California High-Speed Rail Authority

Burbank to Los Angeles Project Section

Paleontological Resources Technical Report

May 2020

CALIFORNIA High-Speed Rail Authority

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 23, 2019, and executed by the Federal Railroad Administration and the State of California.

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ACRONYMS AND ABBREVIATIONS

Amtrak	National Railroad Passenger Corporation
Authority	California High-Speed Rail Authority
Cal. Code Regs.	California Code of Regulations
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CMF	central maintenance facility
CP	construction package
EIR	environmental impact report
EIS	environmental impact statement
Fed. Reg.	*Federal Register*
FRA	Federal Railroad Administration
HMF	heavy maintenance facility
HSR	high-speed rail
IAMF	Impact Avoidance and Minimization Features
I	Interstate
LACM	Natural History Museum of Los Angeles County
LAUS	Los Angeles Union Station
Link US	Los Angeles County Metropolitan Transportation Authority's Link Union Station
LMF	light maintenance facility
LOSSAN	Los Angeles–San Diego–San Luis Obispo Rail Corridor
Ma	million years ago
Metro	Los Angeles County Metropolitan Transportation Authority
MOIF	maintenance of infrastructure facility
MOIS	maintenance of infrastructure siding facility
NEPA	National Environmental Policy Act
PRM	paleontological resources monitor
PRMMP	Paleontological Resource Monitoring and Mitigation Plan
PRS	paleontological resources specialist
PTC	Positive Train Control
RSA	Resource Study Area
SAA	Supplemental Alternatives Analysis
SCRRA	Southern California Regional Rail Authority
SR	State Route
SVP	Society of Vertebrate Paleontology

TPSS	traction power substations
UPRR	Union Pacific Railroad
U.S.C.	U.S. Code

EXECUTIVE SUMMARY

The California High-Speed Rail Authority (Authority) proposes to construct, operate, and maintain an electric-powered high-speed rail (HSR) system in California. When completed, it would run from San Francisco to Los Angeles in under three hours, at speeds in excess of 200 miles per hour. The system would eventually extend to Sacramento and San Diego, with 800 miles of track and up to 24 stations.

The Burbank to Los Angeles Project Section of the HSR system is approximately 14 miles long and would cross the cities of Burbank, Glendale, and Los Angeles on an existing active railroad corridor. It would be located within a narrow and constrained urban environment, crossing major streets and highways, and in portions adjacent to the Los Angeles River. The Burbank to Los Angeles Project Section would include HSR stations near Hollywood Burbank Airport and at Los Angeles Union Station (LAUS), as well as power substations along the alignment. The HSR alignment would be entirely grade-separated, meaning that crossings roads, railroads, and other transport facilities would be located at different heights (overcrossings or undercrossings) so that the HSR project would not interrupt nor interface with other modes of transport, including vehicle, bicycle, and pedestrian.

The project footprint would be primarily located within the existing railroad right-of-way and would include both northbound and southbound electrified tracks for high-speed trains. The Build Alternative would include new and upgraded track, systems facilities, grade separations, drainage, communication towers, security fencing, and other necessary facilities to introduce HSR service. The northern portion of the proposed alignment would begin at the underground Burbank Airport Station and run through a tunnel. After emerging from the tunnel, the alignment would remain at the surface, travel parallel to the Ventura Metrolink line for a short distance, and follow the existing Los Angeles County Metropolitan Transportation Authority (Metro) owned right-of-way to LAUS. The surface portion of the alignment would be designed with structural flexibility to accommodate shared operations with other passenger rail operators.

The Authority and the Federal Railroad Administration (FRA) have prepared program-wide, Tier 1 environmental documents for the HSR system under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Specifically, the Authority and the FRA prepared the *Statewide Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)* (Authority and FRA 2005) to evaluate the ability of the HSR system to meet existing and future demands on the capacity of California's intercity transportation system. The Authority is now undertaking Tier 2, project environmental evaluations for individual sections of the statewide system. This technical report evaluates project impacts to significant paleontological resources for the Burbank to Los Angeles Project Section, and the information contained herein will be included in the Burbank to Los Angeles Project Section EIR/EIS.

The resource study area (RSA) studied for this technical report included a 150-foot buffer around the project footprint. Relevant geologic maps, geological and paleontological literature, and technical reports were reviewed to determine which geologic units are present within the RSA and whether fossils have been recovered from those or similar geologic units elsewhere in the region. A fossil locality search was conducted through the Natural History Museum of Los Angeles County (LACM) to identify any vertebrate localities in the LACM records that are known from the RSA or from the same or similar deposits as those mapped in the RSA. Based on the information from the literature review and fossil locality search, the paleontological sensitivity (i.e., potential to produce significant paleontological resources) of each geologic unit within the RSA was determined following the guidelines of the Society of Vertebrate Paleontology (SVP). Project development plans were then reviewed to determine the type, degree, and extent of project impacts to any potential significant paleontological resources. Site reconnaissance was conducted for the accessible portions of public right-of-way within the RSA. However, as of the writing of this report, access to private property was not available.

Geologic mapping indicates the RSA contains Artificial Fill; Alluvial Fan Deposits; Young Alluvial Fan Deposits, undivided; and the Puente Formation. Artificial Fill has no paleontological sensitivity. The Alluvial Fan Deposits and Young Alluvial Fan Deposits, undivided, have low paleontological sensitivity from the surface to a depth of 10 feet and high sensitivity below that mark. The Puente Formation have high paleontological sensitivity. Based on the paleontological sensitivity of these geologic units and the ground disturbance anticipated from current project plans, the effects analysis concluded the following:

- Along the alignment, the majority of trackwork would not affect significant paleontological resources. Only trackwork excavation in the paleontologically sensitive Puente Formation has the potential to affect significant paleontological resources.
- Construction of all road overcrossings and undercrossings, the relocation of existing oil and fiber-optic lines along San Fernando Road, all bridgework, the tunnel section, and the trench section have the potential to affect significant paleontological resources.
- At the Metrolink CMF, all construction activities, except those for the retention basin, may affect significant paleontological resources.
- At Burbank Airport Station, only ground-disturbing activities for the tracks, platforms, and station facilities, which are below ground, may affect significant paleontological resources. Ground disturbance associated with construction of the surface features, including the pick-up/drop-off facilities for private autos, the transit center for buses and shuttles, and surface parking areas, is not expected to affect significant paleontological resources.
- At LAUS, all modifications to the platforms would not affect significant paleontological resources.
- Of all the ancillary and support facilities, installation of the overhead contact system mast poles and manholes and Positive Train Control (PTC) towers may affect significant paleontological resources in all geologic units along the project footprint. Installation of the PTC fiber optic lines may only affect significant paleontological resources in areas of the paleontologically sensitive Puente Formation. Lastly, construction of the switching station and paralleling station would not affect significant paleontological resources.
- Of the early action projects, excavation for the pedestrian bridges for the Downtown Burbank Metrolink Station and all of the grade separations have the potential to affect significant paleontological resources.

1 INTRODUCTION

1.1 California High-Speed Rail System Background

The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building, and operating the first high-speed passenger rail service in the nation. The California High-Speed Rail (HSR) System will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. When it is completed, it will run from San Francisco to the Los Angeles basin in under three hours at speeds capable of exceeding 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations, as shown on Figure 1-1.[1] In addition, the Authority is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs.

The California HSR System is planned to be implemented in two phases. Phase 1 would connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley.[2] Phase 2 would connect the Central Valley to Sacramento, and another extension is planned from Los Angeles to San Diego. The California HSR System would meet the requirements of Proposition 1A,[3] including the requirement for a maximum nonstop service travel time between San Francisco and Los Angeles of two hours and 40 minutes.

1.2 Burbank to Los Angeles Project Section Background

The Burbank to Los Angeles Project Section would be a critical link in Phase 1 of the California HSR System connecting the San Francisco Bay Area to the Los Angeles Basin. The Authority and the Federal Railroad Administration (FRA) selected the existing railroad right-of-way as the corridor for the preferred alternative between Sylmar and Los Angeles Union Station (LAUS) in the 2005 *Statewide Program Environmental Impact Report/Environmental Impact Statement* (EIR/EIS) (Authority and FRA 2005). The Sylmar to Los Angeles railroad corridor includes Burbank, which is southeast of Sylmar. Therefore, the Project EIR/EIS for the Burbank to Los Angeles Project Section focuses on alignment alternatives along the existing Sylmar to Los Angeles railroad corridor.

The Burbank to Los Angeles Project Section was initially considered as part of the Palmdale to Los Angeles Project Section. The Authority and FRA announced their intention to prepare a joint EIR/EIS for the Palmdale to Los Angeles Project Section in March 2007. On March 12, 2007, the Authority released a Notice of Preparation, and the FRA published a Notice of Intent on March 15, 2007. Over the next several years, the Authority and FRA conducted scoping and prepared alternatives analysis documents for that section. The 2010 Palmdale to Los Angeles Preliminary Alternatives Analysis recommended alignment alternatives and station options for the Palmdale to Los Angeles Project Section based on the program-level corridor selected in 2005. The 2011 Palmdale to Los Angeles Supplemental Alternatives Analysis (SAA) focused specifically on the subsections from the community of Sylmar to LAUS, and reevaluated the alternatives and station options. In June 2014, the Authority published a Palmdale to Los Angeles SAA Report, which introduced the concept of splitting the Palmdale to Los Angeles Project Section into two sections. On July 24, 2014, the Authority released a Notice of Preparation and the FRA published a Notice of Intent to prepare EIR/EIS documents for the Palmdale to Burbank and Burbank to Los Angeles project sections.

[1] The alignments on Figure 1-1 are based on Authority/FRA decisions made in the 2005, 2008, and 2012 Programmatic EIR/EIS documents.

[2] Phase 1 may be constructed in smaller operational segments, depending on available funds.

[3] http://www.catc.ca.gov/programs/hsptbp.htm.

Source: California High-Speed Rail Authority and Federal Railroad Administration (2017)

Figure 1-1 California High-Speed Rail System

One of the main reasons for the project section split was the Initial Operating Section[4] concept and its interim terminus in the San Fernando Valley, which was discussed in the Authority's 2012 and 2014 Business Plans. Additionally, the Authority and FRA determined that separate environmental documents would be more beneficial to address environmental impacts and conduct stakeholder outreach. The key environmental resources likely to be impacted were different between the two sections, and separate environmental documents better supported project phasing and sequencing.

In April 2016, the Authority released the Burbank to Los Angeles SAA, which refined the previously studied alignments. Additionally, the Authority released the 2016 Palmdale to Burbank SAA, which refined the concepts at the Burbank Airport Station and the alignments from south of the Burbank Airport Station to Alameda Avenue in the City of Burbank. The 2016 Burbank to Los Angeles SAA Report proposed to evaluate one build alternative south of Alameda Avenue to LAUS. The subsection between the Burbank Airport Station and Alameda Avenue was studied in the 2016 Palmdale to Burbank SAA, which proposed two station options and two alignment options. Table 1-1 summarizes the conclusions of the two SAA reports.

Table 1-1 2016 Supplemental Alternatives Analysis Recommendations for the Burbank to Los Angeles Project Section

Alternative	Alignment/ Station	Area/Station	Alignment/Station Type
No Project Alternative			
HSR Build Alternative	Alignments	Burbank Airport Station to Alameda Avenue	Alignment Option A (Surface) Alignment Option B (Below-Grade and Surface)
		Alameda Avenue to LAUS	Surface Alignment
	Stations	Burbank Airport Station	Station Option A (Surface) Station Option B (Below-Grade)
		LAUS	Surface Station Option

Sources: California High-Speed Rail Authority and Federal Railroad Administration (2016). "Palmdale to Burbank Supplemental Alternatives Analysis"; "Burbank to Los Angeles Supplemental Alternatives Analysis."
HSR = High-Speed Rail
LAUS = Los Angeles Union Station

Since the release of the two SAA documents in 2016, the design has undergone further refinements. The surface options from Burbank Airport to Alameda Avenue (Alignment Option A and Station Option A) have been eliminated from consideration. The below-grade options (Alignment Option B and Station Option B) have been refined in order to minimize potential environmental effects and reduce cost. Therefore, this environmental document evaluates one build alternative for the project section.

FRA requires logical termini for project level analysis. The Authority has determined that logical termini are defined by stations, with Burbank Airport Station as the northern terminus and LAUS as the southern terminus for the Burbank to Los Angeles Project Section. These two stations are also termini for the Palmdale to Burbank and Los Angeles to Anaheim Project Sections. The analysis for the Burbank Airport Station is consistent with what is included in the Palmdale to Burbank EIR/EIS. Similarly, the analysis for LAUS is consistent with what is included in the Los Angeles to Anaheim EIR/EIS.

[4] The Initial Operating Section was the first segment planned for construction and operations, as outlined in the 2014 Business Plan. The segment permitted operation of HSR service from Merced to the San Fernando Valley. The 2016 Business Plan revised the initial segment termini to the Central Valley and Silicon Valley.

1.3 Project Description Purpose

This project description describes the project for use during environmental impact analyses to complete technical reports to inform the Burbank to Los Angeles Project Section EIR/EIS. The basis of this project description is the HSR Build Alternative as defined in the *Burbank to Los Angeles Project Section Draft Preliminary Engineering for Project Definition* document. This project description describes the physical design elements of the project and does not define all operating plans and scenarios, construction plans, or capital and operating costs. This project description will serve as the basis for Chapter 2, Alternatives, of the project EIR/EIS. Chapter 2 of the EIR/EIS will include additional detail beyond the content of this report.

This report documents the detailed environmental resource analysis conducted for the Burbank to Los Angeles Project Section of the California HSR System and includes the following:

- A brief description of the project and the alternatives under study
- A discussion of pertinent statutes and regulations
- A description of the existing environmental resource conditions in the study area
- A description of the analytical methodologies and assumptions used for this study
- The results of these analyses, including effects or benefits resulting from the project

2 PROJECT DESCRIPTION

The Burbank to Los Angeles Project Section of the California HSR System is approximately 14 miles long, crossing the cities of Burbank, Glendale, and Los Angeles on an existing railroad corridor. HSR for this project section would be within a narrow and constrained urban environment, crossing major streets and highways and, in some portions, adjacent to the Los Angeles River. The Los Angeles County Metropolitan Transportation Authority (Metro) owns the railroad right-of-way, the Southern California Regional Rail Authority owns the track and operates the Metrolink commuter rail service, the National Railroad Passenger Corporation (Amtrak) provides intercity passenger service, and the Union Pacific Railroad (UPRR) holds track access rights and operates freight trains.

This section describes the No Project Alternative and the HSR Build Alternative to be evaluated in the Burbank to Los Angeles Project EIR/EIS.

2.1 No Project Alternative

Under the No Project Alternative, the California HSR System would not be built. The No Project Alternative represents the condition of the Burbank to Los Angeles Project Section as it existed in 2015, and as it would exist without the HSR System at the horizon year (2040).

The No Project Alternative assumes that all currently known programmed and funded improvements to the intercity transportation system (highway, transit, and rail) and reasonably foreseeable local land development projects (with funding sources identified) would be developed by 2040. The No Project Alternative is based on a review of the following: regional transportation plans for all modes of travel; the State Transportation Improvement Program; the Federal Transportation Improvement Program; Southern California Regional Rail Authority strategic plans, transportation plans and programs for Los Angeles County; airport master plans; and city and county general plans.

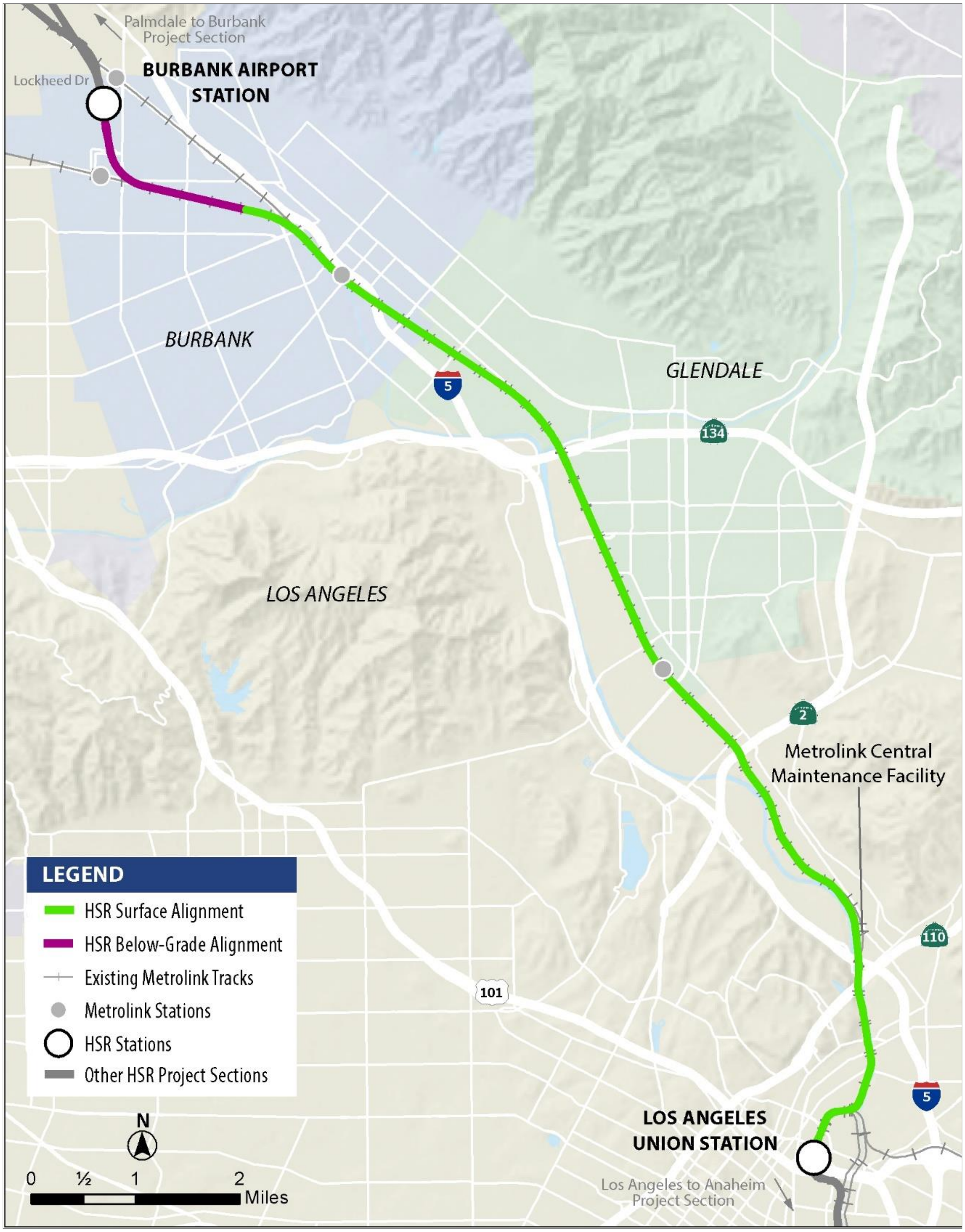
2.2 High-Speed Rail Build Alternative

The HSR Build Alternative includes new and upgraded track, maintenance facilities, grade separations, drainage improvements, communications towers, security fencing, passenger train stations, and other necessary facilities to introduce HSR service into the Los Angeles-San Diego-San Luis Obispo (LOSSAN) Corridor from near Hollywood Burbank Airport to LAUS. In portions of the alignment, new and upgraded tracks would allow other passenger trains to share tracks with the HSR system. HSR stations would be located near Hollywood Burbank Airport and at LAUS. The alignment would be entirely grade-separated at crossings, meaning that roads, railroads, and other transport facilities would be located at different heights so the HSR system would not interrupt or interface with other modes of transport, including vehicle, bicycle, and pedestrian.

For most of the project section, the HSR alignment would be within the existing railroad right-of-way, which is typically 70 to 100 feet wide. The HSR alignment includes northbound and southbound electrified tracks for high-speed trains. The right-of-way would be fenced to prohibit pedestrian and public or unauthorized vehicle access.

The project footprint (the area required to build, operate, and maintain HSR service) is based on the following elements of design: station areas, hydrology, track, roadway, structures, systems, and utilities.

Figure 2-1 shows an overview of the Burbank to Los Angeles Project Section.



Source: California High-Speed Rail Authority (2019)

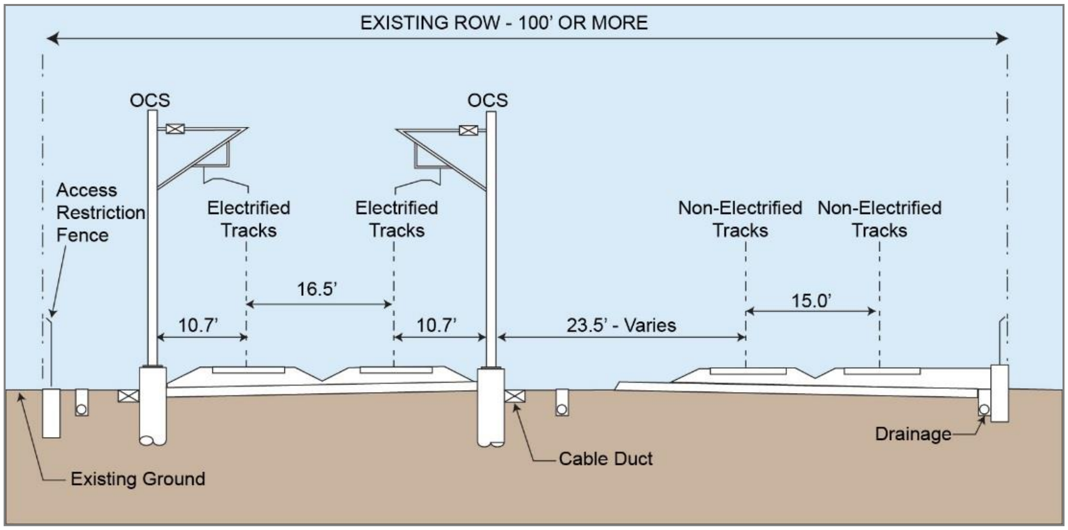
Figure 2-1 Overview of Burbank to Los Angeles Project Section

The Burbank to Los Angeles Project Section includes a combination of at-grade, below-grade, and retained-fill track, depending on corridor and design constraints. The at-grade and retained-fill portions of the alignment would be designed with structural flexibility to accommodate shared operations with other passenger rail operators. Throughout most of the project section (between Alameda Avenue and State Route [SR] 110), two new electrified tracks would be placed along the west side of the existing railroad right-of-way and would be useable for HSR and other passenger rail operators. The existing non-electrified tracks would be realigned closer to the east side of the existing right-of-way, for a total of four tracks; these realigned, non-electrified tracks would be usable for freight and other passenger rail operators, but not for HSR. Figure 2-2 illustrates the placement of the new electrified tracks and realigned, non-electrified tracks relative to the existing tracks.

Source: California High-Speed Rail Authority (2019)

Figure 2-2 New Electrified and Non-Electrified Tracks Within Existing Right-of-Way

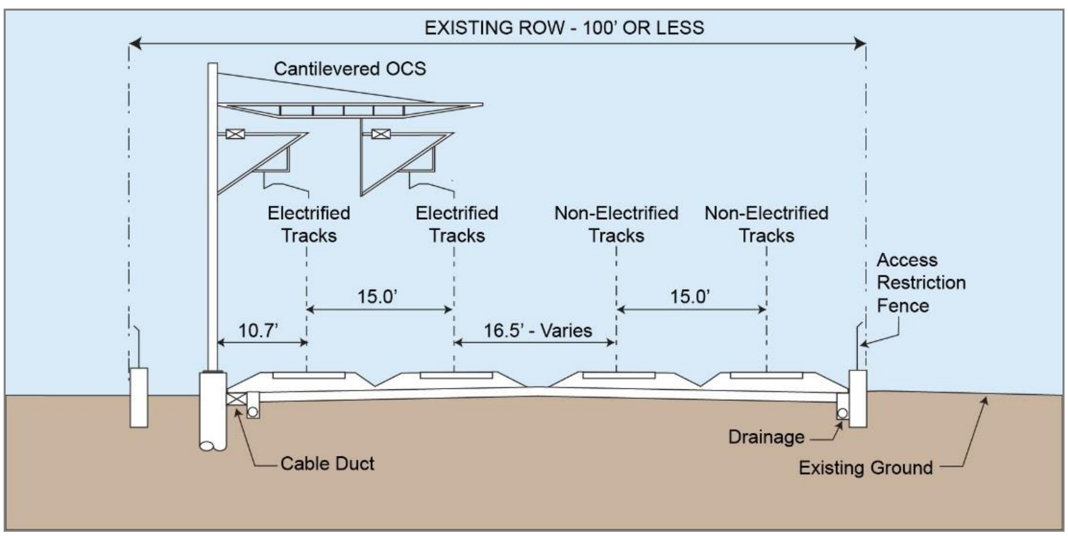
Throughout most of the Burbank to Los Angeles Project Section, the electrified track centerline and the non-electrified track centerline would have a minimum separation of 23.5 feet, and the northbound and southbound electrified tracks would have a separation of 16.5 feet, following the Authority's *Technical Memorandum 1.1.21 Typical Cross Sections for 15% Design*. These standard separations are illustrated on Figure 2-3.



Source: California High-Speed Rail Authority (2019)
This illustration shows the standard separations between the electrified and non-electrified tracks in areas where the railroad right-of-way is at least 100 feet wide. (Figure not to scale.)

Figure 2-3 Standard Track Separations within Non-Constrained Right-of-Way

However, in several areas of the corridor, the right-of-way is less than 100 feet wide, a threshold that constrains the design. As a result, reduced track separations were used in these constrained areas in order to stay within the existing right-of-way to the greatest extent possible and thus minimize property impacts. The reduced separations between the electrified and non-electrified track centerlines would be a minimum of 16.5 feet, and between the two electrified track centerlines would be 15 feet. The narrower cross-section separations are illustrated on Figure 2-4.



Source: California High-Speed Rail Authority (2019)
This illustration shows the narrow separations between the electrified and non-electrified tracks, which would minimize property impacts in areas where right-of-way is constrained. The reduced separations are applied in areas where the railroad right-of-way is less than 100 feet wide. (Figure not to scale.)

Figure 2-4 Reduced Track Separations within Constrained Right-of-Way

2.2.1 HSR Build Alternative Description

The following section describes the HSR Build Alternative in greater detail. Figure 2-5 (Sheets 1 to 3) shows the HSR Build Alternative, including the HSR alignment, new/modified non-electrified tracks, and roadway crossings.

The HSR alignment would begin at the underground Burbank Airport Station and would consist of two new electrified tracks. After exiting the underground station, the alignment would travel southeast beneath the Hollywood Burbank Airport runway in a tunnel, which would be constructed using the sequential excavation method without any disruptions to airport operations. The alignment from south of the airport to where it would join the Metrolink Ventura Subdivision would be constructed as cut-and-cover, and the alignment would then transition to a trench within the Metrolink Ventura Subdivision. The existing Metrolink Ventura Subdivision tracks would be realigned north within the existing right-of-way, and an existing UPRR siding track between Buena Vista Street and Beachwood Drive would be realigned north of the relocated Metrolink Subdivision tracks within the existing right-of-way. These non-electrified tracks would remain at-grade. The trench, which would be south of and parallel to the relocated non-electrified tracks, would be dedicated for HSR tracks only. Figure 2-6, Figure 2-7, and Figure 2-8 depict the typical cross-sections of the below-grade portion of the alignment. During construction of the below-grade alignment, shoofly tracks would be provided to support Metrolink operations. The proposed shoofly tracks would be aligned between Hollywood Way and Buena Vista Street outside the existing right-of-way and would result in temporary roadway impacts to Vanowen Street.

The HSR tracks would transition from the trench and emerge to at-grade within the existing railroad right-of-way near Beachwood Drive in the City of Burbank Near Beachwood Drive, the HSR tracks would curve south out of the existing railroad right-of-way and cross Victory Place on a new railroad bridge, which would be directly south of the existing Victory Place bridge. South of Burbank Boulevard, the HSR tracks would re-enter the railroad right-of-way and run parallel to the Metrolink Antelope Valley Subdivision tracks. Between Burbank Boulevard and Magnolia Boulevard, several UPRR industry tracks west of the right-of-way would be removed.

Continuing south, the HSR alignment would pass the Downtown Burbank Metrolink Station, which would be modified. HSR tracks would be placed within the existing parking lot west of the southbound platforms, and new pedestrian connections and relocated parking would be provided. Section 2.6.1 provides more details on design modifications for the Downtown Burbank Metrolink station.

Source: California High-Speed Rail Authority (2019)

Figure 2-5 HSR Build Alternative Overview

(Sheet 1 of 3)

Source: California High-Speed Rail Authority (2019)

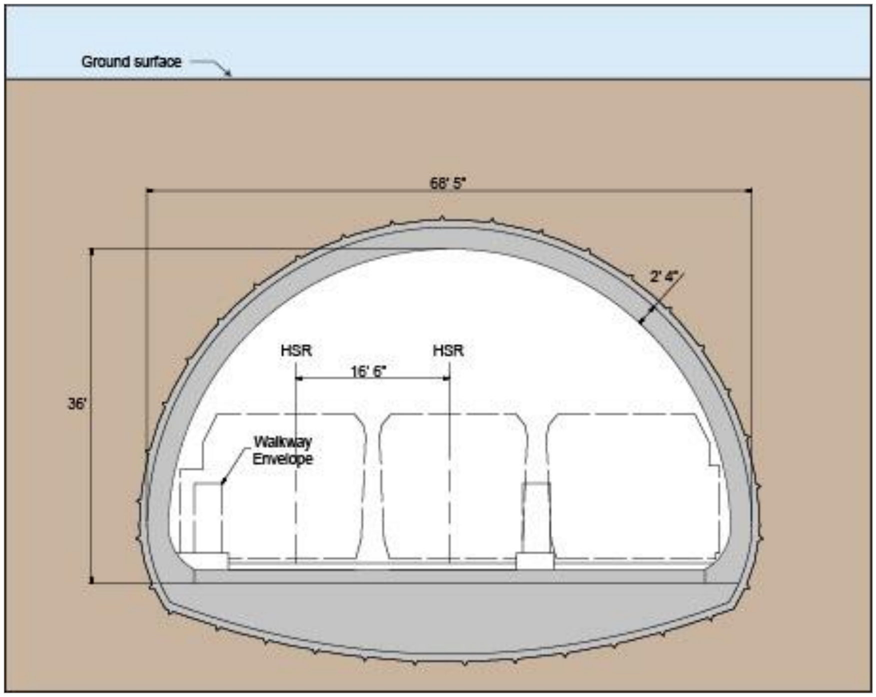
Figure 2-5 HSR Build Alternative Overview

(Sheet 2 of 3)

Source: California High-Speed Rail Authority (2019)

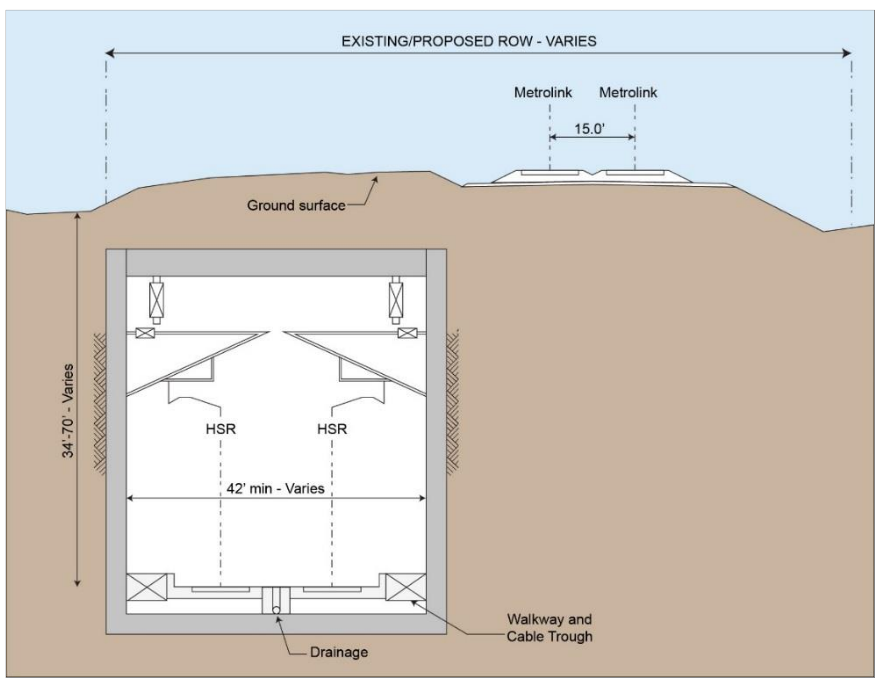
Figure 2-5 HSR Build Alternative Overview

(Sheet 3 of 3)



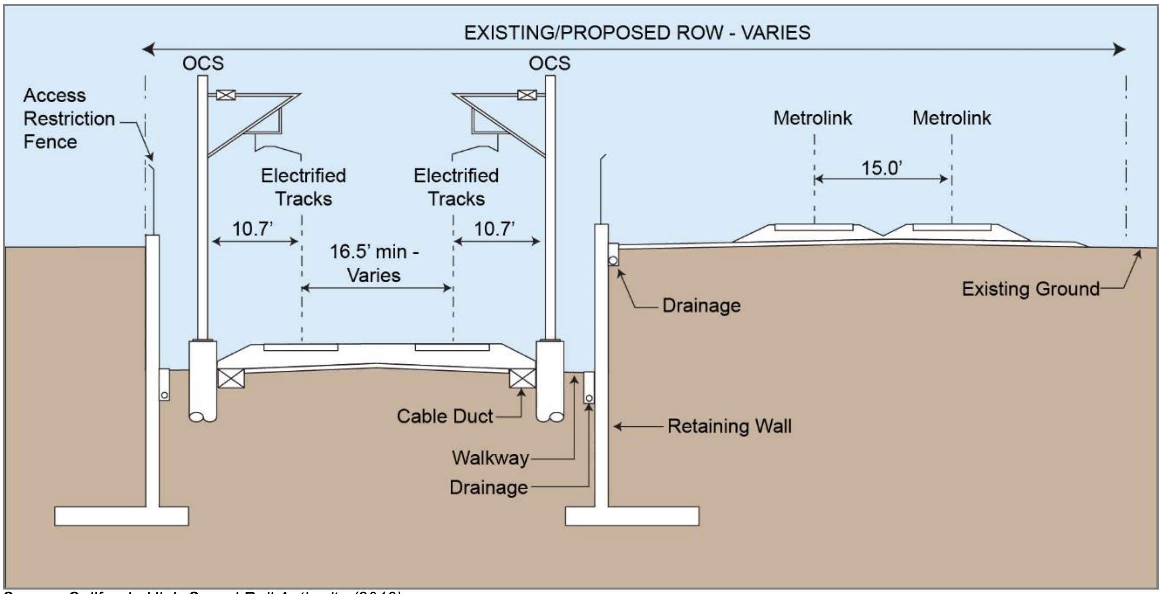
Source: California High-Speed Rail Authority (2019)

Figure 2-6 Typical Tunnel Cross-Section



Source: California High-Speed Rail Authority (2019)

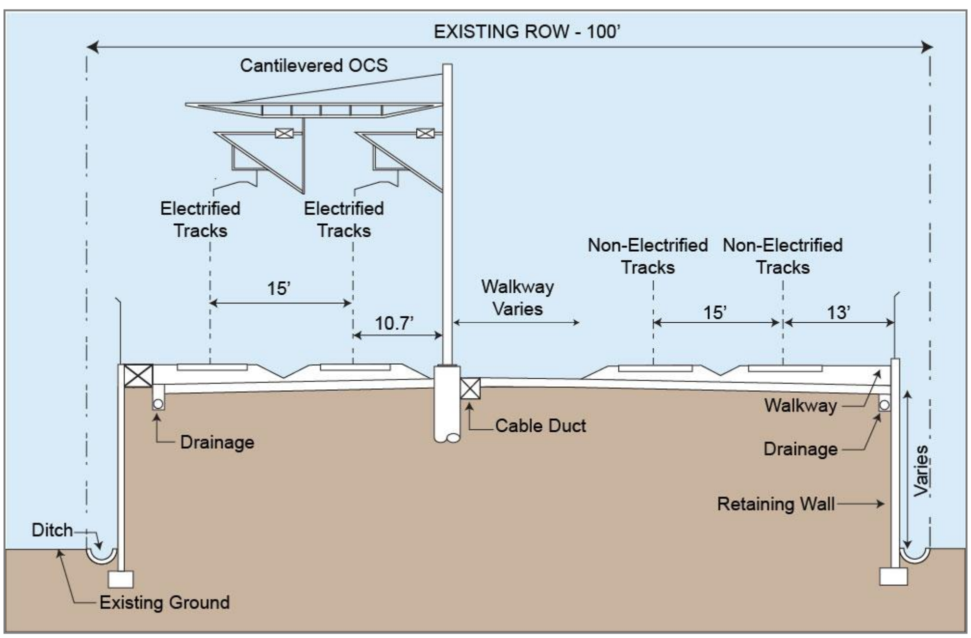
Figure 2-7 Typical Cut-and-Cover Tunnel Cross-Section



Source: California High-Speed Rail Authority (2019)

Figure 2-8 Typical Trench Cross-Section

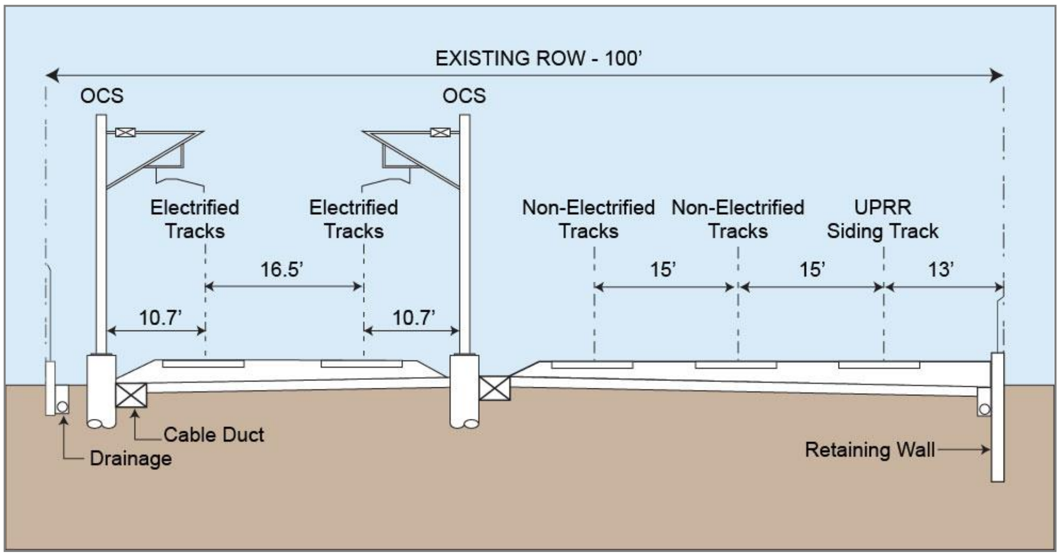
Between Olive Avenue to the north end of the Metrolink Central Maintenance Facility (CMF), the existing non-electrified tracks would be shifted east within the right-of-way to accommodate the addition of the electrified tracks within the right-of-way. Throughout this area, both sets of tracks would be at-grade, with a retained fill segment between Western Avenue and SR 134. Figure 2-9 shows a typical cross-section of the alignment on retained fill.



Source: California High-Speed Rail Authority (2019)

Figure 2-9 Typical Retained-Fill Cross-Section

The alignment would cross Verdugo Wash, where an existing railroad bridge would be rebuilt as a new clear-span structure, to accommodate the additional set of electrified tracks. The alignment would continue south within the existing railroad right-of-way, which follows the Glendale and Los Angeles city borders. Between SR 134 and Chevy Chase Drive, a UPRR siding track would be realigned to the east of the non-electrified tracks, for a total of five tracks within the right-of-way through this area. This siding track is currently located at the Metrolink Central Maintenance CMF but would need to be relocated to accommodate HSR at the CMF. Figure 2-10 shows the typical cross-section for this area.

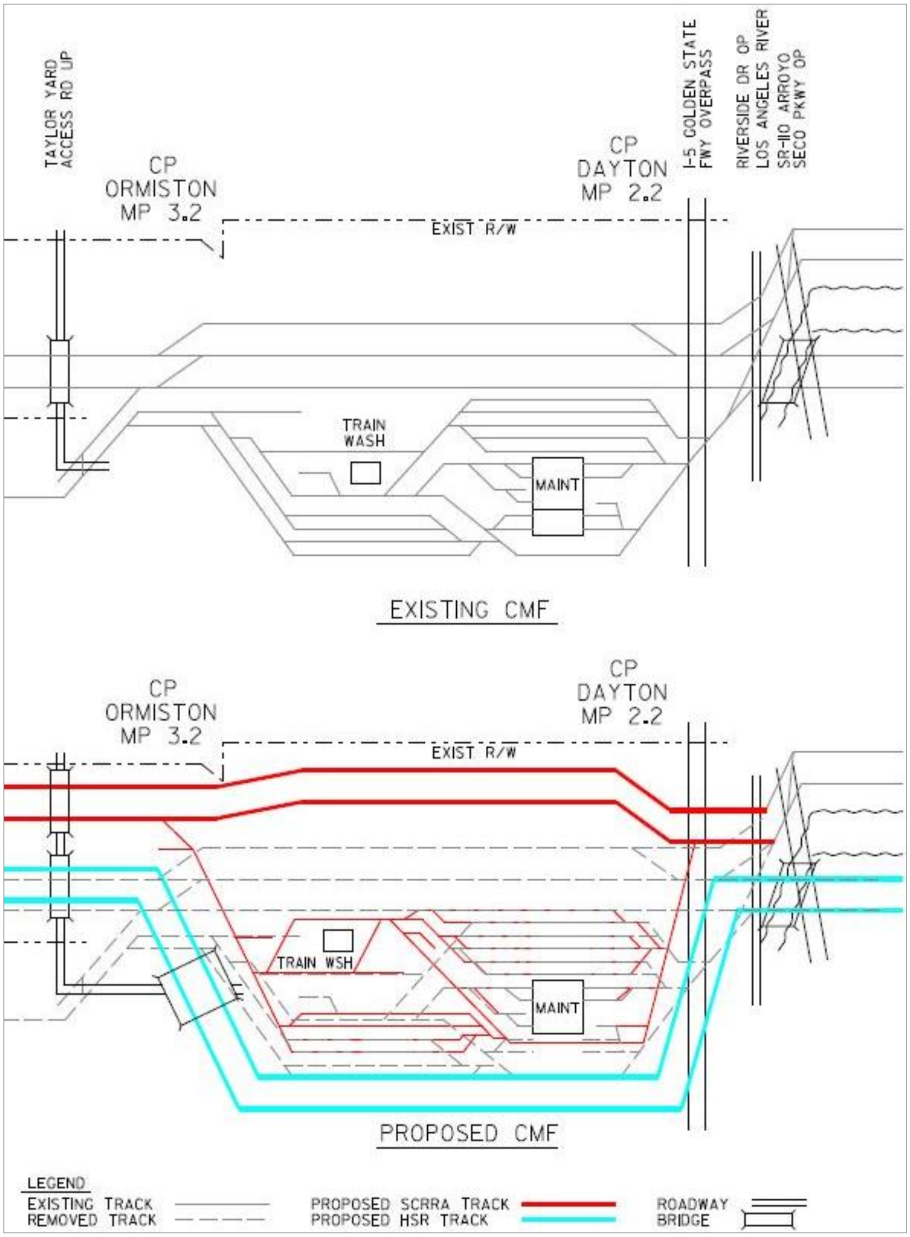


Source: California High-Speed Rail Authority (2019)

Figure 2-10 Typical Cross-Section Between State Route 134 and Chevy Chase Drive

The alignment would pass by the Glendale Metrolink Station (originally known as the Southern Pacific Railroad Depot), a known historical resource listed on the National Register of Historic Places and located north of Glendale Boulevard. No modifications would be needed for the Glendale Metrolink Station. At Tyburn Street, the alignment would enter the City of Los Angeles. Continuing south, the two sets of tracks would diverge at the north end of the Metrolink CMF. The electrified tracks would travel along the west side of the CMF, and the non-electrified, mainline tracks would travel along the east side of the facility.

The CMF is Metrolink's major daily servicing location and maintenance facility in the region. The Burbank to Los Angeles Project Section proposes reconfiguring the various yard and maintenance facilities within the CMF to accommodate HSR, while maintaining as many of the existing yard operations as possible. Figure 2-11 displays a schematic diagram of the existing CMF and the proposed changes, which include new mainline-to-yard track connections, partial demolition of the existing maintenance shop, a revised roadway network with reconfigured parking areas, track relocation shifts, and construction to provide additional storage capacity. Additionally, several facilities would need to be relocated or reconstructed within the CMF, including a train washing/reclamation building, a yard pump house, and two service and inspection tracks. Utilities would also need to be relocated with the CMF, including domestic and fire water, underdrains and reconstructed catch basins, power facilities, fueling facilities and storage tanks, and sanitary sewer systems. The proposed design would not be able to accommodate wheel truing operations or progressive maintenance bays; these would relocate to another Metrolink facility. All other facilities and infrastructure would remain in place. The construction work at the CMF would be phased to minimize the disruption to the existing operations and to maintain the key operational facilities.



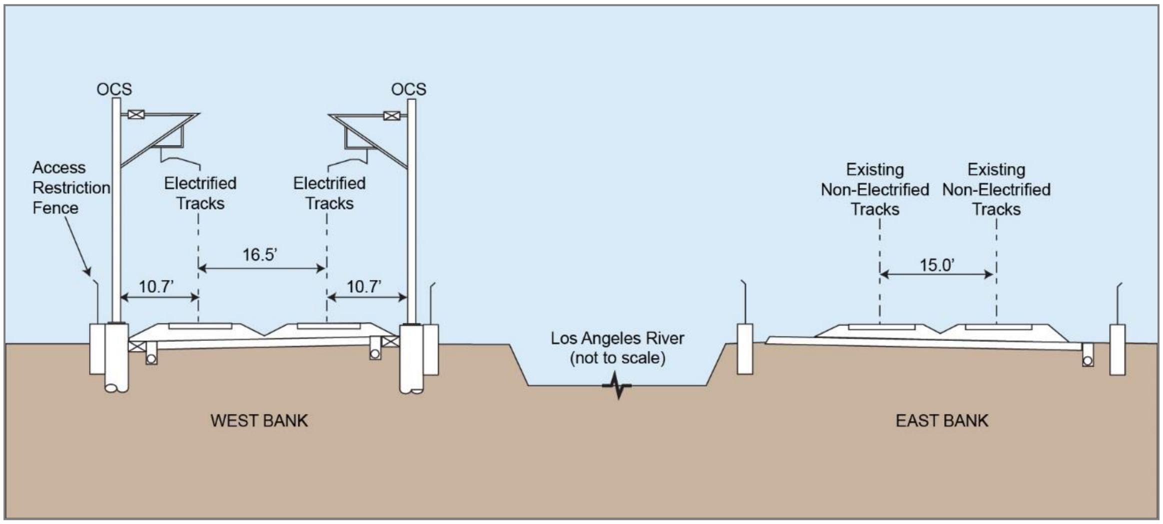
Source: Burbank to Los Angeles Draft Preliminary Engineering for Project Description Design Submittal (2019)

Figure 2-11 Diagram of Existing and Proposed Metrolink Central Maintenance Facility

At the south end of the CMF, the two electrified and two non-electrified tracks would converge briefly within the right-of-way and then diverge again south of Figueroa Street. The electrified tracks would cross over to the west bank of the Los Angeles River on the existing Metrolink Downey Bridge. The existing tracks on the Downey Bridge would be electrified, which would allow for both HSR and passenger rail operations. The non-electrified tracks would remain on the east bank of the Los Angeles River and cross the Arroyo Seco on an existing railroad bridge, which would not require modifications. These non-electrified tracks would connect with the existing tracks on the east bank, which currently serve UPRR and nonrevenue trains. An illustrative cross-section for this area is shown on Figure 2-12.

South of Main Street, on the east bank of the river, the existing tracks would be modified at Mission Junction to be used by freight and passenger rail. They would cross the Los Angeles River on the existing Mission Tower bridge to join the electrified tracks within the railroad right-of-way. The existing Mission Tower bridge has two tracks, but currently only one track is functional and used by Metrolink. The HSR Build Alternative would replace the trackwork to conform to the most current design standards and specifications, which may require a retrofit to the bridge.

The two sets of tracks would continue south to terminate at LAUS. The electrified tracks and HSR station platforms would be located on the west side of the station, while the non-electrified tracks would merge with the Metrolink and Amtrak tracks. The configuration at LAUS is described in further detail in Section 2.3.2.



Source: California High-Speed Rail Authority (2019)
The electrified tracks would cross the Los Angeles River just north of State Route 110 and run along the west bank of the river. The non-electrified tracks would run along the east bank of the river. (Figure not to scale.)

Figure 2-12 Typical Cross-Section from State Route 110 to Mission Junction

2.2.2 Roadway Crossings

The HSR Build Alternative would cross a total of 34 roadways, 15 of which would require modifications. Figure 2-5 shows the crossings throughout the project section, and Table 2-1 lists their configurations before and after the introduction of the HSR Build Alternative.

Modifications to existing crossings

- Victory Place: a new bridge for the HSR tracks would be constructed directly south of the existing railroad bridge over Victory Place, and the roadway would be lowered to cross under the new bridge.
- Burbank Boulevard: the roadway bridge would be reconstructed to cross over the tracks, and Burbank Boulevard would be raised in elevation on the west side.
- Alameda Avenue: the railroad bridge would be reconstructed to be wider.
- Colorado Street: the railroad bridge would be reconstructed to be wider.
- Los Felix Boulevard: the railroad bridge would be reconstructed to be wider, and the roadway would be lowered slightly
- Glendale Boulevard: the railroad bridge would be reconstructed to be wider, and the roadway would be lowered slightly

- Kerr Road: the railroad bridge would be reconstructed to be wider, and the roadway would be lowered slightly

New grade separations

- Buena Vista Street: the crossing would be modified and remain at-grade for Metrolink and UPRR tracks, but a new undercrossing would be constructed to grade-separate the HSR tracks only from the roadway.
- Sonora Avenue: a new roadway undercrossing would be constructed, with the tracks slightly raised on retained fill and the roadway slightly lowered (see Section 2.6).
- Grandview Avenue: a new roadway undercrossing would be constructed, with the tracks slightly raised on retained fill and the roadway slightly lowered (see Section 2.6).
- Flower Street: a new roadway undercrossing would be constructed, with the tracks slightly raised on retained fill and the roadway slightly lowered (see Section 2.6).
- Goodwin Avenue: the road currently does not cross the railroad right-of-way, but the project would grade-separate it as a new roadway undercrossing (see Section 2.6).
- Main Street: a new roadway bridge would be constructed north of the existing Main street bridge, which would cross the railroad right-of-way and the Los Angeles River (see Section 2.6).

Closures

- Chevy Chase Drive: the roadway would be closed, and a new pedestrian undercrossing would be provided (see Section 2.6).
- Private driveway: a driveway that currently provides access to a Los Angeles Department of Water and Power facility parking lot would be closed, and the Los Angeles Department of Water and Power parking would be relocated to a new facility on Main Street.

Table 2-1 Roadway Crossings within the Burbank to Los Angeles Project Section

Roadway	Current Crossing Configuration	Proposed Crossing Configuration[1]
Buena Vista Street	At-Grade*	**At-Grade* (modified)** **Undercrossing** (new)**
Victory Place	Undercrossing"	Undercrossing* **Undercrossing (new)**
Burbank Boulevard	Overcrossing	**Overcrossing (modified)**
Magnolia Boulevard	Overcrossing	Overcrossing
Olive Avenue	Overcrossing	Overcrossing
Interstate 5	Overcrossing	Overcrossing
Alameda Avenue	Undercrossing	**Undercrossing (modified)**
Western Avenue	Overcrossing	Overcrossing
Sonora Avenue	At-Grade	**Undercrossing (new)**
Grandview Avenue	At-Grade	**Undercrossing (new)**
Flower Street	At-Grade	**Undercrossing (new)**
Fairmont Avenue	Overcrossing	Overcrossing
SR 134	Overcrossing	Overcrossing
Salem/Sperry St[2]	No Crossing	Overcrossing (Metro project)
Colorado Street	Undercrossing	**Undercrossing (modified)**

Roadway	Current Crossing Configuration	Proposed Crossing Configuration[1]
Goodwin Avenue	No Crossing	**Undercrossing (new)**
Chevy Chase Drive	At-Grade	**Closed**
Los Feliz Boulevard	Undercrossing	**Undercrossing (modified)**
Glendale Boulevard	Undercrossing	**Undercrossing (modified)**
Fletcher Drive	Undercrossing	Undercrossing
SR 2	Overcrossing	Overcrossing
Kerr Road	Undercrossing	**Undercrossing (modified)**
Interstate 5	Overcrossing	Overcrossing
Figueroa Street	Overcrossing	Overcrossing
SR 110	Overcrossing	Overcrossing
Metro Gold Line	Overcrossing	Overcrossing
Broadway	Overcrossing	Overcrossing
Spring Street	Overcrossing	Overcrossing
Main Street	At-Grade	**Overcrossing (new)**
Private LADWP road	At-Grade	**Closed**
Vignes Street	Undercrossing	Undercrossing
Cesar Chavez Avenue	Undercrossing	Undercrossing

Source: California High-Speed Rail Authority (2019)
[1] All proposed grade crossing configurations are pending Public Utilities Commission approval.
[2] Salem/Sperry Street would be grade-separated as a part of the Metro Doran Street and Broadway/Brazil Grade Separation Project. The project also proposes closing the existing at-grade railroad crossings at Doran Street and Broadway/Brazil Street. As the Metro project would be completed before the introduction of HSR service, the crossing configurations are considered part of the existing conditions for the HSR project.
**Crossings apply to Metrolink and/or UPRR tracks only*
***Crossing applies to HSR tracks only*
***Bold** denotes change from existing condition under the HSR Build Alternative.*
Overcrossing = Road over train tracks *Undercrossing = Road under train tracks*
HSR = High-Speed Rail SR = State Route
Source: California High-Speed Rail Authority and Federal Railroad Administration (2019)

2.3 Station Sites

The HSR stations for the Burbank to Los Angeles Project Section would be in the vicinity of Hollywood Burbank Airport and at LAUS. Stations would be designed to optimize access to the California HSR System, particularly to allow for intercity travel and connections to local transit, airports, highways, and the bicycle and pedestrian network. Both stations would include the following elements:

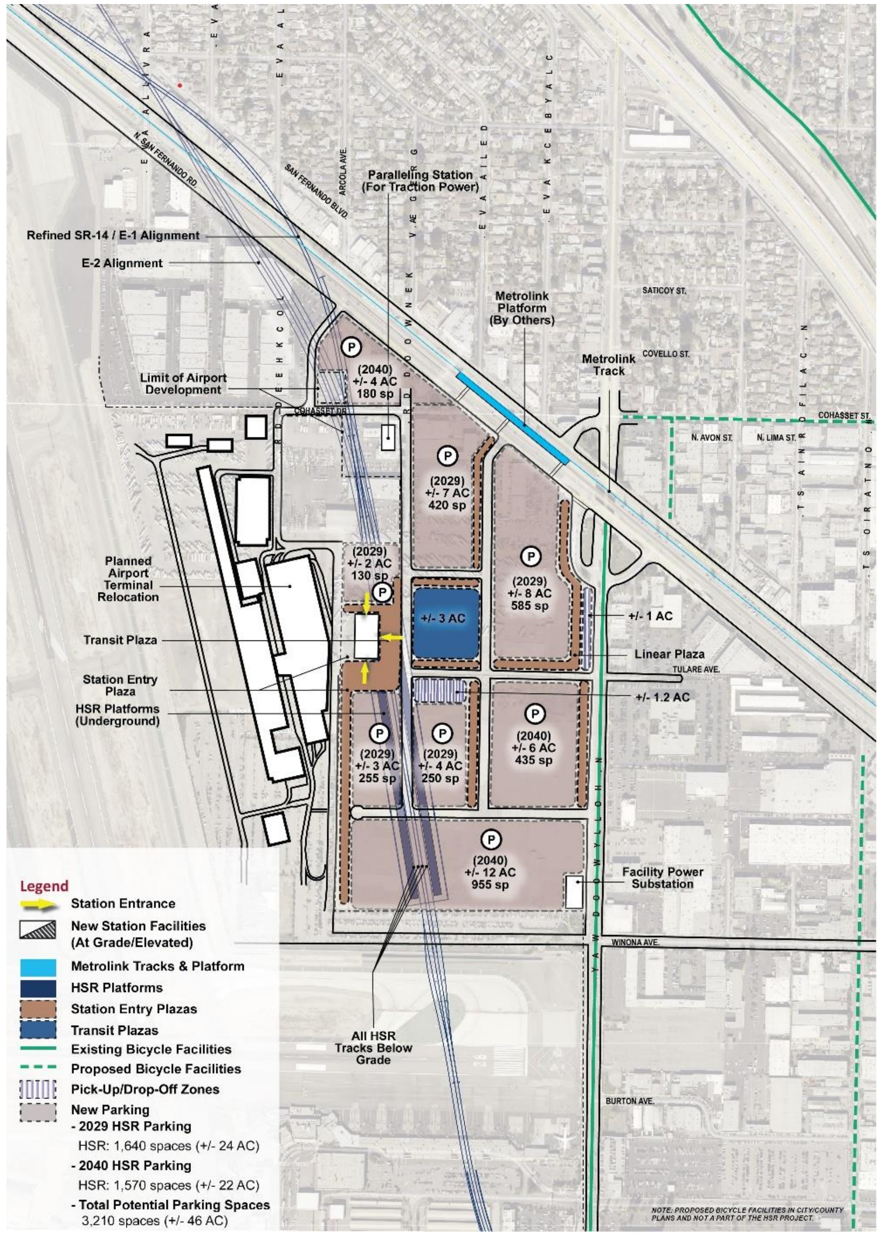
- Passenger boarding and alighting platforms
- Station head house with ticketing, waiting areas, passenger amenities, vertical circulation, administration and employee areas, and baggage and freight-handling service
- Vehicle parking (short-term and long-term)
- Pick-up and drop-off areas
- Motorcycle/scooter parking
- Bicycle parking
- Waiting areas and queuing space for taxis and shuttle buses
- Pedestrian walkway connections

2.3.1 Burbank Airport Station

The Burbank Airport Station site would be located west of Hollywood Way and east of Hollywood Burbank Airport. The airport and ancillary properties occupy much of the land south of the Burbank Airport Station site, while industrial and light industrial land uses are located to the east and residential land uses are found north of the Burbank Airport Station site. Interstate 5 runs parallel to the station site, approximately 0.25 mile north of the proposed Metrolink platform.

The Burbank Airport Station would have both underground and aboveground facilities that would span approximately 70 acres. Station facilities would include train boarding platforms, a station building (that would house ticketing areas, passenger waiting areas, restrooms, and related facilities), pick-up/drop-off facilities for private autos, a transit center for buses and shuttles, and surface parking areas. Underground portions of the station would be beneath Cohasset Street, along which runs the boundary between the City of Los Angeles to the north and the City of Burbank to the south. There would be two HSR tracks at the station.

The Burbank Airport Station would have up to 3,200 surface parking spaces. About 2,980 spaces would be located between the proposed Replacement Terminal and N Hollywood Way. An additional 220 spaces would be located in surface lots in the area bounded by Lockheed Drive to the west, Cohasset Street to the south, and N San Fernando Boulevard to the north and east. The preliminary station layout concept plan is shown on Figure 2-13. The Burbank to Los Angeles Project Section EIR/EIS analyzes the Burbank Airport Station project footprint displayed on Figure 2-13 as permanently impacted because no additional temporary construction easements are identified beyond the permanent area required to construct, operate, and maintain the station. This is the assumption based on the current level of design.



Source: California High-Speed Rail Authority (2019)

Figure 2-13 Preliminary Station Concept Layout Plan, Burbank Airport Station

2.3.2 Los Angeles Union Station

The existing LAUS campus and surrounding tracks are being reconfigured as a part of the Metro Link Union Station (Link US) [5] Project. The Metro Link US Project would reconfigure the station entry tracks from north of Mission Junction and construct an elevated structure through the station arrival and boarding area, which would extend south over U.S. Route 101 and come back to grade near First Street. Reconfiguration would occur over two construction phases. The first phase would include an elevated structure for non-HSR passenger rail operators between Vignes Street and First Street. The second phase would add additional tracks to the structure for use by HSR. The Metro Link US EIR/EIS, on which the Authority is a cooperating agency, would evaluate these changes, along with an expanded passenger concourse area and changes to the Metro Gold Line. These changes would be completed prior to the introduction of HSR service.

While Metro would environmentally clear and construct the trackwork and new passenger concourse, the HSR project would require additional modifications within the Link US area. HSR improvements include raising the platform heights and installing an overhead contact system. The Burbank to Los Angeles Project EIR/EIS evaluates these modifications, as well as potential increases in traffic associated with the introduction of HSR service.

The proposed HSR station at LAUS would include up to four HSR tracks and two 870-foot platforms (with the possibility of extending to 1,000 feet). The HSR system would share passenger facilities, such as parking and pick-up/drop-off, with other operators. HSR would require 1,180 parking spaces in 2029 and 2,010 spaces in 2040. This new demand may be met by existing underutilized parking supply within 0.5 mile of LAUS. This parking would be shared with other LAUS service providers and businesses.

[5] Link US will transform LAUS from a “stub-end” station to a “run-through” station by extending tracks south over U.S. Route 101. The project will add a new passenger concourse that will provide improved operational flexibility for rail service. The Draft FIR is available at: https://www.metro.net/projects/link-us/final-ei-report/.

Sources: California High-Speed Rail Authority (2019); Los Angeles Metropolitan Transportation Authority (2018)

Figure 2-14 Preliminary Station Elements Plan, Los Angeles Union Station

2.4 Maintenance of Infrastructure

The California HSR System includes four types of maintenance facilities: maintenance of infrastructure facilities (MOIF), Maintenance of infrastructure siding facilities (MOIS), heavy maintenance facilities, and light maintenance facilities (LMF).[6] The California HSR System would require one heavy maintenance facility for the system, located in the Central Valley. The design and spacing of maintenance facilities along the HSR system do not require the Burbank to Los Angeles Project Section to include any of the maintenance facilities within the limits of the project section.

For purposes of environmental analysis, the Authority has defined each project section to have the capability to operate as a stand-alone project in the event that other project sections of the

[6] Maintenance facilities are described in the Authority's *Summary of Requirements for O&M Facilities* (2013).

HSR system are not constructed. Because this project section does not provide a heavy maintenance facility or MOIF, an independent contractor would need to be retained to handle all maintenance functions for vehicles and infrastructure if this project section were built as a stand-alone project for purposes of independent utility. Independent utility is discussed further in Section 2.9.

2.4.1 Maintenance of Infrastructure Facilities

The HSR system infrastructure will be maintained from regional MOIFs located at approximately 150-mile intervals. Each MOIF is estimated to be approximately 28 acres in size and would provide a location for regional maintenance machinery servicing storage, materials storage, and maintenance and administration. The MOIFs could be co-located with the MOIS within each 75-mile segment. The MOIFs would be located outside of the Burbank to Los Angeles Project Section.

2.4.2 Maintenance of Infrastructure Sidings

The MOISs would be centrally located within the 75-mile maintenance sections on either side of each MOIF. Each MOIS would support MOIF activities by providing a location for the layover of maintenance of infrastructure equipment and temporary storage for materials. The MOIS is estimated to be about 4 acres in size. The MOISs would be located outside of the Burbank to Los Angeles Project Section.

2.4.3 Heavy Maintenance Facility

Only one heavy maintenance facility is required for the HSR system, and it would be within either the Merced to Fresno Project Section or the Fresno to Bakersfield Project Section. The heavy maintenance facility would include all activities associated with train fleet assembly, disassembly, and complete rehabilitation; all on-board components of the trainsets; and overnight layover accommodations and servicing facilities. The site would include a maintenance shop, a yard Operations Control Center building, one traction power substation (TPSS), other support facilities, and a train interior cleaning platform.

2.4.4 Light Maintenance Facility

An LMF would be used for all activities associated with fleet storage, cleaning, repair, overnight layover accommodations, and servicing facilities. The LMF closest to the Burbank to Los Angeles Project Section would be sited in proximity to LAUS but within the Los Angeles to Anaheim Project Section, and would likely support the following functions:

- **Train Storage:** Some trains would be stored at the LMF prior to start of revenue service.
- **Examinations in Service:** Examinations would include inspections, tests, verifications, and quick replacement of certain train components on the train.
- **Inspection:** Periodic inspections would be part of the planned preventive maintenance program requiring specialized equipment and facilities.

The LMF site will be sized to support the level of daily revenue service dispatched by the nearby terminal at the start of each revenue service day. The Authority defines three levels of maintenance that can be performed at an LMF:

- **Level I:** Daily inspections, pre-departure cleaning, and testing
- **Level II:** Monthly inspections
- **Level III:** Quarterly inspections, including wheel-truing

A Level I LMF is proposed on the west bank of the Los Angeles River at the existing Amtrak Railroad Yard. The facility would be where the current BNSF Railway storage tracks are located and would require their relocation.

2.5 Ancillary and Support Facilities

2.5.1 Electrification

Trains on the California HSR System would draw power from California's existing electricity grid distributed via an overhead contact system. The Burbank to Los Angeles Project Section would not include the construction of a separate power source, although it would include the extension of power lines from potential TPSSs to a series of independently owned power substations positioned along the HSR corridor if necessary. The transformation and distribution of electricity would occur in three types of stations:

- TPSSs transform high-voltage electricity supplied by public utilities to the train operating voltage. TPSSs would be adjacent to existing utility transmission lines and the right-of-way, and would be located approximately every 30 miles along the HSR system route.
- Switching stations connect and balance the electrical load between tracks, and switch overhead contact system power on or off to tracks in the event of a power outage or emergency. Switching stations would be midway between, and approximately 15 miles from, the nearest TPSSs. Each switching station would be 120x80 feet and be adjacent to the HSR right-of-way.
- Paralleling stations, or autotransformer stations, provide voltage stabilization and equalize current flow. Paralleling stations would be located approximately every 5 miles between the TPSSs and the switching stations. Each paralleling station would approximately be 100x80 feet and located adjacent to the right-of-way.

Table 2-2 lists the proposed switching station and paralleling station sites within the Burbank to Los Angeles Project Section. A TPSS is not required for the Burbank to Los Angeles Project Section because of the HSR system's facilities spacing requirements. The Burbank to Los Angeles Project Section would be able to use the TPSSs within the Palmdale to Burbank Project Section and/or Los Angeles to Anaheim Project Section. In the event the other project sections of the HSR system are not constructed, a standalone TPSS would be required within the Burbank to Los Angeles Project Section for purposes of independent utility. Independent utility is discussed further in Section 2.8.

Table 2-2 Traction Power Facility Locations for the Burbank to Los Angeles Project Section

Type of Facility	Location
Paralleling Station	Los Angeles, south of Main Street between railroad right-of-way and Los Angeles River
Switching Station	Los Angeles, south of Verdant Street and west of railroad right-of-way

Source: California High-Speed Rail Authority and Federal Railroad Administration (2019)

2.5.2 Signaling and Train-Control Elements

To reduce the safety risks associated with freight and passenger trains, the National Transportation Safety Board, FRA, and other agencies have mandated Positive Train Control (PTC). PTC is a train safety system designed to automatically implement safety protocols and provide communication with other trains to reduce the risk of a potential collision. The U.S. Rail Safety Improvement Act of 2008 requires the implementation of PTC technology across most railroad systems; in October 2015, Congress extended the deadline for implementation to December 31, 2018. The FRA published the Final Rule regarding PTC regulations on January 15, 2010.

Communication towers and ancillary facilities are included in the Burbank to Los Angeles Project Section to implement the FRA PTC requirements. PTC infrastructure consists of integrated command, control, communications, and information systems for controlling train movements that improve railroad safety by significantly reducing the probability of collisions between trains, casualties to roadway workers and equipment, and over-speed accidents. PTC is especially important in “blended”[7] corridors, such as in the Burbank to Los Angeles Project Section, where passenger and freight trains need to share the same tracks safely.

PTC for the HSR project would use a radio-based communications network that would include a fiber-optic backbone and communications towers approximately every 2 to 3 miles, depending on the terrain and selected radio frequency. The towers would be located in the fenced HSR corridor in a fenced area of approximately 20x15 feet, including a 10x8-foot communications shelter and a 6- to 8-foot-diameter, 100-foot-tall communications pole. These communications facilities could be co-located within the TPSSs. Where communications towers cannot be located with TPSSs or other HSR facilities, the communications facilities would be located near the HSR corridor in a fenced area of approximately 20 feet by 15 feet.

2.6 Early Action Projects

As described in the 2016 Business Plan, the Authority has made a commitment to invest in regionally significant connectivity projects in order to provide early benefits to transit riders and local communities while laying a solid foundation for the HSR system. These early actions will be made in collaboration with local and regional agencies. These types of projects include grade separations and improvements at regional passenger rail stations, which increase capacity, improve safety, and provide immediate benefits to freight and passenger rail operations. Local and regional agencies may take the lead on coordinating the construction of these early action projects. Therefore, they are described in further detail below and are analyzed within the Burbank to Los Angeles Project Section EIR/EIS to allow the agencies, as Responsible Agencies under CEQA, to adopt the findings and mitigation measures as needed to construct these projects.

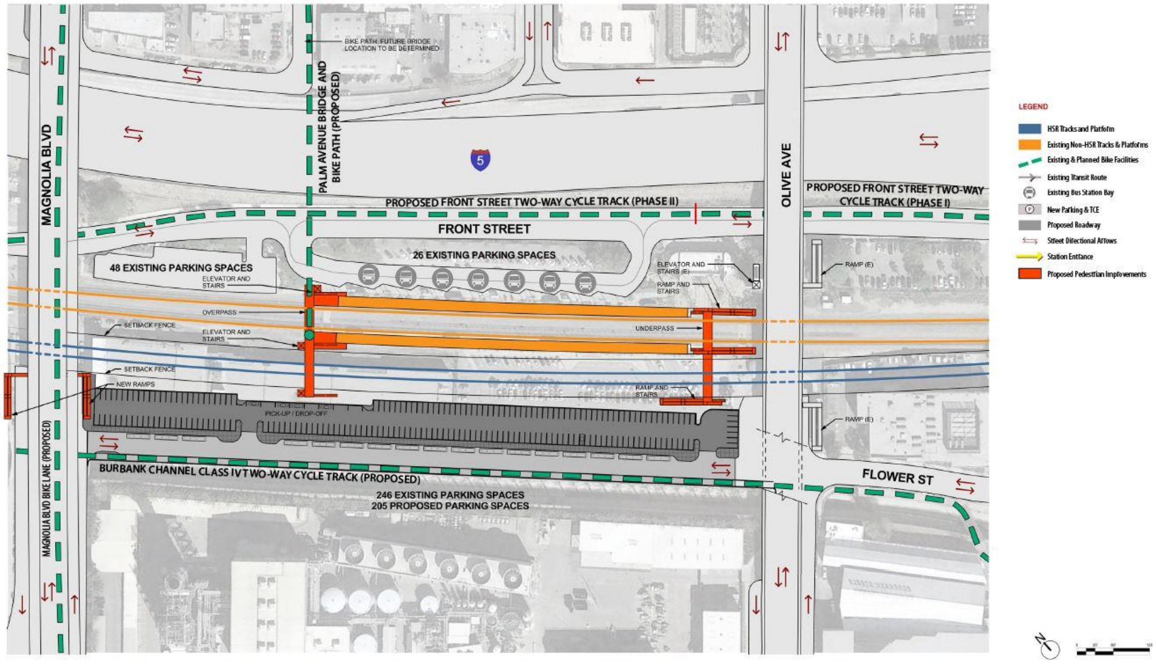
2.6.1 Downtown Burbank Metrolink Station

Although the HSR system will not serve the Downtown Burbank Metrolink Station, modifications at the station would be required to ensure continued operations of existing operators. The HSR tracks would be located within the existing parking lot west of the southbound platforms; the platforms and existing Metrolink tracks would not change. The parking would be relocated to between Magnolia Boulevard and Olive Avenue, and Flower Street would be extended from where it currently ends at the south side of the Metrolink Station. Pedestrian bridges would be provided for passengers to cross over the HSR tracks to access the Metrolink platforms. Other accessibility improvements would include additional vehicle parking, bus parking, and bicycle pathways. Figure 2-15 shows the proposed site plan for the Downtown Burbank Metrolink Station.

2.6.2 Sonora Avenue Grade Separation

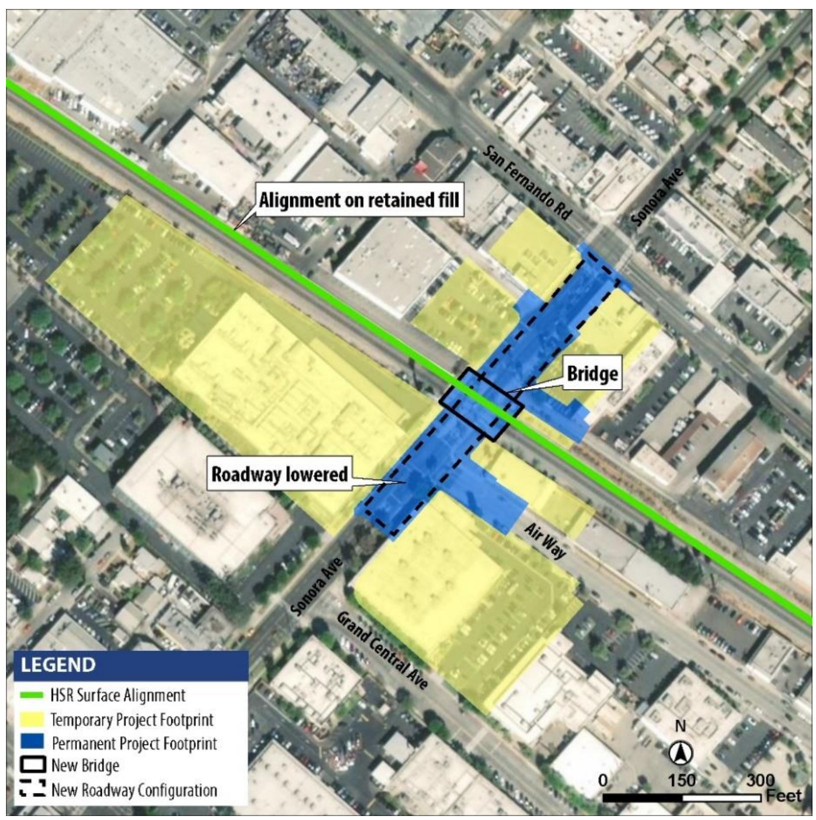
Sonora Avenue is an existing at-grade crossing. The existing roadway configuration consists of two traffic lanes in both the eastbound and westbound directions. The Burbank to Los Angeles Project Section proposes a “hybrid” grade separation, with Sonora Avenue slightly depressed and the HSR alignment and non-electrified tracks raised on a retained-fill structure. A 10-foot-wide median would be added and the lanes would be narrowed, so the overall width of Sonora Avenue would not change. Sonora Avenue would be lowered in elevation between Air Way and San Fernando Road, and the lowest point of the undercrossing would be approximately 10 feet below the original grade. The height of the new retained-fill structure would be approximately 28 feet. Figure 2-16 shows the temporary and permanent project footprint areas.

[7] California HSR Project Business Plans (http://www.hsr.ca.gov/About/Business_Plans/) suggest blended railroad systems and operations. These terms refer to integrating the HSR system with existing intercity, and commuter and regional rail systems through coordinated infrastructure (blended systems) and scheduling, ticketing, and other means (blended operations).



Source: California High-Speed Rail Authority (2019)

Figure 2-15 Downtown Burbank Metrolink Station Site Plan



Source: California High-Speed Rail Authority (2019)

Figure 2-16 Sonora Avenue Grade Separation Footprint

2.6.3 Grandview Avenue Grade Separation

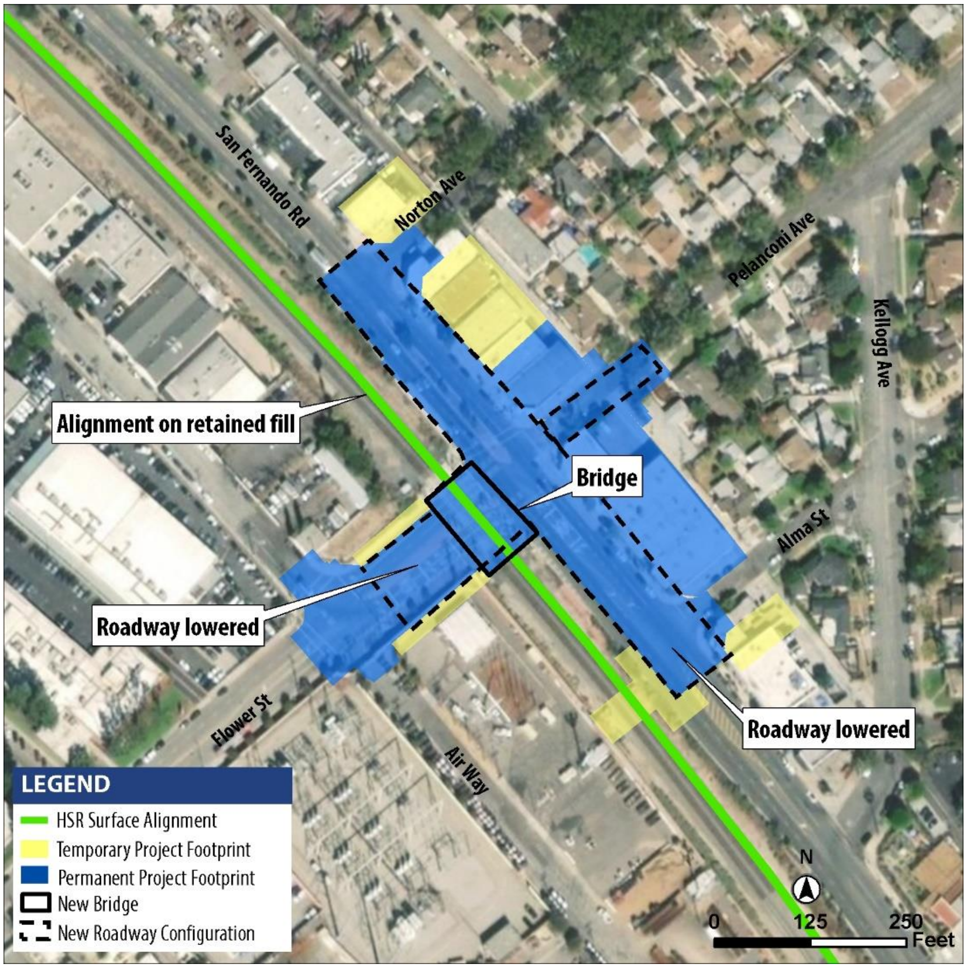
Grandview Avenue is an existing at-grade crossing. The existing roadway configuration consists of three traffic lanes in both the eastbound and westbound directions. The Burbank to Los Angeles Project Section proposes a “hybrid” grade separation, with Grandview Avenue slightly depressed and the HSR alignment and non-electrified tracks raised on retained fill. Grandview Avenue would be lowered in elevation between Air Way and San Fernando Road, and the lowest point of the undercrossing would be approximately 3 feet below original grade. The lanes and overall width of Grandview Avenue would not change. The height of the new retained-fill structure would be approximately 30 feet. Figure 2-17 shows the temporary and permanent project footprint areas.

Source: California High-Speed Rail Authority (2019)

Figure 2-17 Grandview Avenue Grade Separation Footprint

2.6.4 Flower Street Grade Separation

Flower Street is an existing at-grade crossing, with Flower Street ending in a T-shaped intersection with San Fernando Road, which runs parallel on the east side of the railroad right-of-way. Existing Flower Street consists of two traffic lanes in both the westbound and eastbound directions, with a right-turn-only lane in the westbound direction. The Burbank to Los Angeles Project Section proposes a “hybrid” grade separation, with Flower Street and San Fernando Road slightly depressed, and the HSR alignment and non-electrified tracks raised on a retained-fill structure. Flower Street would be lowered in elevation between Air Way and San Fernando Road, and the lowest point of the undercrossing would be approximately 10 feet below original grade. The existing median would be modified on Flower Street, and the overall width of Flower Street would remain the same. San Fernando Road would be lowered in grade between Norton Avenue and Alma Street, and Pelanconi Avenue would be extended to connect to San Fernando Road. The height of the new retained-fill structure would be approximately 28 feet. Figure 2-18 shows the temporary and permanent project footprint areas.



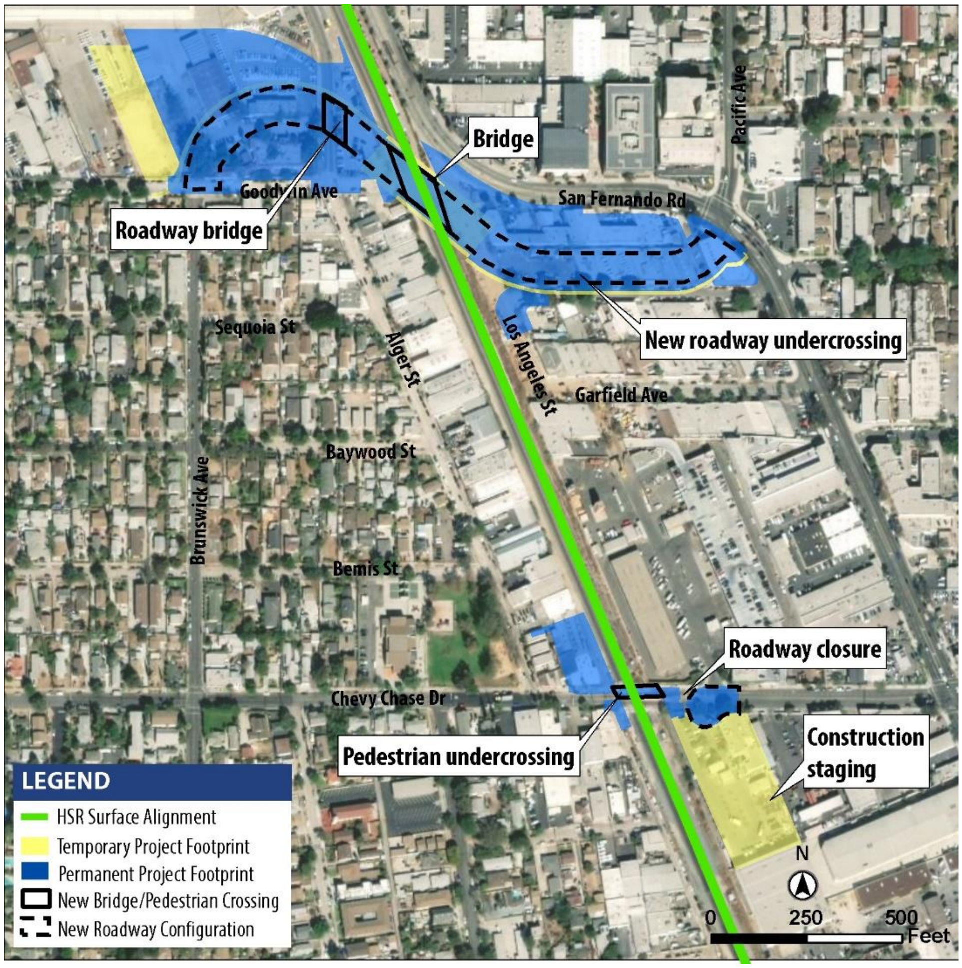
Source: California High-Speed Rail Authority (2019)

Figure 2-18 Flower Street Grade Separation Footprint

2.6.5 Goodwin Avenue/Chevy Chase Drive Grade Separation

There is currently no crossing at Goodwin Avenue, which ends in a cul-de-sac on the west side of the railroad right-of-way. The Burbank to Los Angeles Project Section proposes a grade separation, with Goodwin Avenue realigned and depressed to cross under a new railroad bridge supporting the HSR and non-electrified tracks. A new roadway bridge would also be required to carry Alger Street over the depressed Goodwin Avenue, connecting to W San Fernando Road. The new depressed roadway would curve north from Brunswick Avenue, cross under the new roadway and railroad bridges, and connect with Pacific Avenue on the east side of the railroad right-of-way. The lowest point of the undercrossing would be approximately 28 feet below original grade.

Chevy Chase Drive is an at-grade crossing. With the construction of a new grade separation at Goodwin Avenue, Chevy Chase Drive would be closed on either side of the rail crossing and a pedestrian undercrossing would be provided. Figure 2-19 shows the temporary and permanent project footprint areas for Goodwin Avenue and Chevy Chase Drive.



Source: California High-Speed Rail Authority (2019)

Figure 2-19 Goodwin Avenue Grade Separation

2.6.6 Main Street Grade Separation

Main Street is an existing at-grade crossing. It crosses the existing tracks at-grade on the west bank of the Los Angeles River, crosses over the river on a bridge, and then crosses the existing tracks at-grade on the east bank of the river. The existing bridge carries two traffic lanes in both directions. The Burbank to Los Angeles Project Section proposes a grade separation, with a new Main Street bridge spanning the tracks on the west bank, the Los Angeles River, and the tracks on the east bank. The new Main Street bridge would be 86 feet wide and 75 feet high at its highest point over the Los Angeles River and would place three columns within the river channel. Main Street would be raised in elevation, starting from just east of Sotello Street on the west side of the Los Angeles River. The new bridge would come down to grade at Clover Street on the east side of the Los Angeles River. Several roadways on the east side of the Los Angeles River would be reconfigured, including Albion Street, Lamar Street, Avenue 17, and Clover Street. The existing Main Street bridge would not be modified, but it would be closed to public access. Figure 2-20 shows the temporary and permanent project footprint areas.

Source: California High-Speed Rail Authority (2019)

Figure 2-20 Main Street Grade Separation Footprint

2.7 Project Construction

For the Burbank to Los Angeles Project Section of the California HSR System, specific construction elements would include at-grade and underground track, grade-separated roadway crossings, retaining walls, and installation of a PTC system. Surface track sections would be built using conventional railroad construction techniques. A typical construction sequence includes clearing, grubbing, grading, and compacting the railbed; applying crushed rock ballast; laying track; and installing electrical and communications systems. The at-grade track would be laid on an earthen railbed topped with rock ballast approximately 3 feet off the ground. Fill and ballast for the railbed would be obtained from permitted borrow sites and quarries.

Retaining walls are used when it is necessary to transition between an at-grade and elevated profile. In this project section, retained fill would be used between Western Avenue and SR 134. The tracks would be raised in elevation on a retained-fill platform made of reinforced walls, much like a freeway ramp. Short retaining walls would have a similar effect and would protect the adjacent properties from a slope extending beyond the proposed rail right-of-way.

The preferred construction method for the tunnel alignment underneath the Burbank Airport runway is the Sequential Excavation Methods. The tunnel alignment south of the airport would be constructed using cut-and-cover.

Pre-construction activities would be conducted during final design and would include geotechnical investigations, interpretation of anticipated ground behavior and ground support requirements, identification of staging areas, initiation of site preparation and demolition, relocation of utilities, and implementation of temporary, long-term, and permanent road closures. Additional studies and investigations to develop construction requirements and worksite traffic control plans would be conducted as needed.

Major construction activities for the Burbank to Los Angeles Project Section would include earthwork and excavation support, systems construction, bridge and aerial structure construction, and railway systems construction (including trackwork, traction electrification, signaling, and communications).

During peak construction periods, work is envisioned to be underway at several locations along the route simultaneously, with overlapping construction of various project elements. Working hours and the number of workers present at any time would vary depending on the activities being performed but could be expected to extend to 24 hours per day, seven days per week.

2.8 Independent Utility of the Burbank to Los Angeles Project Section

The Burbank to Los Angeles Project Section would have independent utility if it is able to operate as a standalone project in the event the other project sections of the HSR system are not constructed. As none of the four types of maintenance facilities would be located within the limits of the Burbank to Los Angeles Project Section, all maintenance functions for vehicles and infrastructure would be handled through an independent contractor to achieve independent utility. For power, one potential location for a TPSS has been preliminarily identified within the project section. Because the addition of a TPSS would alter the spacing of the other systems facilities, further design and environmental study would be required to environmentally clear the TPSS site and the alteration of the other systems facilities in the absence of the Palmdale to Burbank and Los Angeles to Anaheim project sections being built and operated.

Any electrical interconnections between a potential future TPSS site and existing utility providers would also have to be environmentally evaluated and cleared in subsequent documentation.

2.9 Operations of the Burbank to Los Angeles Project Section

The conceptual HSR service plan for Phase 1, starting in 2029, begins with service between Los Angeles/Anaheim running through the Central Valley from Bakersfield to Merced, and traveling northwest into the Bay Area. Subsequent sections in Phase 2 of the HSR system include a southern extension from Los Angeles to San Diego and an extension from Merced to north of Sacramento. These extensions do not have an anticipated implementation date.

Currently, the Metrolink Ventura and Antelope Valley Lines, Amtrak Pacific Surfliner and Coast Starlight, and UPRR freight trains operate within the Burbank to Los Angeles Project Section. As the proposed HSR Build Alternative is within the active LOSSAN passenger and freight rail corridor, all existing operators would have to change their operation patterns and frequency. New and realigned tracks would change the tracks on which the various users operate, with passenger rail and freight trains shifted closer to the east side of the right-of-way. With the introduction of HSR service, the proposed general operational characteristics are shown in Table 2-3.

Table 2-3 Existing and Future Trains per Day in the Los Angeles–San Diego–San Luis Obispo Rail Corridor Within the Burbank and Los Angeles Project Section

Operator	2016 Existing Conditions	2029 Opening Day	2040 Horizon Year
California High-Speed Rail Authority[1]	N/A	196	196
Metrolink[2]	61	99	99
Amtrak[3]	12	16	18
UPRR[4]	11	18	23

[1] 2029 Opening Day and 2040 Horizon Year projections are from the California High-Speed Rail Authority's "Year 2029 and Year 2040 Concept Timetable for EIR/EIS Analysis."
[2] Existing Conditions data are from the 2016 Metrolink Schedule (effective October 3, 2016); 2029 Opening Day projections are extrapolated from the 2016 Metrolink 10-Year Strategic Plan, "Growth Scenario 2: Overlay of Additional Service Patterns."
[3] Existing Conditions data are from the 2016 LOSSAN Corridor Schedule; 2029 Opening Day projections are extrapolated from 2012 LOSSAN Corridorwide Strategic Implementation Plan "Long-Term Operations Analysis" (increase of approximately one train every four years for the Amtrak Pacific Surfliner and no growth for the Amtrak Coast Starlight between Hollywood Burbank Airport and LAUS).
[4] Existing Conditions data are from the 2012 LOSSAN Corridorwide Strategic Implementation Plan "Long-Term Operations Analysis"; 2029 Opening Day projections are extrapolated from the 2012 LOSSAN Corridorwide Strategic Implementation Plan "Long-Term Operations Analysis" (increase of approximately one train every two years for UPRR between Hollywood Burbank Airport and LAUS).
Amtrak = National Railroad Passenger Corporation
LAUS = Los Angeles Union Station
N/A = not applicable
UPRR = Union Pacific Railroad

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3 LAWS, REGULATIONS, AND ORDERS

This section describes the federal, state, and local laws, regulations, orders, and plans germane to paleontological resources within the Burbank to Los Angeles Project Section.

3.1 Federal

A project must comply with one or more federal regulations concerning paleontological resources, if (1) the project involves land under the jurisdiction of a federal agency, (2) a federal agency has oversight on the project, and/or (3) a permit, license, authorization, or funding from a federal agency is required to complete the project. A brief discussion of the federal regulations involving paleontological resources that are applicable to this project is included below.

3.1.1 National Environmental Policy Act of 1969 (NEPA) (42 United States Code § 4321-4375)

NEPA established a national policy for the protection, promotion, enhancement, and understanding of the environment and created the Council on Environmental Quality. As part of this act, Section 101(b)(4) (42 U.S.C. 4331) seeks to "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice." NEPA requires that the environmental effects of a proposed federal project or action be evaluated, and regulations for implementing this evaluation are found in Title 40 of the Code of Federal Regulations (C.F.R.) Section 1500-1508. Because a federal agency (i.e., the FRA) has oversight on this project, compliance with NEPA regulations is required.

3.1.2 American Antiquities Act of 1906 (16 United States Code § 431–433)

The American Antiquities Act was enacted with the primary goal of protecting cultural resources in the U.S. As such, it prohibits appropriation, excavation, injury, or destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government. The act also established penalties for such actions and sets forth a permit requirement for collection of antiquities on federally owned lands.

Neither the American Antiquities Act itself, nor its implementing regulations (43 C.F.R. Part 3), specifically mention paleontological resources. However, many federal agencies have interpreted objects of antiquity to include fossils. Consequently, the American Antiquities Act represents an early cornerstone for efforts to protect the nation's paleontological resources. Because the railroad facilities along the existing corridor are overseen by a federal agency, (i.e., the FRA), the provisions in this act are applicable to this project.

3.2 State

Several state regulations provide for the protection of paleontological resources, and the three that are applicable to this project are discussed below.

3.2.1 California Environmental Quality Act (California Public Resources Code, § 21000 et seq.) and California Environmental Quality Act Guidelines Protection for Paleontological Resources

The purpose of CEQA is to provide a statewide policy of environmental protection. As part of this protection, state and local agencies are required to analyze, disclose, and, when feasible, mitigate the environmental impacts of, or find alternatives to, proposed projects.

The State CEQA Guidelines (California Code of Regulations 15000 et seq.) provide regulations for the implementation of CEQA and include more specific direction on the process of documenting, analyzing, disclosing, and mitigating environmental impacts of a project. To assist in this process, Appendix G of the State CEQA Guidelines provides a sample checklist form that may be used to identify and explain the degree of impact a project will have on a variety of environmental aspects, including paleontological resources (Section V[c]).

As stated in Section 15002(b)(1-3) of the State CEQA Guidelines, CEQA applies to governmental action, including activities that are undertaken by, financed by, or require approval from a governmental agency. Because this project is undertaken by governmental agencies, CEQA regulations apply.

3.2.2 California Public Resources Code

This state law protects historic, archaeological, and paleontological resources on public lands within California and establishes criminal and civil penalties for violations.

Specifically, Public Resources Code Section 5097.5 states:

> "(a) No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.
>
> (b) As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

3.2.3 California Administrative Code (California Code of Regulations, Title 14, §§ 4307-4309)

These sections of the California Administrative Code relating to the State Division of Beaches and Parks afford protection to geologic features and "paleontological materials" but also assign the director of the state park system the authority to issue permits for activities that may result in damage to such resources, if the activities are for state park purposes and are in the interest of the state park system. Because this section of the project will pass through two state parks, these regulations apply.

3.3 Regional and Local

Various communities, cities, and counties have passed resolutions related to paleontological resources within their jurisdictions. These resolutions are usually included in their General Plans, which provide additional guidance on assessment and treatment measures for projects subject to CEQA compliance. Provided below is a summary of any policies regarding paleontological resources for Los Angeles County and the cities along the Burbank to Los Angeles Project Section alignment.

3.3.1 Los Angeles County General Plan

The Los Angeles County General Plan (Los Angeles County 2012) sets forth the goals, policies, and programs the County uses to manage future growth and land use. The Conservation and Natural Resources Element (Chapter 6) of this General Plan contains the following goal and policies designed to protect paleontological resources within the County (p. 157):

Goal C/NR 14: Protected historic, cultural, and paleontological resources.

- **Policy C/NR 14.1.** Mitigate all 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 carries out for development on or near historic, cultural, and paleontological resources.

3.3.2 City of Burbank General Plan

One of the goals of the Open Space and Conservation Element of the General Plan for the City of Burbank (City of Burbank 2013) is that “Burbank’s open space areas and mountain ranges are protected spaces supporting important habitat, recreation, and resource conservation” (p. 6-4). In order to meet this goal, the general plan includes the following policy and program actions regarding paleontological resources:

> **Policy 6.1:** Recognize and maintain cultural, historical, archaeological, and paleontological structure and sites essential for community life and identity
>
> **Program OSC-7:** Implement the following actions during development review and the CEQA review process to achieve Open Space and Conservation Element goals and policies:
>
> If paleontological resources are discovered during earthmoving activities associates with future development projects, the construction crew shall immediately cease work in the vicinity of the find and notify the City. The project applicant(s) shall retain a qualified paleontologist to evaluate the resource and prepare a recovery plan in accordance with Society of Vertebrate Paleontology guidelines ([2010]). The recovery plan shall include, but is not limited to, a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan that are determined by the lead agency to be necessary and feasible shall be implemented before construction activities can resume at the site where paleontological resources were discovered.

3.3.3 City of Glendale General Plan

The Open Space and Conservation Element of the General Plan for the City of Glendale outlines ten policies regarding cultural and natural resources that guide decision-making and future development (City of Glendale 1993). The following policy addresses paleontological resources:

> **Policy 3:** Cultural, historical, archaeological, and paleontological structures and sites are essential to community life and identity and should be recognized and maintained.

This policy recognizes the value and contribution to the City of Glendale that its heritage makes, providing both a bridge to the past and a sense of place through the judicious management of cultural and natural resources.

3.3.4 City of Los Angeles General Plan

The Conservation Element of the City of Los Angeles General Plan identifies natural and cultural resources within the City of Los Angeles and describes objectives, policies, and programs for their protection, preservation, and management (City of Los Angeles 2001). Chapter II: Resource Conservation and Management, Section 3: Archaeological and Paleontological discusses protection of paleontological resources and states, in part:

> “Pursuant to CEQA, if a land development project is within a potentially significant paleontological area, the developer is required to contact a bona fide paleontologist to arrange for assessment of the potential impact and mitigation of potential disruption of or damage to the site. If significant paleontological resources are uncovered during project execution, authorities are to be notified and the designated paleontologist may order excavations stopped, within

> reasonable time limits, to enable assessment, removal or protection of the resources." (p. II-5)

This section also indicates that the City is responsible for protecting paleontological resources and outlines the following objective, policy, and program regarding paleontological resources (p. II-5, II-6):

> **Objective:** protect the City's archaeological and paleontological resources for historical, cultural, 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.
>
> **Program:** permit processing, monitoring, enforcement and periodic revision of regulations and procedures.

3.3.5 Local Jurisdiction Ordinances and Codes

There are no ordinances or municipal codes covering paleontological resources in the County or the cities of Burbank, Glendale, and Los Angeles.

3.4 Professional Standards

The following discussion of professional standards for assessing project impacts to paleontological resources, determining appropriate paleontological mitigation measures, and implementing paleontological mitigation programs is based on the standards and procedures developed by the Society of Vertebrate Paleontology (SVP) (SVP 2010). Additional information regarding professional standards developed by the SVP can be found in Appendices A and B.

All aspects of paleontological assessment and mitigation should be conducted or overseen by a qualified professional paleontologist, who is considered to have a graduate degree in paleontology or geology and/or a publication record in peer reviewed journals; demonstrated competence in field techniques, preparation, identification, curation, and reporting; at least two full years of professional experience in the field; proficiency in recognizing fossils in the field and determining their significance; expertise in local geology, stratigraphy, and biostratigraphy; and experience collecting vertebrate fossils in the field. Paleontological monitoring should be conducted by monitors who have a B.S. or B.A. in geology or paleontology and one year of experience in the field or an A.S., A.A., or enrollment in upper division courses and pursuing a degree in paleontology or geology and two years of experience in the field.

Standard procedures for paleontological resource impact assessment and mitigation include an assessment before construction starts; a paleontological resource mitigation plan; adequate monitoring; macrofossil and microfossil salvage or avoidance as needed; fossil preparation, identification, cataloging, analysis, and storage; and reporting.

The paleontological assessment should be prepared by a qualified professional paleontologist and include a literature search, a records search, consultation with others, a field survey, and agency confirmation. The literature search consists of a review of pertinent geological and paleontological literature, such as geologic maps, journal articles, geotechnical reports, and/or borehole logs, all of which provide a baseline for evaluating the geological and paleontological context of the project site. The records search involves reviewing the fossil locality and specimen records from local or regional institutions in order to determine what, if any, fossil have been recovered from the deposits within the project site. This background data can be supplemented by consulting with other paleontologists or geologists who are knowledgeable about the area being developed. A survey of the project site is undertaken to re-examine any previously recorded localities, collect any resources that may be present at the surface, and delimit the boundaries of the geologic units within the site. All of this information is used to determine the potential for project development to affect any paleontological resources that may be encountered within the project site, to make recommendations for any necessary mitigation, and to prepare the paleontological assessment report. The lead agency then reviews the assessment report to ensure it is adequate.

Prior to construction, if the paleontological assessment recommends mitigation, a paleontological mitigation plan should be prepared by a qualified professional paleontologist, who will then oversee its implementation. This plan should outline the mitigation requirements, including procedures for monitoring; methods of fossil recovery, preparation, and identification; report preparation; and curation. It is useful to have a curation agreement with an appropriate repository in place prior to ground disturbance, although this agreement may be arranged if and when fossils are recovered. The project paleontologist should also attend a pre-construction meeting with representatives of the lead agency, the developer, and the contractors to explain the importance of fossils, the laws protecting fossils, the types of fossils that may be encountered, and the procedures to follow if fossils are encountered.

In very rare instances, paleontological mitigation may require avoidance or site protection when the fossil occurrence is so important that removal and salvage are unacceptable to all parties involved. However, generally paleontological mitigation involves paleontological monitoring during project excavation. In geologic units with high or undetermined paleontological sensitivity, paleontological monitoring should be conducted by a qualified paleontological monitor who is supervised by the professional paleontologist. In geologic units with low paleontological sensitivity, non-paleontologists may conduct the monitoring. If paleontological resources are encountered during grading activities, all activities in the vicinity of the discovery should stop until a qualified paleontologist can assess the scientific significance of the discovery and recommend the appropriate course of action. Paleontological monitors must be equipped with the proper tools and supplies to quickly and efficiently recover any significant resources discovered. If very large or abundant fossils are encountered, provisions should be made for additional staff to assist with recovery in order to minimize delays to the construction schedule.

Many fossils may be collected directly from the field without additional effort; however, some specimens may require protection in the form of a consolidation medium and/or plaster jacket prior to removal. Depending on the lithology of the geologic units within a project area, samples should also be taken for screen washing to recover microfossils and/or for other studies that may provide additional information. When fossils are recovered, the associated contextual data, including but not limited to, location, geologic unit, sediment type, disposition, and condition, should be recorded as well. Once collected, fossils must be prepared to the point of identification, which may require removal of excess sediment surrounding the fossil, consolidation, repairs, and/or stabilization. Identification should be made to the lowest taxonomic level possible, and an itemized list of the specimens recovered should be compiled.

At the conclusion of the monitoring program, a final report should be prepared. This report should include a summary of the purpose of the monitoring program, the field and laboratory methods employed, a review of the geology of the project area, and a description and itemized list of the fossils recovered. As needed, copies of field notes, locality forms, maps, and stratigraphic sections also should be included as appendices. Copies of the report should be submitted to the lead agency for review and to the curation repository.

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4 METHODS FOR EVALUATING EFFECTS

4.1 Definition of Resource Study Area

Following the *Environmental Methodology Guidelines Version 5* (Authority and FRA 2014), the RSA includes the project footprint plus a 150-foot buffer and the vertical extent of the geologic units below the horizontal RSA which project construction or operation may encounter. Section 2 describes the project footprint, Figure 4-1 shows an overview of the location of the entire RSA, and Appendix C provides a more detailed depiction. No subsurface exploration (i.e., geotechnical borings, logs, or other subsurface sampling) was conducted for this report.

4.2 Methodology for Effects Analysis

The methodology for effects analysis involves identification of the geologic units that are present within the surface and, to the extent possible, the subsurface of the RSA. Background research is then conducted to determine the potential for each geologic unit within the RSA to produce paleontological resources, as well as the scientific importance of those resources. An analysis of project development plans then determines the type, degree, and extent of project impacts on any potential resources. Lastly, the significance of project impacts is evaluated by determining the extent of damage or loss of scientifically important resources.

4.2.1 Resource Inventory Methods

Relevant geologic maps, geological and paleontological literature, and technical reports were reviewed to determine what geologic units are present within the RSA and whether fossils have been recovered from those or similar geologic units elsewhere in the region. For the purposes of this analysis, the region includes most of southern California to the extent necessary to demonstrate paleontological sensitivity. In this case, it includes the Los Angeles Basin and the Inland Empire because enough fossil material has been recovered from this region to demonstrate paleontological sensitivity. Geologic units may extend over large geographic areas and contain similar lithologies and fossils. Therefore, the literature review includes areas with the same or similar geologic units outside the RSA because fossils found in the same or similar deposits elsewhere in the region demonstrate the potential to find fossils during development of this project.

In March 2016, a locality search was conducted through the LACM. This search identified any vertebrate localities in the LACM records that are known from the RSA or from the same or similar deposits as those mapped in the RSA. The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources within the RSA and within the same or similar deposits as those mapped within the RSA. A copy of the locality search results letter from Dr. Samuel McLeod, Curator of Vertebrate Paleontology at LACM (March 4, 2016), is provided in Appendix D.

A field inspection was also conducted to identify any unrecorded paleontological resources and note the sediments exposed at the surface. In this way, impacts to existing, unrecorded paleontological material may be mitigated prior to the beginning of ground-disturbing activities, and portions of the project area that are more likely to contain paleontological resources may be identified. The field inspection included open and accessible areas of public right-of-way, such as parks and areas along streets or intersections, but access to private property was not available as of the writing of this report.

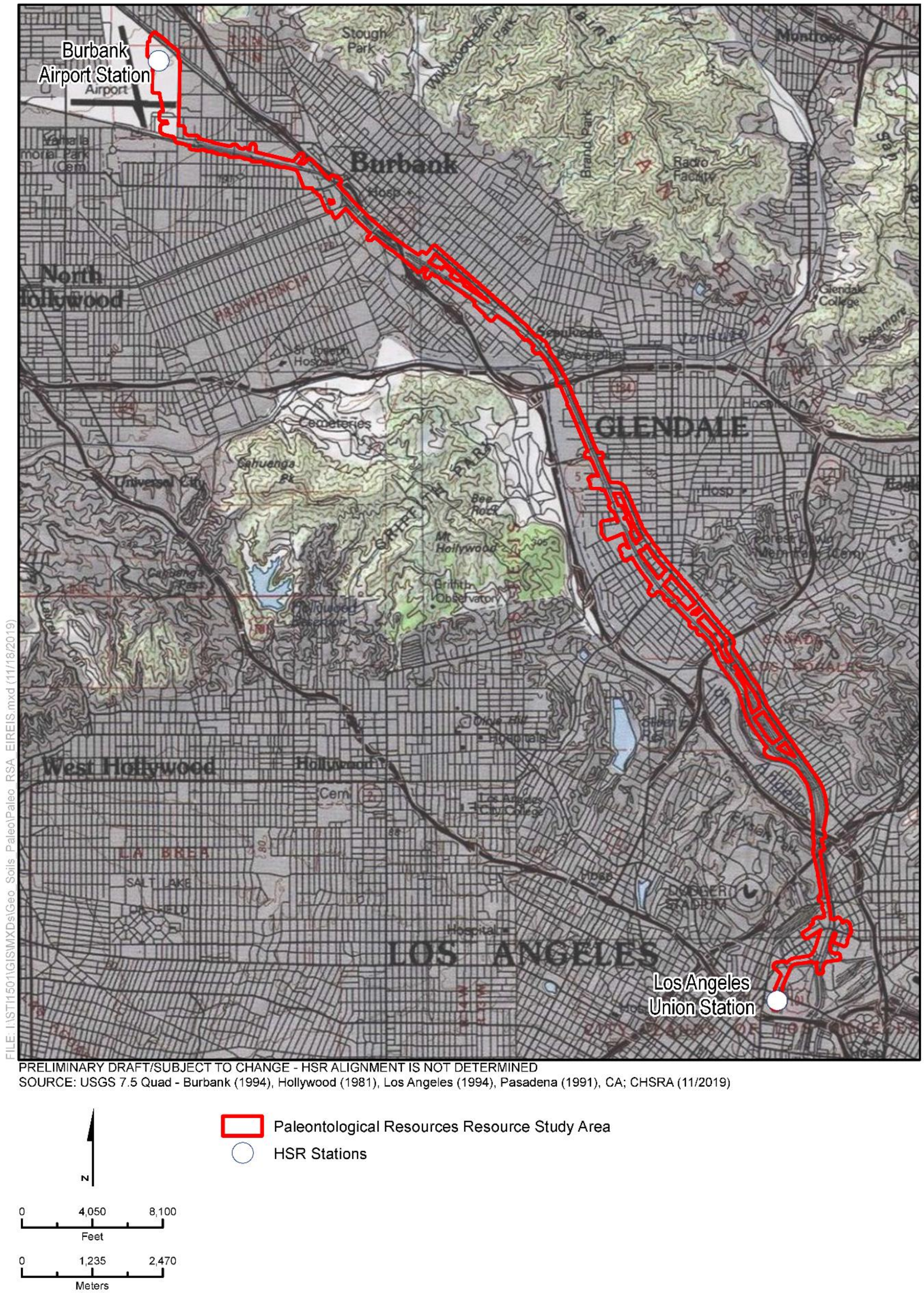

Figure 4-1 Location of the Resource Study Area

4.2.2 Society of Vertebrate Paleontology Categories of Sensitivity

According to the SVP (2010), paleontological sensitivity is the potential for the presence of scientifically significant, nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have potential for the presence of scientifically significant, nonrenewable paleontological resources, and review of available literature would further refine the potential of each geologic unit, formation, or facies. The SVP has four categories of potential, or sensitivity: High, Low, None, and Undetermined. If a geographic area or geological unit is classified as having undetermined potential for paleontological resources, studies must be undertaken to determine whether that geologic unit has a sensitivity of either High, Low, or None. These categories are described in more detail below.

- **High Potential:** Geologic units from which vertebrate or scientifically significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional scientifically significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to:
  - Sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras)
  - Some low-grade metamorphic rocks that contain scientifically significant paleontological resources anywhere within their geographical extent
  - Sedimentary geologic units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones)

  Paleontological potential consists of both

  (a) The potential for yielding abundant or scientifically significant vertebrate fossils or for yielding a few scientifically significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils, and

  (b) The importance of recovered evidence for new and scientifically significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data.

  Geologic units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and geologic units which may contain new vertebrate deposits, traces, or trackways, are also classified as having high potential.

- **Low Potential:** Geologic units that have a low potential for yielding scientifically significant fossils would be those poorly represented by fossil specimens in institutional collections, or (based on general scientific consensus) those where fossils are only preserved in rare circumstances. Thus, for low-potential geologic units, the presence of fossils is the exception, not the rule (e.g., basalt flows or Recent colluvium). Geologic units with low potential typically will not require impact mitigation measures to protect fossils.

- **No Potential:** Some geologic units have no potential to contain scientifically significant paleontological resources (e.g., high-grade metamorphic rocks [such as gneisses and schists] and plutonic igneous rocks [such as granites and diorites]). Geologic units with no potential require no protection or impact mitigation measures relative to paleontological resources.

- **Undetermined Potential:** Geologic units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine whether these geologic units have high or low potential to contain scientifically significant paleontological resources. A field survey by a qualified professional to specifically determine the paleontological resource potential of these geologic units is required before a Paleontological Resources

Impact Mitigation Program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

4.3 Determining Significance Under the National Environmental Policy Act

For paleontological resources, the intensity (and hence the potential significance) of an impact is generally linked to the potential for loss of scientific information, particularly new information. Typically, impact assessments are based on the extent of the physical disturbance/loss in combination with the scientific importance of the fossils involved. Scientifically important (i.e., significant) fossils include those that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and biochronologic data (SVP 2010; Appendix A). Identifiable vertebrate fossils of all types are considered scientifically important because of their rarity compared to invertebrate, plant, and trace fossils (SVP 2010; Appendix A). However, uncommon invertebrate, plant, and trace fossils, as well as microfossils that provide new or additional information for scientific research, are also considered important (SVP 2010; Appendix A).

4.4 Determining Significance Under the California Environmental Quality Act

Based on the State CEQA Guidelines, the proposed HSR project would have a significant impact if it:

- Directly or indirectly destroys a unique paleontological resource or site

5 AFFECTED ENVIRONMENT

The following subsections provide a detailed discussion of the existing environment in which the project is located and describes the geological and paleontological aspects of the RSA.

5.1 Geographic Location

The project is located in the transition zone between the south-central part of the Transverse Ranges Geomorphic Province and the northern end of the Peninsular Ranges Geomorphic Province (Figure 5-1; California Geological Survey 2002). The Transverse Ranges Geomorphic Province is characterized by steep mountains and valleys that trend in an east-west direction at an oblique angle to the northwest-southeast trend of the California coast (Dibblee 1982; Norris and Webb 1976), hence the name “Transverse.” This type of trend is extremely rare elsewhere in the United States (Dibblee 1982; Yerkes and Campbell 2005). Compression along the San Andreas Fault is squeezing and rotating the Transverse Ranges, making this area one of the most rapidly rising regions on earth (California Geological Survey 2002; Dibblee 1982; Jackson and Molnar 1990; Morton and Yerkes 1987; Nicholson et al. 1994). Tectonic activity in this province has also folded and faulted thick sequences of Cenozoic, organic-rich sedimentary rocks, making the area an important source for oil (Biddle 1991; Redin 1991; Yerkes et al. 1965). The Peninsular Ranges Geomorphic Province is a 900-mile long northwest-southeast trending structural block that extends from the Transverse Ranges in the north to the tip of Baja California in the south and includes the Los Angeles Basin (Norris and Webb 1976). This province is characterized by mountains and valleys that trend in a northwest-southeast direction, roughly parallel to the San Andreas Fault Zone (Norris and Webb 1975; Sharp 1976). The total width of the province is approximately 225 miles, extending from the Colorado Desert in the east, across the continental shelf, to the Southern Channel Islands (i.e., Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) (Sharp 1976). The province contains extensive pre-Cenozoic (more than 66 million years ago [Ma]) igneous and metamorphic rocks that are covered by a veneer of Cenozoic (66 Ma to present) sedimentary deposits in many places (Norris and Webb 1976; Wright 1991).

5.2 Regional Geographic Setting

The Burbank to Los Angeles Project Section has its northern terminus in the eastern end of the San Fernando Valley, passes along the eastern side of the Elysian Park Hills, and has its southern terminus in the Los Angeles Basin (Figure 5-1).

The San Fernando Valley is a large structural trough bordered by the San Gabriel Mountains to the north and east, and the Santa Monica Mountains, Hollywood Hills, and Elysian Park Hills to the south (Figure 5-1; Yerkes 1997). The valley has been filled by sediment carried down the drainages of the surrounding hills and mountains and contains the headwaters of the Los Angeles River (Yerkes 1997). The basement of this valley is composed of igneous and metamorphic rocks that range in age from approximately 1.7 billion years ago to 66 Ma (Yerkes 1997, Yerkes et al. 1965). Overlying these basement rocks are thousands of feet of Cenozoic marine and terrestrial deposits that have accumulated in this area as the depositional environment shifted from a series of forearc basins, to rifted basins, to a larger offshore basin and coastal environment that extended from what is now Ventura County down to Orange County (Wright 1991; Yerkes 1997; Yerkes et al. 1965).

Figure 5-1 Geographic Location of the Resource Study Area

The broad alluvial lowland that forms the current Los Angeles Basin is bounded by the San Gabriel Mountains to the north, the Santa Ana Mountains to the east, and the Pacific Ocean to the southwest (Yerkes et al. 1965). As with the San Fernando Valley, the current Los Angeles Basin is underlain by a structural depression that has discontinuously accumulated thousands of feet of marine and terrestrial deposits since the Late Cretaceous (approximately 100.5 Ma) (Wright 1991; Yerkes et al. 1965). Over millions of years, the basin has experienced episodes of subsidence, deposition, uplift, erosion, prolific sources of crude oil (Biddle 1991; Bilodeau et al. 2007; Wright 1991; Yerkes et al. 1965). The modern surface of the basin slopes gently southwestward toward the Pacific Ocean, interrupted in various places by low hills, such as the Elysian Hills bordering the RSA (Wright 1991; Yerkes et al. 1965). The basin is also traversed by several large rivers (Sharp 1976; Yerkes et al. 1965), including the Rio Hondo, the San Gabriel River, the Santa Ana River, and the Los Angeles River. The RSA parallels the Los Angeles River along part of its length. The low relief of the basin is primarily due to the coalesced floodplains and alluvial fans of the Santa Ana River and San Gabriel River (Yerkes et al., 1965).

5.3 Geology and Paleontological Sensitivity in the Resource Study Area

The geologic units mapped within the RSA and their paleontological sensitivities are discussed below.

5.3.1 Geology of the Resource Study Area

According to the geologic map prepared by Yerkes and Campbell (2005), four geologic units may be encountered within the RSA. These geologic units include Artificial Fill; Holocene Alluvial Fan Deposits; Holocene and late Pleistocene Young Alluvial Fan Deposits, undivided; and the late Miocene Puente Formation. Each of these units is briefly described below, and Table 5-1 provides a summary of the geologic units found in the RSA. The geologic map in Appendix E shows the geology of the RSA and of surrounding areas. As such, this map includes geology that is not relevant to this project section and will not be discussed in this technical report. The dates for the geologic epochs and ages for all the geologic units (except Artificial Fill) are based on the *International Chronostratigraphic Chart* prepared by Cohen et al. (2018).

Table 5-1 Geologic Units in the Resource Study Area

Geologic Unit	Map Symbol*	Age (years ago)	Geologic Epoch
Artificial Fill	Af	Present to approximately 100	Holocene
Alluvial Fan Deposits	Qf	Present to 11,700	Holocene
Young Alluvial Fan Deposits, undivided	Qyf	Present to 126,000	Holocene to late Pleistocene
Puente Formation, sandstone unit	Tpna	5.333 to 11.62 million	late Miocene

Sources: Yerkes and Campbell (2005), Cohen et al. (2018)
* Map symbols are shown on the geologic map in Appendix E.

5.3.1.1 Artificial Fill (Af)

Artificial Fill consists of sediments that have been removed from one location and transported to another location by human activity, rather than by natural means. The transportation distance can vary from a few feet to many miles, and composition is dependent on the source and purpose. Artificial Fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material. Yerkes and Campbell (2005) mapped Artificial Fill within the RSA along I-5 from approximately W Burbank Boulevard to W Providencia Avenue in the City of Burbank, as well as in a small portion of SR 134 just east of where it crosses San Fernando Road in the City of Glendale (Appendix E). However, it likely occurs elsewhere within the RSA along the existing railroad tracks, highways, streets, and bridges where it was used during construction to provide suitable foundation or drainage or to adjust for changes in topography and for overcrossings and interchanges. Artificial Fill was noted during the field inspection at several overcrossings within the RSA, including the North San Fernando Boulevard overcrossing at North Hollywood Way in the City of Burbank; the SR 134 and Fairmont Avenue overcrossings at San Fernando Road in the City of Glendale; the San Fernando Road and San Fernando Road West overcrossings at the Colorado Street I-5 on/off ramps in the cities of Glendale and Los Angeles; and the SR 2 overcrossings at San Fernando Road, Casitas Avenue, and the existing railroad right-of-way in the City of Los Angeles.

5.3.1.2 Alluvial Fan Deposits (Qf)

The Alluvial Fan Deposits formed during the Holocene (less than 11,700 years ago) (Yerkes and Campbell 2005). These deposits can include sediments deposited in the last 100 years, but unlike Artificial Fill, they were deposited naturally, not by humans. The Alluvial Fan Deposits consist of unconsolidated mixtures of boulders, cobbles, gravel, sand, and silt (Yerkes and Campbell 2005). These deposits are found in active and recently active alluvial fans, as well as the upstream portions of some connected channels (Yerkes and Campbell 2005). These deposits are mapped throughout the majority of the RSA, along San Fernando Road from approximately Delia Avenue to N Hollywood Way, around the intersection of Winona Avenue and N San Fernando Boulevard, around the intersection of East Avenue and N San Fernando Boulevard, and from approximately W Burbank Boulevard to W Magnolia Boulevard in the City of Burbank. Alluvial Fan Deposits are also mapped from approximately Grandview Avenue to Broadway/Brazil Street in the cities of Glendale and Los Angeles, as well as from SR 2 to LAUS in the City of Los Angeles (Appendix E). However, these deposits likely overlie older, Pleistocene (11,700–2.588 Ma) deposits at undetermined depths throughout the RSA (Yerkes et al. 1965). Unconsolidated sediments of brown to brownish-gray silt, sand, and gravel, consistent with the Alluvial Fan Deposits were noted in the RSA in some areas of exposed ground in Rio de Los Angeles State Park and Cypress Park in the City of Los Angeles.

5.3.1.3 Young Alluvial Fan Deposits, Undivided (Qyf)

The Young Alluvial Fan Deposits, undivided, are Holocene to late Pleistocene in age (less than 126,000 years ago) (Yerkes and Campbell 2005). These deposits can include sediments less than 11,700 years ago, but unlike the Holocene Alluvial Fan Deposits, which were only deposited during the Holocene (less than 11,700 years ago); they also include late Pleistocene deposits (i.e., deposits from 11,700 to 126,000 years ago. The Young Alluvial Fan Deposits consist of unconsolidated gravel, sand, and silt with occasional cobbles and boulders near mountain fronts (Yerkes and Campbell 2005). These sediments were deposited by flooding streams and debris flows coming down from higher elevations and generally form a fan or lobe shape at the base of hills and mountains (Yerkes and Campbell 2005). In some areas, the surfaces can show slight to moderate soil development (Yerkes and Campbell 2005). The Young Alluvial Fan Deposits are mapped over portions of the RSA, from approximately Cohasset Street to Grandview Avenue in the cities of Burbank and Glendale, as well as from approximately Broadway/Brazil Street to SR 2 in the cities of Glendale and Los Angeles (Appendix E). During the field inspection, unconsolidated grayish-brown silt and sand, consistent with the Young Alluvial Fan Deposits, undivided, was noted in some areas of exposed ground in the RSA in Gross Park in the City of Burbank, as well as Griffith Manor Park and Pelanconi Park in the City of Glendale.

5.3.1.4 Puente Formation, Sandstone Unit (Tpna)

Originally named for exposures in the Puente Hills (Eldridge and Arnold 1907), the Puente Formation in the Elysian Park Hills area has a maximum thickness of 8,500 feet. This thickness includes rocks that are exposed at the surface and those below the surface. The Puente Formation consists of marine siltstone, sandstone, and shale deposited during the late Miocene to early Pliocene (3.6–11.62 Ma) (Lamar 1970). In the Elysian Park Hills area, Lamar (1970) used rock type to map four non-sequential, interbedded units, which have not been specifically correlated with formal members identified elsewhere in Los Angeles and Orange counties (Durham and Yerkes 1964; Schoellhamer et al. 1981; Yerkes 1972). Yerkes and Campbell (2005) consolidated these four units into three: a sandstone unit, a siltstone unit, and a siliceous shale unit. Of these three units, only the sandstone unit is mapped within the RSA along Elysian Park

Drive from approximately SR 110 to N Broadway in the City of Los Angeles (Appendix E). The brown to light gray, very fine- to very coarse-grained sandstones of this unit accumulated during the late Miocene (5.333–11.62 Ma) and contain discoidal concretions in some places (Yerkes and Campbell 2005). Based on lithology, depositional structures, and faunal comparisons, the rocks of the Puente Formation in this area are inferred to have been deposited as part of a submarine fan in water several thousand feet deep (Lamar 1970). Exposures of light brown, fine-grained sandstone, consistent with rocks of the Puente Formation were noted during the field inspection in the RSA at Elysian Park in the City of Los Angeles.

5.3.2 Paleontological Sensitivity Evaluation by Geologic Unit

Paleontological sensitivity describes the potential for a geologic unit to produce paleontological resources. It is based on the age and depositional environment of a given geologic unit, whether paleontological resources have been recovered from that geologic unit or similar deposits elsewhere in the region, and the scientific importance of those resources. Refer to Section 4.2.2 for additional information and categories of paleontological sensitivity. The paleontological sensitivities of the geologic units within the RSA are summarized in Table 5-2, discussed in detail below, and shown in Appendix F.

Table 5-2 Geologic Units Found in the Resource Study Area

Geologic Unit	Age (years ago)	Geologic Epoch	Paleontological Sensitivity
Artificial Fill	Present to 100	Holocene	No
Alluvial Fan Deposits	Present to 11,700	Holocene	Low: Above a depth of 10 feet High: Below a depth of 10 feet
Young Alluvial Fan Deposits, undivided	Present to 126,000	Holocene to late Pleistocene	Low: Above a depth of 10 feet High: Below a depth of 10 feet
Puente Formation, sandstone member	5.333 to 11.62 million	late Miocene	High

Sources: Yerkes and Campbell (2005), Cohen et al. (2018)
*Paleontological sensitivity assignment based on SVP guidelines (SVP 2010)
SVP = Society of Vertebrate Paleontology

5.3.2.1 Artificial Fill

While Artificial Fill may contain fossils, these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study. As such, Artificial Fill has no paleontological sensitivity (Appendix F).

5.3.2.2 Alluvial Fan Deposits

Although Holocene (less than 11,700 years ago) deposits, such as the Alluvial Fan Deposits in the RSA, can contain remains of plants and animals, only those from the middle to early Holocene (4,200 to 11,700 years ago) are considered scientifically important (SVP 2010). Scientifically important fossils from middle to early Holocene deposits are not very common, and the LACM has no records of vertebrate fossil localities from Holocene deposits within or surrounding the RSA (Appendix D).

These Holocene deposits likely overlie older, Pleistocene deposits, which have produced scientifically important fossils elsewhere in the County and the region (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). These older deposits span the end of the Rancholabrean North American Land Mammal Age, which dates from 11,000 to 240,000 years ago (Sanders et al. 2009) and was named for the Rancho La Brea fossil site in central Los Angeles. The presence of *Bison* defines the beginning of the Rancholabrean North American Land Mammal Age (Bell et al. 2004), but fossils from this time also include other large and small mammals, reptiles, fish, invertebrates, and plants (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009).

Although the LACM has no records of vertebrate fossil localities from Pleistocene deposits within the RSA, the museum has many records from Pleistocene deposits in the area surrounding the RSA (Appendix D, except where cited otherwise). At the northern end of the RSA in the San Fernando Valley, near the intersection of San Fernando Road and Lankershim Boulevard, LACM Locality 1146 produced fossils of mastodon (*Mammut*), horse (*Equus*), and camel (Camelidae) from depths of approximately 160 to 170 feet below grade (Authority 2016a). LACM Locality 6970 is located along Lankershim Boulevard just east of Tujunga Wash and just north of the Los Angeles River in an unincorporated area of the county. This locality was collected during excavation of the Metro Red Line Universal City Tunnel at approximately 60 to 80 feet below grade. Specimens of ground sloth (*Glossotherium harlani*), elephant (Proboscidea), camel (*Camelops hesternus*), and bison (*Bison antiquus*) were found at this locality. Farther south along Lankershim Boulevard and south of the Los Angeles River in an unincorporated area of the county, additional localities were collected during the Metro Red Line station and tunnel excavation at depths of 40 to 60 feet below grade. These localities, LACM Locality 6306, LACM Locality 6385, and LACM Locality 6386, yielded specimens of stickleback fish (*Gasterosteidae*), frogs (*Rana,* Hylidae), lizards (*Gerrhonotus*, *Uta*), snakes (*Thamnophis*, *Tantilla*), bird (Aves), shrew (*Sorex*), rabbit (*Sylvilagus*), and rodents (*Perognathus*, *Thomomys*, *Dipodomys*, *Microtus*, and *Peromyscus*). Also during excavations for the Metro Red Line near the intersection of Hollywood Boulevard and Western Avenue, fossils of mastodon (*Mammut*), horse (*Equus*), camel (*Camelops*), and bison (*Bison*) were recovered from depths of between 47 and 80 feet below grade at LACM Localities 6297–6300 (Authority 2016a).

Along the central portion of the RSA east of Eagle Rock Boulevard just south of York Boulevard in the City of Los Angeles, LACM (CIT) Locality 342 produced specimens of turkey (*Parapavo californicus*) and a rare, nearly complete mammoth (*Mammuthus*) from a depth of 14 feet below the surface. Farther south near the RSA close to the intersection of Workman Avenue and Alhambra Avenue, excavations for a storm drain discovered LACM Locality 1023, which yielded turkey (*Parapavo californicus*), saber-toothed cat (*Smilodon fatalis*), horse (*Equus*), and deer (*Odocoileus*). Near the intersection of Mission Road and Daly Street in the City of Los Angeles, at a depth of 20 to 35 feet below the surface, LACM Locality 2032 produced specimens of pond turtle (*Emys marmorata*), ground sloth (*Paramylodon harlani*), mastodon (*Mammut americanum*), mammoth (*Mammuthus imperator*), horse (*Equus*), and camel (*Camelops*). West of the RSA near the intersection of US-101 and South Vermont Avenue in the City of Los Angeles, LACM Locality 3250 produced mammoth (*Mammuthus*) remains at a depth of 8 feet below grade (Authority 2016b).

During excavation for the Metropolitan Water District Southern California Headquarters facility at LAUS, fossilized wood, pollen, and spores were recovered from University of California Museum of Paleontology Locality PB98033 at depths of approximately 22 to 25 feet below grade (Authority 2016b). These plant fossils were dated to approximately 5,020 +/- 80 years ago (middle Holocene), and the Holocene/Pleistocene boundary in this area was inferred to be found at approximately 30 feet below grade (Authority 2016b). During excavation for the Metro Red Line tunnel immediately west of LAUS, bison (*Bison*) fossils were recovered from an uncatalogued fossil locality approximately 35 to 55 feet below grade (Authority 2016b). Southwest of the RSA and near the intersection of South Hill Street and West 12th Street in the City of Los Angeles, LACM Locality 1755 produced a specimen of horse (*Equus*) at a depth of 43 feet below grade (Authority 2016b; Metro 2016). A little farther southwest of the RSA, near the intersection of South Western Avenue and West 46th Street, LACM Locality 7758 yielded specimens of three-spined stickleback (*Gasterosteus aculeatus*), meadow vole (*Microtus*), deer mouse (*Peromyscus*), pocket gopher (*Thomomys*), and pocket mouse (*Perognathus*) at a depth of 16 feet below grade (Metro 2016). Southeast of the RSA, along East 26th Street and in the area of the intersection of Atlantic Avenue and I-710 in the City of Vernon, LACM Localities 7701 7702, 17869, and 17870 produced a large and diverse assemblage of animals from depths of 11 to 34 feet below grade. The specimens recovered from these four localities represent many species of ostracods, gastropods, bivalves, bony fish, salamanders, lizards, snakes, birds, rabbits, and rodents (Authority 2016b; Metro 2016),

Near LAUS, the depth of the Holocene/Pleistocene boundary has been inferred to be at a depth of approximately 30 feet below grade (Authority 2016b). However, the exact depth of the Holocene/Pleistocene boundary is not known throughout the entire RSA and, as noted in the fossil localities detailed above, Pleistocene fossils have been recovered from shallower depths elsewhere near the RSA, supporting the fact that the depth for this boundary varies greatly across the Los Angeles Basin. Based on the shallowest depths at which Pleistocene fossils were found closest to the RSA (e.g., *Mammuthus* remains 8 feet below grade approximately 3.5 miles west of the RSA, a nearly complete *Mammuthus* skeleton at 14 feet below the surface approximately 1.5 miles east of the RSA, and a large assemblage of invertebrates and vertebrates 11–34 feet below grade approximately 5 miles southeast of the RSA), it is inferred that Pleistocene deposits may be encountered in the RSA beginning at a depth of approximately 10 feet. Therefore, the Alluvial Fan Deposits are assigned low paleontological sensitivity from the surface to a depth of 10 and high sensitivity below that mark (Appendix F).

5.3.2.3 Young Alluvial Fan Deposits, Undivided

The Young Alluvial Fan Deposits, undivided, are Holocene and late Pleistocene in age. Although Holocene (less than 11,700 years ago) deposits can contain remains of plants and animals, only those from the middle to early Holocene (4,200 to 11,700 years ago) are considered scientifically important (SVP 2010). Scientifically important fossils from middle to early Holocene deposits are not very common, and the LACM has no records of vertebrate fossil localities from Holocene deposits within or surrounding the RSA (Appendix D). The older, Pleistocene deposits in this geologic unit have produced scientifically important fossils elsewhere in the county and the region (see discussion above on Alluvial Fan Deposits). Although the exact depth of the Holocene/Pleistocene boundary is not known throughout the RSA, based on the shallowest depth at which Pleistocene fossils were found near the RSA (see discussion of LACM fossil localities in Section 5.3.2.2), it is inferred that Pleistocene deposits may be encountered beginning at a depth of approximately 10 feet. Therefore, these deposits are assigned low paleontological sensitivity from the surface to a depth of 10 feet and high sensitivity below that mark (Appendix F).

5.3.2.4 Puente Formation

Scientifically important paleontological resources have been recovered from the late Miocene to early Pliocene sandstones, siltstones, and shales of the Puente Formation. In the Elysian Park Hills area (Figure 5-1; Appendices E and F), Lamar (1970) reported 12 genera of fossil fish from eight localities. To the southeast in the Puente Hills, this formation has produced significant fossil remains, including fish, marine mammals (mostly whales), invertebrates, and plants (Eisentraut and Cooper 2002). The deep-water shales of the Puente Formation in the Peralta Hills in southeastern Anaheim, Orange County, yielded rare fossils of hexactinellid sponges, the first of their kind from the Miocene in California and one of few known from the Miocene in all of North America (Rigby and Albi 1996). In the Santa Ana Mountains, invertebrates, such as bivalves, gastropods, and barnacles (Schoellhamer et al. 1981), as well as some vertebrates have been recovered from strata of the Puente Formation. Moreover, to the east in Riverside County, these deposits have yielded less commonly preserved invertebrate fossils like shrimp and crabs, in addition to bivalves, microfossils, plants, and marine mammals (Feldmann 2003).

The fossil locality search through the LACM revealed several localities near or within the RSA. LACM Locality 4967 is a general Elysian Park locality, which encompasses a large area, likely because a more precise location of the fossil(s) recovered is not known. As such, the RSA passes through this general locality, which produced the holotype of a fossil herring (*Clupea tiejei*). To the east of the RSA and south of I-110, between the Los Angeles River and I-5, LACM Locality 7507 produced a specimen of snake mackerel (*Thyrsocles kriegeri*). Also east of the RSA on the southwestern part of Mt. Washington, LACM Locality 1880 yielded a suite of bony fish, including hatchetfish (*Argyropelecus bullockii*), bristlemouth (*Cyclothone*), herring (*Etringus*), rockfish (Scorpaenidae), extinct deep-sea fish (*Chauliodus*), slickheads (Alepocephalidae), cod (*Eclipes*), and croaker (*Lompoquia*). In Lincoln Heights, LACM Locality 3882 produced the holotype of an early baleen whale (*Mixocetus elysius*), which is one of the most complete fossil whale skulls known from California, according to the LACM (Appendix D).

The marine rocks of the Puente Formation in the RSA were deposited in the same environment and have similar lithologies to the fossiliferous strata of the Puente Formation found elsewhere in the region. Therefore, rocks of the Puente Formation in the RSA have the potential to yield similar fossils, which would be useful for taxonomic, evolutionary, and paleoecological studies. Moreover, because the rocks of the Puente Formation record depositional and tectonic changes that occurred in the Los Angeles Basin through the late Miocene to early Pliocene, fossils recovered from the RSA could be beneficial for biostratigraphic studies and correlating geologic units across this basin. This information would ultimately present a clearer, more complete picture of the geologic history of Southern California. Because these deposits have the potential to yield scientifically significant paleontological resources, they are assigned high paleontological sensitivity (Appendix F).

6 EFFECTS ANALYSIS

6.1 Introduction

The effects analysis is conducted based on the geologic units within the RSA; the potential for each of those geologic units to produce significant paleontological resources; the scientific importance of those resources; and the type, degree, and extent of project development activities. The following section discusses the potential for the different components of the project section to affect significant paleontological resources. Table 6-1 summarizes the impacts of the various project section activities on geologic units sensitive to paleontological resources.

6.2 No Project Alternative

The No Project Alternative assumes that all currently known, programmed, and funded improvements to the intercity transportation system (highway, rail, and transit) and reasonably foreseeable local land development projects (with funding sources identified) would be developed by 2040. Depending on the geologic units and development plans for each of these projects, there is a potential for ground disturbance associated with one or more of those projects to affect geologic units sensitive to paleontological resources. By affecting paleontologically sensitive geologic units, those projects have the potential to affect significant paleontological resources.

6.3 HSR Build Alternative

6.3.1 Geologic Units Sensitive to Paleontological Resources

6.3.1.1 Construction

Along the alignment, the majority of trackwork constructed at-grade would involve excavation with general construction equipment (e.g., scrapers, trackhoes, backhoes, bulldozers, etc.) to a depth of approximately 8 feet below the current grade (Jacobs, personal communication, December 2017). Based on the shallow depth of proposed excavation for most of the trackwork (less than 8 feet below current grade), the only geologic unit sensitive to paleontological resources that most of the trackwork would potentially affect is the Puente Formation. However, excavation for the shoofly tracks to support Metrolink operations during construction of the HSR alignment would reach a depth of 20 feet (Jacobs, personal communication, December 2018). As such, excavation for the shoofly tracks may potentially affect the paleontologically sensitive Young Alluvial Fan Deposits below a depth of 10 feet.

The depth of any existing utilities would dictate the depth of excavation for any undercrossings or overcrossings and may extend up to 30 feet below grade (Jacobs, personal communication, June 2016). For the bridgework at Verdugo Wash, Colorado Street, Los Feliz Boulevard, Glendale Boulevard, and the Los Angeles River proposed near Glendale Avenue, cast-in-drilled-hole piles would be constructed for the supports, which would be drilled to approximately 50 to 120 feet (Jacobs, personal communication September 2016). In addition, existing oil lines and fiber-optic lines would be relocated from within the railroad right-of-way east along San Fernando Road, which parallels the railroad corridor. The relocation would require directional drilling along San Fernando Road at depths of approximately 40 to 100 feet along the alignment, with access pits approximately 12 feet wide by 300 feet long, spaced approximately every 1,000 feet (Jacobs, personal communication, January 2019). Construction of all overcrossings and undercrossings, all bridgework, and relocation of existing oil and fiber-optic lines may potentially affect paleontologically sensitive geologic units in all places where these activities occur. The paleontologically sensitive geologic units that may be affected include the Alluvial Fan Deposits below a depth of 10 feet and the Young Alluvial Fan Deposits, undivided, below a depth of 10 feet.

Table 6-1 Geologic Units Sensitive to Paleontological Resources Potentially Affected by Development of Project Section Components

Project Section Component	Depth of Ground Disturbance (feet)	Geologic Unit(s) Sensitive to Paleontological Resources Potentially Affected
No Project Alternative		
Various	TBD	TBD
HSR Build Alternative		
Trackwork	8	Puente Formation
Shoofly Tracks	20	Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Overcrossings/Undercrossings	≤ 30	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Bridgework	50 to 120	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Relocation of Existing Oil Lines/ Fiber Optic Lines	40 to 100	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Tunnel Section	60 to 90	Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Trench Section	75	Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Metrolink CMF: Roadway Work	25	Alluvial Fan Deposits below a depth of 10 feet
Metrolink CMF: Track Relocation	16	Alluvial Fan Deposits below a depth of 10 feet
Metrolink CMF: Facility Relocation/Reconstruction	12 to 15	Alluvial Fan Deposits below a depth of 10 feet
Metrolink CMF: Utility Relocation	12 to 15	Alluvial Fan Deposits below a depth of 10 feet
Metrolink CMF: Retention Basin	12	None
Station Sites		
Burbank Airport Station: Underground Portion	90	Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Burbank Airport Station: Surface Features	0 to 10	None
LAUS: Platforms	0	None
Maintenance Facilities (N/A – see discussion in Section 6.5)		
Ancillary and Support Facilities		
Overhead Contact System Mast Poles and Manholes	20	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet Puente Formation?
Switching Station	5	None
Paralleling Station	5	None
PTC Fiber Optic Lines	6 to 10	Puente Formation?

Project Section Component	Depth of Ground Disturbance (feet)	Geologic Unit(s) Sensitive to Paleontological Resources Potentially Affected
PTC Towers	30 to 40	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet Puente Formation?
Early Action Projects		
Downtown Burbank Metrolink Station: Trackwork	5	None
Downtown Burbank Metrolink Station: Parking Areas	5	None
Downtown Burbank Metrolink Station: Pedestrian Bridges	8 to 15	Young Alluvial Fan Deposits, undivided below a depth of 10 feet
Grade Separations: • Sonora Avenue • Grandview Avenue • Flower Street • Goodwin Avenue/Chevy Chase Drive • Main Street	≤ 30	Alluvial Fan Deposits below a depth of 10 feet Young Alluvial Fan Deposits, undivided below a depth of 10 feet

HSR = high-speed rail
CMF = Central Maintenance Facility
N/A = not applicable
LAUS = Los Angeles Union Station
TBD = to be determined
PTC = positive train control

The below-grade section of the alignment beginning at Burbank Airport Station involves excavation of a tunnel at the northern and southern ends and a trench section in between. Excavation for the tunnel section would extend to a depth of approximately 60 to 90 feet (Jacobs, personal communication, December 2018). The portion of the alignment that would travel in a trench would require excavation to a depth of 75 feet (Jacobs, personal communication, December 2018). Excavation activities for the entire below-grade section of the alignment, including tunnel section and the trench section, may affect the paleontologically sensitive Young Alluvial Fan Deposits, undivided.

At the Metrolink CMF, excavation for relocation and construction of new tracks would extend to a depth of approximately 12 to 15 feet (Jacobs, personal communication, December 2018). Revision of the roadway network would involve excavation to approximately 25 feet and use soldier pile walls with timber or concrete lagging (Jacobs, personal communication, February 2017). Excavation up to approximately 12 to 15 feet would be required for relocation or reconstruction of the train washing/reclamation building, yard pump house, and two service and inspection facilities, as well as relocation of wet and dry utilities (Jacobs, personal communication, February 2017). Lastly, construction of a retention basin would involve excavation to a depth of approximately 12 feet (Jacobs, personal communication, December 2018). All excavation activities at the Metrolink CMF, with the exception of excavation for the retention basin, may potentially affect the paleontologically sensitive Alluvial Fan Deposits below a depth of 10 feet.

6.3.1.2 Operation

Operational activities associated with the Build Alternative would not involve ground disturbance in undisturbed, native geologic units. Therefore, they would not affect geologic units sensitive to paleontological resources.

6.3.2 Significant Paleontological Resources

6.3.2.1 Construction

Due to the depth of trackwork excavation along the majority of the alignment, it is unlikely that significant paleontological resources would be affected. However, any trackwork excavation in the paleontologically sensitive Puente Formation has the potential to affect significant paleontological resources. Excavation for all overcrossings and undercrossings, all bridgework, relocation of existing oil and fiber-optic lines, the tunnel section, and the trench section would occur in paleontologically sensitive geologic units. Therefore, there is a potential for these activities to affect significant paleontological resources. All excavation activities for the Metrolink CMF, with the exception of those for the retention basin, would occur in paleontologically sensitive geologic units and have the potential to affect significant paleontological resources.

6.3.2.2 Operation

Operational activities associated with the Build Alternative would not involve ground disturbance in geologic units sensitive to paleontological resources. Therefore, they would not affect significant paleontological resources.

6.4 Station Sites

6.4.1 Geologic Units Sensitive to Paleontological Resources

6.4.1.1 Construction

Current plans for the Burbank Airport Station indicate that excavation for the underground portion, which includes the tracks, platforms, and station, is expected to extend to a depth of approximately 90 feet and may require additional specialized equipment that is yet to be determined in addition to conventional excavation equipment due to the exceptional depth (Jacobs, personal communication, December 2018). Based on the experience of the RC, excavation for the surface features, including pick-up/drop-off facilities for private autos, the transit center for buses and shuttles, and surface parking areas is inferred to extend to depths of less than 10 feet. Excavation activities for the underground portion of the Burbank Airport Station may potentially affect the paleontologically sensitive Young Alluvial Fan Deposits, undivided, below a depth of 10 feet. However, none of the excavation activities for the surface features at the Burbank Airport Station are expected to have the potential to affect paleontologically sensitive geologic units.

As noted in the project description in Section 2.3.2, at LAUS, construction of the additional tracks and platforms is expected to be completed as part of the Metro Link US Project. The tracks will only require electrification for use by HSR, and the platforms will only require height increases. Moreover, the foundations for the overhead contact system at LAUS will also be completed as part of the Metro Link US Project, and therefore, no excavation for the overhead contact system at LAUS will be necessary. With no excavation anticipated for the platforms or electrification systems at LAUS as part of HSR, these components are not expected to affect any geologic units sensitive to paleontological resources.

6.4.1.2 Operation

Operational activities associated with the station sites would not involve ground disturbance in undisturbed, native geologic units. Therefore, they would not affect geologic units sensitive to paleontological resources.

6.4.2 Significant Paleontological Resources

6.4.2.1 Construction

Excavation for the underground portion of the Burbank Airport Station, including the tracks, platforms, and station, would extend into a paleontologically sensitive geologic unit and, therefore, has the potential to affect significant paleontological resources. However, excavation for the surface features at Burbank Airport Station, including pick-up/drop-off facilities for private autos, the transit center for buses and shuttles, and surface parking lots, is not expected to reach paleontologically sensitive geologic units and, therefore, would not affect significant paleontological resources.

As no excavation is anticipated for the platforms or electrification systems at LAUS as part of HSR, no significant paleontological resources would be affected by their construction.

6.4.2.2 Operation

Operational activities associated with the station sites would not involve ground disturbance in geologic units sensitive to paleontological resources. Therefore, they would not affect significant paleontological resources.

6.5 Maintenance Facilities

No maintenance facilities are planned for the Burbank to Los Angeles Project Section. Instead, this project section would be served by the HMF located within the Merced to Fresno Project Section or the Fresno to Bakersfield Project Section, as well as the LMF located within the Los Angeles to Anaheim Project Section. The Burbank to Los Angeles Project Section would also be served by MOIFs located at intervals of approximately 150 miles and MOISs located at intervals of approximately 75 miles along the HSR system. The impacts of all of these maintenance facilities on paleontological resources are analyzed in the technical reports and environmental documents for their respective project sections.

6.6 Ancillary and Support Facilities

6.6.1 Geologic Units Sensitive to Paleontological Resources

6.6.1.1 Construction

Current plans indicate that ground disturbance for the mast poles for the overhead contact system would involve augering 3-foot radius holes to depths of approximately 20 feet, while the manholes for the overhead contact system would be open cuts to depths of approximately 20 feet dug with traditional excavation equipment (Jacobs, personal communication, January 2019). As such, installation of the mast poles and manholes would affect several geologic units sensitive to paleontological resources within the RSA, including the Alluvial Fan Deposits below a depth of 10 feet; the Young Alluvial Fan Deposits, undivided below a depth of 10 feet; and the Puente Formation.

Ground disturbance associated with construction of the switching station and paralleling station would involve traditional excavation to depths of approximately 5 feet (Jacobs, personal communication, December 2018). The switching station is located in an area mapped with Young Alluvial Fan Deposits, undivided, while the paralleling station is located in Alluvial Fan Deposits. Excavation for these features is too shallow to affect the paleontologically sensitive sediments of the Alluvial Fan Deposits or the paleontologically sensitive deposits of the Young Alluvial Fan Deposits, undivided.

Installation of the PTC infrastructure would involve excavation to approximately 6 to 10 feet along the alignment for the fiber-optic lines and excavation to approximately 30 to 40 feet at intervals of approximately 2 to 3 miles for the communications towers (Jacobs, personal communication, January 2019). Depending on which side of the alignment the PTC fiber-optic lines are located, the only geologic unit sensitive to paleontological resources that may be affected is the Puente Formation. Excavation activities for PTC communications towers would affect several paleontologically sensitive geologic units, including the Alluvial Fan Deposits below a depth of 10 feet and the Young Alluvial Fan Deposits, undivided below a depth of 10 feet. Depending on where the towers are located, excavation activities for the PTC communications towers may also potentially affect the paleontologically sensitive Puente Formation.

6.6.1.2 Operation

Operational activities associated with the electric power utility improvements would not involve ground disturbance in undisturbed, native geologic units. Therefore, they would not affect geologic units sensitive to paleontological resources.

6.6.2 Significant Paleontological Resources

6.6.2.1 Construction

Installation of the overhead contact system mast poles and manholes has the potential to affect significant paleontological resources in areas of the Alluvial Fan Deposits; the Young Alluvial Fan Deposits, undivided; and the Puente Formation.

Construction of the switching station and paralleling station would not exceed a depth of 5 feet, and therefore, would be too shallow to affect significant paleontological resources, which would likely be encountered below a depth of 10 feet.

Excavation for the PTC fiber-optic lines is not expected to exceed a depth of 10 feet and, therefore, only has the potential to affect significant paleontological resources in areas of the Puente Formation. However, excavation for the PTC communications towers has the potential to affect significant paleontological resources in areas of the Alluvial Fan Deposits; the Young Alluvial Fan Deposits, undivided; and the Puente Formation.

6.6.2.2 Operation

Operational activities associated with the electric power utility improvements would not involve ground disturbance in geologic units sensitive to paleontological resources. Therefore, they would not affect significant paleontological resources.

6.7 Early Action Projects

6.7.1 Geologic Units Sensitive to Paleontological Resources

6.7.1.1 Construction

Current plans indicate that ground disturbance for the Downtown Burbank Metrolink Station would involve excavation to a depth of approximately 5 feet for the trackwork and the parking areas; however, excavation for the pedestrian bridges is expected to range from approximately 8 to 15 feet (Jacobs, personal communication, December 2017). The Downtown Burbank Metrolink Station is located in an area mapped with Artificial Fill and Young Alluvial Fan Deposits, undivided. As such, excavation for the trackwork and parking areas is too shallow to affect the paleontologically sensitive sediments of the Young Alluvial Fan Deposits, undivided. Only construction of the pedestrian bridges would extend deep enough to reach paleontologically sensitive sediments in the Young Alluvial Fan Deposits, undivided.

Ground disturbance associated with the grade separations at Sonora Avenue, Grandview Avenue, Flower Street, Goodwin Avenue/Chevy Chase Drive, and Main Street would involve traditional excavation to depths of less than approximately 30 feet (Jacobs, personal communication, December 2017). These grade separations are located in areas mapped with Alluvial Fan Deposits and Young Alluvial Fan Deposits, undivided. Excavation for these features could affect the paleontologically sensitive sediments of the Alluvial Fan Deposits or the paleontologically sensitive deposits of the Young Alluvial Fan Deposits, undivided.

6.7.1.2 Operation

Operational activities associated with the Downtown Burbank Metrolink Station or the grade separations at Sonora Avenue, Grandview Avenue, Flower Street, Goodwin Avenue/Chevy Chase Drive, or Main Street would not involve ground disturbance in undisturbed, native geologic units. Therefore, they would not affect geologic units sensitive to paleontological resources.

6.7.2 Significant Paleontological Resources

6.7.2.1 Construction

Construction of the tracks and parking areas for the Downtown Burbank Metrolink Station would not exceed a depth of 5 feet and would therefore be too shallow to affect significant paleontological resources, which would likely be encountered below a depth of 10 feet. However, construction of the pedestrian bridges would extend below a depth of 10 feet and has the potential to affect significant paleontological resources in areas of the Young Alluvial Fan Deposits, undivided.

Excavation for the grade separations at Sonora Avenue, Grandview Avenue, Flower Street, Goodwin Avenue/Chevy Chase Drive, and Main Street has the potential to affect significant paleontological resources in areas of the Alluvial Fan Deposits and the Young Alluvial Fan Deposits, undivided.

6.7.2.2 Operation

Operational activities associated with the early action projects would not involve ground disturbance in geologic units sensitive to paleontological resources. Therefore, they would not affect significant paleontological resources.

6.8 Cumulative Impacts

This section presents potential cumulative impacts based on current knowledge of the project section. Subsequent to this technical report, the Authority will further refine the cumulative impacts described herein and present the information in Section 3.19 of the EIR/EIS.

Cumulative impacts are those resulting from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the proposed project related to paleontological resources. The RSA for the cumulative impacts analysis is limited to the RSA of the proposed HSR Build Alternative.

The locations of any undiscovered paleontological resources are unknown, and the presence of paleontological resources in one area does not preclude or imply the presence of paleontological resources in another. Nonetheless, an increase in the amount of ground disturbance in geologic units sensitive to paleontologically resources corresponds to an increase in the potential to impact significant paleontological resources. Temporary construction easements, a few of the construction activities, and the operational activities associated with the proposed project would not result in substantial cumulative impacts to significant paleontological resources because they would not involve ground disturbance in paleontologically sensitive geologic units. However, the majority of project construction activities involve ground disturbance in geologic units sensitive to paleontological resources. Therefore, the proposed project could contribute to cumulative impacts on significant paleontological resources if those resources are present in the RSA.

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7 IMPACT AVOIDANCE AND MINIMIZATION FEATURES

The HSR Build Alternative incorporates standardized HSR features to avoid and minimize impacts. These features are referred to as IAMFs. The Authority will implement these measures during project design and construction to avoid or reduce impacts. A detailed description of IAMFs is provided in the following sections.

The following IAMFs would be implemented to avoid and/or minimize adverse effects on paleontological resources:

7.1 Impact Avoidance and Minimization Features for Paleontological Resources

GEO-IAMF#11: Engage a Qualified Paleontological Resources Specialist

Prior to the 90% design milestone for each construction package[8] (CP) within the Project Section, the Contractor would retain a Paleontological Resources Specialist (PRS) responsible for

- reviewing the final design for the CP,
- developing a detailed Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the CP, and
- the PRS will be responsible for implementing the PRMMP, including development and delivery of WEAP Training, supervision of Paleontological Resources Monitors (PRMs), evaluation and treatment of finds, if any, and preparation of a final paleontological mitigation report, per the PRMMP and for each CP.

Retention of PRS staff would occur in a timely manner, in advance of the 90% design milestone for each CP, such that the PRS is on board and can review the 90% design submittal without delay when it becomes available. If feasible, the same PRS would be responsible for all CPs within a given Project Section.

All PRS staff would meet or exceed the qualifications for a Principal Paleontologist as defined in the California Department of Transportation's (Caltrans') current *Standard Environmental Reference*, Chapter 8 (Caltrans 2017). Appointment of PRS staff would be subject to review and approval by the Authority.

GEO-IAMF #12: Perform Final Design Review and Triggers Evaluation

For each CP within the Project Section, the responsible PRS would evaluate the 90% design submittal to identify the portions of the CP that would involve work in paleontologically sensitive geologic units (either at the surface or in the subsurface), based on findings of the final Paleontological Resources Technical Report (TR) prepared for the Project Section. Evaluation would consider the location, areal extent, and anticipated depth of ground disturbance, the construction techniques that are planned/proposed, and the geology (i.e., location of geologic units with high paleontological sensitivity) of the CP and vicinity. The evaluation and resulting recommendations would be consistent with guidance in the Society of Vertebrate Paleontology (SVP) *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010), the *SVP Conditions of Receivership for Paleontologic Salvage Collections* (SVP 1996), and relevant guidance from Chapter 8 of the current Caltrans *Standard Environmental Reference* (Caltrans 2017).

The purpose of the Final Design Review and Triggers Evaluation would be to develop specific language detailing the location and duration of paleontological monitoring and other requirements for paleontological resources applicable to each CP within the Project Section. Paleontological protection requirements identified through the Final Design Review and Triggers Evaluation

[8] Because of their length and complexity, most HSR project sections are expected to be designed and constructed in segments, with separate construction documents (plans and specifications) developed for each segment. *Construction package* refers to a portion (segment) of a project section for which a discrete, stand-alone construction document set will be developed.

would be recorded in a concise technical memorandum ("Final Design Review Requirements for Paleontological Resources Protection"), whichwould then be incorporated in full detail into the PRMMP for each CP. Those portions of the CP requiring paleontological monitoring would also be clearly delineated in the project construction documents for each CP.

GEO-IAMF #13: Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan (PRMMP)

Following the Final Design Review and Triggers Evaluation for each CP, the PRS would develop a CP-specific PRMMP. For greater efficiency, PRMMPs may be written such that they cover more than one CP, as long as the specific requirements of the IAMFs are satisfied explicitly and in detail for each CP included.

The PRMMP for each CP would incorporate the findings of the Design Review and Triggers Evaluation for that CP and would be consistent with the Society of Vertebrate Paleontology (SVP) *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010), the SVP *Conditions of Receivership for Paleontologic Salvage Collections* (SVP 1996), and relevant guidance from Chapter 8 of the current Caltrans *Standard Environmental Reference* (Caltrans 2017). As such, the PRMMP would provide for at least the following:

- Implementation of the PRMMP by qualified personnel, including the following positions:
  - Paleontological Resources Specialist - The PRS will be required to meet or exceed Principal Paleontologist qualifications per Chapter 8 of the current *Caltrans Standard Environmental Reference* (Caltrans 2017). The Supervising Paleontologist may, but not necessarily, be the PRS who prepares the PRMMP.
  - Paleontological Resources Monitors – The PRMs would be required to meet or exceed Paleontological Monitor qualifications per Chapter 8 of the current Caltrans *Standard Environmental Reference* (Caltrans 2017).
- Development of pre-construction and construction-period coordination procedures and communications protocols.
- Evaluation as to whether a pre-construction survey by qualified personnel is warranted for the CP. In general, pre-construction surveys are beneficial if there is a strong possibility that significant paleontological resources (e.g., concentrations of vertebrate fossils) are exposed at the ground surface and would be destroyed during the initial clearing and grubbing phase of earthwork. Such a determination can usually be made during preparation of the Paleontological Resources TR.
- Requirements for paleontological monitoring by qualified PRMs of all ground disturbance activities known to affect, or potentially affect, highly sensitive geologic units and for ground disturbance activities affecting other geologic units in any areas where the PRS considers it warranted based on the findings of the Paleontological Resources TR or any pre-construction surveys. In all areas of the CP subject to monitoring, monitoring would initially be conducted full-time for all ground disturbance activities. However, the PRMMP may provide for monitoring frequency in any given location to be reduced once approximately 50% of the ground disturbance activity in that location has been completed, if the reduction is appropriate based on the implementing PRS's professional judgment in consideration of actual site conditions.
- Provisions, if recommended by the PRS, for paleontological monitoring of specific construction drilling operations. In general, small diameter (i.e., <18 inches) drilling operations or drilling operations using bucket augers tend to pulverize impacted sediments and any contained fossils and are typically not monitored. The section in the PRMMP addressing monitoring for drilling operations would rely, in part, on the information supplied by the CP design and geotechnical teams, but would also take into consideration of the nature, depth, and location of drilling needed, and the anticipated equipment and staging configurations.

- Provisions for the content development and delivery of paleontological resources WEAP training.
- Provisions for in-progress documentation of monitoring (and, if applicable, salvage/recovery operations) via "construction dailies" or a similar approved means.
- Provisions for a "stop work, evaluate, and treat appropriately" response in the event of a known or potential paleontological discovery, including finds in highly sensitive geologic units as well as finds, if any, in geologic units identified as less sensitive, or non-sensitive, for paleontological resources.
- Provisions for sampling and recovery of unearthed fossils consistent with SVP *Standard Procedures* (SVP 2010) and the SVP *Conditions of Receivership* (SVP 1996). Recovery procedures would provide for recovery of both macrofossils and microfossils.
- Provisions for acquiring a repository agreement from an approved regional repository for curation, care, and storage of recovered materials, consistent with the SVP *Conditions of Receivership* (SVP 1996). If more than one repository institution is designated, separate repository agreements must be provided.
- Provisions for preparation of a final monitoring and mitigation report that meets the requirements of the Caltrans *Standard Environmental Reference* Chapter 8 provisions for the Paleontological Monitoring Report and Paleontological Stewardship Summary (Caltrans 2017).
- Provisions for the preparation, identification, analysis, and curation of fossil specimens and data recovered, consistent with the SVP *Conditions of Receivership* (SVP 1996) and any specific requirements of the designated repository institution(s).

GEO-IAMF #14: Provide WEAP Training for Paleontological Resources

Prior to groundbreaking for each CP within the Project Section, the Contractor, in coordination with the property owner(s), would provide paleontological resources WEAP training delivered by the PRS. All management and supervisory personnel and construction workers involved with ground-disturbing activities would be required to take this training before beginning work on the project. Refresher training would also be made available to management and supervisory personnel and workers as needed, based on the judgment of the PRS.

At a minimum, paleontological resources WEAP training would include information on:

- the coordination between construction staff and paleontological staff
- the construction and paleontological staff roles and responsibilities in implementing the PRMMP
- the possibility of encountering fossils during construction
- the types of fossils that may be seen and how to recognize them, and
- the proper procedures in the event fossils are encountered, including the requirement to halt work in the vicinity of the find and procedures for notifying responsible parties in the event of a find.

Training materials and formats may include, but are not necessarily limited to, in-person training, prerecorded videos, posters, and informational brochures that provide contacts and summarize procedures in the event paleontological resources are encountered. WEAP training contents would be subject to review and approval by the Authority. Paleontological resources WEAP training may be provided concurrently with cultural resources WEAP training.

Upon completion of any WEAP training, the Contractor would require workers to sign a form stating that they attended the training and understand and would comply with the information presented. Verification of paleontological resources WEAP training will be provided to the Authority by the Contractor.

GEO-IAMF #15: Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found

Consistent with the PRMMP, if fossil materials are discovered during construction, regardless of the individual making the discovery, all activity in the immediate vicinity of the discovery would halt and the find would be protected from further disturbance. If the discovery is made by someone other than the PRS or PRM(s), the person who made the discovery would immediately notify construction supervisory personnel, who would in turn notify the PRS. Notification to the PRS would take place promptly (prior to the close of work the same day as the find), and the PRS would evaluate the find and prescribe appropriate treatment as soon as feasible. Work may continue on other portions of the CP while evaluation (and, if needed, treatment) takes place, as long as the find can be adequately protected in the judgment of the PRS.

If the PRS determines that treatment (i.e., recovery and documentation of unearthed fossil[s]) is warranted, such treatment, and any required reporting, would proceed consistent with the PRMMP. The Contractor would be responsible for ensuring prompt and accurate implementation, subject to verification by the Authority.

The stop work requirement does not apply to drilling since drilling operations typically cannot be suspended in mid-course. However, if finds are made during drilling, the same notification and other follow-up requirements would apply. The PRS would coordinate with construction supervisory and drilling staff regarding the handling of recovered fossils.

The requirements of this IAMF would be detailed in the PRMMP and presented as part of the paleontological resources WEAP training.

8 REFERENCES

This section includes the references cited in the text, as well as the persons and agencies consulted during preparation of this report.

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8.2 Persons and Agencies Consulted

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9 PREPARER QUALIFICATIONS

Project Role	Name, Credential	Qualifications
Regional Consultant Environmental Team		
Environmental Manager; QA/QC	Rob McCann, Principal LSA	38 years of experience B.A., Geography, California State University, Fullerton
Paleontologist; Author	Sarah Rieboldt, Ph.D., Senior Paleontological Resources Manager LSA	18 years of experience Ph.D., Paleontology, University of California, Berkeley B.A., Biology, University of Colorado, Boulder
Senior Technical Editor/ Word Processor	Jennette Bosseler, Technical Editor LSA	16 years of experience B.A., English, with Minor in Professional Writing, University of California, Santa Barbara
Technical Editor	Lauren Johnson, Technical Editor LSA	33 years of experience B.A., English, University of California, Santa Barbara
Senior Word Processor	Chantik Virgil, Word Processor LSA	38 years of experience
GIS analysis and cartography	Meredith Canterbury, Senior GIS Analyst LSA	12 years of experience B.A., Geography, California State University, Fullerton A.A., Liberal Studies, Fullerton College

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APPENDIX A: ASSESSMENT AND MITIGATION OF ADVERSE IMPACTS TO NONRENEWABLE PALEONTOLOGICAL RESOURCES—STANDARD GUIDELINES

These standard guidelines are for the assessment and mitigation of adverse impacts to paleontological resources and are derived from the Society of Vertebrate Paleontology (2010).

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APPENDIX B: CONDITIONS OF RECEIVERSHIP FOR PALEONTOLOGICAL SALVAGE COLLECTIONS

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APPENDIX C: PALEONTOLOGICAL RESOURCE STUDY AREA MAP

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APPENDIX D: RESULTS OF FOSSIL LOCALITY SEARCH THROUGH THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

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APPENDIX E: GEOLOGIC MAP

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APPENDIX F: PALEONTOLOGICAL SENSITIVITY MAP

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