted area as described above: This field work authorization request is for the SCE Subtransmission Line Rating Remediation Licensing – Control-Silver Peak 55 kV TL Project (Project) in Inyo and Mono counties, California. The Project crosses privately owned lands, local government-administered lands, U.S. Bureau of Land Management (BLM)-administered lands, and U.S. Forest Service (USFS)-administered lands. A Paleontological Resources Survey Work Plan, which includes a desktop inventory assessment, has been completed for the Project. This request is to conduct a paleontological field reconnaissance survey within geologic units of paleontological potential classes PFYC U, 3, 4, and 5. The survey will occur in areas where scientifically significant fossils can be potentially expected to occur within the boundary and immediate vicinity of the anticipated disturbance, or where the probability of encountering fossils is unknown, and in locations where fossils have been recorded in the past. The field survey will be conducted by a survey crew consisting of two paleontologists. The crew will complete a 100% pedestrian linear survey of all potentially fossiliferous bedrock outcrops and exposures of surficial sediments that occur on PFYC U, 3, 4, or 5 formations and verification of PFYC Class 1 and 2 extents. Areas with very low to low sensitivity will not be intensively surveyed. Fossil localities will be documented, but not collected. Pre-construction recommendations will be made to collect scientifically important fossils identified during the survey.

Permit Terms and Conditions

1. This permit expires on **09/30/2019**, unless the Agency extends it in writing before that date.
2. The permittee must notify the Agency not less than 30 days, but not more than 60 days, prior to starting the project and entering on Forest Service lands.
3. All paleontological resources that are collected from National Forest System lands under permit will remain the property of the United States.
4. The collection will be preserved in an approved repository, to be made available for scientific research and public education.
5. Specific locality data will not be released by the permittee or repository unless authorized in accordance with 36 CFR 291.6, or as otherwise agreed to in another agreement.
6. The permittee recognizes that the area within the scope of the permit may be subject to other authorized uses.
7. The permittee must conform to all applicable Federal, State, and local laws.

8. The permittee must assume responsibility for all work conducted under the permit and the actions of all persons conducting this work.
9. The permit cannot be transferred.
10. The permittee cannot modify the permit without the approval of the authorized officer.
11. The permittee must comply with all timelines established in the permit, and must request modification of the permit if those timelines cannot be met.
12. The permittee or other persons named on the permit must be on site at all times when field work is in progress and will have a copy of the signed permit on hand.
13. The permittee will comply with any vehicle or access restrictions, safety or environmental restrictions, or local safety conditions or restrictions.
14. The permittee will report suspected resource damage or theft of paleontological or other resources to the authorized officer in a timely manner after learning of such damage or theft.
15. The permittee will acknowledge the Forest Service in any report, publication, paper, news article, film, television program or other media resulting from work performed under the permit.
16. The permittee will comply with the timeline established in the permit for providing a complete list to the authorized officer of specimens collected and the current location of the specimens[1].
17. The permittee will provide scheduled reports to the authorized officer within the timeline established in the permit[2].
18. The permittee will be responsible for all costs for the proposed activity, including fieldwork, preparation, identification, cataloging, and storage of collections, unless otherwise arranged through a specific agreement.
19. The permittee will comply with the tasks required by the authorized officer, even in the event of permit expiration, suspension, or revocation.
20. Additional stipulations, terms, and conditions as required by the authorized officer and/or the agency may be appended.
21. Salvaged (collected) specimens shall be curated into collections at the Natural History Museum of Los Angeles County, CA (see attached repository agreement). Fossil specimens accessioned into collections of LACM: **a)** remain Federal Property; **b)** cannot be permanently transferred or disposed of without written certification of the US Forest Service.
22. Locality information of collected specimens shall remain confidential (per Paleontological Resources Preservation Act) and shared only discriminately with scientific researchers, as determined by professional practice or established policy of LACM
23. The permittee shall submit a final report of activities (digital) prior to expiration of permit. Report will include a detailed log of field activity and methods, and a comprehensive list of fossil specimens collected and accessioned into museum collections. Photographs, geologic charts, and site maps should be included as appropriate to supplement quality of report information. The permittees assessment of scientific importance and management recommendations for specimens and localities is strongly encouraged, and will assist the Forest Service in stewardship of paleontological resources using scientific principles and expertise.
    Sensitive locality information should be redacted as stand-alone list, table or appendix at end of report. Forms FS-2800-22C (Paleontological Investigation Report Form) and FS-2800-22D (Paleontological Specimen Data Form) may be utilized to supplement final report (attached). For a comprehensive list of report requirements, see Code Of Federal Regulations § 291.17 (Permit reports).

Final Report shall be submitted to:

Colleen Garcia
Minerals and Geology Program Manager
Inyo National Forest
Redding, CA 96002
760-873-2424
colleenggarcia@fs.fed.us

Bruce A. Schumacher
National Paleontologist, WO
US Forest Service
La Junta, CO 81050
(719) 384-2181
baschumacher@fs.fed.us

24. The FS requests notification of publications or professional presentations resulting from work conducted under this permit. Public (federal) ownership of all lands and paleontological resources cited in such records shall be acknowledged as "courtesy United States Forest Service".

A copy of this permit must be carried in the field whenever field work is in progress and an individual named in line 8 of the *Application for Authorization* is responsible in the field for compliance with all permit terms and conditions.

Geraldine L. Aron Paleo Solutions, Inc. 562-818-7713; fax 626-359-0712 geraldine@paleosolutions.com	**Kathleen E. Mick** Acting District Ranger Inyo National Forest White Mtn. & Mt. Whitney Ranger Districts
[signature] 10/25/2018	[signature] 11/2/2018
(Signature of Permittee) (Date)	(Signature of Agency Signing Officer) (Date)

[1] The attached Paleontological Specimen Data Form may facilitate transmittal of required specimen and repository information. Use of this form by the applicant/permit holder is optional.
[2] The attached Paleontological Investigation Report Form may facilitate the applicant/permit holder's transmittal of required documentation pertaining to the authorized paleontological study. Use of this form by the applicant/permit holder is optional.

Errata Sheet

Paleontological Evaluation and Inventory Report: Control-Silver Peak 55 kV Transmission Line Project

Additions shown in underline. Deletions shown in ~~strikethrough~~.

6.1.1 Deep Spring Formation – Precambrian (ds, dl, dm, du)

The Deep Spring Formation is a Precambrian unit first named by Edwin Kirk in 1918, likely from the outcrops on the west side of the Deep Spring Valley, and described by Adolph Knopf (1918) (Nelson, 1962). This formation is mapped in the western portion of the Great Basin in the White and Inyo mountains and Last Chance Range area in California and in Esmeralda County, Nevada. It is between 1,100 and 1,600 feet thick and is equivalent to the Wood Canyon Formation in the southern Great Basin (Stewart, 1970; Nelson, 1962). The Deep Spring Formation is located stratigraphically below the Campito Formation and above the Reed Dolomite (Stewart, 1970). There are three informal members of the Deep Spring Formation distinguished by their lithologies and all mapped within the Project area. These include from oldest to youngest: 1) a lower member composed mostly of limestone with dolomite, quartzite, and calcareous sandstone; 2) a middle member composed of quartzite overlain by blue-gray limestone, with laminations and occasional cross-beds; 3) an upper member composed of a dark gray to black, fine-grained quartzite sandstone overlain by massive, fine-grained, gray dolomite (Nelson, 1962, 1966; Stewart, 1970). The Deep Spring Formation was likely deposited in a shallow, subtidal, carbonate and siliciclastic environment.

Fossils in the Deep Spring Formation are not abundant. Stewart (1970) records trace fossils including worm borings and possible arthropod scratches, sitz-marks, and crawltracks, *Rusophycus* and *Cruziana*, but no trilobite body fossils. UCMP (2020) also records the presence of the trace fossil *Plagiogmus*, which consist of backfilled burrows. Algal material is present, likely stromatolites, enigmatic fossils similar to *Pteridinium* in the middle member of the formation, and one mollusk-like fossil called *Wyattia* (Stewart, 1970; UCMP, 2020). Oliver (1990) extensively documented the shapes, growth patterns/morphologies, and development of the stromatolites found in middle member of the Deep Spring Formation in Mount Dunfree, Esmeralda County, Nevada. While Oliver made no attempt to identify the stromatolites, she did compare them to similar morphologies documented in younger strata than the Precambrian (Oliver, 1990). Oliver does, however, take note that the sediment composition the stromatolites were preserved in was siliciclastic instead of the more typical carbonate lithology. There are abundant modern examples of stromatolites building in siliciclastic rich environments, but not in other parts of the geologic record (Oliver, 1990). Oliver argues that the lack of carbonate cementation and abundant quartz reduces the possibility of preservation, making the stromatolites in the Deep Spring Formation unique (Oliver, 1990). The fossils found in the Deep Spring Formation are not easily identifiable or abundant, but they play an important role in understanding Precambrian organisms~~; therefore this formation has a moderate paleontological potential (PFYC 3)~~. Since the fossil content of the Deep Spring Formation varies in significance, abundance, and predictable occurrence, it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2).

6.1.2 Wyman Formation – Late Precambrian (w, wl)

The upper Precambrian Wyman Formation was named by Maxson (1935) for a section exposed in Wyman Canyon, located in the Blanco Mountain Quadrangle. Maxson originally called the bottom portion of the section the "Roberts Formation" but later studies showed that no unconformity or lithologic difference existed between the two units, so the Roberts Formation was dropped as a stratigraphic unit and the entire section is referred to as the Wyman Formation (Nelson, 1962). This unit consists of phyllitic siltstone and silty claystone, argillite, mudstone, quartzite, sandstone and lesser amounts of carbonate, and within the Project area there are two units mapped: 1) thin-bedded brown to dark-gray agrilllite with fine grained brown quartz sandstone and gray to brown siltstone (w); 2) lenticular grayish-blue oolitic limestone that locally transitions to coarse-grained buff dolomite (wl) (Nelson, 1966; Stewart, 1970; Moore, 1973). It is over 9,000 feet thick in the Inyo and White mountains and is laterally equivalent to the Johnnie Formation and the lower portion of the Stirling Quartzite (Stewart, 1970). This correlation is uncertain since exposures of the formations are over 35 miles apart, and there are no fossils to provide diagnostic age correlations. It unconformably underlies the Reed Dolomite, but its base is not exposed at any of the known sections, so the underlying formation is not known (Stewart, 1970). The age determination for this formation is based on its stratigraphic location well below lower Cambrian faunal zones in overlying units (Stewart, 1970; Nelson, 1962). The UCMP online database records trace fossils from ten localities within the Wyman Formation, six of which were recovered from Hines Ridge. All of the listed specimens are noted as "unidentified Precambrian-Cambrian trace fossils" in the UCMP database (UCMP, 2020), and are mentioned in Nelson et al. (1991) as invertebrate animal tracks and trails. A study by Corsetti and Hagadorn (2003) identified tubular trace fossils of *Helminthoidichnities* and *Planolites*. Due to the scarcity of fossils, and the fact that only invertebrate trace fossils have been reported from the Wyman Formation, it is considered to have low paleontological potential (PFYC 2). ~~The Wyman Formation is unfossiliferous and is considered to have low paleontological potential (PFYC 2).~~

6.1.3 Campito Formation – Precambrian to Early Cambrian (Cc, Cca, Ccm)

The Campito Formation is a Precambrian to lower Cambrian unit first named by Edwin Kirk (IN Knopf, 1918) after outcrops located on the Campito Mountain in the northwest corner of the Blanco Mountain Quadrangle (Nelson, 1962). The Andrews Mountain Member of the Campito Formation occurs both below and above the lowest occurrence of olenellid trilobites and archeocyathids, which gives the formation an age range of Precambrian to early Cambrian (Stewart, 1970). The Campito Formation crops out in California and Nevada and is equivalent to the middle part of the Wood Canyon Formation of the central region of the southern Great Basin (Stewart, 1970). It is located stratigraphically below the Poleta Formation and above the Deep Spring Formation (Stewart, 1970). It is up to 3,500 feet thick and has two members, the lower Andrews Mountain Member and the upper Montenegro Member, both mapped within the Project area (Nelson 1962, 1966). The Andrews Mountain Member (2,500 to 2,800 feet thick) is a dark gray, greenish-gray, black, very fine- to fine-grained quartzite, inter-bedded with layers of dark greenish-gray siltstone. The quartzite contains grains of quartz and feldspar in a matrix of muscovite, chlorite, biotite, and magnetite. Cross-beds, ripple marks, and small channel scours have been noted locally in this member (McKee, 1968; Stewart, 1970). The Montenegro Member (~1,000 feet thick) is a dark greenish-gray, thin-bedded siltstone that contains grains of quartz, muscovite, and chlorite.

The majority of the fossils in the Campito Formation are found in the finer grained siltstone of the Montenegro Member. Towards the top of the formation, thin beds of limestone contain archeocyathid fossils (McKee, 1968; Stewart, 1970; Nelson, 1962). Olenellid trilobites are the most common fossil found throughout the Montenegro Member and include *Fallotaspis* sp., *Bristolia bristolensis*, *Daguinaspis* sp., *Nevadia weeksi*, *Holmia* (*Esmeraldina*), and *Nevadella* cf. *N. addeyensis* (McKee, 1968; Stewart, 1970; McKee and Moiola, 1962; UCMP, California Academy of Sciences, 2020). Other fossils include abundant archeocyathids identified as *Ethmophyllum whitneyi* by McKee (1968), as well as *Cambrocyathus*, *Ajacicyathus*, *Copleicyathus*, *Pycnoidocyanthu; s, Syringothalamus*, *Argentocyathus, Exocyathus,* and *Annulofungia*; ~~and~~ trace fossils including worm borings, animal trails, and possible trilobite scratches noted in both members (McKee, 1968; Stewart, 1970; McKee and Moiola, 1962; UCMP, 2020); foraminifera including *Platysolenites*; and a mollusk identified as *Campitius* (UCMP, 2020). The Campito Formation has the stratigraphically lowest occurrence of trilobites in the western region, making this assemblage unique and paleontologically significant (Stewart, 1970). Since the fossil content of the Campito Formation varies in significance, abundance, and predictable occurrence, it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~The Campito Formation has moderate paleontological potential (PFYC 3).~~

6.1.6 Poleta Formation – Early Cambrian (Cp, Cpl, Cpu)

Lower Member
Fossils from the lower member consist primarily of abundant and well-preserved archaocyathids such as the taxa Renalcis found in limestone beds that also contain ooids and pellets (Stewart, 1970; Nelson, 1962; Marenco, 2006). These fossils form reefs and reef-like structures that represent growth on back-shoal, bank margin as well as subtidal open marine environments (Marenco, 2006; Rowland and Gangloff, 1988). Additional specimens recorded from the lower member include the archaeocyathids Annulofungia, Ajacicyathus, Archaeocyathus, Cambrocyathus, Ethmophyllum; the echinoderm Helicoplacus; and the trilobite Fallotaspis (UCMP, 2020). Since the fossil content of the lower member varies in significance with the majority of the recorded fossils consisting of common archaocyathids, it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~This member has moderate paleontological potential (PFYC 3).~~

Upper Member
This member contains poorly preserved archaeocyathids, trilobites, the brachiopods Lingulella and Orthidae, the worm-like animal Emmonsaspis, the echinoderms Westgardella and Helicoplacoidea, as well as bioclastic limestone containing pellets that were deposited in a carbonate-bank depositional system (Marenco, 2006; UCMP, 2020; California Academy of Sciences, 2020). In addition, one specimen from an animal with unknown taxonomic affinities was discovered and is described as a large valve-shaped organism. It has been described as the new genus and species Westgardia gigantean n. gen., n. sp. (Rowland and Carson, 1983). Further discoveries of similar specimens would provide important evolutionary information. Since the fossil content of the upper member varies in significance, abundance, and predictable occurrence, and the member is marine in origin with sporadic known occurrences of paleontological resources, it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~This member has a moderate paleontological potential (PFYC 3).~~

6.1.8 Saline Valley Formation – Early Cambrian (Cs)

The Saline Valley Formation is an early Cambrian formation originally named by Nelson (1962), located in the western portion of the Great Basin in the White and Inyo mountains and Last Chance Range area in California and in Esmeralda County, Nevada near the state boarder (Stewart, 1970). The type locality is an exposure in the Waucoba Spring section near Saline Valley (Nelson, 1962). The Saline Valley Formation lies above the Harkless Formation and below the Mule Spring Formation. It correlates to the upper part of the Zabriskie Quartzite and the lower part of the Carrara Formation in the central Great Basin (Stewart, 1970). The Saline Valley Formation is a marine deposit, about 850 feet thick and contains a wide variety of lithologies, including limestone, sandstone, siltstone, and shale. The lower portion of the formation is a medium- to coarse-grained quartzitic sandstone, followed by a blue-gray arenaceous limestone, topped by quartzitic sandstone, limestone, and a gray-green and black shale (Nelson, 1962; Stewart 1970). Within the Project area, the lithology consists of brown thin- to medium-bedded, fine- to medium-grained siltstone and quartz sandstone that has partially transformed to siliceous hornfels in areas (Nelson, 1966).

Fossils from the Saline Valley Formation were originally discovered by J. P. Albers and J. H. Stewart while describing the geology of Esmeralda County, Nevada, and were described and identified by Palmer (1964). There are at least 12 different species of trilobites, which include *Zacanthopsina eperephes, Zacanthopsis contractus, Zacanthopsis levis, Stephanaspis* (?) *avitus, Syspacephalus* (?) sp., *Ogygopsis batis, Olenoides* spp., *Bonnia caperata, Paedeumias granulatus, Wanneria* cf. *W. walcottana,* and *Goldfieldia pacifica.* The fossils were found predominately in the lower portion of the formation. Another species of trilobite, *Bristolia* sp., has been identified in the upper section of the Saline Valley (Palmer, 1964). This assemblage of trilobites from the lower Cambrian is the largest in North America. Since the fossil content of the Saline Valley Formation varies in abundance and predictable occurrence within the formation (with potentially significant fossils primarily being restricted to the lower portion of the formation), it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~The Saline Valley Formation is considered to have moderate paleontological potential (PFYC 3).~~

6.1.9 Mule Spring Limestone – Early Cambrian (Cms)

The early Cambrian Mule Spring Limestone has a type section east of Waucoba Spring on Saline Valley Road, east of the Inyo Range, Inyo County, California, and was named for exposures at Mule Spring on the west side of the Inyo Mountains, Waucoba Mountain Quadrangle, California (Nelson, 1962). It is composed of distinctly bedded blueish-gray limestone that contains abundant oncoids and fenestral structures throughout the formation; some areas contain more abundant shale and siltstone interbeds, and some portions of the limestone have been dolomitized (Nelson, 1962; Hollingsworth et al., 2011; McKee and Nelson, 1967). The Mule Spring Limestone is structurally complex, so the thickness is hard to determine, though it is likely 700 to 1,000 feet thick in the White and Inyo mountains (Stewart, 1970). The Mule Spring Limestone is found throughout the Great Basin province in California and Nevada. It conformably overlies the Harkless Formation, and the contact between the two is often gradational and hard to define, and is conformably overlain by the Monola Formation. It is equivalent to part of the Carrara Formation in the central portion of the southern Great Basin and to the Bright Angel Shale in the eastern portion of the southern Great Basin (Stewart, 1970; Palmer and Halley, 1979). This formation was deposited in a dominantly shallow subtidal and intertidal carbonate bank environmental on a distal shelf (Hollingsworth et al., 2011).

The Mule Spring Limestone is most well-known for the algae *Grivanella*, which gives the formation its characteristic fenestral texture. Trilobites are also very common in the Mule Spring Limestone, mostly occurring in the lower part of the formation in the silty beds (Stewart, 1970). Trilobite taxa include *Bristolia*, *Paedeumias*, *Fremontia*, *Bonnia* and *Peachella*. The trilobite *Bristolia* provides correlation to other units within the Great Basin (Stewart, 1970). Since the fossil content of the Mule Spring Limestone varies in significance, abundance, and predictable occurrence within the formation (with potentially significant trilobite fossils being primarily restricted to the lower portion of the formation), it is considered to have moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~The Mule Spring Limestone is considered to have moderate paleontological potential (PFYC 3).~~

6.1.10 Emigrant Formation – Middle to Late Cambrian (Cel, Ceu)

The Emigrant Formation is a middle to late Cambrian formation named by H. W. Tuner in 1902 for an outcrop exposed to the south of Emigrant Pass in the northern part of the Silver Peak Range, Esmeralda County, Nevada (McKee and Moiola, 1962). It lies stratigraphically between the Mule Spring Limestone below and the Palmetto Formation above. The formation is estimated to be about 2,500 feet thick in Nevada and California and is composed of mostly limestone with some shale, mudstone, and chert (McKee and Moiola, 1962; McKee, 1968). The Emigrant Formation is divided into two members: 1) the lower member is a light gray to green siliceous shale with very thin-bedded mudstones, interbedded with very thin beds of chert and laminated, platy limestone approximately 500 feet thick; 2) the upper member is a thin-bedded, blue to gray limestone, alternating with bluff to black bands of chert. Orange to reddish gray calcareous shale and sandstone occur near the top of this unit. In addition, there are several distinct beds of limestone breccia that occur throughout the formation (McKee and Moiola, 1962; McKee, 1968). The Emigrant Formation was deposited in an outer-shelf marine environment during a period of sea-level rise (Sundberg and McCollum, 2003, and Skovsted, 2006).

Fossils found in the Emigrant Formation are exclusively marine invertebrates from outer-shelf environments that are not abundant and are not well studied. Trilobites are the most common fossils documented. McKee (1968) originally described the trilobite fauna of the Emigrant Formation, which included the taxa *Syspacephalus* sp., *Ehmaniella* sp., *Oryctocephalus* sp., *Alokistocare* cf. *A. agnesensis*, *Richardsonella* sp., *Drumaspis*, sp., *Homagnostus* sp., *Idahoia* (?) sp., *Pseudoagnostus* sp., *Eupychaspis* sp., and *Eurekia* sp. Sundberg and McCollum (2003) later identified more species of trilobites from the Emigrant Formation, these include *Oryctocephalus indicus, Oryctocephalus orientalis, Oryctocephalus runcinatus, Oryctocephalus americanus, Mircoryctocara nevadensis, Paraantagmus latus, Tonopahella goldfieldensis, Onchocephalites claytonensis,* and *Syspacephalus various*. These trilobite species show an age range of middle to late Cambrian, with the boundary between these ages lying somewhere in the Emigrant Formation. Other fossils include a brachiopod species, *Nisusia festinata*, and miscellaneous shelly fossils, *Anabarella chelata, Costipelagiella nevadense, Parkula esmeraldina*, echinoderm fragments, and sponge spicule (Skovsted, 2006; McKee, 1968). Since the fossil content of the Emigrant Formation varies in abundance and predictable occurrence, and the formation is marine in origin with sporadic known occurrences of paleontological resources, it has a moderate paleontological potential (PFYC 3) in accordance with BLM (2016) guidelines (see Table 2). ~~The Emigrant Formation is considered to have moderate paleontological potential (PFYC 3).~~