Los Angeles County
Metropolitan Transportation Authority

West Santa Ana Branch Transit Corridor

Draft EIS/EIR Appendix Y
Final Paleontological Resource Impacts Analysis Report

Metro®

WEST SANTA ANA BRANCH TRANSIT CORRIDOR PROJECT

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Final Paleontological Resource Impacts Analysis Report

Prepared for:

Metro

Los Angeles County
Metropolitan Transportation Authority

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ACRONYMS AND ABBREVIATIONS

AA	Alternatives Analysis
bgs	below ground surface
BRT	bus rapid transit
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CGS	California Geological Society
CHSRA	California High-Speed Rail Authority
EIR	environmental impact report
EIS	environmental impact statement
FTA	Federal Transit Administration
GCCOG	Gateway Cities Council of Governments
I	interstate
LAUS	Los Angeles Union Station
LPA	locally preferred alternative
LRT	light rail transit
LRTP	Long Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
MRDC	Metro Rail Design Criteria
MSF	maintenance and storage facility
NEPA	National Environmental Policy Act
NHMLAC	Natural History Museum of Los Angeles County
NPS	National Park Service
OCTA	Orange County Transportation Authority
OLDA	Orangeline Development Authority
PEROW/WSAB	Pacific Electric Right-of-Way/West Santa Ana Branch
ROD	record of decision
ROW	right-of-way
SCAG	Southern California Association of Governments
SVP	Society of Vertebrate Paleontology
TPSS	traction power substation
TRS	technical refinement study
UPRR	Union Pacific Railroad
WSAB	West Santa Ana Branch

1 INTRODUCTION

1.1 Study Background

The West Santa Ana Branch (WSAB) Transit Corridor (Project) is a proposed light rail transit (LRT) line that would extend from four possible northern termini in southeast Los Angeles (LA) County to a southern terminus in the City of Artesia, traversing densely populated, low-income, and heavily transit-dependent communities. The Project would provide reliable, fixed guideway transit service that would increase mobility and connectivity for historically underserved, transit-dependent, and environmental justice communities; reduce travel times on local and regional transportation networks; and accommodate substantial future employment and population growth.

1.2 Alternatives Evaluation, Screening and Selection Process

A wide range of potential alternatives have been considered and screened through the alternatives analysis processes. In March 2010, the Southern California Association of Governments (SCAG) initiated the Pacific Electric Right-of-Way (PEROW)/WSAB Alternatives Analysis (AA) Study (SCAG 2013) in coordination with the relevant cities, Orangeline Development Authority (now known as Eco-Rapid Transit), the Gateway Cities Council of Governments, the Los Angeles County Metropolitan Transportation Authority (Metro), the Orange County Transportation Authority, and the owners of the right-of-way (ROW)—Union Pacific Railroad (UPRR), BNSF Railway, and the Ports of Los Angeles and Long Beach. The AA Study evaluated a wide variety of transit connections and modes for a broader 34-mile corridor from Union Station in downtown Los Angeles to the City of Santa Ana in Orange County. In February 2013, SCAG completed the PEROW/WSAB Corridor Alternatives Analysis Report[1] and recommended two LRT alternatives for further study: West Bank 3 and the East Bank.

Following completion of the AA, Metro completed the WSAB Technical Refinement Study in 2015 focusing on the design and feasibility of five key issue areas along the 19-mile portion of the WSAB Transit Corridor within LA County:

- Access to Union Station in downtown Los Angeles
- Northern Section Options
- Huntington Park Alignment and Stations
- New Metro C (Green) Line Station
- Southern Terminus at Pioneer Station in Artesia

In September 2016, Metro initiated the WSAB Transit Corridor Environmental Study with the goal of obtaining environmental clearance of the Project under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

[1] Initial concepts evaluated in the SCAG report included transit connections and modes for the 34 mile corridor from Union Station in downtown Los Angeles to the City of Santa Ana. Modes included low speed magnetic levitation (maglev) heavy rail, light rail, and bus rapid transit (BRT).

Metro issued a Notice of Preparation (NOP) on May 25, 2017, with a revised NOP issued on June 14, 2017, extending the comment period. In June 2017, Metro held public scoping meetings in the Cities of Bellflower, Los Angeles, South Gate, and Huntington Park. Metro provided Project updates and information to stakeholders with the intent to receive comments and questions through a comment period that ended in August 2017. A total of 1,122 comments were received during the public scoping period from May through August 2017. The comments focused on concerns regarding the Northern Alignment options, with specific concerns related to potential impacts to Alameda Street with an aerial alignment. Given potential visual and construction issues raised through public scoping, additional Northern Alignment concepts were evaluated.

In February 2018, the Metro Board of Directors approved further study of the alignment in the Northern Section due to community input during the 2017 scoping meetings. A second alternatives screening process was initiated to evaluate the original four Northern Alignment options and four new Northern Alignment concepts. The *Final Northern Alignment Alternatives and Concepts Updated Screening Report* was completed in May 2018 (Metro 2018a). The alternatives were further refined and, based on the findings of the second screening analysis and the input gathered from the public outreach meetings, the Metro Board of Directors approved Build Alternatives E and G for further evaluation (now referred to as Alternatives 1 and 2, respectively, in this report).

On July 11, 2018, Metro issued a revised and recirculated CEQA Notice of Preparation, thereby initiating a scoping comment period. The purpose of the revised Notice of Preparation was to inform the public of the Metro Board's decision to carry forward Alternatives 1 and 2 into the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR). During the scoping period, one agency and three public scoping meetings were held in the Cities of Los Angeles, Cudahy, and Bellflower. The meetings provided Project updates and information to stakeholders with the intent to receive comments and questions to support the environmental process. The comment period for scoping ended in August 24, 2018; over 250 comments were received.

Following the July 2018 scoping period, a number of Project refinements were made to address comments received, including additional grade separations, removing certain stations with low ridership, and removing the Bloomfield extension option. The Metro Board adopted these refinements to the project description at their November 2018 meeting.

1.3 Report Purpose and Structure

This section examines the affected environment, impacts, and mitigation related to paleontological resources. The report is organized into the following sections:

- Section 2 – Project Description
- Section 3 – Regulatory Framework
- Section 4 – Affected Environment/Existing Conditions
- Section 5 – Environmental Impact/Environmental Consequences
- Section 6 – California Environmental Quality Act
- Section 7 – Construction Impacts
- Section 8 – Project Measures and Mitigation Measures
- Section 9 – References

1.4 General Background

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 physical remains, tracks, or traces of once living organisms preserved in rocks or sediment. Fossils are commonly found in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks under certain conditions (Society of Vertebrate Paleontology [SVP], 2010).

Paleontologists normally distinguish invertebrate from vertebrate fossil localities (as opposed to the archaeological term "site") as each typically requires a different research approach. Invertebrate localities, especially when they comprise microscopic species like diatoms, foraminifera, and radiolarians, but also when they include larger shelly marine fauna (e.g., clams), can require extensive bulk sediment sampling and processing. Also, invertebrate fossils normally occur in marine lithologies, can be widespread and abundant, and are often well-preserved. They tend to contain fewer separate hard parts subject to loss or destruction after death. In contrast, vertebrate fossils can be marine or nonmarine in origin, comprise large and/or small taxa (e.g., whales to rodents) that are locally distributed, numerically scarce (i.e., few individuals), and be poorly-preserved. They tend to contain hundreds of separate hard parts (skeletal elements) that are easily lost or destroyed after death.

1.5 Methodology

To assess whether the Project has the potential to disturb significant fossil resources at the subsurface, geologic maps of the Project APE were examined and existing literature pertaining to the geology, paleontology, and stratigraphy of the area was reviewed. Geologic units are considered to be "sensitive" for paleontological resources if they are known to contain significant fossils anywhere in their extent. Therefore, a search of pertinent local and regional museum repositories for paleontological localities within and nearby the Project APE was necessary to determine whether fossil localities have been previously discovered within a particular rock unit. For the Project, a formal paleontological collections records search was conducted at the Natural History Museum of Los Angeles County (NHMLAC) on May 1, 2017. A supplemental record search of the revised Northern Section was conducted on August 29, 2018. (Refer to Appendix A for the Paleontology Records Search Results).

The Affected Area for the purposes of evaluating potential impacts to paleontological resources within the larger Project APE includes the ground surface and subsurface within the proposed alignments and proposed stations, maintenance and storage facilities, TPSS sites, and parking facilities where ground disturbance associated with the Project may occur. This Affected Area corresponds to the area where potential effects/impacts may occur as a result of the Project.

The Society for Vertebrate Paleontology (SVP) broadly defines significant paleontological resources as follows:

> *Fossils and fossiliferous deposits consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years) (SVP 2010, 11).*

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

Absent specific agency guidelines, most professional paleontologists in California adhere to guidelines set forth by SVP (2010)) in "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources". These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., "sensitivity") of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development. Using baseline information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) (or members thereof) underlying a project area can be assigned to a high, undetermined, low, or no paleontological sensitivity category, as defined by SVP (2010). This criterion is based on rock units within which vertebrate or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. While these standards were specifically written to protect vertebrate paleontological resources, all fields of paleontology have adopted these guidelines.

The paleontological sensitivity of the Affected Area was evaluated according to the following SVP (SVP 2010) categories:

I. **High Potential (sensitivity)** –*Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.*

II. **Low Potential (sensitivity)** – *Sedimentary rock units that are potentially fossiliferous but have not yielded fossils in the past or contain common and/or widespread invertebrate fossils of well documented and understood taphonomic, phylogenetic species and habitat ecology. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils prior to the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations. However, as excavation for construction gets underway it is possible that significant and unanticipated paleontological resources might be encountered and require a*

change of classification from Low to High Potential and, thus, require monitoring and mitigation if the resources are found to be significant.

III. **Undetermined Potential (sensitivity)** –*Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.*

IV. **No Potential** – *Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources*

Existing federal regulations (i.e., Paleontological Resources Protection Act [PRPA]) provide protections for paleontological resources on federal lands, but do not establish standards by which the potential for adverse effects should be evaluated. The Bureau of Land Management (BLM) has developed guidelines for assessing paleontological sensitivity, and these guidelines are generally consistent with the standards and guidelines established by the Society of Vertebrate Paleontology (SVP) (SVP 2010). To satisfy NEPA requirements, the potential for adverse effects to paleontological resources are analyzed in accordance with SVP guidelines for assessing paleontological sensitivity of geologic units, and the following threshold for evaluating effects under NEPA: Destruction, damage or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data as a result of ground disturbance from project activity could be considered a direct adverse effect under NEPA.

To satisfy CEQA requirements, paleontological resource impacts are analyzed in accordance with Appendix G of the *CEQA Guidelines*, which states that impacts are considered significant if the Project would directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. Impacts would be significant if construction activities result in the destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data. The activities may include grading, excavation, or other activities that disturb substantial quantities of the subsurface geologic units with a high paleontological sensitivity.

2 PROJECT DESCRIPTION

This section describes the No Build Alternative and the four Build Alternatives studied in the WSAB Transit Corridor Draft EIS/EIR, including design options, station locations, and maintenance and storage facility (MSF) site options. The Build Alternatives were developed through a comprehensive alternatives analysis process and meet the purpose and need of the Project.

The No Build Alternative and four Build Alternatives are generally defined as follows:

- **No Build Alternative** - Reflects the transportation network in the 2042 horizon year without the proposed Build Alternatives. The No Build Alternative includes the existing transportation network along with planned transportation improvements that have been committed to and identified in the constrained Metro 2009 Long Range Transportation Plan (2009 LRTP) (Metro 2009) and SCAG's 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (SCAG 2016), as well as additional projects funded by Measure M that would be completed by 2042.
- **Build Alternatives**: The Build Alternatives consist of a new LRT line that would extend from different termini in the north to the same terminus in the City of Artesia in the south. The Build Alternatives are referred to as:
  - Alternative 1: Los Angeles Union Station to Pioneer Station; the northern terminus would be located underground at Los Angeles Union Station (LAUS) Forecourt
  - Alternative 2: 7th Street/Metro Center to Pioneer Station; the northern terminus would be located underground at 8th Street between Figueroa Street and Flower Street near 7th Street/Metro Center Station
  - Alternative 3: Slauson/A (Blue) Line to Pioneer Station; the northern terminus would be located just north of the intersection of Long Beach Avenue and Slauson Avenue in the City of Los Angeles, connecting to the current A (Blue) Line Slauson Station
  - Alternative 4: I-105/C (Green) Line to Pioneer Station; the northern terminus would be located at I-105 in the city of South Gate, connecting to the C (Green) Line along the I-105

Two design options are under consideration for Alternative 1. Design Option 1 would locate the northern terminus station box at the LAUS Metropolitan Water District (MWD) east of LAUS and the MWD building, below the baggage area parking facility. Design Option 2 would add the Little Tokyo Station along the WSAB alignment. The Design Options are further discussed in Section 2.3.6.

Figure 2-1 presents the four Build Alternatives and the design options. In the north, Alternative 1 would terminate at LAUS and primarily follow Alameda Avenue south underground to the proposed Arts/Industrial District Station. Alternative 2 would terminate near the existing 7th Street/Metro Center Station in the Downtown Transit Core and would primarily follow 8th Street east underground to the proposed Arts/Industrial District Station.

Figure 2-1. Project Alternatives

Source: Metro, 2020

From the Arts/Industrial District Station to the southern terminus at Pioneer Station, Alternatives 1 and 2 share a common alignment. South of Olympic Boulevard, the Alternatives 1 and 2 would transition from an underground configuration to an aerial configuration, cross over the Interstate (I-) 10 freeway and then parallel the existing Metro A (Blue) Line along the Wilmington Branch ROW as it proceeds south. South of Slauson Avenue, which would serve as the northern terminus for Alternative 3, Alternatives 1, 2, and 3 would turn east and transition to an at-grade configuration to follow the La Habra Branch ROW along Randolph Street. At the San Pedro Subdivision ROW, Alternatives 1, 2, and 3 would turn southeast to follow the San Pedro Subdivision ROW and then transition to the Pacific Electric Right-of-Way (PEROW), south of the I-105 freeway. The northern terminus for Alternative 4 would be located at the I-105/C (Green) Line. Alternatives 1, 2, 3, and 4 would then follow the PEROW to the southern terminus at the proposed Pioneer Station in Artesia. The Build Alternatives would be grade-separated where warranted, as indicated on Figure 2-2.

Figure 2-2. Project Alignment by Alignment Type

Source: Metro, 2020

2.1 Geographic Sections

The approximately 19-mile corridor is divided into two geographic sections—the Northern and Southern Sections. The boundary between the Northern and Southern Sections occurs at Florence Avenue in the City of Huntington Park.

2.1.1 Northern Section

The Northern Section includes approximately 8 miles of Alternatives 1 and 2 and 3.8 miles of Alternative 3. Alternative 4 is not within the Northern Section. The Northern Section covers the geographic area from downtown Los Angeles to Florence Avenue in the City of Huntington Park and would generally traverse the Cities of Los Angeles, Vernon, Huntington Park, and Bell, and the unincorporated Florence-Firestone community of LA County (Figure 2-3). Alternatives 1 and 2 would traverse portions of the Wilmington Branch (between approximately Martin Luther King Jr Boulevard along Long Beach Avenue to Slauson Avenue). Alternatives 1, 2, and 3 would traverse portions of the La Habra Branch ROW (between Slauson Avenue along Randolph Street to Salt Lake Avenue) and San Pedro Subdivision ROW (between Randolph Street to approximately Paramount Boulevard).

Figure 2-3. Northern Section

Source: Metro, 2020

2.1.2 Southern Section

The Southern Section includes approximately 11 miles of Alternatives 1, 2, and 3 and includes all 6.6 miles of Alternative 4. The Southern Section covers the geographic area from south of Florence Avenue in the City of Huntington Park to the City of Artesia and would generally traverse the Cities of Huntington Park, Cudahy, South Gate, Downey, Paramount, Bellflower, Cerritos, and Artesia (Figure 2-4). In the Southern Section, all four Build Alternatives would utilize portions of the San Pedro Subdivision and the Metro-owned PEROW (between approximately Paramount Boulevard to South Street).

Figure 2-4. Southern Section

Source: Metro, 2020

2.2 No Build Alternative

For the NEPA evaluation, the No Build Alternative is evaluated in the context of the existing transportation facilities in the Study Area (the Study Area extends approximately 2 miles from either side of the proposed alignment) and other capital transportation improvements and/or transit and highway operational enhancements that are reasonably foreseeable. Because the No Build Alternative provides the background transportation network, against

which the Build Alternatives' impacts are identified and evaluated, the No Build Alternative does not include the Project.

The No Build Alternative reflects the transportation network in 2042 and includes the existing transportation network along with planned transportation improvements that have been committed to and identified in the constrained Metro 2009 LRTP and the SCAG 2016 RTP/SCS, as well as additional projects funded by Measure M, a sales tax initiative approved by voters in November 2016. The No Build Alternative includes Measure M projects that are scheduled to be completed by 2042.

Table 2.1 lists the existing transportation network and planned improvements included as part of the No Build Alternative.

Table 2.1. No Build Alternative – Existing Transportation Network and Planned Improvements

Project	To / From	Location Relative to Study Area
Rail (Existing)		
Metro Rail System (LRT and Heavy Rail Transit)	Various locations	Within Study Area
Metrolink (Southern California Regional Rail Authority) System	Various locations	Within Study Area
Rail (Under Construction/Planned)[1]		
Metro Westside D (Purple) Line Extension	Wilshire/Western to Westwood/VA Hospital	Outside Study Area
Metro C (Green) Line Extension[2] to Torrance	96th Street Station to Torrance	Outside Study Area
Metro C (Green) Line Extension	Norwalk to Expo/Crenshaw[3]	Outside Study Area
Metro East-West Line/Regional Connector/Eastside Phase 2	Santa Monica to Lambert Santa Monica to Peck Road	Within Study Area
Metro North-South Line/Regional Connector/Foothill Extension to Claremont Phase 2B	Long Beach to Claremont	Within Study Area
Metro Sepulveda Transit Corridor	Metro G (Orange) Line to Metro E (Expo) Line	Outside Study Area
Metro East San Fernando Valley Transit Corridor	Sylmar to Metro G (Orange) Line	Outside Study Area
Los Angeles World Airport Automated People Mover	96th Street Station to LAX Terminals	Outside Study Area
Metrolink Capital Improvement Projects	Various projects	Within Study Area
California High-Speed Rail	Burbank to LA LA to Anaheim	Within Study Area
Link US[4]	LAUS	Within Study Area

Project	To / From	Location Relative to Study Area
Bus (Existing)		
Metro Bus System (including BRT, Express, and local)	Various locations	Within Study Area
Municipality Bus System[5]	Various locations	Within Study Area
Bus (Under Construction/Planned)		
Metro G (Orange) Line (BRT)	Del Mar (Pasadena) to Chatsworth Del Mar (Pasadena) to Canoga Canoga to Chatsworth	Outside Study Area
Vermont Transit Corridor (BRT)	120th Street to Sunset Boulevard	Outside Study Area
North San Fernando Valley BRT	Chatsworth to North Hollywood	Outside Study Area
North Hollywood to Pasadena	North Hollywood to Pasadena	Outside Study Area
Highway (Existing)		
Highway System	Various locations	Within Study Area
Highway (Under Construction/Planned)		
High Desert Multi-Purpose Corridor	SR-14 to SR-18	Outside Study Area
I-5 North Capacity Enhancements	SR-14 to Lake Hughes Rd	Outside Study Area
SR-71 Gap Closure	I-10 to Rio Rancho Rd	Outside Study Area
Sepulveda Pass Express Lane	I-10 to US-101	Outside Study Area
SR-57/SR-60 Interchange Improvements	SR-70/SR-60	Outside Study Area
I-710 South Corridor Project (Phase 1 & 2)	Ports of Long Beach and LA to SR-60	Within Study Area
I-105 Express Lane	I-405 to I-605	Within Study Area
I-5 Corridor Improvements	I-605 to I-710	Outside Study Area

Source: Metro 2018, WSP 2019
Notes: [1] Where extensions are proposed for existing Metro rail lines, the origin/destination is defined for the operating scheme of the entire rail line following completion of the proposed extensions and not just the extension itself.
[2] Metro C (Green) Line extension to Torrance includes new construction from Redondo Beach to Torrance; however, the line will operate from Torrance to 96th Street.
[3] The currently under construction Metro Crenshaw/LAX Line will operate as the Metro C (Green) Line.
[4] Link US rail walk times included only.
[5] The municipality bus network system is based on service patterns for Bellflower Bus, Cerritos on Wheels, Cudahy Area Rapid Transit, Get Around Town Express, Huntington Park Express, La Campana, Long Beach Transit, Los Angeles Department of Transportation, Norwalk Transit System and the Orange County Transportation Authority.
BRT = Bus Rapid Transit; LAUS = Los Angeles Union Station; LAX = Los Angeles International Airport; VA = Veterans Affairs

2.3 Build Alternatives

2.3.1 Proposed Alignment Configuration for the Build Alternatives

This section describes the alignment for each of the Build Alternatives. The general characteristics of the four Build Alternatives are summarized in Table 2.2. Figure 2-5 illustrates the freeway crossings along the alignment. Additionally, the Build Alternatives would require relocation of existing freight rail tracks within the ROW to maintain existing operations where there would be overlap with the proposed light rail tracks. Figure 2-6 depicts the alignment sections that would share operation with freight and the corresponding ownership.

Table 2.2. Summary of Build Alternative Components

Component	Quantity			
Alternatives	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**
Alignment Length	19.3 miles	19.3 miles	14.8 miles	6.6 miles
Stations Configurations	11 3 aerial; 6 at-grade; 2 underground[3]	12 3 aerial; 6 at-grade; 3 underground	9 3 aerial; 6 at-grade	4 1 aerial; 3 at-grade
Parking Facilities	5 (approximately 2,780 spaces)	5 (approximately 2,780 spaces)	5 (approximately 2,780 spaces)	4 (approximately 2,180 spaces)
Length of underground, at-grade, and aerial	2.3 miles underground; 12.3 miles at-grade; 4.7 miles aerial[1]	2.3 miles underground; 12.3 miles at-grade; 4.7 miles aerial[1]	12.2 miles at-grade; 2.6 miles aerial[1]	5.6 miles at-grade; 1.0 miles aerial[1]
At-grade crossings	31	31	31	11
Freight crossings	10	10	9	2
Freeway Crossings	6 (3 freeway undercrossings[2] at I-710; I-605, SR-91)	6 (3 freeway undercrossings[2] at I-710; I-605, SR-91)	4 (3 freeway undercrossings[2] at I-710; I-605, SR-91)	3 (2 freeway undercrossings[2] at I-605, SR-91)
Elevated Street Crossings	25	25	15	7
River Crossings	3	3	3	1
TPSS Facilities	22[3]	23	17	7
Maintenance and Storage Facility site options	2	2	2	2

Source: WSP, 2020
Notes: [1] Alignment configuration measurements count retained fill embankments as at-grade.
[2] The light rail tracks crossing beneath freeway structures.
[3] Under Design Option 2 – Add Little Tokyo Station, an additional underground station and TPSS site would be added under Alternative 1

Figure 2-5. Freeway Crossings

Source: WSP, 2020

Figure 2-6. Existing Rail Right-of-Way Ownership and Relocation

Source: WSP, 2020

2.3.2 Alternative 1

The total alignment length of Alternative 1 would be approximately 19.3 miles, consisting of approximately 2.3 miles of underground, 12.3 miles of at-grade, and 4.7 miles of aerial alignment. Alternative 1 would include 11 new LRT stations, 2 of which would be underground, 6 would be at-grade, and 3 would be aerial. Under Design Option 2, Alternative 1 would have 12 new LRT stations, and the Little Tokyo Station would be an additional underground station. Five of the stations would include parking facilities, providing a total of up to 2,780 new parking spaces. The alignment would include 31 at-grade crossings, 3 freeway undercrossings, 2 aerial freeway crossings, 1 underground freeway crossing, 3 river crossings, 25 aerial road crossings, and 10 freight crossings.

In the north, Alternative 1 would begin at a proposed underground station at/near LAUS either beneath the LAUS Forecourt or, under Design Option 1, east of the MWD building beneath the baggage area parking facility (Section 2.3.6). Crossovers would be located on the north and south ends of the station box with tail tracks extending approximately 1,200 feet north of the station box. A tunnel extraction portal would be located within the tail tracks for both Alternative 1 terminus station options.

From LAUS, the alignment would continue underground crossing under the US-101 freeway and the existing Metro L (Gold) Line aerial structure and continue south beneath Alameda Street to the optional Little Tokyo Station between 1st Street and 2nd Street (note: under Design Option 2, Little Tokyo Station would be constructed). From the optional Little Tokyo Station, the alignment would continue underground beneath Alameda Street to the proposed Arts/Industrial District Station under Alameda Street between 6th Street and Industrial Street. (Note, Alternative 2 would have the same alignment as Alternative 1 from this point south. Refer to Section 2.3.3 for additional information on Alternative 2.)

The underground alignment would continue south under Alameda Street to 8th Street, where the alignment would curve to the west and transition to an aerial alignment south of Olympic Boulevard. The alignment would cross over the I-10 freeway in an aerial viaduct structure and continue south, parallel to the existing Metro A (Blue) Line at Washington Boulevard. The alignment would continue in an aerial configuration along the eastern half of Long Beach Avenue within the UPRR-owned Wilmington Branch ROW, east of the existing Metro A (Blue) Line and continue south to the proposed Slauson/A Line Station. The aerial alignment would pass over the existing pedestrian bridge at E. 53rd Street. The Slauson/A Line Station would serve as a transfer point to the Metro A (Blue) Line via a pedestrian bridge. The vertical circulation would be connected at street level on the north side of the station via stairs, escalators, and elevators. (The Slauson/A Line Station would serve as the northern terminus for Alternative 3; refer to Section 2.3.4 for additional information on Alternative 3.)

South of the Slauson/A Line Station, the alignment would turn east along the existing La Habra Branch ROW (also owned by UPRR) in the median of Randolph Street. The alignment would be on the north side of the La Habra Branch ROW and would require the relocation of existing freight tracks to the southern portion of the ROW. The alignment would transition to an at-grade configuration at Alameda Street and would proceed east along the Randolph Street median. Wilmington Avenue, Regent Street, Albany Street, and Rugby Avenue would be closed to traffic crossing the ROW, altering

the intersection design to a right-in, right-out configuration. The proposed Pacific/Randolph Station would be located just east of Pacific Boulevard.

From the Pacific/Randolph Station, the alignment would continue east at-grade. Rita Avenue would be closed to traffic crossing the ROW, altering the intersection design to a right-in, right-out configuration. At the San Pedro Subdivision ROW, the alignment would transition to an aerial configuration and turn south to cross over Randolph Street and the freight tracks, returning to an at-grade configuration north of Gage Avenue. The alignment would be located on the east side of the existing San Pedro Subdivision ROW freight tracks, and the existing tracks would be relocated to the west side of the ROW. The alignment would continue at-grade within the San Pedro Subdivision ROW to the proposed at-grade Florence/Salt Lake Station south of the Salt Lake Avenue/Florence Avenue intersection.

South of Florence Avenue, the alignment would extend from the proposed Florence/Salt Lake Station in the City of Huntington Park to the proposed Pioneer Station in the City of Artesia, as shown in Figure 2-4. The alignment would continue southeast from the proposed at-grade Florence/Salt Lake Station within the San Pedro Subdivision ROW, crossing Otis Avenue, Santa Ana Street, and Ardine Street at-grade. The alignment would be located on the east side of the existing San Pedro Subdivision freight tracks and the existing tracks would be relocated to the west side of the ROW. South of Ardine Street, the alignment would transition to an aerial structure to cross over the existing UPRR tracks and Atlantic Avenue. The proposed Firestone Station would be located on an aerial structure between Atlantic Avenue and Florence Boulevard.

The alignment would then cross over Firestone Boulevard and transition back to an at-grade configuration prior to crossing Rayo Avenue at-grade. The alignment would continue south along the San Pedro Subdivision ROW, crossing Southern Avenue at-grade and continuing at-grade until it transitions to an aerial configuration to cross over the LA River. The proposed LRT bridge would be constructed next to the existing freight bridge. South of the LA River, the alignment would transition to an at-grade configuration crossing Frontage Road at-grade, then passing under the I-710 freeway through the existing box tunnel structure and then crossing Miller Way. The alignment would then return to an aerial structure to cross the Rio Hondo Channel. South of the Rio Hondo Channel, the alignment would briefly transition back to an at-grade configuration and then return to an aerial structure to cross over Imperial Highway and Garfield Avenue. South of Garfield Avenue, the alignment would transition to an at-grade configuration and serve the proposed Gardendale Station north of Gardendale Street.

From the Gardendale Station, the alignment would continue south in an at-grade configuration, crossing Gardendale Street and Main Street to connect to the proposed I-105/C Line Station, which would be located at-grade north of Century Boulevard. This station would be connected to the new infill C (Green) Line Station in the middle of the freeway via a pedestrian walkway on the new LRT bridge. The alignment would continue at-grade, crossing Century Boulevard and then over the I-105 freeway in an aerial configuration within the existing San Pedro Subdivision ROW bridge footprint. A new Metro C (Green) Line Station would be constructed in the median of the I-105 freeway. Vertical pedestrian access would be provided from the LRT bridge to the proposed I-105/C Line Station platform via stairs and elevators. To accommodate the construction of the new station platform, the existing Metro C (Green) Line tracks would be widened and, as part of the I-105 Express Lanes Project, the I-105 lanes would be reconfigured. (The I-105/C Line Station would serve

as the northern terminus for Alternative 4; refer to Section 2.3.5 for additional information on this alternative.)

South of the I-105 freeway, the alignment would continue at-grade within the San Pedro Subdivision ROW. In order to maintain freight operations and allow for freight train crossings, the alignment would transition to an aerial configuration as it turns southeast and enter the PEROW. The existing freight track would cross beneath the aerial alignment and align on the north side of the PEROW east of the San Pedro Subdivision ROW. The proposed Paramount/Rosecrans Station would be located in an aerial configuration west of Paramount Boulevard and north of Rosecrans Avenue. The existing freight track would be relocated to the east side of the alignment beneath the station viaduct.

The alignment would continue southeast in an aerial configuration over the Paramount Boulevard/Rosecrans Avenue intersection and descend to an at-grade configuration. The alignment would return to an aerial configuration to cross over Downey Avenue descending back to an at-grade configuration north of Somerset Boulevard. One of the adjacent freight storage tracks at Paramount Refinery Yard would be relocated to accommodate the new LRT tracks and maintain storage capacity. There are no active freight tracks south of the World Energy facility.

The alignment would cross Somerset Boulevard at-grade. South of Somerset Boulevard, the at-grade alignment would parallel the existing Bellflower Bike Trail that is currently aligned on the south side of the PEROW. The alignment would continue at-grade crossing Lakewood Boulevard, Clark Avenue, and Alondra Boulevard. The proposed at-grade Bellflower Station would be located west of Bellflower Boulevard.

East of Bellflower Boulevard, the Bellflower Bike Trail would be realigned to the north side of the PEROW to accommodate an existing historic building located near the southeast corner of Bellflower Boulevard and the PEROW. It would then cross back over the LRT tracks at-grade to the south side of the ROW. The LRT alignment would continue southeast within the PEROW and transition to an aerial configuration at Cornuta Avenue, crossing over Flower Street and Woodruff Avenue. The alignment would return to an at-grade configuration at Walnut Street. South of Woodruff Avenue, the Bellflower Bike Trail would be relocated to the north side of the PEROW. Continuing southeast, the LRT alignment would cross under the SR-91 freeway in an existing underpass. The alignment would cross over the San Gabriel River on a new bridge, replacing the existing abandoned freight bridge. South of the San Gabriel River, the alignment would transition back to an at-grade configuration before crossing Artesia Boulevard at-grade.

East of Artesia Boulevard the alignment would cross beneath the I-605 freeway in an existing underpass. Southeast of the underpass, the alignment would continue at-grade, crossing Studebaker Road. North of Gridley Road, the alignment would transition to an aerial configuration to cross over 183rd Street and Gridley Road. The alignment would return to an at-grade configuration at 185th Street, crossing 186th Street and 187th Street at-grade. The alignment would then pass through the proposed Pioneer Station on the north side of Pioneer Boulevard at-grade. Tail tracks accommodating layover storage for a three-car train would extend approximately 1,000 feet south from the station, crossing Pioneer Boulevard and terminating west of South Street.

2.3.3 Alternative 2

The total alignment length of Alternative 2 would be approximately 19.3 miles, consisting of approximately 2.3 miles of underground, 12.3 miles of at-grade, and 4.7 miles of aerial alignment. Alternative 2 would include 12 new LRT stations, 3 of which would be underground, 6 would be at-grade, and 3 would be aerial. Five of the stations would include parking facilities, providing a total of approximately 2,780 new parking spaces. The alignment would include 31 at-grade crossings, 3 freeway undercrossings, 2 aerial freeway crossings, 1 underground freeway crossing, 3 river crossings, 25 aerial road crossings, and 10 freight crossings.

In the north, Alternative 2 would begin at the proposed WSAB 7th Street/Metro Center Station, which would be located underground beneath 8th Street between Figueroa Street and Flower Street. A pedestrian tunnel would provide connection to the existing 7th Street/Metro Center Station. Tail tracks, including a double crossover, would extend approximately 900 feet beyond the station, ending east of the I-110 freeway. From the 7th Street/Metro Center Station, the underground alignment would proceed southeast beneath 8th Street to the South Park/Fashion District Station, which would be located west of Main Street beneath 8th Street.

From the South Park/Fashion District Station, the underground alignment would continue under 8th Street to San Pedro Street, where the alignment would turn east toward 7th Street, crossing under privately owned properties. The tunnel alignment would cross under 7th Street and then turn south at Alameda Street. The alignment would continue south beneath Alameda Street to the Arts/Industrial District Station located under Alameda Street between 7th Street and Center Street. A double crossover would be located south of the station box, south of Center Street. From this point, the alignment of Alternative 2 would follow the same alignment as Alternative 1, which is described further in Section 2.3.2.

2.3.4 Alternative 3

The total alignment length of Alternative 3 would be approximately 14.8 miles, consisting of approximately 12.2 miles of at-grade, and 2.6 miles of aerial alignment. Alternative 3 would include 9 new LRT stations, 6 would be at-grade and 3 would be aerial. Five of the stations would include parking facilities, providing a total of approximately 2,780 new parking spaces. The alignment would include 31 at-grade crossings, 3 freeway undercrossings, 1 aerial freeway crossing, 3 river crossings, 15 aerial road crossings, and 9 freight crossings. In the north, Alternative 3 would begin at the Slauson/A Line Station and follow the same alignment as Alternatives 1 and 2, described in Section 2.3.2.

2.3.5 Alternative 4

The total alignment length of Alternative 4 would be approximately 6.6 miles, consisting of approximately 5.6 miles of at-grade and 1.0 mile of aerial alignment. Alternative 3 would include 4 new LRT stations, 3 would be at-grade, and 1 would be aerial. Four of the stations would include parking facilities, providing a total of approximately 2,180 new parking spaces. The alignment would include 11 at-grade crossings, 2 freeway undercrossings, 1 aerial freeway crossing, 1 river crossing, 7 aerial road crossings, and 2 freight crossings. In the north, Alternative 4 would begin at the I-105/C Line Station and follow the same alignment as Alternatives 1, 2, and 3, described in Section 2.3.2.

2.3.6 Design Options

Alternative 1 includes two design options:

- **Design Option 1:** LAUS at the Metropolitan Water District (MWD) – The LAUS station box would be located east of LAUS and the MWD building, below the baggage area parking facility instead of beneath the LAUS Forecourt. Crossovers would be located on the north and south ends of the station box with tail tracks extending approximately 1,200 feet north of the station box. From LAUS, the underground alignment would cross under the US-101 freeway and the existing Metro L (Gold) Line aerial structure and continue south beneath Alameda Street to the optional Little Tokyo Station between Traction Avenue and 1st Street. The underground alignment between LAUS and the Little Tokyo Station would be located to the east of the base alignment.
- **Design Option 2:** Add the Little Tokyo Station – Under this design option, the Little Tokyo Station would be constructed as an underground station and there would be a direct connection to the Regional Connector Station in the Little Tokyo community. The alignment would proceed underground directly from LAUS to the Arts/Industrial District Station primarily beneath Alameda Street.

2.3.7 Maintenance and Storage Facility

MSFs accommodate daily servicing and cleaning, inspection and repairs, and storage of light rail vehicles (LRV). Activities may take place in the MSF throughout the day and night depending upon train schedules, workload, and the maintenance requirements.

Two MSF options are evaluated; however, only one MSF would be constructed as part of the Project. The MSF would have storage tracks, each with sufficient length to store three-car train sets and a maintenance-of-way vehicle storage. The facility would include a main shop building with administrative offices, a cleaning platform, a traction power substation (TPSS), employee parking, a vehicle wash facility, a paint and body shop, and other facilities as needed. The east and west yard leads (i.e., the tracks leading from the mainline to the facility) would have sufficient length for a three-car train set. In total, the MSF would need to accommodate approximately 80 LRVs to serve the Project's operations plan.

Two potential locations for the MSF have been identified—one in the City of Bellflower and one in the City of Paramount. These options are described further in the following sections.

2.3.8 Bellflower MSF Option

The Bellflower MSF site option is bounded by industrial facilities to the west, Somerset Boulevard and apartment complexes to the north, residential homes to the east, and the PEROW and Bellflower Bike Trail to the south. The site is approximately 21 acres in area and can accommodate up to 80 vehicles (Figure 2-7).

2.3.9 Paramount MSF Option

The Paramount MSF site option is bounded by the San Pedro Subdivision ROW on the west, Somerset Boulevard to the south, industrial and commercial uses on the east, and All American City Way to the north. The site is 22 acres and could accommodate up to 80 vehicles (Figure 2-7).

Figure 2-7. Maintenance and Storage Facility Options

Source: WSP, 2020

3 REGULATORY FRAMEWORK

3.1 Federal

Federal protection for scientifically significant paleontological resources applies to projects if any construction or other related project impacts occur on federally owned or managed lands, involve the crossing of state lines, or are federally funded. The following federal protections may apply to paleontological resources in the Affected Area.

The National Environmental Policy Act (NEPA) of 1969, as amended (Public Law [P.L.] 91-190, 42 USC 4321- 4347, January 1, 1970, as amended by P.L. 94-52, July 3, 1975; P.L. 94-83, August 9, 1975; and P.L. 97-258 Section 4(b), September 13, 1982), recognizes the continuing responsibility of the federal government to "preserve important historic, cultural, and natural aspects of our national heritage" (Section 101 [42 USC Section 4321], No. 382).

Paleontological Resources Preservation Act, enacted as a result of the passage of the Omnibus Public Lands Management Act of 2009, P.L. 111-011, Title VI, Subtitle D, Paleontological Resources Preservation. Sets forth regulations and provisions pertaining to paleontological resources on all federally administered lands.

3.2 State

The protection of paleontological resources in California is addressed through the regulatory compliance of CEQA.

3.2.1 California Environmental Quality Act

Paleontological resources are considered nonrenewable scientific resources and are protected under CEQA, which states, in part, that a project will "normally" have a significant effect on the environment if it, among other things, will disrupt or adversely affect a paleontological site except as part of a scientific study. Specifically, in Appendix G of the CEQA Guidelines, the "Environmental Checklist Form," the question is posed: "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature". In order to determine the uniqueness of a given paleontological resource, it must first be identified or recovered (i.e., salvaged). Therefore, mitigation of adverse impacts to paleontological resources is mandated by CEQA.

3.2.2 California Public Resources Code

P.R.C. Section 5097.5 states that a person shall not knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. It further states under Code 30244 that any development that would adversely impact paleontological resources shall require reasonable mitigation. These regulations apply to projects located on land owned by or under the jurisdiction of the state or any city, county, district, or other public agency.

3.3 Local

3.3.1 County of Los Angeles

Paleontological resources are addressed under the Conservation and Natural Resource Element of the Los Angeles County 2035 General Plan (2012, 157), which set forth the following policies:

- Policy C/NR 14.1: Mitigate impacts from new development on or adjacent to historic, cultural, and paleontological resources to the greatest extent feasible.
- Policy C/NR 14.2: Support an inter-jurisdictional collaborative system that protects and enhances the County's historic, cultural, and paleontological resources.
- Policy C/NR 14.5: Promote public awareness of the County's historic, cultural, and paleontological resources.
- Policy C/NR 14.6: Ensure proper notification and recovery processes are carried out for development on historic, cultural, and paleontological resources.

3.3.2 City of Los Angeles

The City of Los Angeles General Plan (2001), Conservation Element: Chapter II Resource Conservation and Management, Section 3 outlines an objective and policy for the protection of paleontological resources:

- Objective: protect the city's archaeological and paleontological resources for historical, cultural, research and /or educational purposes.
- Policy: continue to identify and protect significant archaeological and paleontological sites and/or resources known to exist or that are identified during land development, demolition or property modification activities.

3.3.3 City of Vernon

The City of Vernon does not have specific requirements pertaining to paleontological resources.

3.3.4 City of Huntington Park

The City of Huntington Park does not have specific requirements pertaining to paleontological resources.

3.3.5 City of Bell

The City of Bell previously found that "no paleontological resources have been found in the City and the surrounding area. Thus, the City has a low sensitivity for paleontological resources and the potential for the discovery of paleontological resources is unlikely" (City of Bell General Plan 2010).

3.3.6 City of Cudahy

The City of Cudahy General Plan (2010), in Section 5: Conservation Element (subsection 5.6.6), does not contain any specific goals or policies with respect to paleontological resources. As stated:

> "With the City fully urban, discovery of paleontological resources is unlikely. Records of known sites do not indicate the presence of resources in the City or the surrounding area. The Los Angeles County Museum of Natural History has indicated that the entire City of Cudahy has a low potential and sensitivity for paleontological resources."

3.3.7 City of South Gate

The City of South Gate does not have any ordinances or policies relating to paleontological resources.

3.3.8 City of Downey

The City of Downey does not have any ordinances or policies relating to paleontological resources.

3.3.9 City of Paramount

The City of Paramount does not have any ordinances or policies relating to paleontological resources.

3.3.10 City of Bellflower

The City of Bellflower does not have any ordinances or policies relating to paleontological resources.

3.3.11 City of Artesia

The City of Artesia does not have any ordinances or policies relating to paleontological resources.

4 AFFECTED ENVIRONMENT/EXISTING CONDITIONS

4.1 Geologic Setting

The Affected Area lies in the northwestern portion of the Peninsular Ranges geomorphic province, one of 11 major provinces in the state (California Geological Survey [CGS] 2002). The Peninsular Ranges province is characterized by its northwest trending valleys and faults that branch from the San Andreas fault zone (CGS 2002). The Peninsular Ranges consist of rocks from the Paleozoic to late Cenozoic, including a large Jurassic to Cretaceous batholith that intrudes an older Triassic metasedimentary sequence (Kennedy et al. 2007). The batholith is predominately composed of tonalite, gabbro, and granodiorite, and granite plutonic igneous rock (Todd et al. 2003). The Affected Area is located on the wedge-shaped central block of the Los Angeles Basin where Cretaceous to Holocene sedimentary rocks unconformably overlie crystalline basement rocks (Roffers and Bedrossian 2010; Saucedo et al. 2007, 2016; Yerkes et al. 1965). The Los Angeles Basin is a structural basin that contains sediments that range in thickness from just a few feet to as much as 31,000 feet in some places (Yerkes et al. 1965). Throughout the basin, Quaternary sediments are mapped at the surface (Roffers and Bedrossian 2010; Saucedo et al. 2007, 2016).

The Affected Area includes one (1) geologic unit mapped at the surface (Appendix B): Quaternary younger alluvium, unit 2 (Qya_2; Campbell et al. 2014; Saucedo et al. 2016). This alluvial unit is composed of Holocene sediments at the surface. In the subsurface, the Holocene alluvial deposits overlie older late Pleistocene sediments at a depth as shallow as 5 feet below ground surface (bgs) (McLeod 2017 2018).

4.2 Paleontological Record Search Results

The paleontological records search results indicate the NHMLAC does not have any fossil localities that lie directly within the Affected Area, but they do have vertebrate localities nearby from the same sedimentary deposits that occur in the subsurface below the Affected Area (McLeod 2017, 2018). Twenty-one previously recorded vertebrate fossil localities have been identified within Quaternary older alluvium near the Affected Area. Most of the localities were identified in areas mapped at the ground surface as Quaternary younger (Holocene) alluvium, where age of the Quaternary sediments increases with depth. Depth of discovery within these localities varies between 5 feet to over 40 feet. At least one locality (LACM 3347) was recorded at less than 2 feet below ground surface (BGS) in Quaternary older alluvium mapped at ground surface. Combined, these localities have yielded several specimens of mammoth, ground sloth, saber-toothed cat, dire wolf, horse, camel, deer, antelope, rabbit, rodent, reptile, salamander, turkey, shark, and bony fish.

Two additional localities have been previously recorded near the Affected Area from older sedimentary units that may occur at depth below the Quaternary alluvium mapped in downtown Los Angeles near Alternatives 1 and 2. These localities produced vertebrate fossil specimens from the Miocene Puente Formation and Pliocene Fernando Formation, including specimens of at least ten different taxa of bony fish. Depth of discovery within these localities is not provided. The results of the record search are presented in Table 4.1. The project alternative(s) closest to each of the previously recorded paleontological resources is indicated in the first column of Table 4.1.

Table 4.1. Previously Discovered Paleontological Resources in the Vicinity of the Affected Area

Project Alternative	LACM Locality Number(s) and Approximate Location	Geologic Formation	Epoch (geologic age)	Discovery Depth	Taxa
Alternative 1	LACM 5961; below the Civic Center/ Grand Park Metrorail Station, north of the intersection of Hill Street and 1st Street.	Puente Formation	Miocene	Not provided	*Cyclothone* (bristlemouth fish)
Alternative 1	LACM 7990; north of Temple Street between Broadway and Spring Street,	Puente Formation	Miocene	Not provided	*Alepocephalidae* (slickheads), *Argentinidae* (argentinas), *Bathylagidae* (deep sea smelts), *Chauliodus* (viperfish), *Clupeidae* (herring), *Gadiformes* (cod), *Gonostomidae* (bristlemouths), *Scombridae* (mackerel), and *Stomiatidae* (dragonfish).
Alternative 1	LACM 2032; NNE of the N terminus at Union Station near Mission Road and Daly Street and I-5	Quaternary older alluvium	Pleistocene	20-35 feet	*Mammuthus imperator* (mammoth); *Mammut americanum* (mastodon); *Paramylodon harlani* (ground sloth); *Camelops* (camel); *Equus* (horse); *Clemmys mamorata* (pond turtle)
Alternative 1	LACM 7730, 4726, 6971, 3868; in downtown Los Angeles, in the area between the intersections of Main Street and 2nd Street and South Bixel Street and Lucas Avenue	Fernando Formation	Pliocene	Not provided	*Dasyatis* (stingray), *Myliobatis* (eagle ray), *Raja* (skate), *Chimaeriformes* (chimaerid), *Carcharhinus leucas* (bull shark), *Carcharhinus obscurus* (dusky shark), *Sphyrna* (hammerhead shark), *Hexanchiformes* (sixgill shark), *Isurus oxyrinchus* (bonito shark), *Lamna ditropis* (salmon shark), *Carcharodon sulcidens* and *Carcharodon Carcharias* (white sharks), *Clupeidae* (herring), *Merluccius* (hake), *Semicossyphus* (sheepshead), *Scomber* (mackerel), Aves (bird), *Balaenopteridae* (rorqual baleen whale), and *Odontoceti* (toothed whale).

Project Alternative	LACM Locality Number(s) and Approximate Location	Geologic Formation	Epoch (geologic age)	Discovery Depth	Taxa
Alternative 1	LACM 1023; near Workman Street and Alhambra Avenue	Quaternary older alluvium	Pleistocene	unknown	*Equus* *Smilodon fatalis* (sabre-toothed cat); *Odocoileus* (deer); *Meleagris* (turkey)
Alternative 2	LACM 1755; near Hill Street and 12th Street	Quaternary older alluvium	Pleistocene	43 feet	*Equus*
Alternatives 1 and 2	LACM 7758; near the intersection of 46th Street and Western Avenue	Quaternary older alluvium	Pleistocene	16 feet	*Gasterosteus aculeatus*; *Microtus*, *Peromyscus* (deer mouse), *Thomomys*, and *Perognathus* (pocket mouse)
Alternatives 1, 2, and 3	LACM 1225; N of Century Boulevard and I-110	Quaternary older alluvium	Pleistocene	15-20 feet	*Mammuthus*
Alternatives 1, 2, and 3	LACM 7701-7702; near Atlantic Avenue and I-710	Quaternary older alluvium	Pleistocene	11-34 feet	*Sylvilagus* (rabbit); *Microtus* (vole); *Reithrodontomys* (harvest mouse); *Thomomys* (pocket gopher); *Colubridae* (snake); *Lacertelia* (lizard); *Batrachoseps* (salamander); *Gasterosteus aculeatus* (threespine stickleback)
Alternatives 1, 2, and 3	LACM 1295, 1344, 3266, 3365, 4206; around I-110 in the vicinity of Athens	Quaternary older alluvium	Pleistocene	ca. 15 feet	*Mammuthus; Paramylodon* (ground sloth); *Canis dirus* (dire wolf); *Equus; Cervus* (deer); *Capromeryx* (pronghorn antelope); *Bison* (bison); *Sylvilagus*; *Sciuridae* (squirrel); *Microtus*; *Thomomys*; *Parapavo* (turkey); *Mancalla* (puffin); *Clemmys*
Alternatives 1, 2, 3, and 4	LACM 6802; near Bixby Road between Atlantic Avenue and Orange Avenue	Quaternary older alluvium	Pleistocene	16 feet	undetermined vertebrates
Alternatives 1, 2, 3, and 4	LACM 1021; near the intersection of Spring Street and Cherry Avenue south of I-405	Quaternary older alluvium	Pleistocene	unknown	*Aves and Mammuthus*

Project Alternative	LACM Locality Number(s) and Approximate Location	Geologic Formation	Epoch (geologic age)	Discovery Depth	Taxa
Alternatives 1, 2, 3, and 4	LACM 3347; in La Mirada north of Leffingwell Road east of La Mirada Boulevard	Quaternary older alluvium	Pleistocene	2 feet bgs, where Pleistocene alluvium is mapped at surface	*Equus*
Alternatives 1, 2, 3, and 4	LACM 3382; W of I-710, E of Wilmington Avenue and N of Artesia Boulevard	Quaternary older alluvium	Pleistocene	5 feet	*Mammuthus*
Alternatives 1, 2, 3, and 4	LACM 3660; NW side of Long Beach Airport along Cover Street between Pixie Avenue and Paramount Boulevard	Quaternary older alluvium	Pleistocene	19 feet	*Mammuthus*

Source: McLeod (2017, 2018)

4.3 Paleontological Sensitivity Assessment

NHMLAC fossil collections records for the Affected Area accord with the scientific record of abundant and diverse vertebrate fauna previously identified within similar Pleistocene sediments in southern California (Agenbroad 2003; Bell et al. 2004; Brattstrom and Sturn 1959; Koch et al. 2004; Jefferson 1985, 1991; Maguire and Holroyd 2016; Merriam 1911; Reynolds et al. 1991; Savage et al. 1954; Scott and Cox 2008; Springer et al. 2009; Steadman 1980; Tomiya et al. 2011; Wilkerson et al. 2011; Winters 1954). Based on depth of previous fossil discoveries in the area (McLeod 2017, 2018), the Quaternary younger (Holocene) alluvium mapped at the surface of the Affected Area is underlain by older Quaternary (Pleistocene) fossil-bearing alluvium at depths as shallow as 5 feet bgs. The entire Affected Area is thus considered to have high paleontological sensitivity at depths at or below 5 feet (refer Appendix B for a figure showing paleontological sensitivity of the Affected Area).

5 ENVIRONMENTAL IMPACTS/ENVIRONMENTAL CONSEQUENCES

Direct effects result from activities related to construction and occur at the same time and place as the surface-disturbing action. The potential for direct effects on scientifically significant surface and subsurface fossils in fossiliferous sedimentary deposits is controlled by two factors. These include: (1) the depth and lateral extent of disturbance of fossiliferous bedrock and/or surficial sediments; and (2) the depth and lateral extent of occurrence of fossiliferous bedrock and/or surficial sediments beneath the surface. Ground disturbance has the potential to adversely affect an unknown quantity of fossils that may occur on or underneath the surface in areas containing paleontologically sensitive geologic units. Without mitigation, these fossils, as well as the paleontological data they could provide, if not properly salvaged and documented, could be adversely affected (destroyed), rendering them permanently unavailable for future scientific research.

Indirect effects occur later in time or further away in distance than direct effects but are still reasonably foreseeable. They typically include effects that result from the normal ongoing operation and maintenance of facilities and infrastructure constructed under a project. An example of an indirect adverse effect on paleontological resources would be the construction of a new road that increases public access to a previously inaccessible area and results in unauthorized fossil collecting and vandalism.

This section discusses the potential effects to paleontological resources that may occur from operation of the Project. Environmental impacts and consequences for Project Alternatives, Design Options, and MSF Site Options are consistent in their analysis because the underlying geologic unit and paleontological sensitivity of the Affected Area are consistent across geographic sections for paleontological resources.

5.1 No Build Alternative

Under the No Build Alternative, the Project would not be constructed. The existing transportation network would remain and planned transportation improvements that have been committed to and identified in the constrained 2009 LRTP and SCAG's RTP/SCS, as well as additional projects funded by Measure M that would be completed by 2042 would be implemented. Under the No Build Alternative, no new ground disturbance would result from the operation of the Project because the Project would not be constructed, and the environmental setting would remain in current conditions (with the addition of currently planned and funded projects). Any construction projects under the No Build Alternative that disturb paleontological sensitive strata have the potential to adversely impact paleontological resources unless mitigation measures are employed. The specific nature of the effects to each committed project would be dependent on the lithology, age, and location of the underlying strata, as well as the depth and extent of native sediment disturbance.

5.2 Build Alternatives

Under NEPA, direct and indirect adverse effects to paleontological resources due to ongoing maintenance and operations under the Project Alternatives (i.e., Alternatives 1, 2, 3, and 4) would be negligible because there would be minimal, if any, ground disturbance during operation of the Project. As a result, there would be no adverse effects to paleontological resources during operation of the Project.

5.3 Design Options

Neither Design Option 1 (LAUS at the MWD Building) nor Design Option 2 (Add Little Tokyo Station) would require ground disturbance during operation. Therefore, no adverse effects to paleontological resources would occur as a result of the operation of either Design Option.

5.4 Maintenance and Storage Facility Site Options

No ground disturbing activities are proposed at either MSF site option during the operation phase of the Project. Therefore, there would be no adverse effects to paleontological resources resulting from the operation of either MSF site option.

6 CALIFORNIA ENVIRONMENTAL QUALITY ACT DETERMINATION

To satisfy CEQA requirements, paleontological resource impacts were analyzed in accordance with Appendix G of the CEQA Guidelines. Appendix G states that impacts would be significant if operation of the Project would result in any activities that could directly disturb or destroy paleontological resources. Impacts would be significant if project activities result in the destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data. The activities may include grading, excavation, or other activities that disturb substantial quantities of the subsurface geologic units with a high paleontological sensitivity. Indirect disturbances or destruction of paleontological resources may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility.

6.1 Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

6.1.1 No Project Alternative

Under the No Project Alternative, the Build Alternatives would not be constructed, and the environmental setting would remain in current conditions. Therefore, no impacts to paleontological resources would result.

6.1.1.1 Mitigation Measures

No impacts to paleontological resources are expected as a result of the No Project Alternative and no mitigation measures are required.

6.1.1.2 Impacts Remaining After Mitigation

No impacts would occur.

6.1.2 Alternative 1: Los Angeles Union Station to Pioneer Station

Direct impacts to paleontological resources due to ongoing maintenance and operation under the Alternative 1 are considered to be negligible because there would be minimal, if any, ground disturbance during operation of the Project. As such, Alternative 1 would result in no impacts.

6.1.2.1 Mitigation Measures

No impacts to paleontological resources are expected as a result of Alternative 1 and no mitigation measures are required.

6.1.2.2 Impacts Remaining After Mitigation

No impacts would occur.

6.1.3 Alternative 2: 7th Street/Metro Center to Pioneer Station

Direct impacts to paleontological resources due to ongoing maintenance and operation under the Alternative 2 are considered to be negligible because there would be minimal, if any, ground disturbance during operation of the Project. As such, Alternative 2 would result in no impacts.

6.1.3.1 Mitigation Measures

No impacts to paleontological resources are expected as a result of Alternative 2 and no mitigation measures are required.

6.1.3.2 Impacts Remaining After Mitigation

No impacts would occur.

6.1.4 Alternative 3: Slauson/A (Blue) Line to Pioneer Station

Direct impacts to paleontological resources due to ongoing maintenance and operation under the Alternative 3 are considered to be negligible because there would be minimal, if any, ground disturbance during operation of the Project. As such, Alternative 3 would result in no impacts.

6.1.4.1 Mitigation Measures

No impacts to paleontological resources are expected as a result of Alternative 3 and no mitigation measures are required.

6.1.4.2 Impacts Remaining After Mitigation

No impacts would occur.

6.1.5 Alternative 4: I-105/C (Green) Line to Pioneer Station

Direct impacts to paleontological resources due to ongoing maintenance and operation under the Alternative 4 are considered to be negligible because there would be minimal, if any, ground disturbance during operation of the Project. As such, Alternative 4 would result in no impacts.

6.1.5.1 Mitigation Measures

No impacts to paleontological resources are expected as a result of Alternative 4 and no mitigation measures are required.

6.1.5.2 Impacts Remaining After Mitigation

No impacts would occur.

6.1.6 Design Options

6.1.6.1 Design Option 1

Direct impacts to paleontological resources due to ongoing maintenance and operation of Design Option 1 are considered to be negligible because there would be minimal, if any, ground disturbance during operation of this design option. As such, Design Option 1 would result in no impacts.

6.1.6.2 Design Option 2

Direct impacts to paleontological resources due to ongoing maintenance and operation of Design Option 2 would result in no impacts.

6.1.6.3 Mitigation Measures

No impacts to paleontological resources are expected as a result of Design Options 1 and 2 and no mitigation measures are required.

6.1.6.4 Impacts Remaining After Mitigation

No impacts would occur.

6.1.7 Maintenance and Storage Facility

6.1.7.1 Paramount MSF Site Option

No ground disturbing activities are proposed at the Paramount MSF site option during the operation phase of the Project; as a result, there would be no impacts to paleontological resources during operation of the Paramount MSF Site.

6.1.7.2 Bellflower MSF Site Option

No ground disturbing activities are proposed at the Bellflower MSF site option during the operation phase of the Project; as a result, there would be no impacts to paleontological resources during operation of the Bellflower MSF site.

6.1.7.3 Mitigation Measure

No impacts to paleontological resources are expected as a result of the operation of the Paramount or Bellflower MSF site options and no mitigation measures are required.

6.1.7.4 Impacts Remaining After Mitigation

No impacts would occur.

7 CONSTRUCTION IMPACTS

7.1 Construction Activities

Construction activities associated with the West Santa Ana Branch Project are detailed in the *West Santa Ana Branch Transit Corridor Project Construction Methods Report* (Metro 2021).

7.2 Construction Methodology

This section discusses the potential effects/impacts to paleontological resources that may occur from construction of the Project. Environmental effects/impacts and consequences for Project Alternatives 1, 2, 3, and 4; Design Options 1 and 2; and MSF Site Options are the same because the underlying geologic unit and paleontological sensitivity of the Affected Area is consistent across these project elements.

Existing federal regulations (i.e., PRPA) provide protections for paleontological resources on federal lands, but do not establish standards by which the potential for adverse effects should be evaluated. The BLM has developed guidelines for assessing paleontological sensitivity, and these guidelines are generally consistent with the standards and guidelines established by the Society of Vertebrate Paleontology (SVP 2010). To satisfy NEPA requirements, the potential for adverse effects to paleontological resource are analyzed in accordance with SVP guidelines for assessing paleontological sensitivity of geologic units, and the following threshold for evaluating effects under NEPA. Destruction, damage or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data as a result of ground disturbance from project activity could be considered a direct adverse effect under NEPA. Because effects to paleontological resources could occur as a result of ground disturbing activities, the measures recommended in PR-1 below have been designed to avoid direct adverse effects to paleontological resources under NEPA.

To satisfy CEQA requirements, Paleontological resource impacts are analyzed in accordance with Appendix G of the CEQA Guidelines and considered significant if the Project has the potential to result in any activities that could directly disturb or destroy paleontological resources. Impacts would be significant if construction activities result in the destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data. The activities may include grading, excavation, or other activities that disturb substantial quantities of the subsurface geologic units with a high paleontological sensitivity. Indirect disturbances or destruction of paleontological resources may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility.

7.3 Construction Effects

7.3.1 No Build Alternative

Under the No Build Alternative, the Project would not be constructed. However, the existing transportation network would remain and planned transportation improvements that have been committed to and identified in the constrained 2009 LRTP and SCAG's RTP/SCS, as well as additional projects funded by Measure M that would be completed by 2042 would be implemented.

The No Build Alternative is intended to compare the effects of the Build Alternatives versus implementing only currently planned and funded projects, which includes the existing network and future improvements to the rail, bus, and freeway network within and around the Project APE. Effects to paleontological resources are directly related to the extent and type of ground disturbance of a given project. Any construction project under the LRTP that disturbs paleontological sensitive strata has the potential to adversely affect paleontological resources unless mitigation actions are employed. The specific nature of the effects to each committed project under the LRTP would be dependent on the lithology, age, and location of the underlying strata, as well as the depth and extent of native sediment disturbance. Each project would undergo environmental clearance and mitigation measures would be identified as applicable.

7.3.2 Build Alternatives

As a consequence of the paleontological sensitivity of the Affected Area, the potential to discover paleontological resources during ground-disturbing activities associated with the construction of the Build Alternatives (i.e., Alternative 1, 2, 3 and 4) is high below 5 feet bgs. In general, the potential for a given Project activity to result in adverse effects to paleontological resources is directly proportional to the amount and location of ground disturbance associated with the activity.

The types of effects to paleontological resources could include:

- Disturbance, damage, or destruction of a significant fossil
- Destruction of a unique geologic feature associated with a paleontological site
- Disturbance or destruction of a paleontological site, which results in the loss of scientific context of fossil remains

The types of Project-related disturbances and associated effects during construction of the Build Alternatives would include:

- Grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet), could create an adverse effect to paleontological resources. If the construction of the Build Alternatives results in the disturbance or destruction of paleontological resources, an adverse effect for the purposes of NEPA would occur. Mitigation Measure PR-1, described in Section 6, would be implemented to mitigate these potential adverse effects to paleontological resources.
- Ground disturbance related to construction of the Build Alternatives that does not exceed 5-feet BGS would have a low or negligible potential to impact paleontological resources; therefore, no adverse effects are anticipated, and mitigation is not required.
- Staging areas and temporary access roads would be limited to surface-disturbing activities; therefore, no adverse effects are anticipated.
- Removal of existing structures would occur within previously disturbed sediments; therefore, no adverse effects are anticipated.
- Non-construction personnel would not be allowed to gain access to any newly unearthed previously buried paleontological resources and unlawful collecting of fossils would not occur; therefore, no indirect effects are anticipated.

7.3.3 Design Options

The types of Project-related disturbances and associated effects during construction of Design Options 1 and 2 would include:

- Grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet), could create an adverse effect to paleontological resources. If the construction of Design Options 1 or 2 results in the disturbance or destruction of paleontological resources, an adverse effect for the purposes of NEPA would occur. Mitigation Measure PR-1, described in Section 8, would be implemented to mitigate these potential adverse effects to paleontological resources.
- Ground disturbance related to construction of the design option that does not exceed 5-feet BGS would have a low or negligible potential to impact paleontological resources; therefore, no adverse effects are anticipated, and mitigation is not required.
- Removal of existing structures would occur within previously disturbed sediments; therefore, no adverse effects are anticipated.
- Non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur; therefore, no adverse effects/significant indirect impacts are anticipated.

7.3.4 Maintenance and Storage Facility Site Options

The types of Project-related disturbances and associated effects during construction of the MSF site options (i.e., Paramount MSF and Bellower MSF) would include:

- Grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet), could create an adverse effect to paleontological resources. If the construction of either MSF Site Option results in the disturbance or destruction of paleontological resources, an adverse effect for the purposes of NEPA would occur. Mitigation Measure PR-1, described in Section 8, would be implemented to mitigate these potential adverse effects to paleontological resources.
- Ground disturbance related to construction of either MSF site option that does not exceed 5-feet BGS would have a low or negligible potential to effect paleontological resources; therefore, no adverse effects are anticipated, and mitigation is not required.
- Staging areas and temporary access roads would be limited to surface-disturbing activities; therefore, no adverse effects are anticipated.
- Removal of existing structures would occur within previously disturbed sediments; therefore, no adverse effects are anticipated.
- Non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur; therefore, no adverse indirect impacts are anticipated.

7.4 California Environmental Quality Act Determination

To satisfy CEQA requirements, paleontological resource impacts were also analyzed in accordance with Appendix G of the *CEQA Guidelines*.

7.4.1 Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

7.4.1.1 No Project Alternative

Under the No Project Alternative, no new ground disturbance would occur because the Project would not be constructed, and the environmental setting would remain in current conditions. As such, there would be no impacts to paleontological resources.

Mitigation Measures

No mitigation measures are required.

Impacts Remaining After Mitigation

No impacts would occur.

7.4.1.2 Alternative 1: Los Angeles Union station to Pioneer Station

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Alternative 1 is high. Impacts to paleontological resources associated with the construction of Alternative 1 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's significant impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

7.4.1.3 Alternative 2: 7th Street/Metro Center to Pioneer Station

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Alternative 2 is high. Impacts to paleontological resources associated with the construction of Alternative 2 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require

a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's significant impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

7.4.1.4 Alternative 3: Slauson/A (Blue) Line to Pioneer Station

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Alternative 3 is high. Impacts to paleontological resources associated with the construction of Alternative 3 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's significant impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

7.4.1.5 Alternative 4: I-105/C (Green) Line to Pioneer Station

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Alternative 4 is high. Impacts to paleontological resources associated with the construction of Alternative 4 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require

a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's adverse impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

7.4.1.6 Design Options

Design Option 1

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Design Option 1 is high. Impacts to paleontological resources associated with the construction of Design Option 1 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Design Option 2

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of Design Option 2 is high. Impacts to paleontological resources associated with the construction of Design Option 2 would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of

existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's significant impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

7.4.1.7 Maintenance and Storage Facility

Paramount MSF Site Option

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of the Paramount MSF site option is high. Impacts to paleontological resources associated with the construction of the Paramount MSF site option would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Bellflower MSF Site Option

Potential impacts to paleontological resources in the Affected Area during ground-disturbing activities associated with the construction of the Bellflower MSF Site Option is high. Impacts to paleontological resources associated with the construction of the Bellflower MSF Site Option would be greatest for activities such as grading, excavation, trenching, and wide-diameter auguring (greater than 3 feet) that require a high degree of sediment displacement. These activities would directly impact and disturb the geologic strata at depth and have a high potential to impact buried paleontological resources where disturbance would extend below 5 feet bgs. Staging areas or access roads would be examples of Project activities that would be limited to surface-disturbing activities; therefore, the potential to significantly impact paleontological resources as the result of these ancillary activities is low or is not anticipated. Removal of existing structures is not anticipated to result in significant impacts because ground disturbance would occur within previously disturbed sediments. Indirect impacts of the Project are not anticipated because non-construction personnel would not be allowed to gain access to any newly unearthed, previously buried paleontological resources and unlawful collecting of fossils would not occur.

Mitigation Measures

Implementation of Mitigation Measure PR-1 is required.

Impacts Remaining After Mitigation

Impacts would be less than significant with mitigation. Mitigation Measure PR-1 (a) through (d) would effectively mitigate the Project's significant impacts to paleontological resources through the recovery, identification, and curation of previously unrecovered fossils.

8 PROJECT MEASURES AND MITIGATION MEASURES

8.1 Project Measures

There are no project measures related to paleontological resources.

8.2 Mitigation Measures

8.2.1 Operation

The operation of Alternatives 1, 2, 3, and 4; Design Options 1 and 2; and MSF Site Options did not result in impacts to paleontological resources; as such, mitigation is not required.

8.2.2 Construction

Based on the effect/impact analysis described in Section 7, construction of the Alternatives 1, 2, 3, and 4; Design Options 1 and 2; and MSF Site Options would have a high potential to result in adverse effects/significant impacts to paleontological resources during grading, excavation, trenching, and wide-diameter (greater than 3 feet) auguring activities that extend below 5 feet bgs. Tunnel boring, narrow-diameter auguring (less than 3 feet), and pile driving is exempt from monitoring. These adverse effects/impacts would be reduced with implementation of Mitigation Measure PR-1 (a) through (d): PR-1a (Paleontological Resources Mitigation and Monitoring Program), Mitigation Measure PR-1b (Paleontological Worker Environmental Awareness Program), Mitigation Measure PR-1c (Construction Monitoring), and Mitigation Measure PR-1d (Preparation and Curation of Recovered Fossils).

Mitigation Measure PR-1 (a through d), as presented below, would effectively reduce the Project's adverse effects/significant impacts to these resources through the recovery, identification, and curation of previously unrecovered fossils.

PR-1(a) **Paleontological Resources Mitigation and Monitoring Program.** Prior to the commencement of ground-disturbing activities for the Project, Metro shall retain a qualified professional paleontologist to prepare and implement a Paleontological Resources Mitigation and Monitoring Program (PRMMP) for the Project. The qualified paleontologist (principal paleontologist) must have at least a Master's degree or equivalent work experience in paleontology, would have experience with local paleontology, and would be familiar with paleontological procedures and techniques. The PRMMP shall describe mitigation requirements to be consistent with the Society of Vertebrate Paleontology (SVP) standards for paleontological resources mitigation (SVP 2010). The PRMP will include at a minimum the following:

1) Geologic setting, including paleontological sensitivity of the project site.
2) Project description outlining the type and extent of ground disturbance
3) Specifications for what ground-disturbing activity requires paleontological monitoring
4) Paleontological monitoring procedures:
    a. qualifications of paleontological monitors.
    b. timing and duration of monitoring.
    c. required data collection procedures.

   d. daily monitoring log content
5) Communication protocols to be followed in the event that an unanticipated fossil discovery is made during project development.
6) Construction diversion and resource recovery protocols:
   a. authority for ceasing construction.
   b. aerial extent of avoidance (construction exclusion) for any discovery.
   c. timing to evaluate and recover the fossil.
7) Fossil collection and preparation standards (field and museum).
8) Curation standards including appropriate institutions, curation agreements, and deadlines for materials to be accessioned.
9) Post-recovery reporting requirements.

PR-1(b) **Paleontological Worker Environmental Awareness Program.** Prior to the start of construction, the qualified paleontologist or his or her designee would conduct training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff. The Paleontological Worker Environmental Awareness Program would be fulfilled at the time of a pre-construction meeting. In the event of a fossil discovery by construction personnel, all ground-disturbing activities within 50 feet of the find would be halted, a 50-foot exclusion zone around the find would be established, and the qualified paleontologist and/or designee would be contacted to evaluate the find before re-starting work in the exclusion zone. If the qualified paleontologist determines that the fossil(s) is (are) scientifically significant, the qualified paleontologist would complete the conditions outlined in Mitigation Measure PR-1(c) and PR-1(d) to mitigate impacts to significant fossil resources.

PR-1(c) **Construction Monitoring.** Ground-disturbing construction activities (including grading, excavation, trenching, and wide-diameter auguring) that have the potential to impact previously undisturbed (i.e., native) sediments or geologic units of high paleontological sensitivity below 5 feet bgs would be monitored on a full-time basis by a qualified paleontological monitor during initial ground disturbance. Monitoring pursuant to the Paleontological Mitigation and Monitoring Program would be supervised by the qualified paleontologist and would be conducted by a monitor who meets or exceeds the Society of Vertebrate Paleontology (2010) requirements for a qualified paleontological monitor, including at least a Bachelor's degree in geology, paleontology, or related field, and experience with collection and salvage of paleontological resources. If geological evidence indicates that sediments are younger alluvium or previously disturbed sediments and have a low potential to yield paleontological resources, or if older sediments are determined not to be fossiliferous based on results of monitoring at this location, the qualified paleontologist may determine that full-time monitoring is no longer warranted and may recommend reducing monitoring to periodic spot-checking or cease entirely. Monitoring would be reinstated if any new or unforeseen deeper ground disturbances are required and reduction or suspension would need to be reconsidered by the qualified paleontologist. Ground-disturbing activity that

reaches a depth of less than 5 feet bgs would not require paleontological monitoring.

In the event that a paleontological resource is discovered, the monitor would have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and collected. Typically, fossils can be safely recorded and, if significant, potentially collected quickly by a single paleontologist without disrupting construction activity. In some cases, larger fossils (such as complete skeletons or large mammal fossils) may require more extensive excavation and longer recovery periods. In such a case, the monitor, under the supervision of the principal paleontologist, would have the authority to temporarily direct, divert, or halt construction activity so that the fossil(s) can be removed in a safe and timely manner.

PR-1(d) **Preparation and Curation of Recovered Fossils.** Once recovered, significant fossils would be identified to the lowest possible taxonomic level, prepared to a curation-ready condition, and curated at a scientific institution with a permanent paleontological collection (such as the Natural History Museum of Los Angeles County) along with all pertinent field notes, photos, data, and maps. Fossils of undetermined significance at the time of collection may also warrant curation at the discretion of the qualified paleontologist. The cost of curation is assessed by the repository and would be the responsibility of Metro.

At the conclusion of all required monitoring, laboratory work, and museum curation, the qualified paleontologist would prepare a final report describing the results of the paleontological mitigation monitoring efforts associated with the Project. The report would include a summary of the field and laboratory methods, an overview of the project geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. If the monitoring efforts produced fossils, then a copy of the report would also be submitted to the designated museum repository and to Metro.

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APPENDIX A. PALEONTOLOGY RECORDS SEARCH RESULTS

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www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

1 May 2017

Rincon Consultants, Inc.
449 15th Street, Suite 303
Oakland, CA 94612

Attn: Kyle Brudvik, Paleontologist / Geoarchaeologist / Archaeologist

re: Paleontological resources for the proposed West Santa Ana Branch Transit Corridor Project, Rincon Project #16-02417, from Los Angeles to Artesia, Los Angeles County, project area

Dear Kyle:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed West Santa Ana Branch Transit Corridor Project, Rincon Project #16-02417, from Los Angeles to Artesia, Los Angeles County, project area as outlined on the portions of the Los Angeles, South Gate, Whittier, and Los Alamitos USGS topographic quadrangle maps that you sent to me via e-mail on 20 April 2017. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have localities nearby from the same sedimentary deposits that occur subsurface in the proposed project area.

Surface deposits in the entire proposed project area consist of younger Quaternary Alluvium, derived as alluvial fan deposits from the Los Angeles River that currently flows east of the northern and western portions of the proposed project area and from Los Angeles River, Rio Hondo and the San Gabriel River that flow through the southeastern portion of the proposed project area. These younger Quaternary deposits usually do not contain significant fossil vertebrates in the uppermost layers, but the underlying older Quaternary deposits found at varying depths may well contain significant vertebrate fossils.

Our closest vertebrate fossil locality to the northern portion of the proposed project area from the older Quaternary deposits beneath the younger Quaternary Alluvium is LACM 2032, north-northeast of the of the northern terminus of the proposed project area at Union Station near the intersection of Mission Road and Daly Street around the Golden State Freeway (I-5), that produced fossil specimens of pond turtle, *Clemmys mamorata*, ground sloth, *Paramylodon harlani*, mastodon, *Mammut americanum*, mammoth, *Mammuthus imperator*, horse, *Equus*, and camel, *Camelops*, at a depth of 20-35 feet below the surface. The pond turtle specimens from locality LACM 2032 were figured in the scientific literature by B.H. Brattstrom and A. Sturn (1959. A new species of fossil turtle from the Pliocene of Oregon, with notes on other fossil *Clemmys* from western North America. Bulletin of the Southern California Academy of Sciences, 58(2):65-71). At our locality LACM 1023, just north of locality LACM 2032 near the intersection of Workman Street and Alhambra Avenue, excavations for a storm drain recovered fossil specimens of turkey, *Meleagris californicus,* sabre-toothed cat, *Smilodon fatalis*, horse, *Equus*, and deer, *Odocoileus*, at unstated depth. A specimen of the turkey, *Meleagris*, from this locality was published in the scientific literatus by D. W. Steadman (1980. A Review of the Osteology and Paleontology of Turkeys (Aves: Meleagridinae). Contributions in Science, Natural History Museum of Los Angeles County, 330:131-207). West of the northern portion of the proposed project area, near the intersection of Hill Street and 12th Street, our older Quaternary locality LACM 1755 produced a fossil specimen of horse, *Equus*, at a depth of 43 feet below the street.

Our closest vertebrate fossil localities to the central portion of the proposed project area from these Quaternary deposits are LACM 7701-7702, northeast of the central portion of the proposed project area north of the Los Angeles River and east of the Long Beach Freeway (I-710) near the intersection of Atlantic Avenue and the Long Beach Freeway (I-710) just outside the boundaries of the City of Commerce. Localities LACM 7701-7702 produced fossil specimens of threespine stickleback, *Gasterosteus aculeatus*, salamander, *Batrachoseps*, lizard, Lacertilia, snake, Colubridae, rabbit, *Sylvilagus*, pocket mouse, *Microtus*, harvest mouse, *Reithrodontomys*, and pocket gopher, *Thomomys*, at depths of 11 to 34 feet below grade.

Further south, west of the south-central portion of the proposed project area, we have an older Quaternary locality LACM 1225, in excavations for the Harbor Freeway (I-110) just north of Century Boulevard, that produced fossil specimens of mammoth, *Mammuthus*, at a depth of 15-20 feet below the surface, including one specimen figured in the scientific literature by A. Koch et al. (2004. Santa Monica Mountains National Recreation Area Paleontological Survey. National Park Service Geological Resources Division Technical Report, 04/01:1-27).

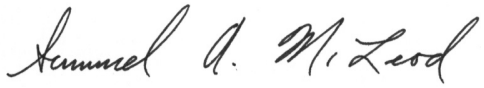
A little further south around the Harbor Freeway (I-110) in the vicinity of Athens, west of the south-central portion of the proposed project area, we have a set of vertebrate fossil localities from older Quaternary deposits including LACM 1295, 1344, 3266, 3365, and 4206. These localities produced a typical late Pleistocene fauna including fossil specimens of pond turtle, *Clemmys*, puffin, *Mancalla*, turkey, *Parapavo*, ground sloth, *Paramylodon*, mammoth, *Mammuthus*, dire wolf, *Canis dirus*, rabbit, *Sylvilagus*, squirrel, Sciuridae, deermouse, *Microtus*, pocket gopher, *Thomomys*, horse, *Equus*, deer, *Cervus*, pronghorn antelope, *Capromeryx*, and bison, *Bison*, at depths as shallow as fifteen feet below the surface.

West of the southeastern portion of the proposed project area, on the northern flank of the Dominguez Hills west of the Long Beach Freeway(I-710), east of Wilmington Avenue and north of Artesia Boulevard, our older Quaternary locality LACM 3382 produced a specimen of fossil mammoth, *Mammuthus*, at a depth of only five feet below the surface. Southwest of the southern terminus of the proposed project area, on the northwest side of the Long Beach Airport along Cover Street between Pixie Avenue and Paramount Boulevard, Our older Quaternary locality LACM 3660, produced a specimen of fossil mammoth, *Mammuthus*, at a depth of 19 feet below the surface.

Shallow excavations in the younger Quaternary Alluvium exposed throughout the proposed project areas are unlikely to uncover significant vertebrate fossils. Deeper excavations that extend down into older Quaternary deposits, however, possibly as shallow as five feet in depth, may well encounter significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

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NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
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29 August 2018

Rincon Consultants, Inc.
87 North Raymond Avenue, Suite 911
Pasadena, CA 91103

Attn: Heather Clifford, Associate Paleontologist / Geologist

re: Paleontological resources for the proposed LA Metro Santa Ana Line (revised northern alignments) Project, Rincon Project # 16-02417, in the Cities of Los Angeles, Artesia, and Cerritos, Los Angeles County, project area

Dear Heather:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed LA Metro Santa Ana Line (revised northern alignments) Project, Rincon Project # 16-02417,in the Cities of Los Angeles, Artesia, and Cerritos, Los Angeles County, project area as outlined on the portions of the Hollywood, Los Angeles, and Los Alamitos USGS topographic quadrangle maps that you sent to me via e-mail on 15 August 2018. We have no vertebrate fossil localities that lie directly within the boundaries of the proposed project area, but we do have localities nearby from sedimentary deposits similar to those that may occur at depth in the proposed project area.

The entire proposed project area has surface deposits composed of younger Quaternary Alluvium, derived as fluvial deposits from the floodplain of the Los Angeles River that currently flows in a concrete channel just to the east for the Alternative E, Alternative G, and northern portion of the WSAB Corridor, and from the San Gabriel River and Coyote Creek for the southern portion of the WSAB Corridor and the Optional Bloomfield Extension. These younger Quaternary deposits usually do not contain significant fossil vertebrate remains, at least in the uppermost layers, but the underlying older Quaternary deposits found at varying depths may well contain significant vertebrate fossils.

Our closest vertebrate fossil locality from the older Quaternary deposits is LACM 2032, just north of due east of the of the northern terminus of the Alternative E proposed project area route near the intersection of Mission Road and Daly Street around the Golden State Freeway (I-5), that produced fossil specimens of pond turtle, *Clemmys mamorata*, ground sloth, *Paramylodon harlani*, mastodon, *Mammut americanum*, mammoth, *Mammuthus imperator*, horse, *Equus*, and camel, *Camelops*, at a depth of 20-35 feet below the surface. The pond turtle specimens from locality LACM 2032 were figured in the scientific literature by B.H. Brattstrom and A. Sturn (1959. A new species of fossil turtle from the Pliocene of Oregon, with notes on other fossil *Clemmys* from western North America. Bulletin of the Southern California Academy of Sciences, 58(2):65-71). At our locality LACM 1023, just north of locality LACM 2032 near the intersection of Workman Street and Alhambra Avenue, excavations for a storm drain recovered fossil specimens of turkey, *Meleagris californicus,* sabre-toothed cat, *Smilodon fatalis*, horse, *Equus*, and deer, *Odocoileus*, at unstated depth. A specimen of the turkey, *Meleagris*, from this locality was published in the scientific literatus by D. W. Steadman (1980. A Review of the Osteology and Paleontology of Turkeys (Aves: Meleagridinae). Contributions in Science, Natural History Museum of Los Angeles County, 330:131-207).

Our next closest vertebrate fossil locality from older Quaternary deposits beneath the younger Quaternary Alluvium is LACM 1755, due south of the western terminus of the Alternative G proposed project area route near the intersection of Hill Street and 12th Street, that produced a fossil specimen of horse, *Equus*, at a depth of 43 feet below the street.

Just north and west of the northwestern extensions of the Alternative G proposed project area route, just north of 6th Street and just west of Broadway, there are exposures of the marine Pliocene Fernando Formation and just to the north of those deposits there are exposures of the marine late Miocene Yorba Member of the Puente Formation (also referred to as an Unnamed Shale in this area), and these two rock units may occur at depth in the proposed project area.

We have a series of vertebrate fossil localities from the Fernando Formation nearby including LACM 7730, between the northern portion of the Alternative E proposed project area route and the northern-most extension of the Alternative G proposed project area route near the intersection of Main Street and 2nd Street; LACM 4726, just southwest of the northern-most extension of the Alternative G proposed project area route near the corner of 4th and Hill Streets; LACM 6971, further to the west of locality LACM 4726 west of Pershing Square near the corner of 6th and Flower Streets; and LACM 3868, almost due north of the western-most extension of the Alternative G proposed project area route north of 6th Street between Lucas Avenue and South Bixel Street. These nearby Fernando Formation localities have produced a composite fauna including fossil specimens of stingray, *Dasyatis*, eagle ray, *Myliobatis*, skate, *Raja*, chimaerid, Chimaeriformes, bull shark, *Carcharhinus leucas*, dusky shark, *Carcharhinus obscurus*, hammerhead shark, *Sphyrna*, sixgill shark, Hexanchiformes, bonito shark, *Isurus oxyrinchus*, salmon shark, *Lamna ditropis*, white sharks, *Carcharodon sulcidens* and *Carcharodon carcharias*, herring, Clupeidae, hake, *Merluccius*, sheepshead, *Semicossyphus*, mackerel, *Scomber*, bird, Aves, rorqual baleen whale, Balaenopteridae, and toothed whale, Odontoceti.

Our Puente Formation locality LACM 5961 occurs just north-northeast of the northern-most extension of the Alternative G proposed project area route just north of the intersection of Hill Street and 1st Street. Locality LACM 5961, discovered during excavation for the Metrorail station at unknown depth, produced a specimen of the fossil bristlemouth fish, *Cyclothone*. Our next closest vertebrate fossil locality from the Puente Formation is LACM 7990, northeast of the northern-most extension of the Alternative G proposed project area and west of the northern portion of the Alternative E proposed project area route north of Temple Street between Broadway and Spring Street, that produced fossil fish including slickheads, Alepocephalidae, argentinas, Argentinidae, deep sea smelts, Bathylagidae, viperfish, *Chauliodus*, herring, Clupeidae, cod, Gadiformes, bristlemouths, Gonostomidae, mackerel, Scombridae, and dragonfish, Stomiatidae.

Our closest older Quaternary localities to the northern portion of the WSAB Corridor proposed project area route are LACM 7701-7702, to the east-southeast in the City of Commerce near the intersection of Atlantic Avenue and the Long Beach Freeway (I-710) that produced fossil specimens of threespine stickleback, *Gasterosteus aculeatus*, salamander, *Batrachoseps*, lizard, Lacertilia, snake, Colubridae, rabbit, *Sylvilagus*, pocket mouse, *Microtus*, harvest mouse, *Reithrodontomys*, and pocket gopher, *Thomomys*, at depths of 11 to 34 feet below grade. To the west-southwest, near the intersection of 46th Street and Western Avenue, our older Quaternary locality LACM 7758 produced fossil specimens of three-spine stickleback, *Gasterosteus aculeatus*, meadow vole, *Microtus*, deer mouse, *Peromyscus*, pocket gopher, *Thomomys*, and pocket mouse, *Perognathus*, at a depth of 16 feet below the surface.

Our closest older Quaternary locality to the southern portion of the WSAB Corridor proposed project area route and to the Optional Bloomfield Extension proposed project area route is LACM 3660, to the southwest of this portion of the the proposed project area on the northwest side of the Long Beach Airport along Cover Street between Pixie Avenue and Paramount Boulevard, that produced a specimen of fossil mammoth, *Mammuthus*, at a depth of 19 feet below the surface. Further to the southwest of this portion of the proposed project area we have locality LACM 6802, near Bixby Road between Atlantic Avenue and Orange Avenue, that produced fossil specimens of undetermined vertebrates at a depth of 16 feet below the surface. South-southwest of the this portion of the proposed project area near the intersection of Spring Street and Cherry Avenue south of the San Diego Freeway (I-405), we have locality LACM 1021 that produced fossil specimens of bird, Aves, and mammoth, *Mammuthus*, at unknown depth. Our closest vertebrate fossil locality from the older Quaternary deposits to the north is LACM 3347, situated northeast of this portion of the proposed project area in La Mirada north of Leffingwell Road east of La Mirada Boulevard, that produced a fossil specimen of horse, *Equus*, at a depth of only two feet below the surface.

Very shallow excavations in the younger Quaternary Alluvium exposed throughout the proposed project area are unlikely to uncover significant vertebrate fossils. Deeper excavations that extend down into older sedimentary deposits, however, may well encounter significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should

be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

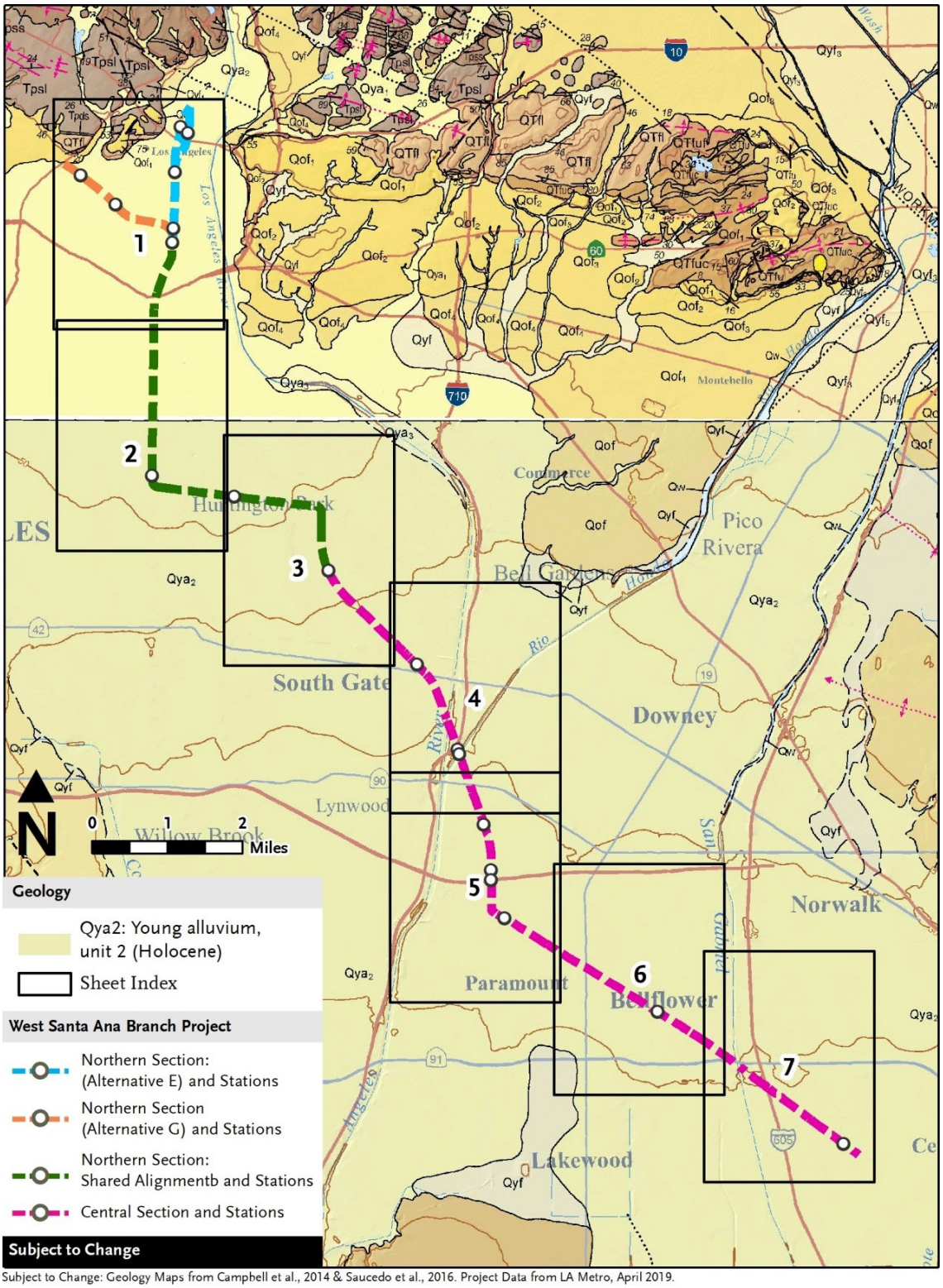
Sincerely,

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

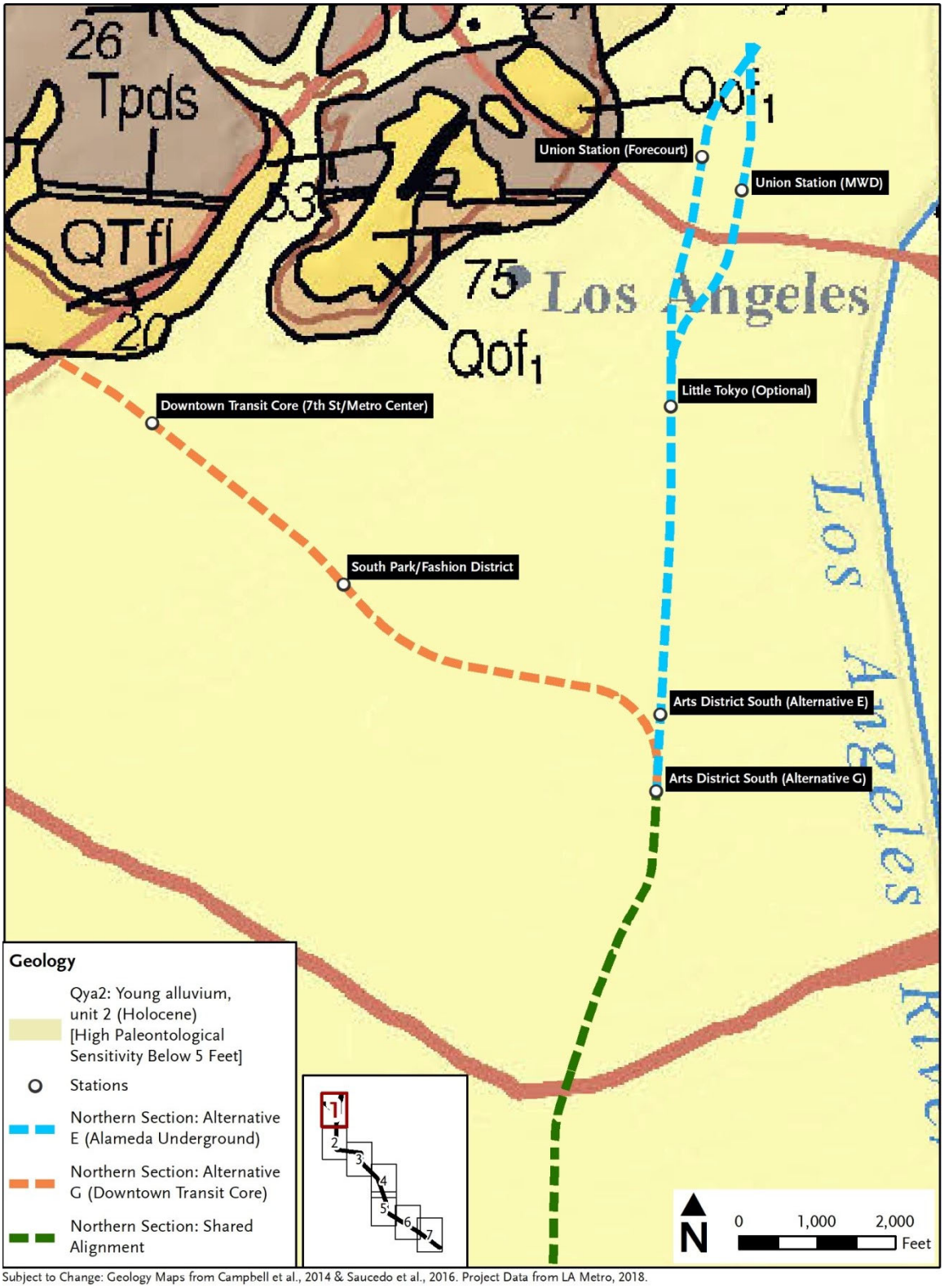
APPENDIX B. PALEONTOLOGY MAPS

Figure B-1. Geologic Units and Paleontological Sensitivity in the Affected Area



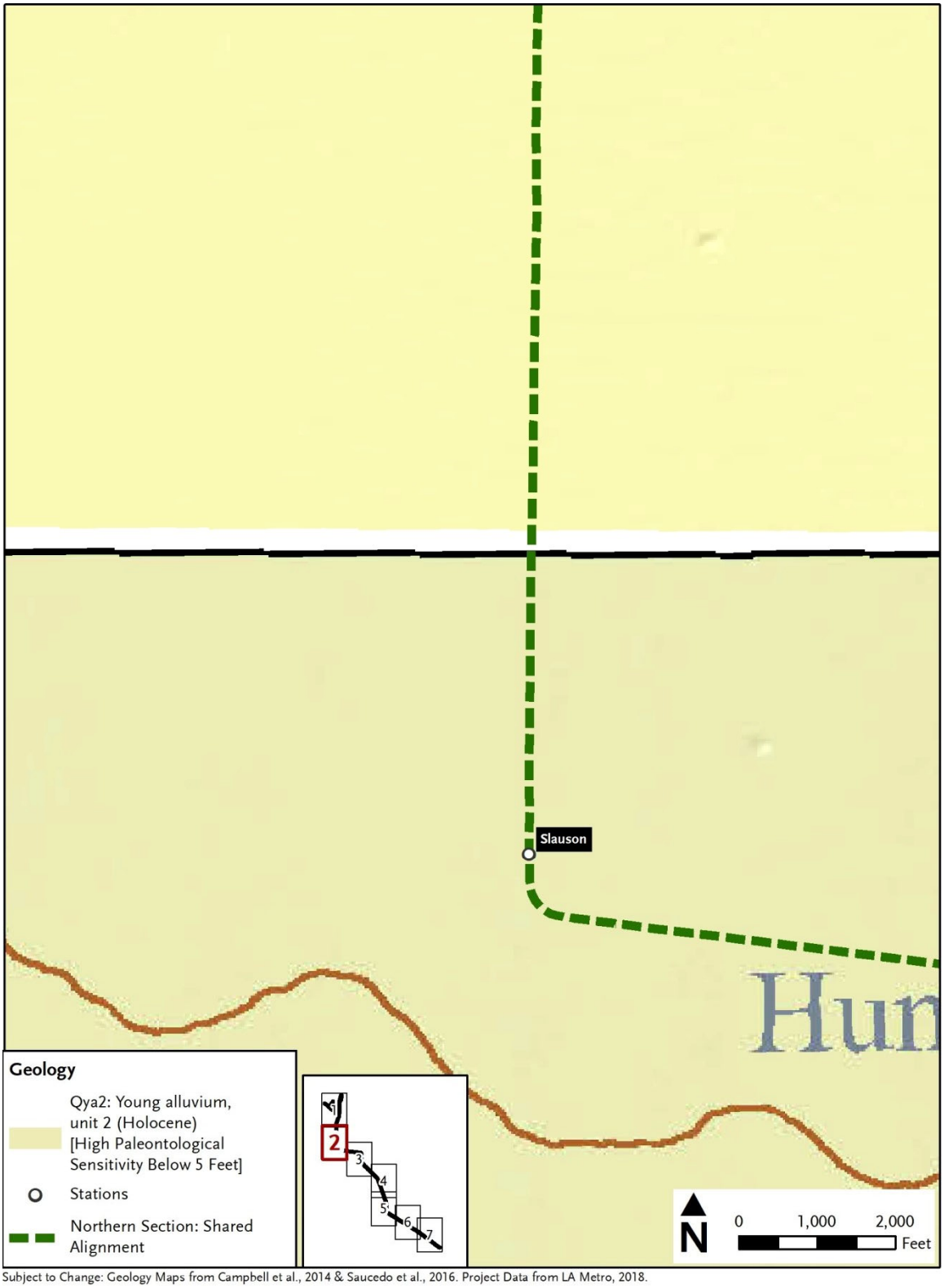
Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, April 2019.

Figure B-2. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 1



Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-3. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 2

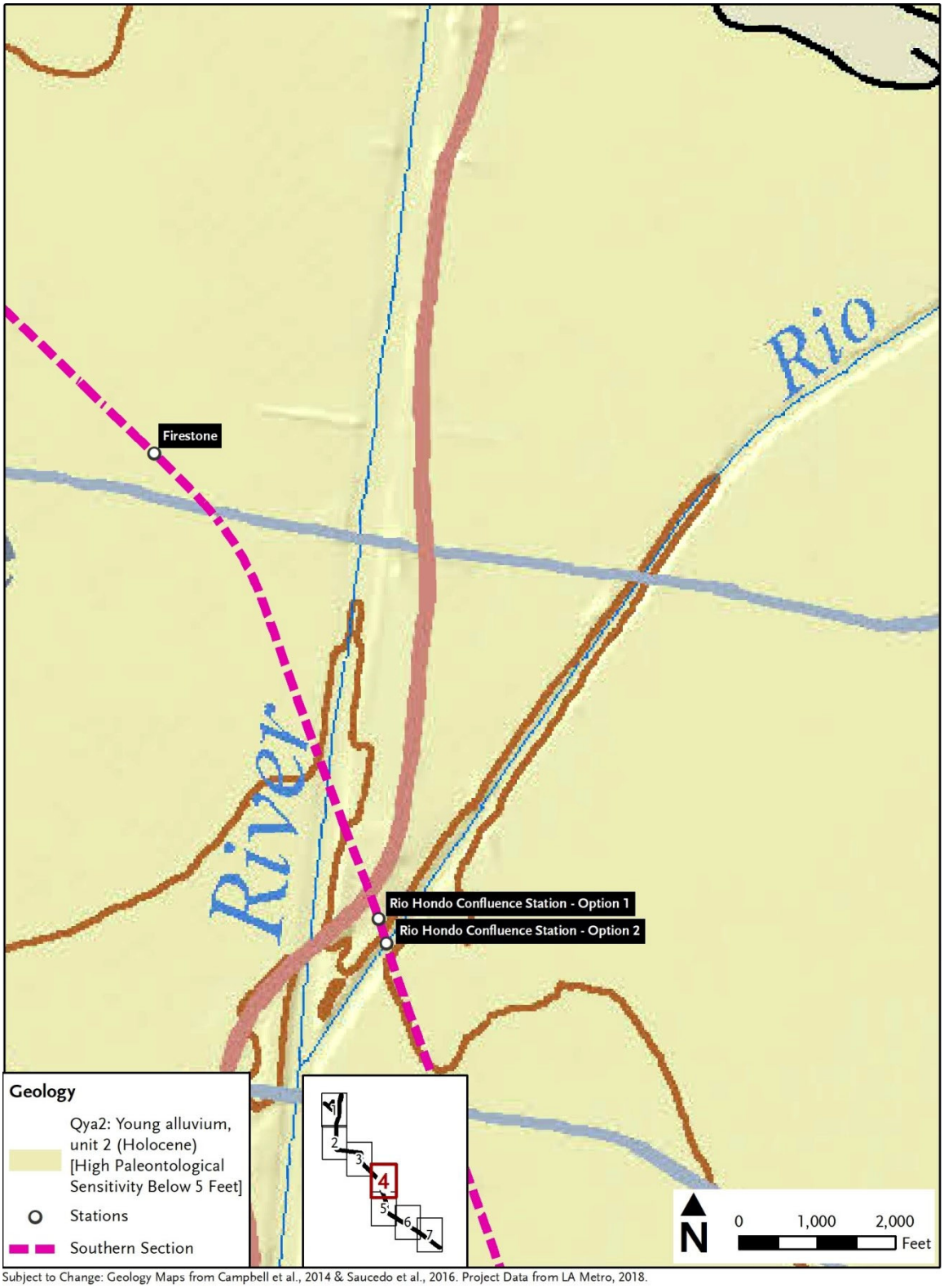


Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-4. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 3

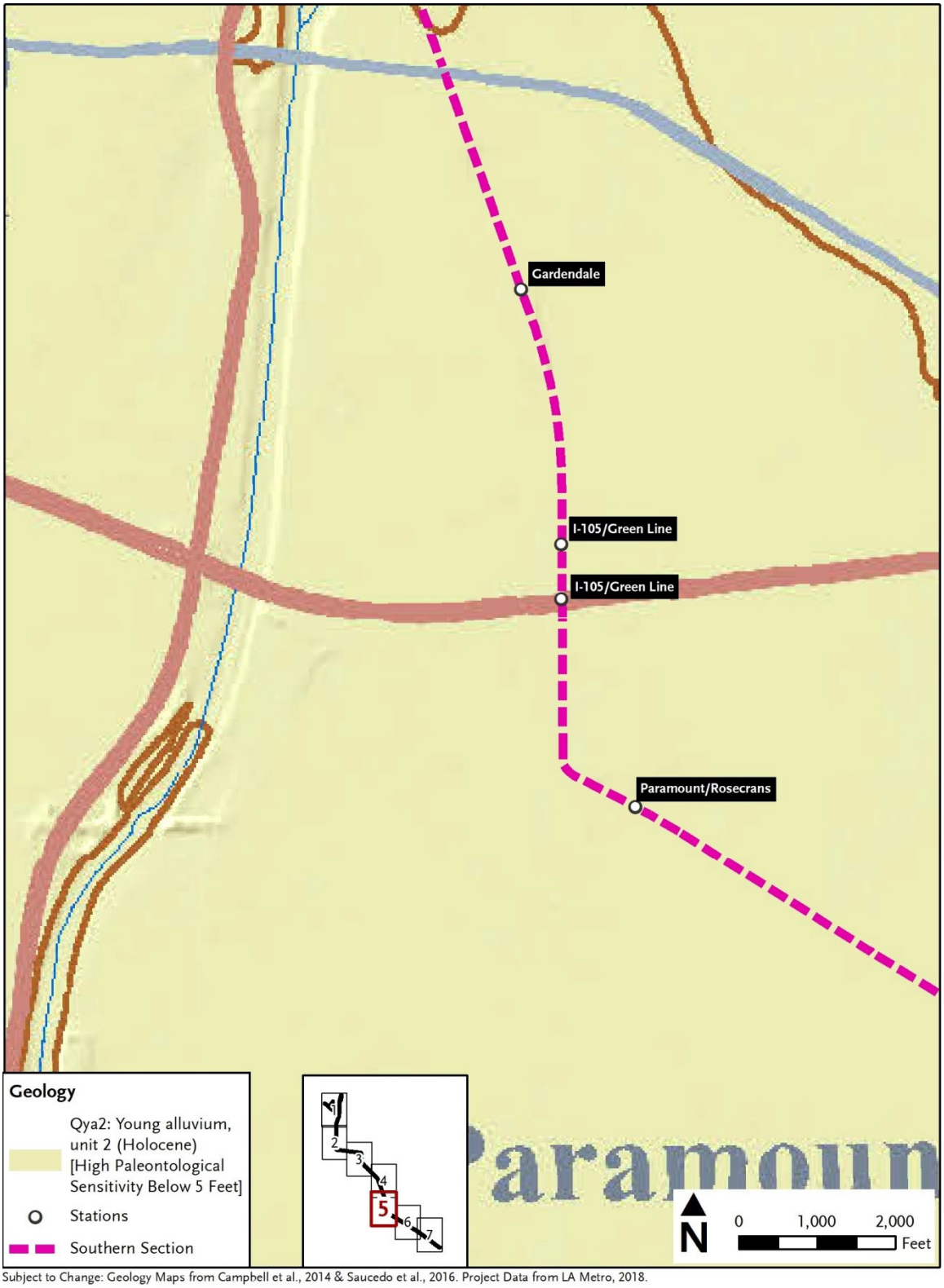
Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-5. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 4



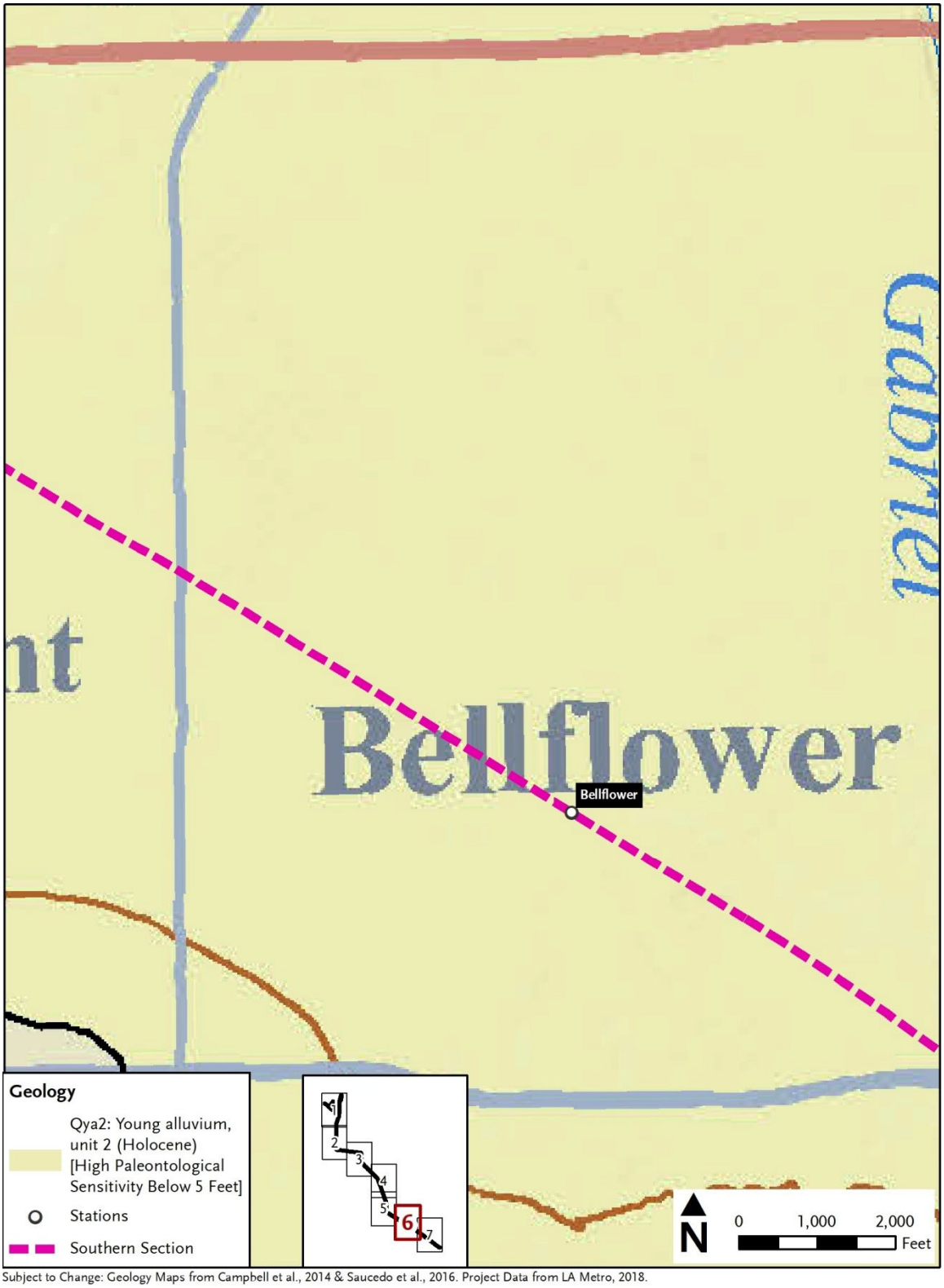
Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-6. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 5



Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-7. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 6



Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.

Figure B-8. Geologic Units and Paleontological Sensitivity in the Affected Area, Sheet 7

Subject to Change: Geology Maps from Campbell et al., 2014 & Saucedo et al., 2016. Project Data from LA Metro, 2018.