Ontario International Airport Connector Project

ONTCONNECTOR

APPENDIX J
GEOLOGY, SOILS, SEISMICITY, AND PALEONTOLOGY TECHNICAL REPORT

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ABBREVIATIONS AND ACRONYMS

ADA	Americans with Disabilities Act
bgs	below ground surface
BMP	Best management practice
Caltrans	California Department of Transportation
Cal/OSHA	California Occupational Safety and Health Administration
CBC	California Building Code
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
DMR	Division of Mine Reclamation
DOGGR	Division of Oil, Gas, and Geothermal Resources
EHRA	Earthquake Hazards Reduction Act
EIR	Environmental Impact Report
FTA	Federal Transit Administration
g	gravity
I-10	Interstate 10
I-15	Interstate 15
Leighton	Leighton Consulting, Inc.
M	Richter Magnitude
MEP	Mechanical, Electrical and Plumbing
ML	sandy silt
MM	Mitigation measures
mm	millimeters
MMI	Modified Mercalli Intensity
MRZ	Mineral Resource Zone
MSF	Maintenance and Storage Facility
Mw	Moment Magnitude
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
OIAA	Ontario International Airport Authority
ONT	Ontario International Airport
PCC	Portland cement-concrete
PRC	California Public Resources Code
Project	Ontario International Airport Connector Project
ROW	right-of-way

SANBAG	San Bernardino Associated Governments
SBCTA	San Bernardino County Transportation Authority
SCRRA	Southern California Regional Rail Authority
SCEDC	Southern California Earthquake Data Center
SM	silty sand
SMARA	Surface Mining and Reclamation Act
SMGB	State Mining and Geology Board
SPT	Standard Penetration Test
SUSMP	Standard Urban Storm Water Mitigation Plan
TBM	tunnel boring machine
UPRR	Union Pacific Railroad
USC	United States Code
USGS	United States Geological Survey
Vent shaft	Ventilation shaft
VMT	Vehicle Miles Traveled

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1 INTRODUCTION

San Bernardino County Transportation Authority (SBCTA), in cooperation with the Federal Transit Administration (FTA), proposes to construct a 4.2-mile-long transit service tunnel directly connecting the Southern California Regional Rail Authority (SCRRA) Cucamonga Metrolink Station to the Ontario International Airport (ONT). The proposed ONT Connector Project (Project) is to expand access options to ONT by providing a direct transportation connection from Cucamonga Metrolink Station to ONT. The proposed Project is subject to federal and state environmental review requirements pursuant to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). FTA is the lead agency for NEPA, while SBCTA is the lead agency under CEQA. Partner agencies include the Ontario International Airport Authority (OIAA), Omnitrans, the City of Ontario and the City of Rancho Cucamonga.

ONT is located approximately two miles east of downtown Ontario in San Bernardino County. The airport services more than 25 major cities via 10 commercial carriers. ONT is owned and operated under a joint powers agreement between the City of Ontario and San Bernardino County. OIAA provides overall direction, management, operations, and marketing for ONT. In 2014, the San Bernardino Associated Governments (SANBAG), now SBCTA, prepared the Ontario Airport Rail Access Study (SANBAG 2014), which identified the need for a direct rail-to-airport connection to ONT to support its projected growth. ONT is one of the fastest growing commercial airports, forecasted to serve 14 million annual passengers by 2045 (OIAA 2019).

The purpose of this technical report is to evaluate potential environmental impacts/effects of geology, soils, seismicity, and mineral resources that the Project may have within the Project area. This technical report describes existing setting, applicable regulatory settings, methodology, and potential impacts from construction and operation of the proposed Project and the No Project Alternative. The information contained in this technical report will be used to prepare the required environmental documents under CEQA.

2 PROJECT DESCRIPTION

2.1 PROJECT PURPOSE AND OBJECTIVES

The purpose of the proposed Project is to expand access options to ONT by providing a direct transportation connection from Cucamonga Metrolink Station to ONT. This new connection would increase mobility and connectivity for transit patrons, improve access to existing transportation services, provide a connection to future Brightline West service to/from ONT, and support the use of clean, emerging technology for transit opportunities between Cucamonga Metrolink Station and ONT. More specifically, the proposed Project's objectives are as follows:

- Expand access options to ONT by providing a convenient and direct connection between ONT and the Metrolink network, and other transportation services at the Cucamonga Station.
- Reduce roadway congestion by encouraging a mode shift to transit from single-occupancy vehicles and provide reliable trips to and from ONT.
- Support autonomous electric vehicle technology usage for transit projects.

2.2 PROJECT NEED

The proposed Project need includes:

- Lack of direct transit connection coinciding with Metrolink trains and peak airport arrival and departure schedules. The lack of a direct transit connection between Cucamonga Metrolink Station and ONT creates mobility challenges for air passengers accessing ONT. In many cases, the lack of a last-mile connection between the Metrolink system and ONT forces airport passengers to use rideshare services or private single-occupancy vehicles, adding congestion to the local roads between the Cucamonga Metrolink Station and ONT. This congestion results in delays for the public to reach their destination, community services, and facilities.
- Roadway congestion affecting trip reliability and causing traffic delays. ONT travelers using rideshare services or private single-occupancy vehicles adds traffic volumes and increasing congestion on the local roads between Cucamonga Metrolink Station and ONT. Increases in future traffic volumes and roadway congestion affects trip reliability for travelers and commuters to and from ONT.
- Increasing Vehicle Miles Traveled (VMT) resulting from ONT travelers and lack of a direct transit connection.
- Increased greenhouse gas emissions within communities surrounding ONT from single-occupancy vehicle travel to and from ONT.

2.3 ALTERNATIVES EVALUATED

2.3.1 No Project Alternative

CEQA requires that existing conditions and the proposed Project be evaluated against a No Project Alternative in an Environmental Impact Report (EIR). The No Project Alternative represents the proposed Project area if the proposed Project is not constructed, and additional municipal projects would still be developed in the area. The No Project Alternative is used for comparison purposes to assess the relative benefits and impacts of constructing a new transit project versus only constructing projects which are already funded and planned for in local and regional plans.

The No Project Alternative would result in no new direct electrically powered, on-demand fixed transit guideway connection from the Cucamonga Metrolink Station to ONT. Omnitrans currently operates a limited-service bus route to ONT, known as ONT Connect or Route 380, which would remain operational under the No Project Alternative. ONT Connect currently operates Monday through Sunday, with bi-directional (northbound and southbound) service frequencies ranging from 35-60 minutes. However, ONT Connect travels with general/mixed traffic on existing roadways. The No Project Alternative assumes that the existing roadway system near ONT (such as the Interstate 10 [I-10] and Interstate 15 [I-15]) will implement some planned expansion and improvement projects and undergo routine maintenance activities. The SBCTA and California Department of Transportation (Caltrans) propose to construct Express Lanes, including tolled facilities, in both directions of I-15. In addition, Caltrans is proposing to improve I-10 by constructing freeway lane(s) and other improvements through all or a portion of the 33-mile-long segment of I-10 from the Los Angeles/San Bernardino County line to Ford Street in San Bernardino County.

A detailed list of the planned projects included in the No Project Alternative is found in the Cumulative Impacts Technical Report (SBCTA 2024a).

2.3.2 Proposed Project

The proposed Project includes a 4.2-mile tunnel alignment, three passenger stations, a maintenance and storage facility (MSF), and an access and ventilation shaft (vent shaft) in the cities of Rancho Cucamonga and Ontario within San Bernardino County (see Figure 2-1). The proposed Project would include autonomous electric vehicles that would be grouped and queued at their origin station and depart toward the destination station once boarded with passengers. The following sections provide additional details on the proposed Project location and land uses, and on the proposed design, construction, and operation, as applicable, for these project elements.

2.3.2.1 Project Location

The proposed Project is located in the City of Rancho Cucamonga and in the City of Ontario within San Bernardino County. Figure 2-1 illustrates the proposed Project site's regional location and vicinity. The proposed Project alignment is a reversed L-shaped alignment consisting of the Cucamonga Metrolink

Station, Milliken Avenue, East Airport Drive, and ONT. Figure 2-2 illustrates the proposed Project area. Cucamonga Metrolink Station is located at 11208 Azusa Court in the City of Rancho Cucamonga and serves the Metrolink San Bernardino Line commuter rail. ONT is located at 1923 East Aviation in the City of Ontario and provides international airport service with over 10 different airline partners. Information related to the proposed Project Design is found in Section 2.3.2.3.

2.3.2.2 Existing Land Uses

The northwestern portion of the proposed Project alignment includes the Cucamonga Metrolink Station. There are 980 standard parking stalls and 24 Americans with Disabilities Act (ADA) compliant stalls at the Cucamonga Metrolink Station (Metrolink 2022).

From the northwestern portion of the proposed Project site, the tunnel alignment travels under Milliken Avenue, which is a major north-south arterial roadway. Milliken Avenue consists of three travel lanes north of Inland Empire Boulevard and four travel lanes south of Inland Empire Boulevard. From Milliken Avenue, the alignment travels south crossing under the existing I-10. I-10 is an east-west cross-country highway and has six lanes in each direction at the proposed Project site. The alignment eventually connects to East Airport Drive, which is an east-west arterial roadway with three travel lanes in each direction.

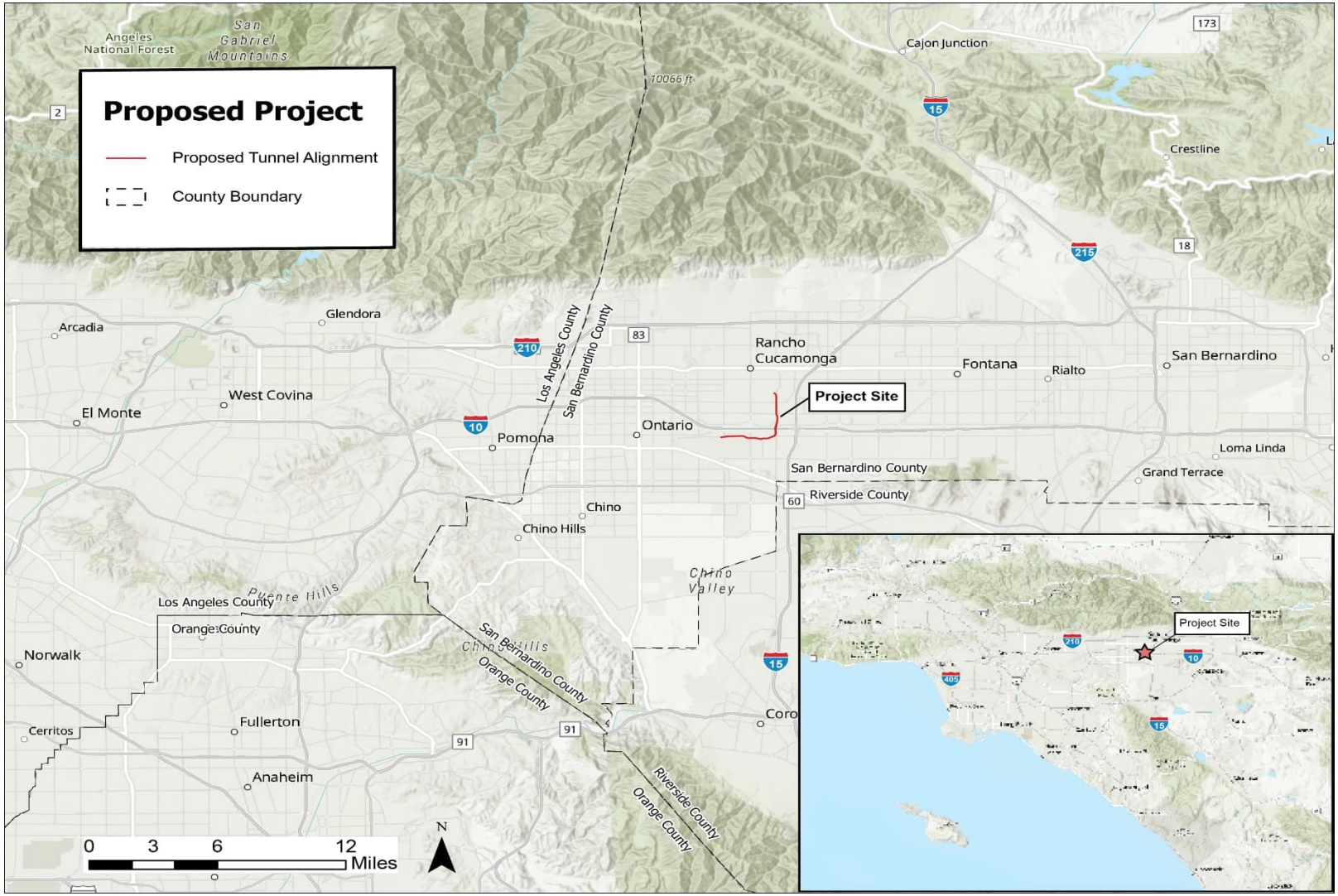
The southwestern portion of the proposed Project tunnel alignment terminates at ONT. Parking Lots 2 through 5 are located on the northern side of ONT. Parking Lots 2, 3, and 4 are surface lots that provide general parking and are a short walk away from the terminals at ONT. Parking Lot 5 is a surface economy lot at which a shuttle service is available.

2.3.2.2.1 Surrounding Land Uses

Development in the immediate vicinity of the proposed Project site includes a mix of industrial, commercial, manufacturing, transportation, office, multi-family residential, hotel, and airport related land uses. The proposed Project site's surrounding land uses are located within the City of Rancho Cucamonga and City of Ontario. Immediately adjacent uses include the following:

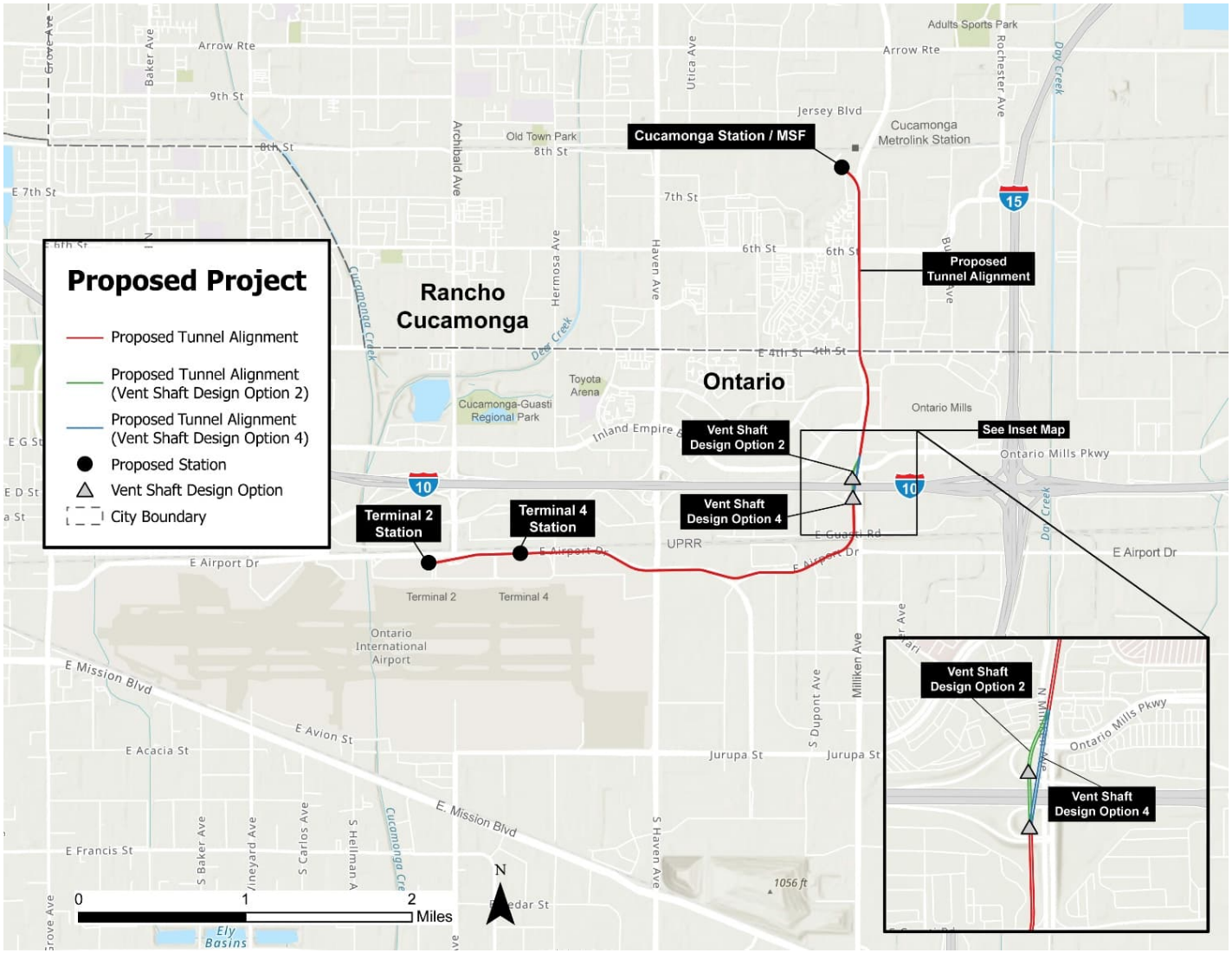
- North: Railroad tracks, industrial and manufacturing uses, trucking facilities, surface parking lots, Rancho Cucamonga Fire Station Number 174, and All Risk Training Center for the Rancho Cucamonga Fire Protection District.

Figure 2-1: Regional Location Map



Source: AECOM 2024

Figure 2-2: Proposed Project Site



Source: AECOM 2024

- South: Industrial and manufacturing uses, along with trucking facilities, rental car facilities, parking lots, hotel uses, and other airport related uses. ONT includes two passenger terminals, general aviation facilities, air freight buildings, parking lots, and numerous airport and aircraft maintenance and support services.
- East: The eastern side of Milliken Avenue from 5th Street south to 4th Street consists primarily of hotel uses. Concentrated areas of commercial uses and restaurants are located along Milliken Avenue from 4th Street south to I-10, including Ontario Mills, which is a regional shopping mall complex. Hotel uses are also located adjacent to the Ontario Mills shopping mall.
- West: The western side of Milliken Avenue from approximately 7th Street south to 4th Street consists primarily of multi-family residential uses. Concentrated areas of large retail, commercial uses, restaurants, hotels, and the Toyota Arena are located along Milliken Avenue from 4th Street south to I-10.

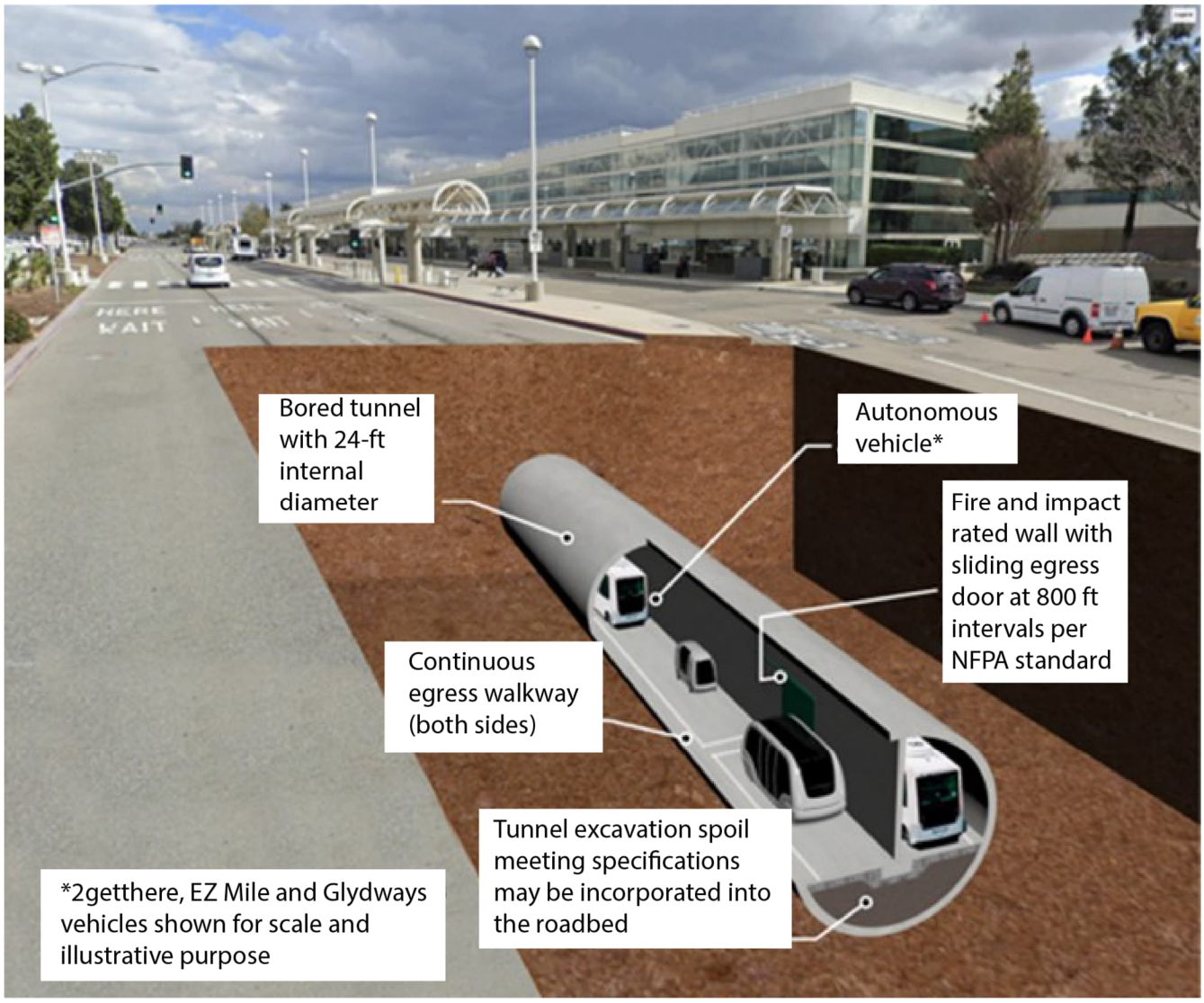
2.3.2.3 Proposed Project Design

The proposed Project includes construction of transit facilities, including three at-grade passenger stations, one MSF, and one emergency access and vent shaft. The proposed alignment would run primarily within a 4.2-mile single underground tunnel (24-foot inner diameter bi-directional tunnel) alignment that begins at the Cucamonga Metrolink Station and travels south along Milliken Avenue and crosses beneath 6th Street and 4th Street, I-10, and the Union Pacific Railroad (UPRR), before traveling west beneath East Airport Drive to connect to Terminals 2 and 4 at ONT. A tunnel configuration has been identified as the proposed Project based on technical analysis, evaluation, and stakeholder input. Figure 2-3 depicts a typical transit tunnel section. Please see the Alternatives Considered Report for additional background on the development and refinement of the proposed Project design.

The three proposed at-grade stations would be constructed to serve Cucamonga Metrolink Station, ONT Terminal 2, and ONT Terminal 4. The MSF would be located adjacent to Cucamonga Metrolink Station and would support operations for the proposed Project by storing, maintaining, and cleaning autonomous electric transit vehicles, and it would also include employee amenities and parking. The access and vent shaft would be constructed to provide a means of emergency passenger egress and first responder access.

The proposed Project would include autonomous electric vehicles that would transport passengers on demand between Cucamonga Metrolink Station and ONT. The autonomous electric vehicles would run on rubber tires, and the vehicles are proposed to travel on a dedicated asphalt guideway within the proposed tunnel. The tunnel will include access ramps for the transit vehicles to surface to grade and provide access to the three proposed at-grade stations for passenger boarding and alighting.

Figure 2-3: Typical Transit Tunnel Section View



2.3.2.3.1 Stations

The proposed Project includes three passenger stations. One station would be located in the northwestern corner of the existing Cucamonga Metrolink Station parking lot, which is owned and maintained by the City of Rancho Cucamonga. The other two proposed stations would be located within two of the existing parking lots at ONT, specifically Parking Lot 2 and Parking Lot 4, which are located across from Terminals 2 and 4. These proposed stations would be located at-grade and would connect to their associated tunnel portals along Terminal Way at ONT. Stations are proposed to be one to two stories and up to approximately 40 feet in height. All three stations would be connected to the bored tunnel via a cut-and-cover structure and an at-grade guideway. The guideway would be enclosed by fencing, and the walls would be buffered with landscaping. A pedestrian walkway would be provided bordering the outside of the guideway. Figure 2-4 and Figure 2-5 illustrate the overview of the proposed station footprint.

The proposed at-grade station Cucamonga Station would be approximately 8,000 square-feet and would be located at the northwest corner of the existing Cucamonga Metrolink Station parking lot. The existing Cucamonga Metrolink Station parking lot is owned and maintained by the City of Rancho Cucamonga. Approximately 180 parking stalls would be permanently removed from the existing Cucamonga Metrolink Station parking lot to accommodate the proposed Cucamonga Station. Two other stations, each approximately 10,000 square-feet, would be located at-grade within two of the existing parking lots at ONT Terminal 2 and Terminal 4. The Cucamonga Station also includes the proposed Project's MSF.

The two airport-serving stations would connect to their associated tunnel portals along Terminal Way via an at-grade connection. The proposed stations would be entirely located within the ONT right-of-way (ROW). Approximately 80 parking stalls would be permanently removed to accommodate the ONT Terminal 2 station, and approximately 115 spaces would be permanently removed to accommodate the ONT Terminal 4 station.

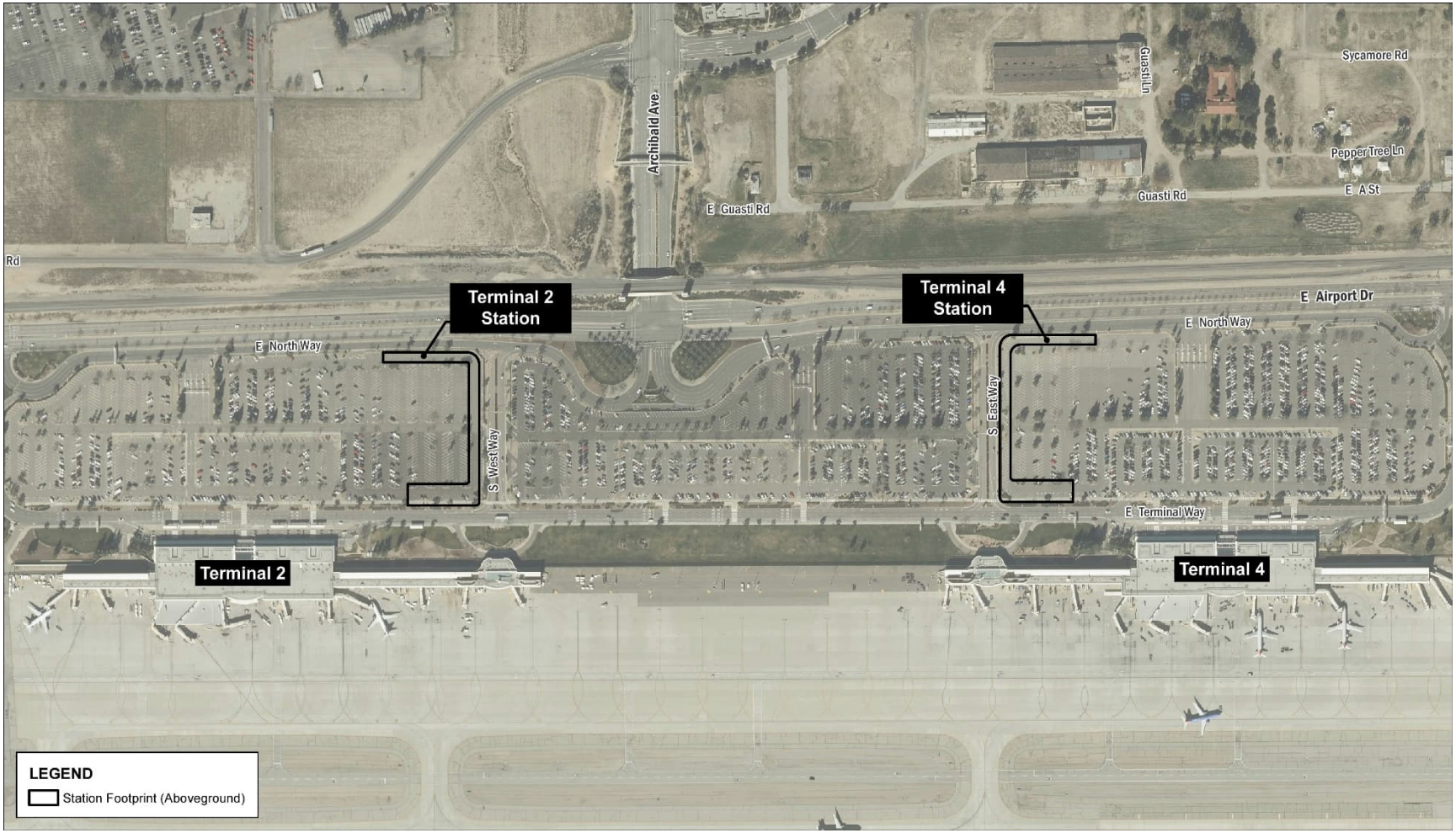
2.3.2.3.2 Maintenance and Storage Facility

The proposed Cucamonga Station would include an adjacent maintenance and storage facility with enclosed bays to store, clean, and maintain vehicles. The MSF would be approximately 11,000 square feet, with an additional 5,000 square feet second story and would contain an operations control center with lockers, breakrooms, and restrooms. Employee parking for the facility would be provided at the existing parking lot owned by SBCTA, in the southeastern quadrant of the Milliken Avenue/Azusa Court intersection.

Figure 2-4: Cucamonga Station

Source: HNTB 2024

Figure 2-5: Ontario International Airport - Terminal 2 Station and Terminal 4 Station



Source: HNTB 2024

2.3.2.3.3 Description of Vent Shaft Design Options

A vent shaft would be constructed to provide a means of emergency passenger egress and first responder access to and from the tunnel. Two locations are being considered west of Milliken Avenue on the north and south sides of I-10, as shown in Figure 2-6. A final decision about the location of the vent shaft would be made after the completion of the CEQA and NEPA environmental processes, and consideration of operational needs, environmental impacts, and stakeholder coordination.

The location option on the north side of I-10 would be in the ROW for the westbound off-ramp and would provide surface ground access from the Milliken Avenue/I-10 westbound off ramp intersection or from the westbound off ramp right lane near the ramp termini or directly from Milliken Avenue. The location option on the south side of I-10 would be in the ROW for the eastbound on-ramp and would provide surface ground access from Milliken Avenue near the eastbound on-ramp.

The vent shaft would consist of both underground and above ground structures. The underground shaft would extend to the tunnel level and the surface structures would consist of a one-(1) story structure above ground.

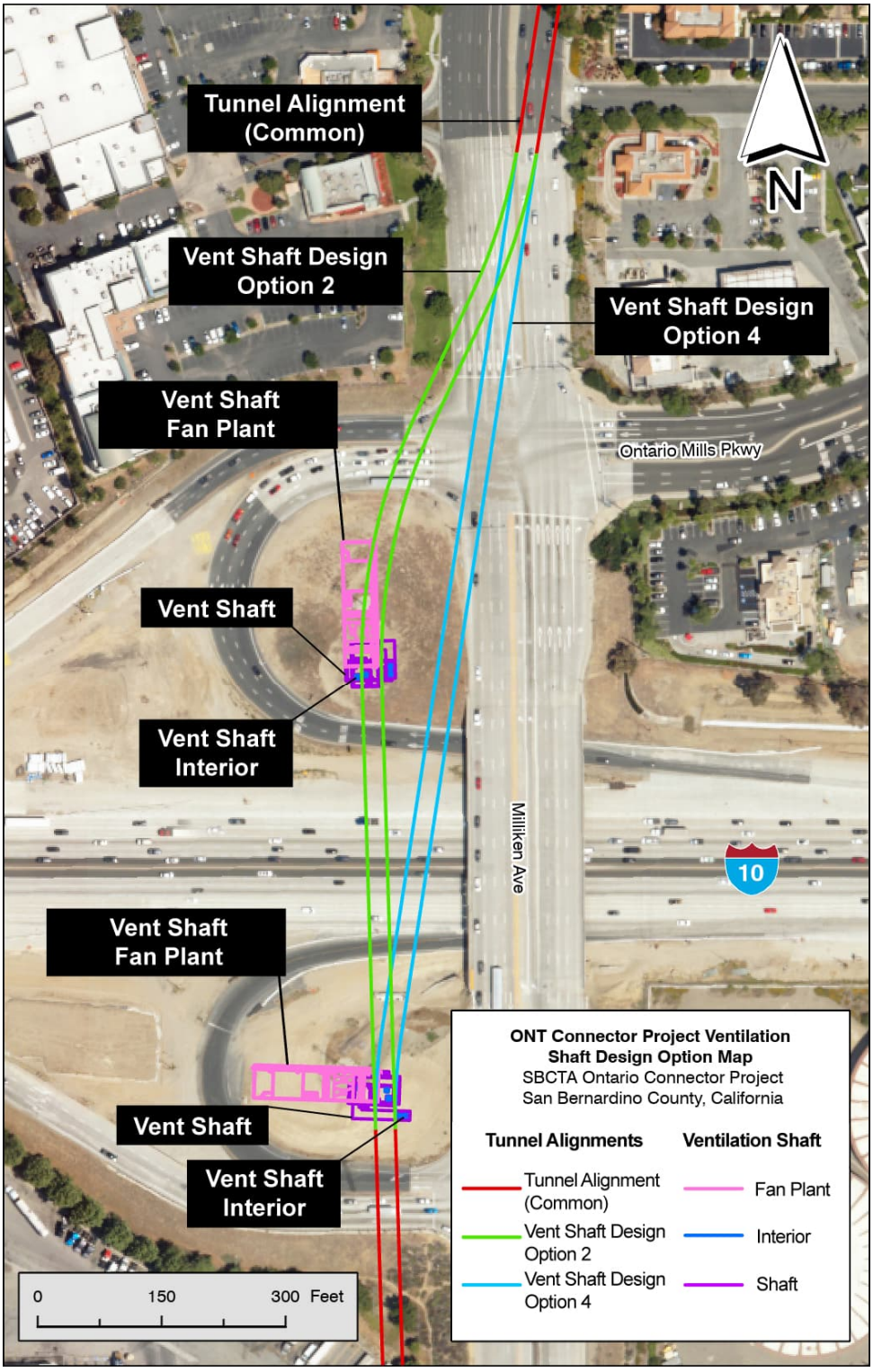
Access points would include underground, surface, and road access for emergencies to and from the tunnel. The proposed vent shaft would include associated electrical and ventilation equipment, and access would be controlled via a lock and key.

2.3.2.4 Proposed Operations

The proposed Project includes operation of autonomous electric vehicles to transport passengers to and from the proposed stations. The autonomous electric vehicles would be grouped and queued at their origin station and would depart toward the destination station once boarded with passengers. After the group of vehicles arrives at the destination station and passengers deboard, new passengers would board, and the group of vehicles would return to its origin station. If no new passengers are present, empty vehicles would be returned to the origin station to pick up new passengers. The proposed Project would provide a peak one-way passenger throughput of approximately a minimum of 100 per hour. Operations would be managed by Omnitrans, with on-demand service provided daily from 4:00 a.m. to 11:30 p.m., including weekends and holidays.

Fleet size and capacity of the vehicles will be up to the Operating System Provider and Design-Builder to determine to provide an initial operating system capable of transporting a minimum of 100 passengers per hour per direction and scalable to meet ridership demand. Based on the initial operating requirements and preliminary vehicle capacities, SBCTA is anticipating initial fleet sizes of between 7 and 60 vehicles to be required. Vehicles are rubber-tired electric autonomous vehicles.

Figure 2-6: Vent Shaft Design Option 2 and Vent Shaft Design Option 4



Source: HNTB 2024

2.3.2.5 Proposed Construction

This section describes the construction approach for the proposed Project. Overall construction of the proposed Project would last approximately 56 months, with project elements varying in their specific construction duration. Construction is projected to start in 2025 and is anticipated to be completed in 2031. The Construction Methods Technical Report provides additional details regarding the construction approach and process for the key project elements (stations, MSF, tunnel construction, and vent shaft) associated with the proposed Project (SBCTA 2024b).

2.3.2.5.1 Stations and Maintenance and Storage Facility Construction

A construction staging area would be required at each of the three proposed Project stations, which includes the MSF at Cucamonga Station, and at the vent shaft location. Construction staging areas would be used to store building materials and construction equipment, assemble the tunnel boring machine (TBM), temporarily store excavated materials, and serve as temporary field offices for the contractor. Heavy-duty, steel, track-out grates (i.e., rumble plates) would be staged at the entrance of the construction staging areas to capture dirt and soil debris from the wheels of trucks and construction equipment. Best management practices (BMPs) would minimize a public nuisance that can result from soil and mud tracks on the public roadway. For security purposes, construction staging areas would be equipped with fences, lighting, security cameras, and guards to prevent vandalism and theft.

Cut-and-cover sites would occur at each proposed station location. Cut-and-cover activities involve the excavation of a shallow underground guideway from the existing street surface. During the construction phase, the cut-and-cover sites at Cucamonga Metrolink Station and Terminal 2 at ONT would be used as the TBM launching and receiving pits. Ultimately, the station cut-and-cover sites would serve as the vehicle ramps for the proposed Project's operations where the underground guideway would transition to at-grade.

Following the mass excavation and grading, the stations would require the installation of the waterproof membrane around the station box. The construction sequence for the station structures would typically commence with construction of the foundation base slab, followed by installation of exterior walls any interior column elements, and pouring of the station roof. Once station structure work is complete, the station excavation would be backfilled, and the permanent roadway would be constructed. Decking removal and surface restoration would then occur. Stations are proposed to be 1 to 2 stories, up to approximately 40 feet in height.

Generally, stations would be built simultaneously with or following guideway construction. However, construction of the Cucamonga Station may need to occur after the completion of all excavation and in-tunnel work. Truck haul routes, described in Table 2-1, would be designated for each staging site to transport excavated material from the staging sites. Additional construction details for the proposed stations and MSF are described in Table 2-1 and in the Construction Methods Technical Report. Table 2-2 provides an overview of the typical sequencing for transit construction activities (SBCTA 2024b).

2.3.2.5.1.1 Construction Details for Cucamonga Station and Maintenance and Storage Facility

Construction at the proposed Cucamonga Station would require a mass excavation and the TBM would be launched from the invert of the Cucamonga Station and retrieved from the ONT Terminal 2 Station construction site. Construction at the proposed Cucamonga Station would require approximately 3.2 acres. Approximately 170 parking stalls would be temporarily unavailable at the Cucamonga Metrolink Station parking lot. Construction at the Cucamonga Station would occur for up to 37 months. No road closures are anticipated for staging at the Cucamonga Station. Equipment needs would include the following: excavators, backhoes, a vertical conveyor system, a gantry crane, a crawler crane, concrete trucks, haul trucks, a wheel loader, Foamplant, cooling towers, a tunnel fan grout plant, segment cars, and flatcars.

Additionally, construction would not interrupt Metrolink service at the Cucamonga Metrolink Station, as construction activities and staging would occur within the existing Cucamonga Station parking lot. SBCTA will coordinate construction at Cucamonga Station with SCRRA, prior to the start of construction and throughout the construction period, to maintain station access and to coordinate station parking, as needed.

The proposed Cucamonga Station includes an MSF to store, clean, and maintain vehicles. The MSF would be approximately 11,000 square feet, with an additional 5,000 square feet second story and would contain an operations control center with lockers, breakrooms, and restrooms. The MSF would be constructed adjacent to the Cucamonga Station and would include enclosed bays.

2.3.2.5.1.2 Construction Details for ONT Terminal 2 Station

Construction staging at the proposed ONT Terminal 2 station would require approximately 3.4 acres within the existing ONT Terminal 2 parking lot. Approximately 300 parking stalls would be temporarily unavailable at the ONT Terminal 2 parking lot. Construction at the ONT Terminal 2 Station would occur for up to 27 months. No road closures are anticipated for staging at the ONT Terminal 2 Station. Equipment needs would include the following: a piling rig, a gantry crane, a crawler crane, excavators, concrete trucks, muck trucks, a wheel loader, Foamplant, cooling towers, a tunnel fan, a grout plant, segment cares, and flatcars.

2.3.2.5.1.3 Construction Details for ONT Terminal 4 Station

Construction Staging at the proposed ONT Terminal 4 station would require approximately 3.2 acres within the existing ONT Terminal 4 parking lot. Approximately 300 parking stalls would be temporarily unavailable at the ONT Terminal 4 parking lot. Construction at the ONT Terminal 4 Station would occur for up to 15 months. No road closures are anticipated for staging at the ONT Terminal 4 Station. Equipment needs would include the following: a piling rig, a crawler crane, concrete trucks, muck trucks, a compressor, a generator, a water treatment plant, a wheel wash, a wheel loader, backhoes, and excavators.

Table 2-1: Stations, Maintenance and Storage Facility Construction Details

Proposed	Construction Area	Duration	Haul Route
Cucamonga Station and MSF	Would require approximately 3.2 acres within the existing Cucamonga Metrolink Station parking lot. Approximately 170 parking stalls would be temporarily unavailable from the existing Metrolink parking lot.	Construction at the Cucamonga Station would occur for up to 37 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. Haul trucks would exit the staging area, travel north along Milliken Avenue, and turn right on Foothill Boulevard to access I-15. No road closures are anticipated for staging at the Cucamonga Station.
ONT Terminal 2 Station	Would require approximately 3.4 acres within the existing ONT Terminal 2 parking lot. Approximately 300 parking stalls would be temporarily unavailable from the ONT parking lot.	Construction at ONT Terminal 2 would occur for up to 27 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. Haul trucks would exit the staging area, travel east along Terminal Way, and turn left on Haven Avenue to access I-10. No road closures are anticipated for staging at the Terminal 2 Station.
ONT Terminal 4 Station	Would require approximately 3.2 acres within the existing ONT Terminal 4 parking lot. Approximately 300 parking stalls would be temporarily unavailable from the ONT parking lot.	Construction at ONT Terminal 4 would occur for up to 15 months.	Haul trucks are needed to support removal and transport of materials from the mass excavation for each construction site (for the stations and vent shaft) and from tunnel boring activities. Haul trucks would collect excavated material from the construction sites and transport it away from the sites, utilizing designated haul routes. Haul trucks would exit the staging area, travel east along Terminal Way, and turn left on Haven Avenue to access I-10. No road closures are anticipated for staging at the Terminal 4 Station.

Table 2-2: Typical Sequencing of Transit Construction Activities

At Grade or Underground	Activity	Typical Duration (Total Months)	Description
At Grade Construction Activities	Utility Relocation	7-14	Relocate utilities from temporary and permanent elements related to the construction and/or operation of the Project.
At Grade Construction Activities	Construction Staging Laydown Yard	3-6	Prepare existing lots to store construction equipment and materials, including the TBM, office space.
At Grade Construction Activities	Roadway	6-18	Reconfigure roadway, demolition of existing roadway installation of curb and gutter and other public ROW improvements.
At Grade Construction Activities	At-grade Guideway	6-18	Install asphalt and striping for guideway.
At Grade Construction Activities	Station Construction (overall)	24-48	Install mechanical, electrical, and plumbing (MEP), canopies, faregates, ticketing, finishes, stairs, and walkways.
At Grade Construction Activities	Parking	3-6	Restoring existing parking stalls temporarily unavailable due to construction, as applicable.
At Grade Construction Activities	MSF	8-12	Install MEP, fencing, enclosed bays, specialized washing equipment, and rebar installation, and concrete pours.
Underground Construction Activities	Utility Relocation	7-14	Relocate and hang underground utilities from temporary and permanent elements related to the construction and operation of the Project.
Underground Construction Activities	Open Cut and Cut and Cover Construction	18-24	Supports the construction of the TBM launching and receiving pit, and of the access ramps connecting the tunnel with the at-grade stations. Install soldier piles for beam and lag support of excavation and excavation. Cover excavation with temporary decking.
Underground Construction Activities	Bored Tunnel	16-24	Underground guideway construction.
Underground Construction Activities	Ventilation and Emergency Access Shaft	6-8	Install ventilation and emergency access shaft.
Underground Construction Activities	Underground Guideway	12-18	Install asphalt and striping for guideway.

2.3.2.5.2 Tunnel Construction

The proposed Project will travel in a below grade tunnel configuration for most of its proposed alignment. A TBM will be utilized in the construction of the tunnel. TBM are typically used in the construction of infrastructure projects to build deep underground tunnels by boring, or excavating, through soil, rocks, and/or other subsurface materials. The TBM would be launched from the Cucamonga Metrolink Station to construct the tunnel. Additional details regarding the underground construction process for the proposed Project are included in the Construction Methods Technical Report (SBCTA 2024b).

The TBM would be launched from the invert of the Cucamonga Station and retrieved from the ONT Terminal 2 Station construction site. A large crane would be used to assemble and disassemble the TBM from the excavation and receiving pits. OIAA height limits at ONT and Rancho Cucamonga, 135 feet and 160 feet, respectively, would restrict crane heights. The TBM would operate six days a week, with maintenance occurring each Sunday. Construction of the entire tunnel would take approximately 22 months. Both ends of the tunnel would need to be constructed via direct excavation (cut and cover) to launch or retrieve the TBM. After mining is completed and TBM logistics are demobilized, both ends of the tunnel would be utilized to build the invert roadway, walkways, center wall and MEP systems, etc.

Vehicle ramps connecting to the tunnel would be constructed via direct excavation, as well. Equipment at the TBM launch site would include trucks, a crane, excavators, a grout plant, a compressor plant, a tunnel fan, and cooling towers. The launch area would also store tunnel construction materials (rail, pipe, ducts, etc.) and stockpile excavated material.

Truck haul routes at the proposed launch site at Cucamonga Station and the proposed retrieval site at ONT Terminal 2 Station are described in Table 2-1. The Construction Methods Technical Report includes additional details on the overall construction approach for the proposed tunnel (SBCTA 2024b).

2.3.2.5.3 Vent Shaft Construction

Two vent shaft design options with different access points are being considered for the proposed Project. Vent shaft design option 2 would be located west of Milliken Avenue on the westbound off-ramp of the I-10. Vent shaft design option 4 would be located west of Milliken Avenue on the eastbound on-ramp of the I-10. The vent shaft will consist of both underground and above ground structures. The underground shaft will extend to the tunnel level and the surface structure will consist of a one-(1) story structure above ground. One vent shaft would be constructed along the tunnel alignment.

The vent shaft could be constructed before or after the construction of the tunnel and would be installed using a similar construction methodology to that of the tunnel and take approximately 6 months to complete. A drill rig would install up to 5 piles deep per day, each 70 feet deep. Piles would be drilled (i.e., no impact driving). The access shaft would then be excavated. The excavation would be supported by an internal bracing system. The vent shaft would require a construction staging area approximately 0.62-acres (27,000 square feet). Anticipated equipment at the location would include haul trucks, a drill rig, a crane, an excavator, a wheel loader, a compressor, and a ventilation fan. The staging area would include material storage, stockpiles of excavated material, water treatment, a workshop, a construction

office, and an employee parking. Additional details regarding the construction process for the vent shaft are included in the Construction Methods Technical Report (SBCTA 2024b).

2.3.2.5.4 Utilities

Utility relocations are anticipated at the launch and retrieval locations at the Cucamonga Metrolink Station site, ONT, and ventilation/emergency access shaft. Multiple utilities would be relocated to allow for the construction of the access shaft, including: potential electric underground distribution cables owned and operated by Southern California Edison; landscape irrigation line owned and operated by the City of Ontario; and Caltrans fiber optic duct bank. In a future project phase, coordination with the existing utility service providers prior to utility relocation would be conducted to reduce potential impacts to utility service and minimize disruptions. Relocations of existing utilities would be coordinated with utility service providers and would be in previously disturbed areas or established ROW close to their existing locations and would stay within the evaluated Project footprint.

2.3.2.6 Proposed Project Easements

The proposed Project would require easements from 19 properties. This includes the need for 12 permanent subsurface easements, two permanent surface easements, and five parcel acquisitions for both subsurface and surface easements. Seven of the easements would be for the three stations and would total approximately 2 acres. SBCTA would require these easements for construction and/or operation of the proposed Project. There are two locations that are options for the location of the Vent Shaft, both belonging to Caltrans. This document evaluates the impacts for both options without selection of a preferred site. The decision of the preferred site will depend in part on the CEQA and NEPA processes, including any potential input from the public. The final decision as to which option is preferred may occur after the completion of the CEQA/NEPA process. Land uses for the parcels where these easements would be required include industrial, transportation facilities, utilities, and commercial. The owners of these parcels include SBCTA and City of Rancho Cucamonga (Cucamonga Metrolink Station west and east parking lots), OIAA, a utility service provider, and some private owners. No relocations of businesses and residences would be required to construct the proposed Project.

3 REGULATORY SETTING

3.1 FEDERAL

The following sections describe applicable federal policies and regulations.

3.1.1 National Environmental Policy Act (42 United States Code Section 4321 et seq.)

NEPA requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning studies in order to ensure that environmental considerations, such as impacts to the earth, are given due weight in the project decision-making. General NEPA procedures are set forth in the Council on Environmental Quality regulations 42 United States Code (USC) 4332 Section 102.

3.1.2 Earthquake Hazards Reduction Act

In October 1977, the United States Congress passed Earthquake Hazards Reduction Act (EHRA) (42 USC Section 7702) to "reduce the risks of life and property from future earthquakes in the United States." To accomplish the goal of EHRA, the act established the National Earthquake Hazards Reduction Program (NEHRP). The NEHRP is an interagency federal program that relies on coordination with program agencies; it has no regulatory authority and cannot dictate or enforce national standards, it works to influence earthquake-resilient building codes through research, data collection, and analyses to produce relevant results and products that will be adopted and used by stakeholders to mitigate public and private earthquake risks.

3.2 STATE

The following sections describe applicable state policies and regulations.

3.2.1 California Environmental Quality Act

CEQA and the CEQA Guidelines require environmental considerations for state and local actions. A CEQA Checklist contains specific questions regarding a project's potential to expose people or structures to seismic, landslide, and subsidence hazards, and also contains questions on mineral resources.

3.2.2 Alquist-Priolo Act

The principal state guidance relating to fault rupture hazards is contained in Alquist-Priolo Act (California Public Resources Code [PRC] Section 2621 et seq.). Alquist-Priolo Act prohibits the location of most types of structures for human occupancy across active traces of faults in earthquake fault zones, shown on maps prepared by the state geologist, and regulates construction in the corridors along active faults (earthquake fault zones). Earthquake fault zones are regulatory zones around active faults designated by the State. The zones vary in width, but average about one-quarter-mile wide.

3.2.3 Seismic Hazards Mapping Act of 1990

Seismic Hazards Mapping Act of 1990 focuses on hazards related to strong ground-shaking, liquefaction, and seismically induced landslides. Under its provisions, the State is charged with identifying and mapping areas at risk of strong ground-shaking, liquefaction, landslides, and other corollary hazards. The maps are to be used by cities and counties in preparing their general plans and adopting land use policies to reduce and mitigate potential hazards to public health and safety. San Bernardino County has not been evaluated or mapped by the Seismic Hazards Mapping program.

3.2.4 California Building Code

California Building Code (CBC), codified in Title 24 California Code of Regulations (CCR), encompasses a number of requirements related to geologic issues, including Part 2, Volume 2, Chapter 18, Soils and Foundations, which outlines the minimum standards for structural design and construction. CBC augments and supersedes Uniform Building Code with stricter requirements to reduce the risks associated with building in seismic areas to the maximum extent practicable. CBC is modeled after International Building Code and sets standards for the investigation and mitigation of the site conditions related to fault movement, liquefaction, landslides, differential compaction/seismic settlement, ground rupture, ground-shaking, and seismically induced flooding.

CBC Chapter 18, Soils and Foundations, requires that geotechnical evaluations be conducted that include, among other requirements, a record of the soil profile, evaluation of active faults in the area, and recommendations for foundation type and design criteria that address issues as applicable such as (but not limited to) bearing capacity of soil, provision to address expansive soil and liquefaction, settlement, and varying soil strength. If a building department, or other appropriate enforcement agency, determines that recommended action(s) presented in the geotechnical evaluations are likely to prevent structural damage, the approved recommended action(s) must be made a condition to the building permit (Section 1803.1.1.3 of Chapter 18).

CBC provides standards for various aspects of construction including (but not limited to) excavation, grading, and earthwork construction; preparation of the site prior to fill placement, specification on fill materials and fill compaction and field testing; retaining wall design and construction, foundation design and construction; and seismic requirements. CBC Chapter 16 provides structural design requirements governing seismically resistant construction (Section 1604), including factors and coefficients used to establish seismic site class for the soil/rock at the building location and seismic occupancy category for the proposed building design (Sections 1613.3 through 1613.5). It includes provisions to address issues such as (but not limited to) construction on expansive soil, liquefaction potential, and soil strength loss. In accordance with California law, the proposed Project design and construction would be required to comply with CBC provisions. CBC sets seismic design requirements based on seismic risk categories, which are associated with a structure's occupancy category (i.e., structures that represent low hazard to human

life, structures that represent substantial hazard to human life, structures designated as essential facilities based on the proposed use), and a structure's seismic risk category (i.e., severity of the design earthquake ground motion and specific soil properties at the site). CBC Chapter 33 includes (but not limited to) requirements for excavation safeguards so that excavation and cut or fill slopes are stable (Section 3304). CBC Appendix J includes (but not limited to) grading requirements for the design of excavations and fills (Sections J106 and J107) and erosion control (Section J110).

3.2.5 State Mining and Geology Board

State Mining and Geology Board (SMGB) is responsible for administration of a mineral lands inventory process termed classification designation. Areas are classified on the basis of geological factors without regard to existing land use and land ownership. These areas are generally not available for mineral extraction. SMGB has established Mineral Resources Zones (MRZs) using the following classifications.

- MRZ-1: Areas where adequate geological information indicated no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.
- MRZ-2a: Areas underlain by mineral deposits where geological data show that significant measured or indicated resources are present.
- MRZ-2b: Areas underlain by mineral deposits where geological information indicated that significant inferred resources are present.
- MRZ-3a: Areas containing known mineral deposits that may qualify as mineral resources. Further exploration work within these areas could result in the reclassification of specific localities into the MRZ-2a or MRZ-2b categories.
- MRZ-3b: Areas that may have inferred mineral deposits which may qualify as mineral resources. Further exploration work could result in the reclassification of all or part of these areas into the MRZ-3a category or specific localities into the MRZ-2a or MRZ-2b categories.
- MRZ-4: Areas where there is not enough geological information available to determine the presence or absence of mineral resources.
- SZ Areas: Contain unique or rare occurrences of rocks, minerals, or fossils that are of outstanding scientific significance.
- IRA Areas: County- or state-identified areas where production and information indicated that significant minerals are present.

3.2.6 Surface Mining and Reclamation Act: California Public Resources Code Section 2710 et seq.

Surface Mining and Reclamation Act of 1975 (SMARA) is the primary regulatory framework for mining in the State. It delegates specific regulatory authority to local jurisdictions. The act requires the State Geologist (California Geological Survey [CGS]) to identify important mineral deposits in the state threatened by land uses that would be incompatible with future extraction and classify them into MRZs. Local jurisdictions are required to enact specific procedures to guide mineral conservation and extraction at identified sites and to incorporate mineral resource management policies into their general plans.

3.2.7 Division of Mine Reclamation

Division of Mine Reclamation (DMR) provides a measure of oversight for local governments as they administer SMARA within their respective jurisdictions. DMR may provide comments to lead agencies on a mining operation's reclamation plan and financial assurance and, jointly with SMGB, is charged with administering actions that encourage SMARA compliance. The primary focus is on existing mining operations and reclaiming mined lands to a usable and safe condition that is readily adaptable for alternative land uses. Issues related to abandoned legacy mines are addressed in the DMR Abandoned Mine Lands Unit.

3.2.8 Division of Oil, Gas, and Geothermal Resources

Division of Oil, Gas, and Geothermal Resources (DOGGR) oversees the drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells in order to protect the environment, prevent pollution, and ensure public safety. All California oil and gas wells (development and prospect wells), enhanced-recovery wells, water-disposal wells, service wells (i.e. structure, observation, temperature observation wells), core-holes, and gas-storage wells, onshore and offshore (within 3 nautical miles of the coastline), located on state and private lands, are permitted, drilled, operated, maintained, plugged, and abandoned under requirements and procedures administered by DOGGR.

3.2.9 California Geological Survey Mineral Resources Program

The Mineral Resources Program provides data about California's varied non-fuel mineral resources such as metals and industrial minerals, mineral hazards (such as radon, mercury, and naturally occurring asbestos), and information about active and historical mining throughout the state.

3.3 REGIONAL AND LOCAL

The following sections describe applicable regional and local policies and regulations.

3.3.1 San Bernardino County

3.3.1.1 San Bernardino County General Plan

The existing San Bernardino County General Plan's Safety Element and the Cultural Resources Element (San Bernardino County 2020) set forth a goal and policies that are applicable to the proposed Project for to the geology, soil, and seismicity.

GOAL HZ-1 Natural Environmental Hazards: Minimized risk of injury, loss of life, property damage, and economic and social disruption caused by natural environmental hazards and adaptation to potential changes in climate.

POLICY HZ-1.1 New subdivisions in environmental hazard areas. The County requires all lots and parcels created through new subdivisions to have sufficient buildable area outside of the following environmental hazard areas:

- Flood: 100-year flood zone, dam/basin inundation area; and
- Geologic: Alquist Priolo earthquake fault zone, County-identified fault zone, rockfall/debris-flow hazard area, existing and County-identified landslide area.

POLICY HZ-1.2 New development in environmental hazard areas. The County requires all new development to be located outside of the listed environmental hazard areas. For any lot or parcel that does not have sufficient buildable area outside of such hazard areas, we require adequate mitigation, including designs that allow occupants to shelter in place and to have sufficient time to evacuate during times of extreme weather and natural disasters.

- Flood: 100-year flood zone, dam/basin inundation area;
- Geologic: Alquist Priolo earthquake fault zone, County-identified fault zone, rockfall/debris-flow hazard area, medium or high liquefaction area (low to high and localized), existing and County-identified landslide area, moderate to high landslide susceptibility area); and
- Fire: high or very high fire hazard severity zone.

POLICY HZ-1.6 Critical and essential facility location. The County requires new critical and essential facilities to be located outside of hazard areas, whenever feasible.

POLICY HZ-1.7 Underground utilities. We require that underground utilities be designed to withstand seismic forces, accommodate ground settlement, and hardened to fire risk.

POLICY HZ-1.7 Hazard areas maintained as open space. The County minimizes risk associated with flood, geologic, and fire hazard zones or areas by encouraging such areas to be preserved and maintained as open space.

POLICY HZ-1.12 Local hazard mitigation plan implementation The County requires adherence to the goals, objectives and actions in the Multi-jurisdictional Hazard Mitigation Plan and subsequent amendments to reduce and mitigate damages from hazards in the County.

3.3.2 City of Rancho Cucamonga

3.3.2.1 City of Rancho Cucamonga General Plan

The City of Rancho Cucamonga General Plan's Safety Element (City of Rancho Cucamonga 2021a) sets forth a goal and policies that are applicable to the proposed Project for geology, soil, and seismicity.

GOAL S-2 Seismic and Geologic Hazards. A built environment that minimizes risks from seismic and geologic hazards.

POLICY S-2.1 Fault Setbacks. The City requires minimum setbacks for structures proposed for human occupancy within State and City Special Study Zones. Setbacks will be based on minimum standards established under State law and recommendations of a Certified Engineering Geologist and/or Geo-technical Engineer.

POLICY S-2.2 Building Functionality. The City requires enhanced siting, design, and construction standards that focus on building functionality for new critical public facilities and key essential (private) facilities after a seismic event.

POLICY S-2.3 Seismically Vulnerable Buildings. The City prioritizes the retrofit by private property owners of seismically vulnerable buildings (including but not limited to unreinforced masonry, soft-story construction, and non-ductile concrete) as better information and understanding becomes available.

POLICY S-2.4 Transfer of Development Rights. The City allows the transfer of development rights from areas of significant seismic and geologic hazards to select development areas throughout the City and Sphere of Influence.

POLICY S-2.5 Hillside Hazards. The City prioritizes regulations and strategies that reduce geologic hazard risk to properties and loss of life.

The City of Rancho Cucamonga General Plan Resource Conservation Element (City of Rancho Cucamonga 2021a) sets forth a policy that is applicable to the proposed Project for paleontological resources.

POLICY RC-4.6 Requires any paleontological artifacts found within the City or the Sphere of Influence to be preserved, reported, and offered for curation at local museums or research facilities.

3.3.2.2 City of Rancho Cucamonga Municipal Code

The City of Rancho Cucamonga Municipal Code Title 15 (Buildings and Construction) sets forth the following policies that are applicable to the proposed Project for geology, soil, and seismicity (City of Rancho Cucamonga 2024.

- Chapter 15.04.010 (Codes Adoption) has adopted the 2019 California Building Code, based on the International Building Code, Volumes 1 and 2 for the City of Rancho Cucamonga.
- Chapter 15.12.065 (Section 1803.5.11 Amended– Seismic Design Categories C though F) requires geotechnical investigation be conducted for all new structures or additions to existing buildings where the addition is more than 50 percent of the existing floor area. The City also requires geotechnical reports that are more than 3 years old to have an updated geotechnical report submitted.
- Chapter 15.12.140 (Section J110.3 of Appendix J Amended – Temporary Erosion Control During grading) requires permittee to put into effect and maintain all precautionary measures necessary to protect adjacent watercourses and public or private property from damage by erosion, flooding, and deposition of mud or debris origination form the site during the grading operation regardless of lot size.

3.3.2.3 City of Rancho Cucamonga Local Hazard Mitigation Plan

The City of Rancho Cucamonga Local Hazard Mitigation Plan (City of Rancho Cucamonga 2021b) evaluates the natural and manmade hazards that could potentially affect the City of Rancho Cucamonga and its inhabitants. Local Hazard Mitigation Plan identifies strategies and actions intended to minimize potential hazards that could result from potential projects. Local Hazard Mitigation Plan was created in conjunction with the City of Rancho Cucamonga General Plan and is considered an extension of that document; adopted by resolution. Potential hazards evaluated by Local Hazard Mitigation Plan include hazards resulting from earthquake, flooding, wildfires, high/straight-line winds, and terrorism.

3.3.3 City of Ontario

3.3.3.1 City of Ontario General Plan

The existing City of Ontario's General Plan, the Ontario Plan 2050, Safety Element (City of Ontario 2022) sets forth a goal and policies that are applicable to the proposed Project for geology, soil, and seismicity.

GOAL S-1	Minimized risk of injury, loss of life, property damage, and economic and social disruption caused by earthquake-induced and other geologic hazards.
POLICY S-1.2	Entitlement and Permitting Process. The City follows state guidelines and the California Building Code to determine when development proposals must conduct geotechnical and geological investigations.

POLICY S-1.3 Continual Update of Technical Information. The City maintains up-to-date California Geological Survey seismic hazard maps.

POLICY S-1.4 Seismically Vulnerable Structures. We conform to state law regarding unreinforced masonry structures.

3.3.3.2 City of Ontario Municipal Code

The City of Ontario Municipal Code, Volume 2, Title 8 (Building Regulations), Chapter 1 (Building Code), Section 8-1.01 (Adoption of the Building Code) has adopted the 2019 edition of the CBC, which incorporates and amends the 2018 edition of the International Building Code (City of Ontario 2019).

3.3.3.3 City of Ontario Hazard Mitigation Plan

In 2023, the City of Ontario prepared a Hazard Mitigation Plan (City of Ontario 2023) to identify the City of Ontario's hazards, review and assess past disaster occurrences, estimate the probability of future occurrences, and set goals to reduce or eliminate long-term risk to people and property from natural and manmade hazards. The multi-hazard mitigation plan goals are to minimize loss of life property from natural and manmade hazard events, protect public health and safety, increase public awareness of risk from natural and manmade hazards; and to enhance emergency systems including warning systems.

4 METHODOLOGY

4.1 RESOURCE STUDY AREA

The following documentation was reviewed and evaluated to describe the environmental setting and the geologic hazards for impact analysis.

- Reports and data collected during previous geotechnical investigations of the proposed Project area;
- Available geologic published literature and relevant reports prepared for this proposed Project within the proposed Project area. Documents reviewed included:
    - San Bernardino Countywide Plan*;*
    - Official Alquist-Priolo Earthquake Fault Zone Maps, geologic and topographic maps, and other publications by CGS (previously California Division of Mines and Geology), United States Geological Survey [USGS], and California Division of Oil and Gas);
    - Draft Geotechnical Exploration Data Report (Leighton Consulting, Inc. [Leighton] 2021);
    - The City of Rancho Cucamonga PlanRC and EIR (City of Rancho Cucamonga 2021b and 2021a); and
    - The Ontario Plan 2050 (City of Ontario 2022).

Geologic impacts, such as earthquakes (seismic hazards) and slope stability, are of concern primarily during operations, although there could be seismic impact during construction of the proposed Project. Geological impacts during construction are generally related to failure of temporary structures related to use of construction equipment such as scaffolding, soil stability, and erosion. The potential for erosion and loss of topsoil to occur is primarily related to the potential for soil disturbance during construction activities but can also be related to operations if soil is exposed following the completion of construction.

4.2 EVALUATION OF IMPACTS UNDER CEQA

CEQA requires a Lead Agency to determine the significance of all environmental impacts across several environmental resource topics. (PRC Section 21082.2; 14 CCR Section 15604 [CEQA Guidelines]). Appendix G of the 2024 CEQA Guidelines lists the environmental conditions that must be assessed for project-related impacts. For each environmental condition, the significance of project-related impacts is evaluated (Association of Environmental Planners CEQA Portal 2020). Project impacts are evaluated at various stages in the project development, including construction (temporary impacts), operational (permanent impacts), and cumulative (in combination with current and future projects in the project area). If an impact may occur, analysis is conducted to determine whether the impact is potentially

significant, less than significant, or less than significant with mitigation. For effects that are "Less than Significant with Mitigation Measures Incorporated", mitigation activities are incorporated during project construction and/or operations that either avoid the impact, minimize the impact, reduce or eliminate the impact over time, or compensate for the impact. Mitigation Measures are activities that go beyond any federal, state, or local requirements or standards, such as requirements outlined in municipal codes.

4.2.1 CEQA Significance Thresholds

The following Thresholds of Significance are based on Appendix G of the 2024 CEQA Guidelines. Implementation of the proposed Project could result in potentially significant impacts if the proposed Project would do the following:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42;
    - strong seismic ground-shaking;
    - seismic-related ground failure, including liquefaction; and
    - landslides.
- Results in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial director or indirect risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater;
- Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

5 EXISTING CONDITIONS

5.1 GEOLOGY AND SOILS STUDY AREA

5.1.1 Regional Geology

The proposed Project area is located on a gently sloping alluvial plain descending southward from the San Gabriel Mountains within the Chino Basin in the northern portion of the Peninsular Ranges geomorphic province of California. The alluvial plain is underlain by shallow eolian ("dune") deposits over a thick accumulation of alluvial soil deposits eroded from the San Gabriel Mountains (CGS 2022b). The mountain range is part of the Transverse Ranges and lies between the Los Angeles Basin and the Mojave Desert. As described in this section, Quaternary, faults are mapped along the foothills of the San Gabriel Mountains, and below the Chino Basin. North of the proposed Project, the San Andreas Fault Zone crosses through Cajon Pass where it forms the boundary between the Pacific Plate and the North American Plate.

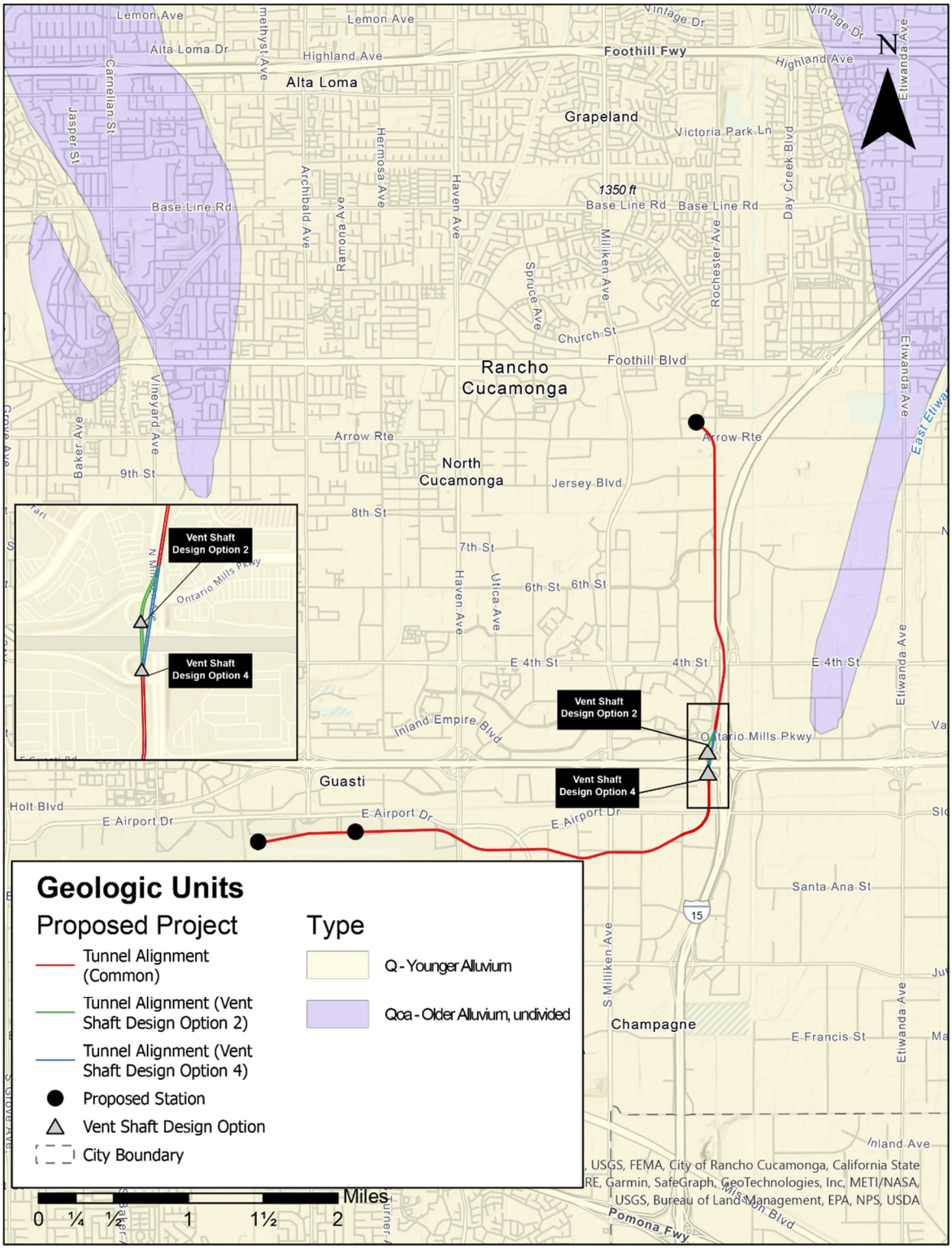
5.1.2 Topography and Drainage

Based on aerial imagery, land in the cities within the proposed Project area is urbanized and largely covered with impervious surfaces, such as areas of asphalt, concrete, buildings, and other land uses which concentrate storm runoff. To a minimal extent, areas of pervious surfaces include landscaped medians and setbacks. Stormwater and other surface water runoff are conveyed to municipal storm drain. Most local drainage networks are controlled by structural flood control measures. The majority of the length of the proposed Project is along major arterials with curb and gutter features. There are multiple storm drains and drainage features within the proposed Project site.

5.1.3 Geological Units

As shown on Figure 5-1, the proposed Project site is underlain by Younger Alluvium ("Q-type soils") generally consisting of unconsolidated gravel, sand, and silt eroded from the San Gabriel Mountains and deposited in the Chino Basin by flooding streams and debris flows. The Geotechnical Exploration Data Report (Leighton 2021) included five hollow-stem-auger borings drilled to depths of 66.5 to 86.5 feet below ground surface (bgs), all within the proposed Project alignment. Below thin asphalt, the borings penetrated Undocumented Artificial Fill ("fill soil"), Young Eolian Deposits, and Young Alluvial Fan Deposits to the total depth of the borings. Standard Penetration Test (SPT) soil samples were obtained at selected intervals within the borings. SPT "blow counts" were recorded to help differentiate soil types. Fill soils were up to 5 feet thick consisting of sand and silt. Young Eolian Deposits were encountered to depths up to 44 feet bgs, consisting of silty sand, sandy silt, and poorly graded sand with gravel (SM, ML, and SP soil types, respectively) (Leighton 2021).

Figure 5-1: Geologic Units



Source: CGS 2022

5.2 FAULTING AND SEISMICITY

5.2.1 General Settings

The primary seismic considerations are surface rupture of the earth materials along fault traces and damage to structures due to seismically induced ground-shaking. There are numerous faults in Southern California including active, potentially active, and inactive faults. The San Andreas Fault is widely recognized as the most extensive fault in California extending approximately 800 miles through the state from the Salton Sea northwest to Cape Mendocino. Its activity is known from historic earthquakes, which have caused rupture of the ground surface, and from many fault studies that show that the San Andreas Fault offsets or displaces recently deposited sediments. The last major San Andreas earthquake to affect Southern California was in 1857, while the southern portion of the San Andreas Fault, from San Bernardino through the Coachella Valley to the Salton Sea has not experienced a major earthquake since around 1690. The proposed Project site is approximately 13 miles from the San Andreas Fault.

An earthquake fault classification system based on criteria adopted by CGS for the Alquist-Priolo Earthquake Zoning Program delineates areas where surface fault rupture previously has occurred, or where local topographic, geological, and geotechnical conditions indicate a potential for permanent ground displacements such that mitigation by avoidance as stated in PRC Section 261.5, would be required. The CGS interactive *Fault Activity Map of California* defines an active fault as one that has had observed, or evidence of, seismic activity such as surface displacement or rupture during the Holocene epoch. A potentially active fault is a fault that has demonstrated surface displacement of Quaternary period deposits, within approximately the past 1.6 million years. Inactive faults have not moved in the last 1.6 million years.

Generally defined, an earthquake is an abrupt release of accumulated energy in the form of seismic waves created when movement occurs along a fault plane. The severity of an earthquake generally is expressed in two ways: magnitude and intensity. The energy released, measured on the Moment Magnitude (M_W) scale, represents the "size" of an earthquake. The Richter Magnitude (M) scale has been replaced in most modern building codes by the M_W scale because the M_W scale provides more useful information to design engineers. The proposed Project site is subject to earthquakes of M_W 6.0 to 8 by the surrounding faults.

The intensity of an earthquake is measured by the Modified Mercalli Intensity (MMI) scale, which emphasizes the current seismic environment at a particular site and measures ground-shaking severity according to damage done to structures, changes in the earth surface, and personal accounts. Table 5-1 (Modified Mercalli Intensity Scale) identifies the level of intensity according to the MMI scale and describes that intensity with respect to how it would be received or sensed by its receptors.

Ground motions also are reported in terms of a percentage of the acceleration of gravity (percent g, where g equals 32 feet per second). One hundred percent of gravity (1 g) is the acceleration a skydiver would experience during free-fall. An acceleration of 0.4 g is equivalent to accelerating from 0 to 60 miles per hour in about 7 seconds.

Table 5-1: Modified Mercalli Intensity Scale

Intensity	Shaking	Description/Damage
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration is similar to the passing of a truck. Duration is estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some are awakened. Dishes, windows, doors are disturbed; walls make cracking sound. Sensation is like a heavy truck striking a building. Standing motor cars are rocked noticeably.
V	Moderate	Felt by nearly everyone; many are awakened. Some dishes and windows are broken. Unstable objects are overturned. Pendulum clocks may stop.
VI	Strong	Felt by all; many are frightened. Some heavy furniture is moved; there are a few instances of fallen plaster. Damage is slight.
VII	Very Strong	Damage is negligible in building of good design and construction, slight to moderate in well-built ordinary structures, considerable in poorly built structures; some chimneys are broken.
VIII	Severe	Damage is slight in specially designed structures, considerable in ordinary substantial budlings with partial collapse, great in poorly built structures. Chimneys, factory stacks, columns, monuments, walls fall. Heavy furniture is overturned.
IX	Violent	Damage is considerable in specially designed structures; well-designed frame structures are thrown out of plum. Damage is great in substantial buildings, with partial collapse. Buildings are shifted off of foundations.
X	Extreme	Some well-build wooden structures are destroyed; most masonry and frame structures are destroyed with foundations. Rails are bent.

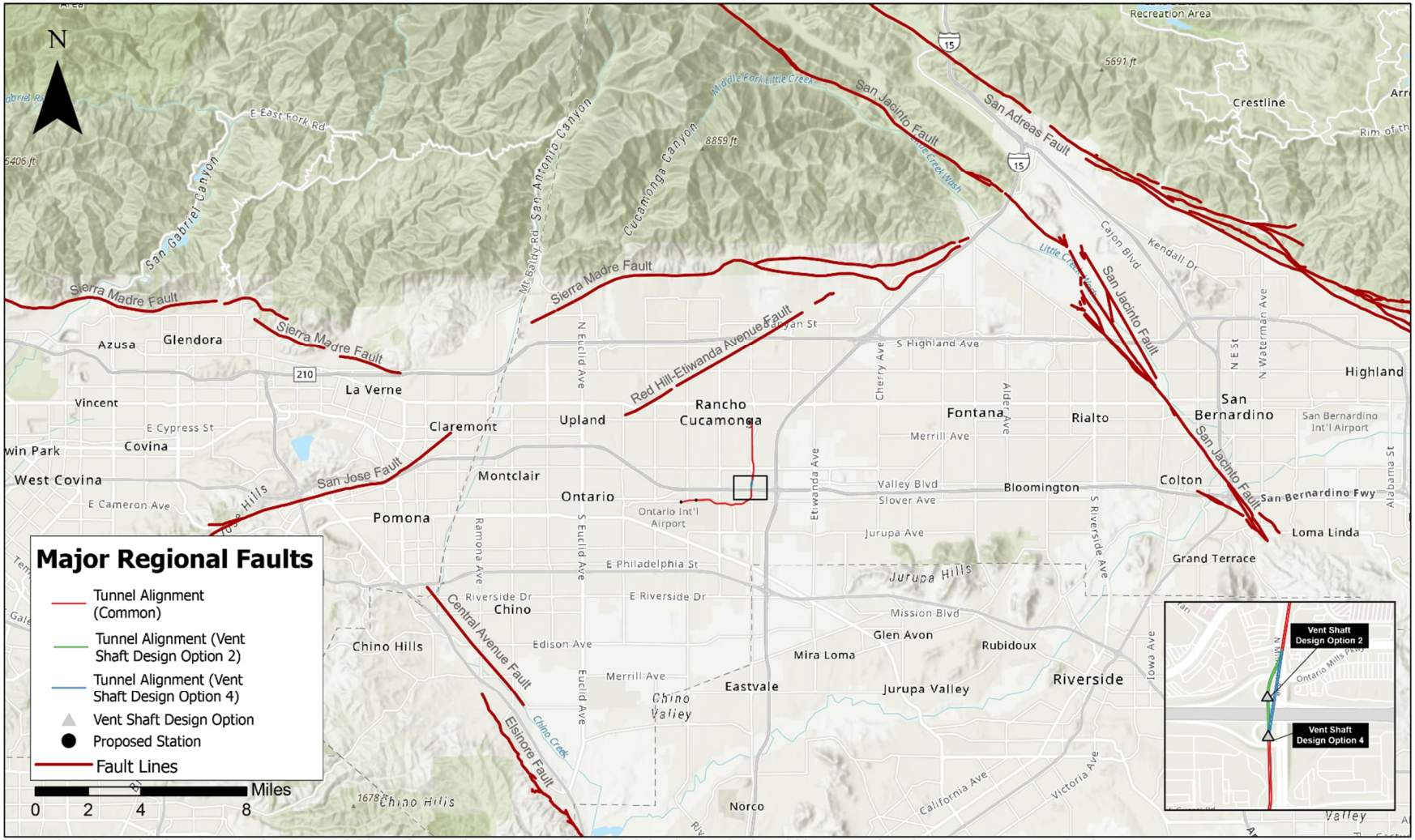
Source: USGS 2022

Active and potentially active faults that are located less than 20 miles from the proposed Project site are discussed in Section 5.2.2 with respect to their known activity status and location relative to the proposed Project. The location of the proposed Project site in relation to known regional faults is shown in Figure 5-2. The proposed Project is not located in a Alquist-Priolo Earthquake Fault zone as depicted in Figure 5-3.

5.2.2 Regional and Local Fault Locations

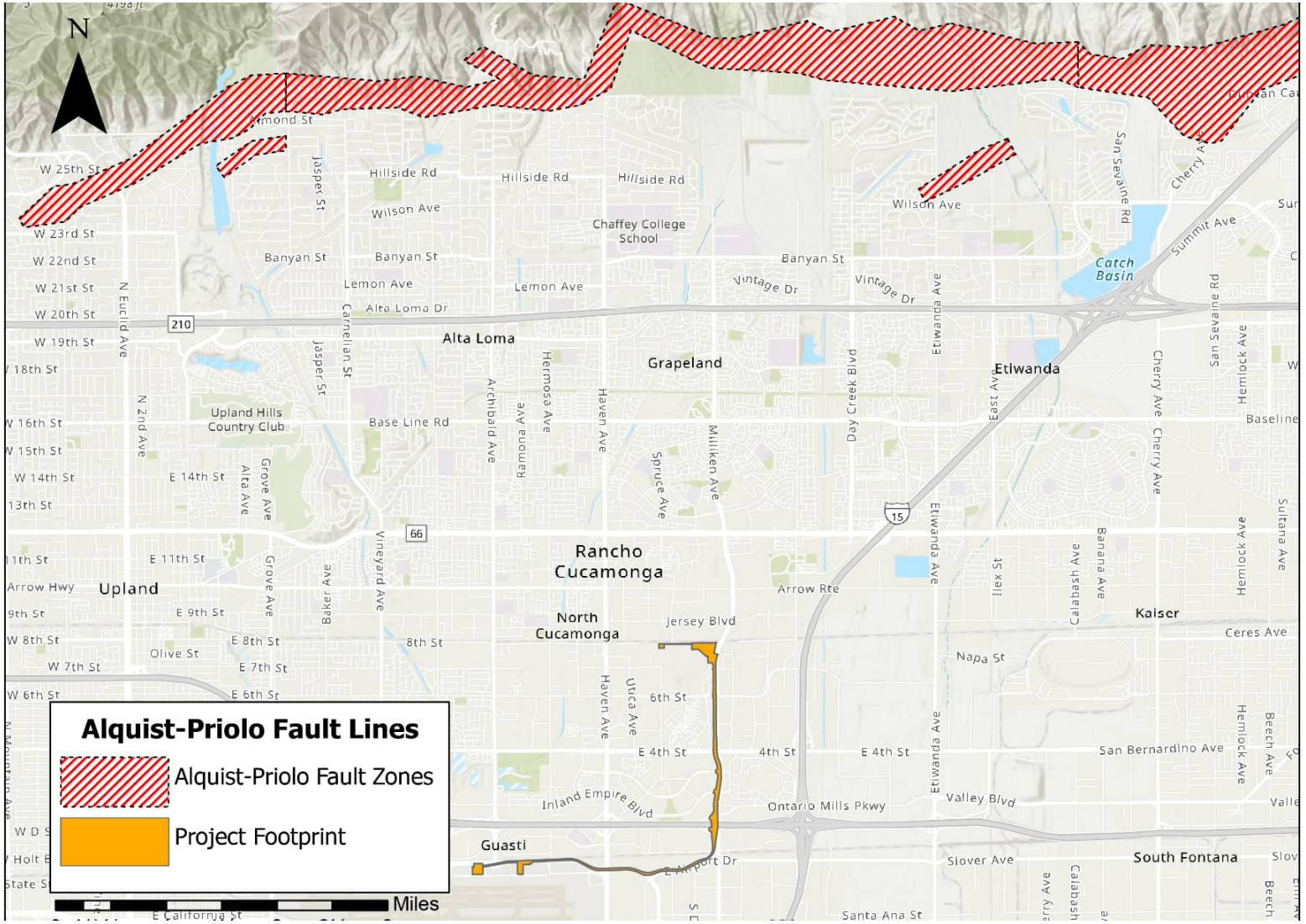
Numerous faults have been mapped within the San Bernardino Valley region of Southern California, and Table 5-2 identify the faults near the proposed Project site. Figure 5-2 illustrates the regional faults in the vicinity of the proposed Project site and Figure 5-3 illustrates the Alquist-Priolo Fault Zones in the region.

Figure 5-2: Major Regional Faults



Esri, NASA, NGA, USGS, City of Rancho Cucamonga, California State Parks, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Figure 5-3: Alquist-Priolo Fault Zones



Source: CGS 2022

Table 5-2: Summary of Faults Near Proposed Project Site

Fault	Distance from Proposed Project Footprint (miles)	Maximum Moment Magnitude (Mw)
Cucamonga Fault	5	6.0 to 7.0
Etiwanda Avenue Fault	4.5	6.0 to 7.0
Red Hill Fault	3	6.0 to 7.0
Chino Hill Fault	8.7	6.0 to 7.0
Central Avenue Fault	8.5	6.7
Sierra Madera Fault	6.5	6.0 to 7.0
San Jacinto Fault	6.8	6.5 to 7.5
San Jose Fault	8.23	6.0 to 6.5
San Andreas Fault	13.5	6.8 to 8.0

Source: USGS 2013; SCEDC 2021; California Geologic Survey Fault Activity Map of California

The San Bernardino and San Gabriel Mountains are separated by the San Andreas Fault, which forms the southwestern margin of the San Bernardino Mountains and the northeastern margin of the San Gabriel Mountains. The rocks that make up these two mountains are of different composition, indicating that these regions formed at a considerable distance from each other and have since been juxtaposed by lateral movement along the San Andreas Fault. The San Andreas Fault is widely recognized as the most extensive fault in California. Its activity is known from historic earthquakes, which have caused rupture of the ground surface, and from many fault studies that show that the San Andreas Fault offsets or displaces recently deposited sediments. The last major rupture was on January 9, 1957, at the Mojave segment and on April 18, 1906, at the northern segment (SCEDC 2022f). The proposed Project site is approximately 13.5 miles northeast of the San Andreas Fault.

The San Jacinto Fault joins the San Andreas Fault at the eastern end near Wrightwood, which is approximately 18 miles north of the proposed Project site. The fault is made up of numerous individual fault strands with a slip rate of approximately 7 to 17 millimeters (mm) per year. The most recent surface rupture was on April 9, 1968, of M_W 6.5 on the Coyote Creek segment of the San Jacinto Fault (SCEDC 2022e). The San Jacinto Fault is approximately 6.8 miles northwest of the proposed Project site.

The Cucamonga Fault is identified as an Alquist-Priolo Special Study Zone area within the City of Rancho Cucamonga General Plan (City of Rancho Cucamonga 2018). The Cucamonga Fault is an Alquist-Priolo fault with an east-west-trending thrust fault that separates the basement rock of the San Gabriel Mountains from the alluvial fan deposits at the base of the mountain range. The Cucamonga Fault has a probable magnitude rate of M_W 6.0 to 7.0. The length of the Cucamonga Fault is approximately 19 miles, and the slip rate is between 5 and 14 mm per year (SCEDC 2022a). The Cucamonga Fault is located approximately 5 miles north of the proposed Project site.

The Etiwanda Avenue Fault is located approximately 4.5 miles north of the proposed Project site. The Etiwanda Avenue Fault has is identified as an Alquist-Priolo Special Study Zone area within the City of

Rancho Cucamonga General Plan (City of Rancho Cucamonga 2018). The length of the Cucamonga Fault is approximately 16 miles and has a probable magnitude rate of M_W 6.0 to 7.0 (SCEDC 2022b). Etiwanda Avenue Fault Line is a northeast-southwest-trending thrust fault found in the northern portion of the City of Rancho Cucamonga. Etiwanda Avenue Fault Line is thought to be active; however, its slip rate is currently unknown.

The Red Hill Fault has been designated by the City of Rancho Cucamonga as a fault hazard zone within the City's General Plan (City of Rancho Cucamonga 2018). The Red Hill Fault requires the same level of analysis required by CGS in compliance with Alquist-Priolo Earthquake Zoning Act. The length of the Red Hill Fault is approximately 16 miles and has a probable magnitude rate of M_W 6.0 to 7.0 (SCEDC 2022c). The Red Hill Fault is located approximately 3 miles north of the proposed Project site.

The Chino Fault is located approximately 8.7 miles southeast from the proposed Project site. The Chino Fault section is northern fault strands that merge into the Elsinore Fault Zone near Corona. The Chino Fault is a high-angle reverse fault with some strike-slip displacement (Mira Costa College 2022). The Chino Fault is approximately 13 miles in length, and the slip rate is approximately 1.0 mm per year (SCEDC 2022d).

The Central Avenue Fault branches from the Chino Fault in the southeastern corner of the City of Pomona near State Route 60, about 8.5 miles southeast of the proposed Project site, and extends about 5 miles into the City of Chino for a total length of 8 miles. The Central Avenue Fault is believed to be a single strand that is sub-parallel to the Chino Fault. It exhibits displacement on the Quaternary- and Holocene-age deposits but has no surface expression. The fault is capable of generating an earthquake up to M_W 6.7 (City of Pomona 2012).

The San Jose Fault is approximately 11 miles in length, and the slip rate is approximately 0.2 to 2 mm per year. The last significant earthquake was on February 28, 1990, of Local Magnitude 5.4, and no surface ruptures were found (SCEDC 2022g). The San Jose Fault is located approximately 8.23 miles west of the proposed Project site.

The Sierra Madre Fault is located approximately 6.5 miles northwest of the proposed Project site. The Sierra Madre Fault is about 47 miles long, and the slip rate is approximately 0.36 to 4 mm per year. It has a probable magnitude rate of M_W 6.0 to 7.0 (SCEDC 2022h).

5.2.2.1 Historic and Future Seismicity

The entire Southern California region is seismically active. The region is crisscrossed by a network of major regional faults and minor local faults. This faulting and seismicity is dominated by the San Andreas Fault System, which separates two of the major tectonic plates that comprise the earth's crust. The Pacific Plate lies west of the San Andreas Fault System. This plate is moving in a northwesterly direction relative to the North American Plate, which lies east of the San Andreas Fault System. This relative movement between the two plates is the driving force of fault ruptures in western California. The San Andreas Fault generally trends northwest/southeast; however, north of the Transverse Ranges Province, the fault trends more in

an east/west direction, causing a north/south compression between the two plates. North/south compression in Southern California has been estimated from 5 to 20 mm per year. This compression has produced rapid uplift of many of the mountain ranges in southern California.

In addition to the San Andreas Fault, there are numerous faults in Southern California that are categorized as active, potentially active, and inactive. A fault is classified as active if it has either moved during the Holocene epoch (during the last 11,000 years) or is included in an Alquist-Priolo Earthquake Fault Zone (as established by CGS). A fault is classified as potentially active if it has experienced movement within the Quaternary period (during the last 1.6 million years). Faults that have not moved in the last 1.8 million years generally are considered inactive. Surface displacement can be recognized by the existence of cliffs in alluvium, terraces, offset stream courses, fault troughs and saddles, the alignment of depressions, sag ponds, and the existence of steep mountain fronts.

Over the past 51 years, southern California has experienced three significant earthquakes: the 1971 San Fernando earthquake (also known as the Sylmar earthquake, on the Sierra Madre Fault), which registered as M_W 6.6; the 1987 Whittier Narrows earthquake, which registered as M_W 5.9; and the Northridge earthquake, which occurred in January 1994 and registered as M_W 6.7.

5.2.2.2 Geological Hazards

5.2.2.2.1 Fault Rupture

The proposed Project site is outside of the nearest Alquist-Priolo Earthquake Fault Zone. The Cucamonga, Etiwanda Avenue, San Andreas, and San Jacinto faults are within the Alquist-Priolo Earthquake Fault Zone and are in proximity to the proposed Project site. However, the faults do not extend into any portion of the proposed Project site. Specifically, the Cucamonga Fault runs east/west, approximately 5 miles north of the proposed Project site. The Etiwanda Avenue Fault runs northeast-southwest, approximately 4.5 miles north of the proposed Project site. The San Andreas Fault runs northwest-southeast, approximately 13.5 miles northeast of the proposed Project site; the San Jacinto fault runs in a similar direction, approximately 6.8 miles northeast of the proposed Project site. There are no known active or potentially active faults trending through the proposed Project site. Because the proposed Project site is not in an Alquist-Priolo Earthquake Fault Zone, the potential for damage at the proposed Project site from direct rupture is remote.

5.2.2.2.2 Ground-shaking

The major cause of structural damage from earthquakes is ground-shaking. The intensity of ground motion expected at a particular site depends upon the magnitude of the earthquake, the distance to the epicenter, and the geology of the area between the epicenter and the property. Greater movement can be expected at sites on poorly consolidated material, such as loose alluvium, in close proximity to the causative fault, or in response to an event of great magnitude. The proposed Project site could experience earthquakes of M_W 6.0 to 8.0. Because of the proximity of known active faults, the hazard posed by seismic shaking is potentially high.

5.2.2.3 Liquefaction

Liquefaction involves a sudden loss in strength of a saturated, cohesionless, uniformly particle-sized soil, typically caused by ground-shaking activities, that causes temporary transformation of the soil to a fluid mass. In rare instances, ground-borne vibrations can cause liquefaction from activities such as pile-driving or tunnel boring. If the liquefying layer is near the ground surface, the effects may resemble the effects of quicksand. If the layer is deep below the ground surface, it may provide a sliding surface for the material above it and/or cause differential settlement of the ground surface, which may damage building foundations by altering weight-bearing characteristics.

Liquefaction typically occurs when loose, cohesionless, water-saturated soils (generally uniformly sized fine-grained sand) are subjected to strong seismic ground motion of significant duration. These soils essentially behave similarly to liquids, losing bearing strength. Structures built on these soils may tilt or settle when the soils liquefy. Liquefaction more often occurs in earthquake-prone areas underlain by young sandy alluvium where the groundwater table is less than 50 feet bgs.

The proposed Project site in the City of Rancho Cucamonga and the City of Ontario has not been identified as being in an area subject to potentially susceptible liquefaction by California Department of Conservation (CGS 2022) or San Bernardino County (San Bernardino County 2022a; 2022b). Due to lack of shallow groundwater, liquefaction potential can be ruled out, and the potential for lateral spreading to occur at the proposed Project site is also considered low (Leighton 2021). As such, the potential for liquefaction to occur on-site is very low.

5.2.2.3.1 Seismically Induced Settlement

Strong ground-shaking can cause soils to become more tightly packed and settle due to the collapse of voids and pore spaces. This type of settlement typically occurs in unconsolidated, compressible soils that are loose, granular, and cohesionless, and can occur in either wet or dry soils; these types of soils are typically restricted to geologically young deposits that have little time to develop cementation or densification. Unconsolidated young alluvial sediments may be susceptible to this hazard. Seismically induced settlement can cause damage to structures and buried pipelines. As discussed in Section 5.1, the primary soil type in the proposed Project site is young alluvial deposits; therefore, these soils may be susceptible to seismically induced settlement. However, the young alluvial deposits are described as dense to very dense in the geotechnical borings (Leighton 2021).

5.2.2.3.2 Landslides

Landslides are the downhill movement of a mass of earth and rock. Landsliding is a geological phenomenon that includes a wide range of ground movements, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary cause of landsliding, there are other contributing factors, such as: (1) erosion by rivers, glaciers, or ocean waves; (2) rock and soil slopes that are weakened through saturation by snowmelt or heavy rains; (3) earthquakes that create stresses such that weak slopes fail; (4) volcanic eruptions that produce loose ash deposits,

heavy rain, and/or debris flows; (5) vibrations from machinery, traffic, blasting, and even thunder; and (6) excess weight from accumulation of rain or snow, stockpiling of rock or ore from waste piles, or from man-made structures. The proposed area of development is outside of any Landslide Hazard Zone defined by the State (CGS 2022).

The proposed Project site is not located within a mapped earthquake-induced landslide zone according to the San Bernardino County General Plan (San Bernardino County 2021b). In general, surface topography within the proposed Project site is relatively flat, sloping gently down to the south-southwest (Leighton 2021). There are significant artificial grade changes along Milliken Avenue for the Metrolink railway grade separation, at the I-10/Milliken Avenue overcrossing, and the UPRR grade separation. These artificial grade changes create some variation within surface topography and thus make the surface more susceptible to landslides than the area's natural topography. However, even with artificial grade changes, the potential for landslides hazards within the proposed Project site is considered low.

5.2.2.3.3 Soil Erosion

Soil erosion is the process by which soil particles are removed from a land surface by wind, water, or gravity. Most natural erosion occurs at slow rates; however, the rate of erosion increases when land is cleared of vegetation or structures, or otherwise altered and left in a disturbed condition. Erosion can occur as a result of, and can be accelerated by, site preparation activities associated with development. Vegetation removal in pervious landscaped areas could reduce soil cohesion, as well as the buffer provided by vegetation from wind, water, and surface disturbance, which could render the exposed soil more susceptible to erosive forces.

Excavation or grading may result in erosion during construction activities, irrespective of whether hardscape previously existed at the construction site, because bare soils would be exposed and could be eroded by wind or water. The effects of erosion are intensified with an increase in slope (as water moves faster, it gains momentum to carry more debris), and the narrowing of runoff channels (which increases the velocity of water). Surface structures, such as paved roads and buildings, decrease the potential for erosion. Once covered, soil is no longer exposed to the elements, and erosion generally does not occur. Based on the current built-out conditions, the proposed Project site is not considered to be susceptible to water erosion and wind erosion.

5.3 MINERAL RESOURCES

Mineral resources are naturally occurring chemicals, elements, or compounds formed by inorganic processes or organic substances. These resources include bituminous rock, gold, sand, gravel, clay, crushed stone, limestone, diatomite, salt, borate, potash, geothermal, petroleum, and natural gas resources. Construction aggregate, another mineral resources, refers to sand and gravel (natural aggregates and crushed stone (rock) that are used as Portland cement-concrete (PCC) aggregate,

asphaltic-concrete aggregate, road base, railroad ballast, riprap, fill, and the production of construction materials.

The City of Rancho Cucamonga General Plan EIR (2021a) states that, based on the California Department of Conservation Mineral Land Classification, the city is within the Claremont-Upland Production-Consumption region where significant mineral resources have been identified along Cucamonga Creek.

The *PlanRC* EIR (2021) uses the CGS Mineral Resources Project to delineate any state-designated significant and significant aggregate mineral resources within the city. Based on that information, the proposed Project area within the City of Rancho Cucamonga is classified by the CGS Mineral Resource Project as MRZ 2, where the geologic data indicate that significant PCC-Grade aggregate resources are present. The *PlanRC* further details that there are designated aggregate resource sectors at the northern end of the city, where limited urban development is present. The majority of these areas are planned for Open Space, Conservation, Flood Control/Utility Corridor, or Hillside Residential that allows low-density development. The resource area along Deer Canyon and Deer Creek is designated Flood Control/Utility Corridor and will continue to provide future access to underlying aggregate resources. In addition, while the aggregate mineral resource areas are within the city and utilized for local and regional construction, as of 2021, there were no active mining operations within the City of Rancho Cucamonga.

According to the City of Ontario General Plan EIR (2022), the proposed Project area within the City of Ontario is also within the Claremont-Upland Production-Consumption. Further, the proposed Project area within the City of Ontario is classified by the CGS Mineral Resources Project as MRZ 3, where the significance of mineral deposits is unknown. CGS has designated three areas within the City of Ontario as resource sectors containing construction aggregate of "regional significance" (City of Ontario 2022). However, these locations are located southeast of the proposed Project, near I-15, adjacent to the border of Riverside County.

These materials have not been previously mined along the proposed Project. Mining of these materials in an urbanized environment is not considered economical. In the context of CEQA, mineral resources are land areas or deposits deemed significant by California Department of Conservation. Mineral resources include oil, natural gas, and metallic and nonmetallic deposits, including aggregate resources.

6 IMPACT EVALUATION

6.1 DIRECTLY OR INDIRECTLY CAUSE POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH INVOLVING: RUPTURE OF A KNOWN EARTHQUAKE FAULT, AS DELINEATED ON THE MOST RECENT ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING MAP ISSUED BY THE STATE GEOLOGIST FOR THE AREA OR BASED ON OTHER SUBSTANTIAL EVIDENCE OF A KNOWN FAULT? REFER TO DIVISION OF MINES AND GEOLOGY SPECIAL PUBLICATION 42

6.1.1 No Project Alternative

6.1.1.1 Construction Impacts

Alquist-Priolo Earthquake Fault Zoning Act prohibits the construction of structures for human occupancy (i.e., residential homes, office buildings, warehouses, etc.) on the surface trace of active faults within an Alquist-Priolo Earthquake Fault Zone. While the proposed Project would not be constructed under the No Project Alternative, the No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. Under the No Project Alternative, no habitable structures would be involved within the Alquist-Priolo Earthquake Fault Zone during construction. Therefore, there would be no impact associated with loss, injury, or death involving the Alquist-Priolo Earthquake Fault Zone for the No Project Alternative.

6.1.1.2 Operational Impacts

The No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. Under the No Project Alternative, no habitable structures would be involved within the Alquist-Priolo Earthquake Fault Zone during operation. Therefore, there would be no impact associated with loss, injury, or death involving the Alquist-Priolo Earthquake Fault Zone for the No Project Alternative.

6.1.2 Proposed Project

6.1.2.1 Construction Impacts

The Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist indicates that the proposed Project is not located within a designated Alquist-Priolo Earthquake Zone. However, some active faults located within the City of Rancho Cucamonga are designated as an Alquist-Priolo Special Study Zone by the City of Rancho Cucamonga. The Cucamonga, Etiwanda, San Andreas, and San Jacinto faults are in proximity to the proposed Project site but do not extend into any portion of the proposed Project site. Specifically, the Cucamonga Fault runs east-west, approximately 5 miles north of the proposed Project site. The Etiwanda Avenue Fault runs northeast-southwest, approximately 4.5 miles north of the proposed Project site. The San Andreas Fault runs in a northwest-southeast direction, approximately 13.5 miles northeast of the proposed Project area; the San Jacinto Fault runs in a similar direction, approximately

6.8 miles northeast of the proposed Project site. Because the proposed Project would not be located within an Alquist-Priolo Earthquake Fault Zone, the potential for damage caused by surface fault rupture is not considered an impact. There are no known active or potentially active faults trending toward or through the proposed development area. Consequently, the proposed Project during construction would have no impact associated with loss, injury, or death involving the Alquist-Priolo Earthquake Fault Zone.

6.1.2.2 Operational Impacts

The Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist indicates that the proposed Project is not located within a designated Alquist-Priolo Earthquake Zone. However, some active faults located within the City of Rancho Cucamonga are designated as Alquist-Priolo Special Study Zone by the City of Rancho Cucamonga. The Cucamonga, Etiwanda, San Andreas, and San Jacinto faults are in proximity to the proposed Project site but do not extend into any portion of the proposed Project site. There are no known active or potentially active faults trending toward or through the proposed Project area. Consequently, the proposed Project during operation would have no impact associated with loss, injury, or death involving the Alquist-Priolo Earthquake Fault Zone.

6.2 DIRECTLY OR INDIRECTLY CAUSE POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH INVOLVING STRONG SEISMIC GROUND-SHAKING AND/OR SEISMIC-RELATED GROUND FAILURE, INCLUDING LIQUEFACTION.

6.2.1 No Project Alternative

6.2.1.1 Construction Impacts

The No Project Alternative is in a seismically active area. Active and potentially active faults in Southern California are capable of producing seismic ground-shaking, and the No Project Alternative site would be anticipated to experience ground acceleration caused by these earthquakes. There are faults capable of generating a characteristic earthquake between M_W 6.0 and 8.0 within the vicinity of the No Project Alternative site. Because the No Project Alternative is in a seismically active region, structures would be required to be designed in accordance with applicable parameters of current CBC. Adherence to existing regulations would ensure that the No Project Alternative would result in a less than significant impact associated with exposing people or structures to seismic ground-shaking, including effects related to seismic-related ground failure, such as liquefaction.

6.2.1.2 Operational Impacts

There are faults capable of generating a characteristic earthquake between M_W 6.0 and 8.0 within the vicinity of the No Project Alternative area. Because the No Project Alternative is a seismically active region, structures would be required to be designed in accordance with applicable parameters of the current CBC. Adherence to existing regulations would ensure that the No Project Alternative would result in a less than

significant impact associated with exposing people or structures to seismic ground-shaking, including effects related to seismic-related ground failure, including liquefaction.

6.2.2 Proposed Project

Construction Impacts

The proposed Project site is in a seismically active area. Active and potentially active faults in Southern California are capable of producing seismic ground-shaking in the proposed Project vicinity, and the area would be anticipated to experience ground acceleration caused by these earthquakes. As stated previously, the proposed Project site would be southwest, south, and east of faults capable of generating a characteristic earthquake between M_W 6.0 and 8.0. To reduce the risks associated with seismically induced ground-shaking, which could include the risk of loss, injury, or death, the design of foundations and structures must consider the location and type of subsurface materials underlying the proposed Project site. The proposed Project would also require TBMs that are large-diameter horizontal drills that continuously excavate circular tunnel sections. Both Earth Pressure Balance and slurry TBMs apply a balancing pressure to the excavation face to stabilize the ground and balance the groundwater pressure in front of the excavation face. The invert of the tunnel would be up to approximately 70 feet in depth. The proposed Project site is in a seismically active region; therefore, the proposed Project would implement MM-GEO-1, which requires the design of the Project to comply with all applicable provisions of the CBC with respect to seismic design and implementation of seismic-resistant earthwork and construction design criteria. With implementation of MM-GEO-1 and adherence to existing regulations, the proposed Project would result in a less than significant impact to seismic ground-shaking and seismic-related ground failure during construction with mitigation.

The proposed Project site within the City of Rancho Cucamonga and the City of Ontario has not been identified as being in an area subject to potentially susceptible liquefaction by California Department of Conservation (CGS 2022) or by San Bernardino County (San Bernardino County 2022a; 2022b). The proposed Project area is not in an area of known liquefaction potential. Therefore, the proposed Project during construction would have a less than significant impact associated with the exposure of people or structures to liquefaction.

6.2.2.1 Operational Impacts

During operation, the proposed Project area would experience earthquake-induced ground-shaking activity because of its proximity to known active faults. The proposed Project site is located in a seismically active region and may be subject to the effects of ground-shaking. The proposed Project site lies in close proximity to several active faults. Therefore, during the life of the proposed development, the proposed Project site would probably experience moderate to high ground-shaking from these fault zones, as well as some background shaking from other seismically active areas of the Southern California region.

Earthquakes are prevalent within Southern California, and there is no practicable way to avoid ground-shaking when it occurs. Measures to minimize the risk of loss, injury, and death from the effects of earthquakes and ground-shaking on buildings are included within 2019 CBC, with specific provisions for seismic design. All buildings proposed as part of the proposed Project are required to resist seismic ground-shaking in accordance with the Zone 4 design parameters identified in CBC. With adherence to the provisions listed in CBC, potential Project impacts during operation related to ground-shaking would be less than significant.

During severe ground-shaking, loose granular soils below the groundwater table may liquefy. The proposed Project has not been identified as being in an area subject to potentially susceptible liquefaction by California Department of Conservation (CGS 2022) or San Bernardino County (San Bernardino County 2022a; 2022b). Therefore, the proposed Project during operation would have no impact associated with the exposure of people or structures to liquefaction.

6.3 DIRECTLY OR INDIRECTLY CAUSE POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH INVOLVING LANDSLIDES

6.3.1 No Project Alternative

6.3.1.1 Construction Impacts

The No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. The possibility for landslides to occur at the No Project Alternative site is considered remote. The No Project Alternative site is not in a designated seismic hazard zone for seismic slope instability as defined by either the state or county. Consequently, there is minimal potential for landslides to occur in the No Project Alternative site; the impact would be less than significant.

6.3.1.2 Operational Impacts

The No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. The possibility for landslides to occur at the No Project Alternative site is considered remote. The No Project Alternative site is not in a designated seismic hazard zone for seismic slope instability as defined by either the state or county. Consequently, there is minimal potential for landslides to occur in the No Project Alternative site; the impact would be less than significant.

6.3.2 Proposed Project

6.3.2.1 Construction Impacts

According to the Landslide Hazard Zone defined by the state, the proposed Project is not located within a landslide hazard zone (CGS 2022). The proposed Project site is not in a designated seismic hazard zone for seismic slope instability as defined by either the State or San Bernardino County.

The proposed Project includes construction of a tunnel at a depth of approximately 70 feet below ground surface (bgs). The proposed Project would require a site-specific slope-stability design to ensure adherence to the standards contained in 2019 CBC and any City of Rancho Cucamonga and City of Ontario and/or San Bernardino County guidelines, as well as by California Occupational Safety and Health Administration (Cal/OSHA) requirements for stabilization during construction. The proposed Project would include excavation construction activities for the tunnel component, which would occur on the perimeter of the proposed Project site. The proposed Project would be required to comply with CBC guidelines to stabilize potential constructed slopes temporary created during construction activities. Consequently, impacts associated with constructed-slope instability are considered less than significant.

In terms of temporary slopes, excavation activities at the proposed Project site could occur in unstable soil. In general, the risk of slope failure is considered higher for temporary slopes due to generally steeper gradients versus permanent, manufactured slopes. Similar to the construction of permanent slopes, temporary slopes would be required to adhere to the Cal/OSHA requirements for stabilization. The proposed Project has the potential to include the risk of loss, injury, or death involving landslides during construction activities associated with temporary slopes. MM-GEO-2, would be implemented, as required by applicable local, state, or federal laws or regulations to ensure stability of temporary slopes. In summary, with adherence to state and local requirements and compliance with MM-GEO-2 the proposed Project during construction would have a less than significant impact associated with exposing people or structures to landslides and/or slope instability.

6.3.2.2 Operational Impacts

The proposed Project site and surrounding vicinity are relatively flat. In addition, the proposed area of development is outside of any Landslide Hazard Zone defined by the state (CGS 2022). Landslides are a type of erosion in which masses of earth and rock move down slope as a single unit. Susceptibility of slopes to landslides and other forms of slope failure depend on several factors including steep slopes, condition of rock and soil materials, presence of water, formational contacts, geologic shear zones, and seismic activity. With adherence to state and local requirements, the proposed Project during operation would have a less than significant impact related to landslides and/or slope instability.

6.4 RESULT IN SUBSTANTIAL SOIL EROSION OR THE LOSS OF TOPSOIL

6.4.1 No Project Alternative

6.4.1.1 Construction Impacts

There would be a potential for temporary construction-related soil erosion because the No Project Alternative involves grading and excavation operations that could expose soils. Site-specific Standard Urban Storm Water Mitigation Plan (SUSMP), which is part of the National Pollutant Discharge Elimination System Municipal General Permit preparation of the site-specific SUSMP would describe the minimum required BMPs to be incorporated into the design and on-going operation of the facilities. Prior to the initiation of grading activities associated with implementation of No Project Alternative developers would submit a site specific SUSMP, which is part of the National Pollutant Discharge Elimination System Municipal General Permit, to reduce the discharge of pollutants to the maximum extent practical using BMPs, control techniques and systems, design and engineering methods, and other provisions that are appropriate during construction activities. All development activities associated with the No Project Alternative would comply with the site-specific SUSMP.

Preparation of a site-specific SUSMP and adherence to existing regulations would ensure the maximum practicable protection available for soils excavated during the construction of buildings and associated infrastructure. Compliance with existing regulations would minimize effects from erosion and ensure consistency with the Regional Water Quality Control Board Water Quality Control Plan. In view of these requirements, the No Project Alternative during construction would have a less than significant impact associated with soil erosion or loss of topsoil.

6.4.1.2 Operational Impacts

Topsoil is the uppermost layer of soil, usually the top 6 to 8 inches. It has the highest concentration of organic matter and micro-organisms and is where most biological soil activity occurs. Plants generally concentrate their roots in and obtain most of their nutrients from, this layer. Topsoil erosion is of concern when the topsoil layer is blown or washed away, which makes plant life or agricultural production impossible. In addition, significant erosion typically occurs on steep slopes where stormwater and high winds can carry topsoil down hillsides. With adherence to existing regulations, the No Project Alternative during operation would result in a less than significant impact to soil erosion.

6.4.2 Proposed Project

6.4.2.1 Construction Impacts

Soils at the proposed Project site have a low to moderate susceptibility to erosion. However, these soils would be susceptible to erosion during construction activities, such as excavation. As part of the City of Rancho Cucamonga and the City of Ontario permitting process, a site-specific SUSMP, which is part of the

National Pollutant Discharge Elimination System Municipal General Permit, would be prepared for the proposed Project. Additional information is provided in the Hydrology and Water Quality Technical Report (SBCTA 2024c).

Preparation of the site-specific SUSMP would describe the minimum required BMPs to be incorporated into the proposed Project design and ongoing operation of the facilities. Prior to the initiation of grading activities associated with implementation of the proposed Project, SBCTA shall submit a site-specific SUSMP to reduce the discharge of pollutants to the maximum extent practicable using BMPs, control techniques and systems, design and engineering methods, and other provisions that are appropriate during operational activities. All construction activities associated with the proposed Project shall comply with the site-specific SUSMP.

Preparation of a site-specific SUSMP, and adherence with existing regulations, would ensure maximum practicable protection available for soils excavated during the construction of buildings and associated infrastructure. Compliance with existing regulations would minimize effects from erosion and ensure consistency with the Regional Water Quality Control Board Water Quality Control Plan. In view of these requirements, the proposed Project during construction would have a less than significant impact associated with soil erosion or loss of topsoil.

6.4.2.2 Operational Impacts

The proposed Project would not result in substantial soil erosion or the loss of topsoil during operational activities. Topsoil is the uppermost layer of soil, usually the top 6 to 8 inches. It has the highest concentration of organic matter and micro-organisms, and is where most biological soil activity occurs. Plants generally concentrate their roots in, and obtain most of their nutrients from, this layer. Topsoil erosion is of concern when the topsoil layer is blown or washed away, which makes plant life or agricultural production impossible. In addition, significant erosion typically occurs on steep slopes where stormwater and high winds can carry topsoil down hillsides. The relatively flat nature of the proposed Project site precludes it from being highly susceptible to erosion. The proposed Project during operation would result in a less than significant impact to soil erosion.

6.5 BE LOCATED ON A GEOLOGIC UNIT OR SOIL THAT IS UNSTABLE, OR THAT WOULD BECOME UNSTABLE AS A RESULT OF THE PROJECT, AND POTENTIALLY RESULT IN ON- OR OFF-SITE LANDSLIDE, LATERAL SPREADING, SUBSIDENCE, LIQUEFACTION OR COLLAPSE

6.5.1 No Project Alternative

6.5.1.1 Construction Impacts

Impacts related to liquefaction are addressed in Section 6.2.1.1 of this technical report and impacts related to landslides are addressed in Section 6.3.1.1 of this technical report. This analysis addresses

impacts related to unstable soils as a result of subsidence, differential settlement, lateral spreading, or collapse.

Using unsuitable materials for fill and/or foundation support would have the potential to create future heaving, subsidence, spreading, or collapse problems leading to building settlement and/or utility line and pavement disruption. An acceptable degree of soil stability can be achieved for expansive or compressible material by the incorporation of soil treatment programs (replacement, grouting, compaction, drainage control, etc.) in the excavation and construction plans that would be prepared to address site-specific soil conditions. A site-specific evaluation of soil conditions is required and must contain recommendations for ground preparation and earthwork specific to the site. Adherence to existing regulations and policies would ensure the maximum practicable protection available for users of buildings and infrastructure and associated trenches, slopes, and foundations. Therefore, construction of the No Project Alternative would have a less than significant impact associated with the exposure of people or structures to hazards associated with unstable geologic units or soils.

6.5.1.2 Operational Impacts

Impacts related to liquefaction are addressed in Section 6.2.1.2 of this technical report and impacts related to landslides are addressed in Section 6.3.1.2 of this technical report. This analysis addresses impacts related to unstable soils as a result of subsidence, differential settlement, lateral spreading, or collapse.

Using unsuitable materials for fill and/or foundation support would have the potential to create future heaving, subsidence, spreading, or collapse problems leading to building settlement and/or utility line and pavement disruption. Using such materials exclusively for landscaping would not cause these problems. The No Project Alternative would have a less than significant impact associated with the exposure of people or structures to hazards associated with unstable geologic units or soils during operations.

6.5.2 Proposed Project

6.5.2.1 Construction Impacts

Impacts related to liquefaction are addressed in Section 6.2.2.1 of this technical report and impacts related to landslides are addressed in Section 6.3.2.1 of this technical report. This analysis addresses impacts related to unstable soils as a result of subsidence, differential settlement, lateral spreading, or collapse.

Using unsuitable materials for fill and/or foundation support would have the potential to create future heaving, subsidence, spreading, or collapse problems leading to building settlement and/or utility line and pavement disruption. Using such materials exclusively for landscaping would not cause these problems. An acceptable degree of soil stability can be achieved for expansive or compressible material by the incorporation of soil treatment programs (replacement, grouting, compaction, drainage control, etc.) in

the excavation and construction plans that would be prepared to address site-specific soil conditions. A site-specific evaluation of soil conditions is required and must contain recommendations for ground preparation and earthwork specific to the site.

Implementation of Mitigation Measures MM-GEO-3 through MM-GEO-5 would require the maximum practicable protection available for users of buildings and infrastructure and associated trenches, slopes, and foundations. Adherence to the City of Rancho Cucamonga and the City of Ontario's codes and policies and implementation of Mitigation Measures MM-GEO-3 through MM-GEO-5 would reduce the impacts associated with the exposure of people or structures to hazards associated with unstable geologic units or soils to a less than significant level.

6.5.2.2 Operational Impacts

Impacts related to liquefaction are addressed in Section 6.2.2.2 of this technical report and impacts related to landslides are addressed in Section 6.3.2.2 of this technical report. This analysis addresses impacts related to unstable soils as a result of subsidence, differential settlement, lateral spreading, or collapse.

Using unsuitable materials for fill and/or foundation support would have the potential to create future heaving, subsidence, spreading, or collapse problems leading to building settlement and/or utility line and pavement disruption. Using such materials exclusively for landscaping would not cause these problems. The proposed Project during operation would have a less than significant impact associated with the exposure of people or structures to hazards associated with unstable geologic units or soils.

6.6 BE LOCATED ON EXPANSIVE SOIL, AS DEFINED IN TABLE 18-1-B OF THE UNIFORM BUILDING CODE (1994), CREATING SUBSTANTIAL DIRECT OR INDIRECT RISKS TO LIFE OR PROPERTY

6.6.1 No Project Alternative

6.6.1.1 Construction Impacts

The No Project Alternative would be required to comply with applicable provisions of the CBC with regard to soil hazard-related design. The City of Rancho Cucamonga's and City of Ontario's Building Codes require a site-specific foundation investigation and report for each construction site that identifies potentially unsuitable soil conditions and contains appropriate recommendations for foundation type and design criteria that conform to the analysis and implementation criteria described in the City of Rancho Cucamonga's and City of Ontario's Building Codes. Regulations exist to address weak soils issues, including expansion. With adherence to existing regulations, the No Project Alternative would have a less than significant impact regarding the exposure of people or structures to hazards related to expansive soils.

6.6.1.2 Operational Impacts

The No Project Alternative would be required to comply with applicable provisions of the CBC with regard to soil hazard-related design. With adherence to existing regulations, the No Project Alternative would have a less than significant impact regarding the exposure of people or structures to hazards related to expansive soil.

6.6.2 Proposed Project

6.6.2.1 Construction Impacts

Adhering to existing regulations, the proposed Project would have a less than significant impact regarding the exposure of people or structures to hazards related to expansive soil during construction. The soils underlying the proposed Project area generally consist of Young Eolian Deposits. The proposed Project would be required to comply with applicable provisions of the 2019 CBC with regard to soil hazard related design. Even the slight potential for the existence of expansive soil at the proposed Project site raises the possibility that foundation stability for buildings, roads, and utilities would be compromised. The City of Rancho Cucamonga's and City of Ontario's Building Codes require a site-specific foundation investigation and report for each construction site that identifies potentially unsuitable soil conditions and contains appropriate recommendations for foundation type and design criteria that conform to the analysis and implementation criteria described in the City of Rancho Cucamonga's and City of Ontario's Building Codes. Regulations exists to address weak soils issues, including expansion. MM-GEO-6 would be implemented for the proposed Project. With implementation of MM-GEO-6 and adherence to existing regulations, the proposed Project during construction would have a less than significant impact regarding the exposure of people or structures to hazards related to expansive soils.

6.6.2.2 Operational Impacts

The soils underlying the proposed Project area generally consist of Young Eolian Deposits. The expansive soil potential is considered low for the proposed Project site. The proposed Project features would be designed in accordance with all standard requirements for improvements on expansive soil, reducing the potential effects from and resulting impacts due to expansive soil. With adherence to existing regulation and with implementation of MM-GEO-6, the operational impacts related to expansive soil would be less than significant.

6.7 HAVE SOILS INCAPABLE OF ADEQUATELY SUPPORTING THE USE OF SEPTIC TANKS OR ALTERNATIVE WASTEWATER DISPOSAL SYSTEMS WHERE SEWERS ARE NOT AVAILABLE FOR THE DISPOSAL OF WASTEWATER

6.7.1 No Project Alternative

6.7.1.1 Construction Impacts

The No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. There are no septic systems or alternative wastewater disposal systems proposed for the No Project Alternative. The No Project Alternative would have no impact associated with soil incapable of adequately supporting such systems.

6.7.1.2 Operational Impacts

The No Project Alternative includes planned expansion, improvement projects, and routine maintenance activities for the existing roadway system and transit facilities. There are no septic systems or alternative wastewater disposal systems proposed for the No Project Alternative. The No Project Alternative would have no impact associated with soil incapable of adequately supporting such systems.

6.7.2 Proposed Project

6.7.2.1 Construction Impacts

The MSF would require construction of a restroom facility to serve the staff. The potential wastewater would discharge into the local sanitary sewer system maintained by Cucamonga Valley Water District which serves the City of Rancho Cucamonga. No septic tanks or alternative wastewater systems are proposed as part of the proposed Project, including the MSF. Consequently, the proposed Project would have no impact associated with soil incapable of adequately supporting such systems during construction, and no further analysis is required.

6.7.2.2 Operational Impacts

The proposed Project would include one MSF located at the proposed Cucamonga Station. The MSF would include a restroom facility to serve the staff. The potential wastewater would discharge into the local sanitary sewer system maintained by Cucamonga Valley Water District which serves the City of Rancho Cucamonga. No septic tanks or alternative wastewater systems are proposed as part of the proposed Project. Consequently, the proposed Project would have no impact associated with soil incapable of adequately supporting such systems during operation, and no further analysis is required.

6.8 RESULT IN THE LOSS OF AVAILABILITY OF A KNOWN MINERAL RESOURCE THAT WOULD BE A VALUE TO THE REGION AND THE RESIDENTS OF THE STATE

6.8.1 No Project Alternative

6.8.1.1 Construction Impacts

The No Project Alternative site is entirely developed and occupied by existing land uses. No mining operations are present within the No Project Alternative area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no mineral resources of value to the region and the state. Therefore, implementation of the No Project Alternative would not result in the loss of availability of a known mineral resource. The No Project Alternative during construction would have no impact on known mineral resources.

6.8.1.2 Operational Impacts

The No Project Alternative site is entirely developed and occupied by existing land uses. No mining operations are present on-site or within the No Project Alternative area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no mineral resources of value to the region and the state. Therefore, implementation of the No Project Alternative would not result in the loss of availability of a known mineral resource. The No Project Alternative during operation would have no impact on known mineral resources.

6.8.2 Proposed Project

6.8.2.1 Construction Impacts

The proposed Project site is entirely developed and occupied by existing land uses. The three stations would be located on existing parking lots, and the tunnel alignment would be located on existing roadway. Vent shaft design option 2 site is located in the center of the westbound off-ramp of the I-10 freeway, vent shaft design option 4 site is located in the center of the eastbound on-ramp of the I-10 freeway, and the MSF site is located in an existing Metrolink parking lot. No mining operations are present within the proposed Project area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no mineral resources of value to the region and the state. Therefore, implementation of the proposed Project would not result in the loss of availability of a known mineral resource and the proposed Project during construction would have no impact on known mineral resources.

6.8.2.2 Operational Impacts

The proposed Project site is entirely developed and occupied by existing land uses. The three stations would be located on existing parking lots, and the tunnel alignment would be located on existing roadway. Vent shaft design option 2 site is located in the center of the westbound off-ramp of the I-10 freeway,

vent shaft design option 4 site is located in the center of the eastbound on-ramp of the I-10 freeway, and the MSF site is located in an existing Metrolink parking lot. No mining operations are present within the proposed Project area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no mineral resources of value to the region and the state. Therefore, implementation of the proposed Project would not result in the loss of availability of a known mineral resource and the proposed Project during operation would have no impact on known mineral resources.

6.9 RESULT IN THE LOSS OF AVAILABILITY OF A LOCALLY IMPORTANT MINERAL RESOURCE RECOVERY SITE DELINEATED ON A LOCAL GENERAL PLAN, SPECIFIC PLAN OR OTHER LAND USE PLAN

6.9.1 No Project Alternative

6.9.1.1 Construction Impacts

The No Project Alternative site is entirely developed and occupied by existing land uses. No mining operations are present within the No Project Alternative area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no locally important mineral resources. Therefore, implementation of the No Project Alternative would not result in the loss of availability of a locally important mineral resource and the No Project Alternative during construction would have no impact on loss of mineral resources.

6.9.1.2 Operational Impacts

The No Project Alternative site is entirely developed and occupied by existing land uses. Under the No Project Alternative, the Project Alternative would not be built, meaning there would be no action, and the improvements associated with the proposed Project would not be constructed. No mining operations are present within the No Project Alternative area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no locally important mineral resources. Therefore, implementation of the No Project Alternative would not result in the loss of availability of a locally important mineral resource. The No Project Alternative during operation would have no impact on loss of mineral resources.

6.9.2 Proposed Project

6.9.2.1 Construction Impacts

The proposed Project is entirely developed and occupied by existing land uses. The three stations would be located on existing parking lots, and the tunnel alignment would be located on existing roadway. Vent shaft design option 2 site is located in the center of the westbound off-ramp of the I-10 freeway, vent shaft design option 4 site is located in the center of the eastbound on-ramp of the I-10 freeway, and the

MSF site is located in an existing Metrolink parking lot. No mining operations are present on-site or within the proposed Project area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no locally important mineral resources. Therefore, implementation of the proposed Project would not result in the loss of availability of a locally important mineral resource. The proposed Project during construction would have no impact on loss of mineral resources.

6.9.2.2 Operational Impacts

The proposed Project site is entirely developed and occupied by existing land uses. The three stations would be located on existing parking lots, and the tunnel alignment would be located on existing roadway. Vent shaft design option 2 site is located in the center of the westbound off-ramp of the I-10 freeway, vent shaft design option 4 site is located in the center of the eastbound on-ramp of the I-10 freeway, and the MSF site is located in an existing Metrolink parking lot. No mining operations are present on-site or within the proposed Project area, and it is unlikely that any future production would occur because the surrounding areas are largely developed urban landscape with no locally important mineral resources. Therefore, implementation of the proposed Project would not result in the loss of availability of a locally important mineral resource and the proposed Project during operation would have no impact on loss of mineral resources.

7 MITIGATION MEASURES AND IMPACTS AFTER MITIGATION

7.1 MITIGATION MEASURES FOR GEOLOGY, SOILS, SEISMICITY AND PALEONTOLOGY

7.1.1 No Project Alternative

The No Project Alternative does not require mitigation measures (MM) for geology, soils, seismicity, and mineral resources.

7.1.2 Proposed Project

The proposed Project shall implement the following MMs for geology, soils, seismicity, and mineral resources:

MM-GEO-1 *San Bernardino County Transportation Authority shall demonstrate to the City of Rancho Cucamonga and the City of Ontario that the design of the Project complies with all applicable provisions of the California Building Code with respect to seismic design for Zone 4. Compliance would include the following:*

- *The use of California Building Code Seismic Zone 4 Standards as the minimum seismic-resistant design for all proposed facilities.*
- *Additional seismic-resistant earthwork and construction design criteria (i.e., for the construction of the tunnel approximately up to 70 feet underground and etc.), based on the site-specific recommendations of a California Certified Engineering Geologist in cooperation with the Project's California-registered geotechnical and structural engineers.*
- *An engineering analysis that demonstrates satisfactory performance of alluvium or fill where either forms part or all of the support.*
- *An analysis of soil conditions and appropriate remediation (compaction, removal/replacement, etc.) prior to using any expansive soils for foundation support.*

MM-GEO-2 *Where excavations are made for the construction of the 4.2-mile tunnel approximately up to 70 feet underground, the construction contractor shall either shore excavation walls, with shoring designed to withstand additional loads, or flatten or "lay back" the excavation walls to a shallower gradient. Excavation spoils shall not be placed immediately adjacent to excavation walls unless the excavation is shored to support the added load.*

MM-GEO-3 *A California-licensed Civil Engineer (Geotechnical) shall prepare and submit to the San Bernardino County Transportation Authority a detailed soils and geotechnical analysis. This evaluation may require subsurface exploration.*

MM-GEO-4 *A registered soil professional shall submit to and have approval by the San Bernardino Transportation Authority a site-specific evaluation of unstable soil conditions, including recommendations for ground preparation and earthwork activities specific to the site and in conformance to City of Rancho Cucamonga and City of Ontario Building Codes.*

MM-GEO-5 *The proposed Project shall comply with the recommendations of the final soils and geotechnical report. These recommendations shall be implemented in the design of the project, including but not limited to measures associated with site preparation, fill placement, temporary shoring and permanent dewatering, groundwater seismic design features, excavation stability, foundations, soil stabilization, establishment of deep foundations, concrete slabs and pavements, surface drainage, cement type and corrosion measures, erosion control, shoring and internal bracing, and plan review.*

MM-GEO-6 *San Bernardino Transportation Authority shall demonstrate that the design of the proposed Project complies with all applicable provisions of the City of Rancho Cucamonga and City of Ontario's Building Codes.*

7.2 CEQA SIGNIFICANCE CONCLUSIONS

7.2.1 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42

7.2.1.1 No Project Alternative

Under the No Project Alternative, there would be no impact associated with loss, injury, or death involving the Alquist-Priolo Earthquake Fault Zone.

7.2.1.2 Proposed Project

Mitigation measures would not be required, and the proposed Project would have no impact.

7.2.2 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground-shaking and/or seismic-related ground failure, including liquefaction.

7.2.2.1 No Project Alternative

Adherence to existing regulations and would ensure that the No Project Alternative would have a less than significant impact associated with exposing people or structures to seismic ground-shaking, including effects related to seismic-related ground failure including liquefaction.

7.2.2.2 Proposed Project

With adherence to existing regulations and implementation of MM-GEO-1, the proposed Project would have a less than significant impact. Mitigation measures related to liquefaction would not be required for the proposed Project.

7.2.3 Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.

7.2.3.1 No Project Alternative

There is minimal potential for landslides to occur in the No Project Alternative area, and the impact would be less than significant.

7.2.3.2 Proposed Project

With adherence to state and local requirements and compliance with MM-GEO-2, the proposed Project would have a less than significant impact.

7.2.4 Project result in substantial soil erosion or the loss of topsoil.

7.2.4.1 No Project Alternative

With adherence to existing regulations, the No Project Alternative would result in a less than significant impact to soil erosion during operations.

7.2.4.2 Proposed Project

Mitigation measures would not be required, and the proposed Project would have a less than significant impact.

7.2.5 Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

7.2.5.1 No Project Alternative

The No Project Alternative would have a less than significant impact associated with the exposure of people or structures to hazards associated with unstable geologic units or soils during operations.

7.2.5.2 Proposed Project

With adherence to the City of Rancho Cucamonga's and the City of Ontario's codes and policies and implementation of MM-GEO-3 through MM-GEO-5, the proposed Project would have a less than significant impact.

7.2.6 Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.

7.2.6.1 No Project Alternative

With adherence to existing regulations, the No Project Alternative would have a less than significant impact regarding the exposure of people or structures to hazards related to expansive soil.

7.2.6.2 Proposed Project

With adherence to existing regulation and with implementation of MM-GEO-6, the proposed Project would have a less than significant impact.

7.2.7 Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

7.2.7.1 No Project Alternative

The No Project Alternative would have no impact associated with soil incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems.

7.2.7.2 Proposed Project

No mitigation measures would be required, and the proposed Project would have no impact.

7.2.8 Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state.

7.2.8.1 No Project Alternative

No mitigation measures would be required, and the No Project Alternative would have no impact.

7.2.8.2 Proposed Project

No mitigation measures would be required, and the proposed Project would have no impact.

7.2.9 Result in the loss of availability of a locally important mineral resource recovery site delineated on a local General Plan, Specific Plan or other Land use Plan.

7.2.9.1 No Project Alternative

No mitigation measures would be required, and the No Project Alternative would have no impact.

7.2.9.2 Proposed Project

No mitigation measures would be required, and the proposed Project would have no impact.

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