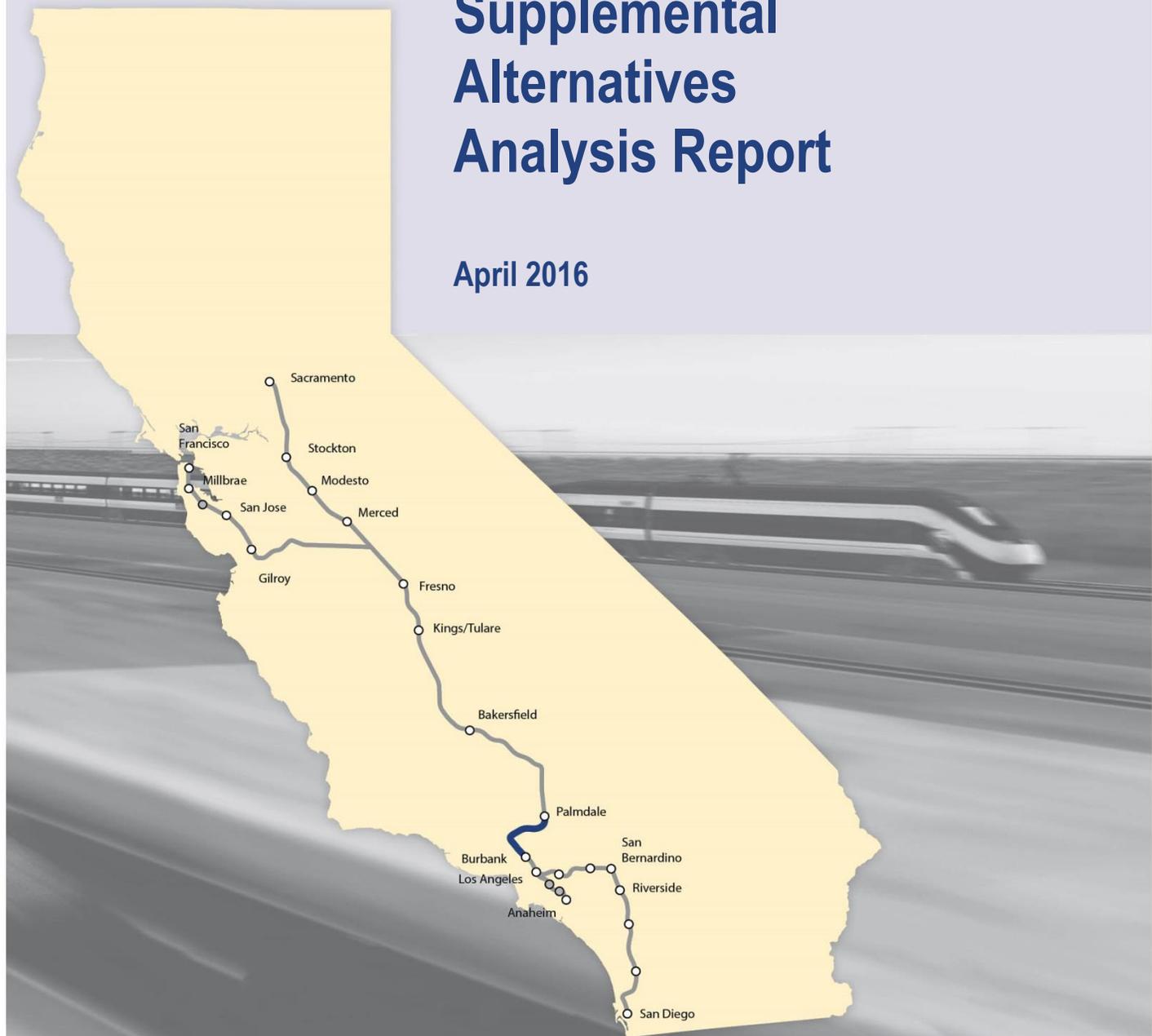


California High-Speed Rail Authority

Palmdale to Burbank *Project Section*

Supplemental Alternatives Analysis Report

April 2016



California High-Speed Rail Project



Palmdale to Burbank Project Section

SUPPLEMENTAL ALTERNATIVES ANALYSIS REPORT

April 2016

California High-Speed Rail Program

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

The California High-Speed Rail program is already delivering benefits to California, years before rail operations actually will begin. It has employed over 260 certified small businesses to work on planning, design and construction activities throughout the state, and is creating new jobs and training opportunities. Ultimately, High-Speed Rail will create 3,500 permanent jobs, in addition to tens of thousands of temporary jobs designing and building the system. Once operational, the system will operate on 100% renewable energy, providing a clean alternative to the current transportation options that degrade air quality across the state.

As part of the program, the California High-Speed Rail Authority is working with regional partners to implement a statewide rail modernization plan that will invest billions of dollars in local and regional rail lines to meet the state's 21st century transportation needs. The proposed projects would add capacity to allow for more rail service, construct new overcrossings to reduce local traffic delays and improve safety, and implement technologies to increase safety for all users. These improvements will provide immediate benefits to existing rail services and local communities, while also setting the stage for future California High-Speed Rail service.

Palmdale to Burbank Section

The Palmdale to Burbank Section will connect the Antelope Valley to the San Fernando Valley in Southern California. The approximately 35- to 45-mile section has multiple alignment options under study and will tunnel under the San Gabriel Mountains. It will include stations at Palmdale and Burbank, providing new opportunities for economic development and opportunities in those cities.

The stations will provide connections to many destinations and transportation options. Palmdale is the planned western terminus of the High Desert Corridor, a multipurpose corridor that can accommodate a highway, energy production and/or transmission facilities and a high-speed rail feeder service line. This feeder service line will provide a connection between the California High-Speed Rail system and XpressWest, a future high-speed rail line between Victorville and Las Vegas, potentially offering a one-seat high-speed rail trip between Las Vegas and Los Angeles. In Burbank, the planned station is adjacent to Bob Hope Airport, which provides commercial airline service to destinations nationwide. Additionally, existing and planned Metrolink stations and the recently opened Regional Intermodal Transportation Center at the Airport provide connections across the region. An extension of the Metro Red Line to Burbank Bob Hope Airport is under consideration that would link the site to Hollywood and Downtown Los Angeles.

TABLE OF CONTENTS

ES 1	Executive Summary	1
ES 1.1	Palmdale to Burbank Project Section Background	2
ES 1.2	Collaborative Planning Approach.....	5
ES 1.3	Summary of Recommendations in the Supplemental Alternatives Analysis	8
ES 1.4	Next Steps.....	10
1	Introduction	11
1.1	Palmdale to Burbank Project Section Background	11
1.2	Alternatives Development Approach.....	12
	1.2.1 Meeting Project Purpose and Need/Project Objectives	12
	1.2.2 Consistency with Business Plan Objectives	13
1.3	Authority Alternatives Analysis Criteria Applied in the Evaluation Process	15
1.4	Collaborative Approach to Alternatives Evaluation	19
	1.4.1 Project Objectives	19
	1.4.2 Community	19
	1.4.3 Environmental Resources	19
	1.4.4 Collaborative Approach Results.....	20
	1.4.5 Section 4(f)	20
1.5	Agency and Stakeholder Outreach	21
	1.5.1 Federal Agency Engagement.....	21
	1.5.2 State Agency Engagement	22
	1.5.3 Tribal and Interested Parties Consultation	22
	1.5.4 Elected Officials and Local Government Staff Coordination	22
	1.5.5 Summary of Regional Agency Activities	25
	1.5.6 Stakeholder and Community Engagement	27
	1.5.7 Environmental Justice Engagement.....	28
	1.5.8 Summary of Agency and Public Scoping Meetings	29
	1.5.9 Summary of Community Open House Meetings.....	29
	1.5.10 Summary of Community Working Group Meetings	32
	1.5.11 Summary of Corridor Stakeholder Activities	33
	1.5.12 Summary of June 2015 Board Meeting	38
2	Description and Analysis of Alternatives	40
2.1	Introduction	40
2.2	Background	40
2.3	SR14 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis	42
	2.3.1 Overview of SR14 Alignment Alternatives Carried Forward in 2015 SAA	42
	2.3.2 Refinement since the 2015 SAA	44
	2.3.3 Refined Alternative: SR14 Refined	44
	2.3.4 Recommendation	50
2.4	E1 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis	52
	2.4.1 Overview of E1 Alignment Alternatives Carried Forward in 2015 SAA.....	52
	2.4.2 Refinement since the 2015 SAA	54
	2.4.3 Refined Alternative: E1 Refined	54
	2.4.4 Recommendation	59
2.5	E2 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis	59
	2.5.1 Overview of E2 Alignment Alternatives Carried Forward in 2015 SAA.....	59
	2.5.2 Refinement since the 2015 SAA	62
	2.5.3 Refined Alternative: E2 Refined	62
	2.5.4 Recommendation	66

2.6	E3 Alignment Alternatives: Refinements since the June 2015 Supplemental Alternatives Analysis	68
2.6.1	Overview of E3 Alignment Alternatives Carried Forward in 2015 SAA.....	68
2.6.2	Key Design and Environmental Issues Identified in 2015 SAA	70
2.6.3	Refinement since the 2015 SAA	70
2.6.4	Recommendation	71
2.7	Station Alternatives	71
2.7.1	Overview of Station Alternatives Carried Forward in 2015 SAA.....	71
2.7.2	Key Design and Environmental Issues Identified in 2015 SAA	71
2.7.3	Refinement since the 2015 SAA	72
2.7.4	Recommendation	72
3	Alternatives Evaluation	73
3.1	Key Differences Between Options	74
3.2	Areas of No Substantial Difference.....	75
4	Recommendation	77
4.1	Alignment Alternatives	77
4.2	Station Alternatives	77

LIST OF TABLES

Table 1.3-1	Performance Objectives and Criteria	15
Table 1.3-2	High-Speed Rail Alternatives Analysis Evaluation Measures.....	16
Table 1.5-1	Summary of Palmdale to Burbank Project Section Federal Agency Outreach Meetings (June 2014-May 2015)	21
Table 1.5-2	Summary of Palmdale to Burbank Project Section Elected and City Staff Outreach Meetings (June 2014-November 2015)	23
Table 1.5-3	Summary of Palmdale to Burbank Project Section Regional Agency Outreach Meetings (June 2014-March 2016).....	26
Table 1.5-4	Community Meetings since Spring 2014	28
Table 1.5-5	Key Stakeholder Themes, Concerns, and Project Coordination	34
Table 1.5-6	Summary of Palmdale to Burbank Project Section Key Stakeholder Outreach Meetings (June 2014–March 2015)	36
Table 2.3-1	SR14 Corridor – Summary of Non-tunnel (Surface and Aerial) Evaluation Measurement Criteria1	46
Table 2.4-1	E1 Alignment Alternatives – Summary of Selected Evaluation Measurement Criteria – Non-tunnel (Surface and Aerial).....	55
Table 2.5-1	E2 Alignment Alternatives – Selected Evaluation Measurement Criteria – Non Tunnel (Surface and Aerial).....	63
Table 3-1	Summary of Distinguishing Evaluation Measurement Criteria.....	73
Table 3-2	Evaluation Criteria with No Difference Between Alignments	75
Table 4-1	Alternatives Evaluation Summary.....	79

TABLE OF FIGURES

Figure ES-1	Environmental and Alternatives Analysis Processes.....	2
Figure ES-2	Alignment and Station Alternatives Carried Forward in the 2015 SAA.....	4
Figure ES-3	Collaborative Approach.....	5
Figure ES-4	Ongoing Community Engagement.....	6
Figure ES-5	Evolution of Alternatives	7
Figure ES-6	Alignment and Station Alternatives Carried Forward in this SAA	19
Figure 1.4-1	Collaborative Approach.....	19
Figure 2.2-1	Alignment and Station Alternatives Carried Forward in the 2015 SAA.....	41
Figure 2.3-1	SR 14 Alignment and Station Alternatives Carried Forward in the 2015 SAA.....	43
Figure 2.3-2	SR14 Refined Compared to SR14-1 and SR14-2	51
Figure 2.4-1	E1 Alignment Alternatives Carried Forward in the 2015 SAA.....	53
Figure 2.4-2	E1 Refined Compared to E1a and E1b.....	58
Figure 2.5-1	E2 Alignment Alternatives Carried Forward in the 2015 SAA.....	61
Figure 2.5-2	E2 Refined Compared to E2a and E2b.....	67
Figure 2.6-1	E3 Alignment Alternatives Carried Forward in the 2015 SAA.....	19
Figure 4.1-1	Alignment and Station Alternatives Carried Forward in the 2015 SAA.....	78

APPENDICES

Appendix A	Detailed Evaluation Tables for SR14 and East Corridor Alignments
Appendix B	Table B-1: Palmdale to Burbank Corridor Alignment Alternatives and Station Options
Appendix C	Example of discussion notes taken from the San Fernando Community Working Group Meeting 1

ABBREVIATIONS AND ACRONYMS

AA	alternatives analysis
ANF	Angeles National Forest
AS	agency staff
Amtrak	National Railroad Passenger Corporation
Authority	California High-Speed Rail Authority
B	briefing
Caltrans	California Department of Transportation
CGS	California Geological Survey
CT	U.S. Census tract
CWG	Community Working Group
E1a	East Corridor 1a
E1b	East Corridor 1b
E1 Refined	East Corridor 1 Refined Alignment
E2a	East Corridor 2a
E2b	East Corridor 2b
E2 Refined	East Corridor 2 Refined Alignment
E3a	East Corridor 3a
E3b	East Corridor 3b
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FRA	Federal Railroad Administration
GI Plan	Geophysical/Geotechnical Investigation Plan for Tunnel Feasibility Exploration
GIO	general interest organization
GIS	geographic information systems
HDC	High Desert Corridor
HSR	high-speed rail
I-	Interstate
LAUS	Los Angeles Union Station
LEP	limited English proficiency
LOS	level of service
Metro	Los Angeles County Metropolitan Transportation Authority
Metrolink	Southern California Regional Rail Authority
Mph	miles per hour
NCL	No collapse performance level
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOP	Notice of Preparation
PAA	Preliminary Alternatives Analysis
PIM	public information meeting
PTC	Palmdale Transportation Center
RC	Regional Consultant
ROW	right-of-way
SAA	Supplemental Alternatives Analysis

SCN	Santa Clarita North
SCS	Santa Clarita South
SFW	San Fernando West
SHPO	State Historic Preservation Officer
SR	State Route
SR 14	State Route 14
SR 14-1	State Route 14 Hybrid-Santa Clarita Long Tunnel-San Fernando West
SR 14-2	State Route 14 Hybrid-Santa Clarita South-San Fernando West
SR 14-3	State Route 14 East-Santa Clarita Long Tunnel-San Fernando West
SR 14-4	State Route 14 East-Santa Clarita South-San Fernando West
SR 14 Refined	State Route 14 Refined Alignment
STB	Surface Transportation Board
STO	stakeholder organization
TOD	transit-oriented development
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

ES 1 Executive Summary

The California High-Speed Rail Authority (Authority) is responsible for planning, designing, building, and operation of the first high-speed rail system (HSR System) in the nation. The California HSR System will connect the mega-regions of the state, contribute to economic development and a cleaner environment, create jobs, and preserve agricultural and protected lands. By 2029, the system will run from San Francisco to the Los Angeles basin in under three hours at speeds of over 200 miles per hour. The system will eventually extend to Sacramento and San Diego, totaling 800 miles with up to 24 stations.

The system is being developed in sections; this report presents the Supplemental Alternatives Analysis (SAA) for the Palmdale to Burbank section.

The purpose of the SAA process is to describe the range of alternatives considered for the Palmdale to Burbank Project Section, and to do the following: (1) evaluate whether the alternatives meet the HSR Project objectives and the purpose and need; (2) evaluate and disclose the potential impacts of the alternatives based on a screening level of information, (3) evaluate whether the alternatives are potentially feasible and reasonable; and (4) either recommend alternatives for further study in the environmental clearance process or withdraw them from further evaluation. Figure ES-1 illustrates this process as a part of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) evaluation processes.¹

This SAA informs the project description in the project-level environmental documents that will comply with CEQA and NEPA requirements. It also sets parameters for the environmental analysis and design.

¹ By preparing this alternatives analysis, the Authority is not waiving any rights it may have related to Surface Transportation Board jurisdiction and regulation of this proposed project under the Interstate Commerce Commission Termination Act of 1995, including that Act's preemptive effect on CEQA.

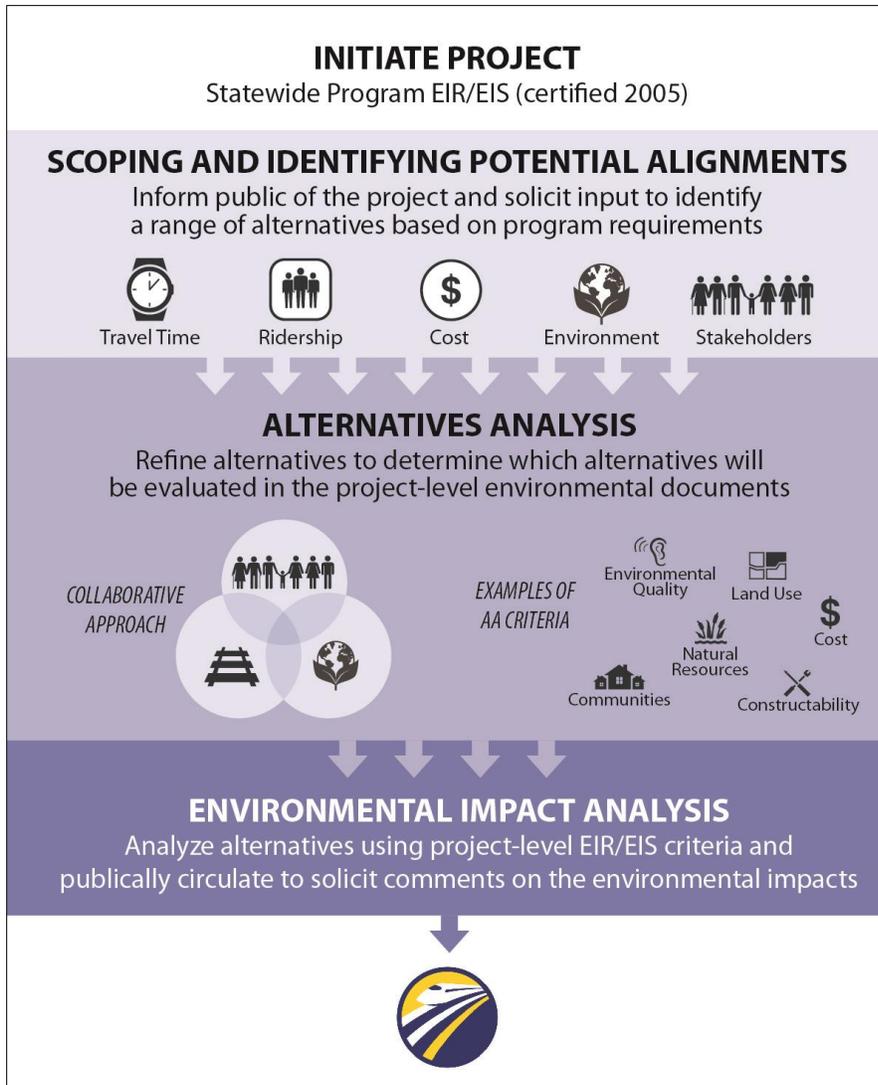


Figure ES- 1 Environmental and Alternatives Analysis Processes

ES 1.1 Palmdale to Burbank Project Section Background

The Palmdale to Burbank Project Section of the California HSR system includes alternatives that are approximately 35 to 45 miles long, from the proposed Palmdale Transportation Center Station to the proposed Burbank Airport Station (starting near Avenue O in the City of Palmdale and ending at Alameda Avenue in Burbank). Some of the rail alignment alternatives follow the State Route 14 (SR 14) freeway corridor into the northeast San Fernando Valley via a mixture of elevated, at-grade, and in-tunnel track. Other alternatives introduced in 2014 would follow a more direct route between Palmdale and Burbank via extensive tunnels beneath the San Gabriel Mountains and Angeles National Forest emerging in the northeast San Fernando Valley or at the proposed Burbank station. The Palmdale to Burbank Project Section would help to fill a gap in the current north-south passenger rail network in California. It would provide a new transportation mode that would contribute to increased mobility and improved access to markets throughout California.

In 2014, the California High-Speed Rail Authority (Authority) published a Palmdale to Los Angeles SAA Report and held scoping meetings to separate Palmdale to Burbank into a distinct project section for study. One of the main reasons for the project section split was the Initial Operating Section (IOS)

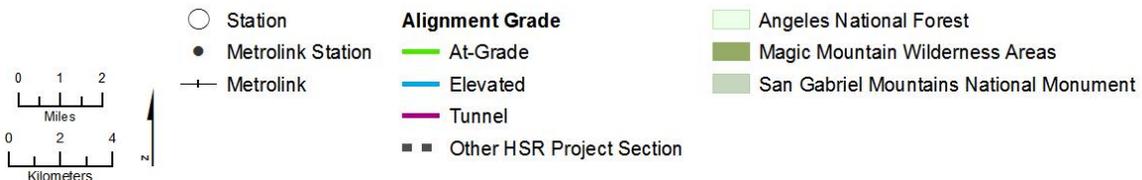
concept and its interim terminus in the San Fernando Valley, which was discussed in the Authority's 2012 and 2014 Business Plans. Additionally, the Authority and Federal Railroad Administration (FRA) determined that separate environmental documents would be more beneficial to address environmental impacts and conduct stakeholder outreach, because key environmental resources likely to be impacted were different between the two areas, and separate environmental documents better supported project phasing and sequencing. Since then, the Authority and FRA have completed additional analysis on this section and have prepared this SAA to describe the updates.

Figure ES-2 illustrates the potential range of alternatives for the Palmdale to Burbank Project Section that were carried forward in the 2015 SAA. Further analysis in this SAA revises and refines these alternatives. Appendix A of this SAA summarizes a variety of design and environmental criteria used in the alternatives evaluation process.



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016



The 2015 SAA recommended that the alternatives displayed on this map be carried forward for further consideration in the draft environmental document.

Figure ES-2 Alignment and Station Alternatives Carried Forward in the 2015 SAA

ES 1.2 Collaborative Planning Approach

The Authority evaluates project alternatives using system performance criteria that address design differences and qualities, and correspond to the project’s Purpose and Need and objectives. The Authority considers input from stakeholders through a collaborative approach to alternatives evaluation shown in Figure ES-3. This approach seeks to avoid or minimize potential impacts, by balancing the project objectives, environmental resources, and community concerns for any given alternative.

As part of this collaborative approach, the Authority has held several meetings to engage with stakeholders and solicit feedback. The 2010 Preliminary Alternatives Analysis (PAA), 2011 SAA, 2012 SAA, and 2014 SAA include descriptions of the outreach meetings the Authority conducted to inform the reports. This SAA provides a list of meetings held since the California High-Speed Rail Authority Board of Directors (Authority Board) was briefed on the 2014 SAA on June 3, 2014.



The alternative development process seeks to balance project objectives, environmental resources, and community concerns.

Figure ES-3 Collaborative Approach

In addition, on July 21, 2014, the Authority released a Notice of Preparation (NOP), and the FRA published a Notice of Intent (NOI) for the Palmdale to Burbank and Burbank to Los Angeles Project Sections. The concept of splitting the Palmdale to Los Angeles Project Section into two sections was introduced in the 2014 SAA and was implemented with the release of the NOPs/NOIs. In relation to these NOPs/NOIs, the Authority hosted seven scoping meetings in August 2014 throughout the project area between the Cities of Palmdale and Los Angeles. These meetings were held to allow public agencies and the members of the general public to provide comments on the types of analyses to be included in the Palmdale to Burbank and Burbank to Los Angeles environmental documents.

The feedback from these public meetings was used to further develop the alternatives and design refinements shared with the public at several rounds of outreach efforts that took place after the scoping period in the fall of 2014. These efforts are described in more detail in Section 1.6. Figure ES-4 illustrates the process.

Starting with the efforts related to completion of the 2014 SAA and the preparation of this SAA, the Authority held more than 220 individual and group meetings in the Palmdale to Burbank area, including:

Summary of Meetings

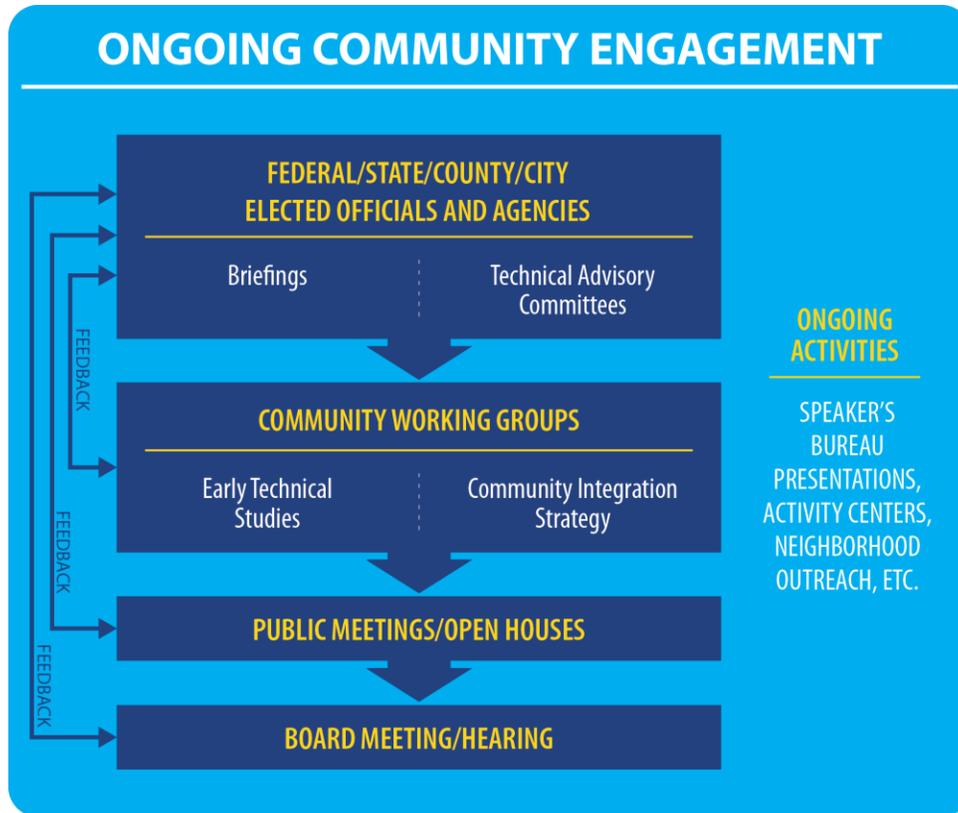
Five open house meetings held between May and June 2014

Seven public scoping meetings held in August 2014

Seven open house meetings held in December 2014

Seventeen Community Working Group (CWG) meetings held between February and April 2015

Nine open house meetings held in May and June 2015



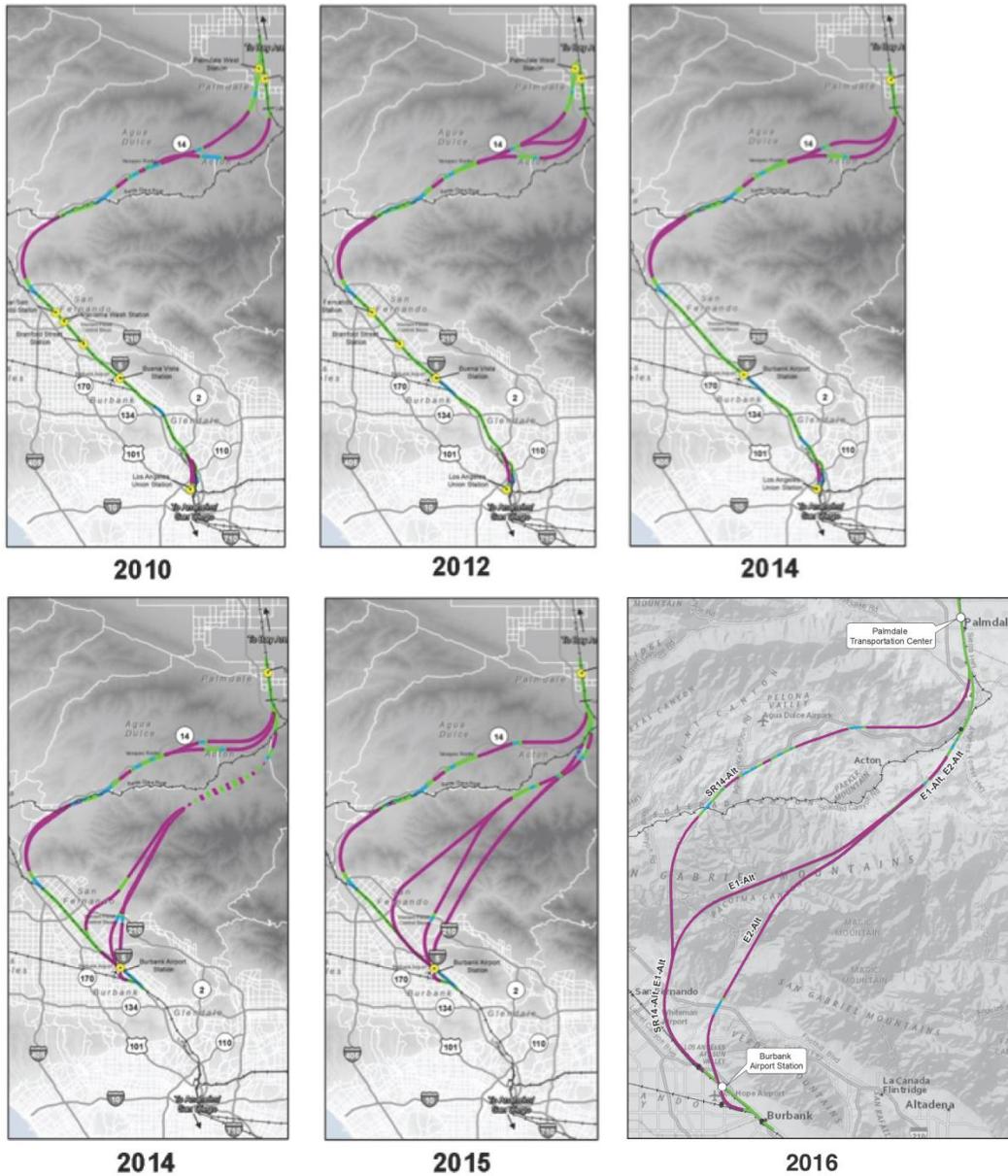
Community engagement is an ongoing process that continually informs the development of the project.

Figure ES-4 Ongoing Community Engagement

Feedback from the public has included concerns over the following:

- Sensitive habitat and species
- Water and groundwater
- Noise and vibration
- Traffic
- Mountains and forests (including the Angeles National Forest)
- Environmental justice issues
- Visual impacts
- Impacts to community character
- Project cost and funding
- Right-of-way
- Accessibility
- Consistency with local planning
- Other impacts as documented in this report

Figure ES- 5 shows the results of the collaborative planning process; the route concepts and the geographic boundaries have evolved over the years, with this SAA consolidating and redefining subsections for analysis.



- Legend**
- Proposed Station
 - +— Metrolink Rail
 - Tunnel
 - Surface
 - Elevated
 - Under Review

The collaborative planning process is reflected in the evolution of route concepts since 2010.

Figure ES-5 Evolution of Alternatives

ES 1.3 Summary of Recommendations in the Supplemental Alternatives Analysis

This SAA makes the following recommendations regarding alignment alternatives and station options either not being carried forward for detailed evaluation in the project-level environmental document, or withdrawn from further consideration:

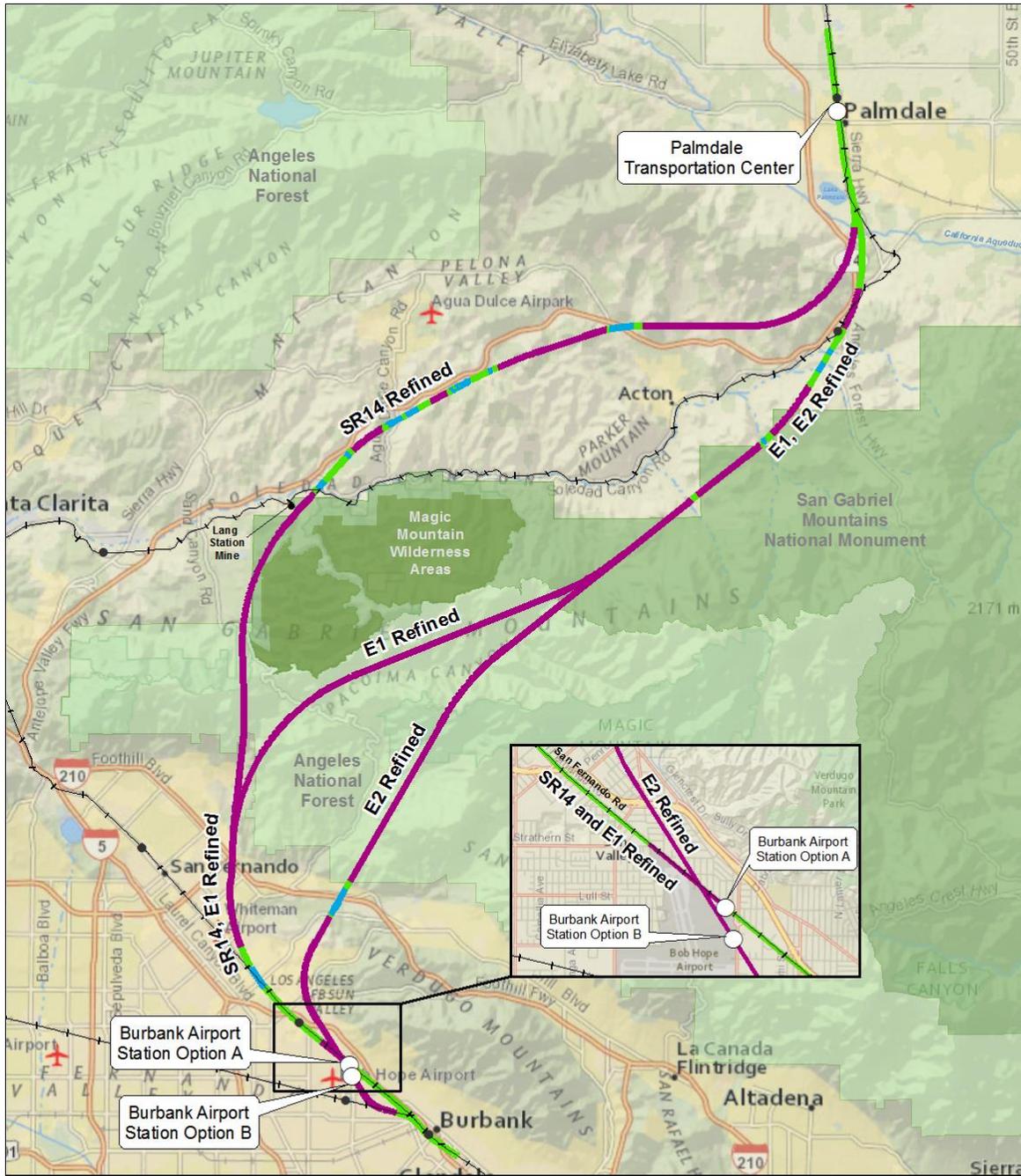
Based on the additional design work, outreach, and analysis conducted after the 2015 SAA, this 2016 SAA recommends eliminating the following 2015 SAA alignment alternatives and station options:

- SR 14-1 – not carried forward
- SR 14-2 – not carried forward
- E1a – not carried forward
- E1b – not carried forward
- E2a – not carried forward
- E2b – not carried forward
- E3a – not carried forward
- E3b – not carried forward
- Burbank Airport Station C – not carried forward

The 2016 refinement work incorporated new technical information, and this SAA recommends carrying forward the following alternative and options:

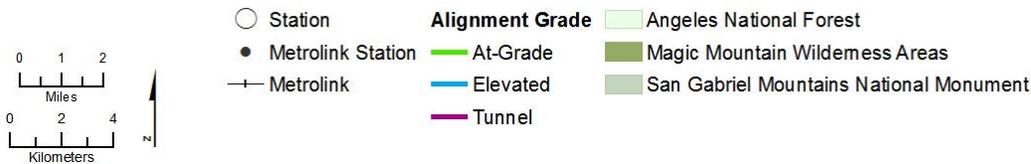
- SR 14 Refined – carried forward as SR14
- E1 Refined – carried forward as E1
- E2 Refined – carried forward as E2
- Palmdale Transportation Center – carried forward
- Burbank Airport Station A – carried forward
- Burbank Airport Station B – carried forward

These recommendations above are shown in Figure ES-6 and are subject to further in-depth evaluation in the Palmdale to Burbank CEQA/NEPA environmental review process. The alternatives carried forward represent a reasonable range of alternatives to be analyzed in depth in forthcoming project-level environmental documents, which will be subsequently circulated for public review and comment.



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016



Refined alternatives reflect feedback from communities, resource agencies, and additional technical information obtained.

Figure ES-6 Alignment and Station Alternatives Carried Forward in this SAA

ES 1.4 Next Steps

The previously completed SAA Reports and this document establish that the alignments being carried forward for detailed study in the project-level environmental document sufficiently meet project objectives and purpose and need, are potentially feasible and reasonable, and have varying levels of environmental and community impacts.

Authority staff will continue engaging with local government and the public. Additionally, Authority and FRA staff will work with the United States Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) to finalize alternatives to be evaluated in the project-level environmental document.

1 Introduction

The Authority is assessing alternatives for the California High-Speed Rail (HSR) project section between Palmdale and Burbank to determine reasonable alternatives that merit detailed study in a project-level environmental document. This report builds upon the Alternatives Analysis (AA) reports and Supplemental Alternatives Analysis reports (SAA) completed previously, and presents the changes that have been made in response to stakeholder input and new technical information. These new technical developments include the emphasis on phased implementation of the HSR system and implementation of a blended system that meets the goals of providing a one-seat ride from San Francisco to Los Angeles and Anaheim.

Section 1 at a Glance—In this section you will find the following information:

- ▶ Palmdale to Burbank Project Section Background
- ▶ Alternatives Development Approach
- ▶ Collaborative Approach to Evaluation of Alternatives
- ▶ Agency and Stakeholder Outreach

While this SAA considers alternatives within a small section of the entire HSR network, these alternatives are evaluated in the context of the HSR system as a whole to meet the HSR project goals. For example, alternatives in individual sections that may increase travel time and/or disproportionately increase implementation cost could cumulatively influence how the HSR system can meet its program-wide goals.

The purposes of this SAA are as follows:

- Provide screening environmental and preliminary engineering information on a range of alternatives considered for the Palmdale to Burbank Project Section (referred to as the Project Section throughout this document)
- Report how the range of alternatives considered either meet or do not meet the HSR objectives and project purpose and need
- Identify potential broad impacts associated with each alternative to environmental resources
- Recommend alternatives for additional analysis in the environmental clearance process or their withdrawal from further evaluation

1.1 Palmdale to Burbank Project Section Background

The Palmdale to Burbank Project Section includes alternatives that are approximately 35 to 45 miles long. This SAA begins with the alternatives and station options recommended for further study in the 2015 SAA. These alternatives extend from the proposed Palmdale Transportation Center Station to the proposed Burbank Airport Station (starting near Avenue O in the City of Palmdale and ending at Alameda Avenue in Burbank), connecting with the Bakersfield to Palmdale Project Section to the north and the Burbank to Los Angeles Project Section to the south.

The Palmdale to Burbank Project Section is an essential part of the statewide HSR system, filling a gap in the current north-south passenger rail network in California. The HSR system would provide a new transportation option that would contribute to increased mobility and improved access to major urban areas throughout California. The HSR plans for this area have evolved throughout the years, not only in response to stakeholder input, but also because of changes to the overall HSR program and to the adjoining project sections. This SAA updates the Preliminary Alternatives Analysis (PAA) for the Palmdale to Los Angeles Project Section issued by the Authority in July 2010, the Palmdale to Los Angeles Project Section Supplemental Alternatives Analyses (SAAs) issued by the Authority in March 2011, April 2012, and May 2014, and the Palmdale to Burbank Project Section SAA issued by the Authority in June 2015.² The 2011 SAA reevaluated the SR 14 Corridor from Los Angeles Union Station (LAUS) to Sylmar, and the 2012 SAA focused solely on the area between Sylmar and Palmdale. The 2014 SAA reevaluated all alignment alternatives and station options of the SR 14 Corridor of the Palmdale to Los Angeles Project Section based on the current definition of the HSR objectives and the project purpose and need. The

² Mapping above does not show developments from the 2011 SAA.

2015 SAA focused on the Palmdale to Burbank Project Section, proposed design modifications to the alignment alternatives in the SR 14 Corridor, environmental resources in the area, and additional alignments along the proposed East Corridor across the San Gabriel Mountains. In July 2014, the Burbank to Los Angeles Section was defined as a separate Project Section and is described in a separate SAA.

The primary recommendations of the 2015 Palmdale to Burbank SAA were to:

- Withdraw alternatives SR 14-3 and SR 14-4 because of community impacts in the Acton area
- Define and carry forward six new alignment alternatives (E1a, E1b, E2a, E2b, E3a, and E3b) in the East Corridor, all of which would travel more directly between Palmdale and Burbank via tunnels that would go beneath portions of the Angeles National Forest (ANF) and San Gabriel Mountains National Monument (National Monument)
- Adjust platform option locations at the Palmdale Transportation Center (PTC) and Burbank Airport Stations
- Modify the alignment in Palmdale by approximately 200 feet to the west of existing railroad right-of-way (ROW)
- Modify alignments starting near Lake Palmdale and ending near Acton

This 2016 SAA builds on the recommendations of the 2015 SAA, is consistent with the 2014 Notice of Preparation/Notice of Intent (NOP/NOI), and is informed by the subsequent scoping process and the 2014 Business Plan.

Since the 2014 Palmdale to Los Angeles SAA, the Authority has continued to refine the alternatives by responding to community feedback and by performing additional engineering and environmental analysis. This SAA Report documents the additional analysis and refinement work performed for the alignment and station configuration options, and provides recommendations for withdrawal or further consideration in the Palmdale to Burbank Project Section environmental process.

1.2 Alternatives Development Approach

Through the alternatives analysis process, the Authority and FRA seek to identify a reasonable range of alternatives for detailed study by defining station and alignment configurations that would meet the project's purpose and need and the agencies' goals and objectives, and that would be potentially feasible. Additionally, in the alternatives screening process the Authority and FRA identify areas of potential environmental impacts, and conduct a comparative evaluation of the alternatives. Every conceivable alternative to a project need not be evaluated. Rather, when multiple potentially feasible options exist, a reasonable range of alternatives is considered. Alternatives that are not potentially feasible or that do not meet the basic purpose and need are not required to be considered.

The following sections summarize the Authority's goals and objectives found within its purpose and need and the 2014 and Draft 2016 Business Plans. Section 1.4 provides more detailed descriptions of the environmental and engineering criteria, which are used to determine an alternative's feasibility.

1.2.1 Meeting Project Purpose and Need/Project Objectives

The Authority is responsible for planning, designing, building, and operation of the HSR system and ensuring coordination with California's existing transportation network. This SAA compares the proposed alternatives against the HSR system purpose and need as described in the 2005 EIR/EIR, and below:

The purpose of the statewide [High-Speed Train] HST system is to provide a reliable high-speed electric-powered train system that links the major metropolitan areas of the state, and that delivers predictable and consistent travel times. A further objective is to provide an interface with commercial airports, mass transit, and the highway network,

and to relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California's unique natural resources. (Authority and FRA 2005)

The Palmdale to Burbank project section purpose and need was described in the 2015 Palmdale to Burbank Scoping Report, and is as follows:

The purpose of the Project is to implement the Palmdale to Burbank HSR Project Section of the California HSR System; to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers, and connectivity to airports, mass transit systems, and the highway network in the Antelope Valley and the San Fernando Valley; and to connect the Northern and Southern portions of the Statewide HSR System, also allowing direct connectivity with existing regional rail networks in the Los Angeles area.

The Authority has adopted the following objectives for the proposed HSR Project, which are included in the 2005 Statewide Program Environmental Impact Report (EIR)/Environmental Impact Statement (EIS):

- Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports.
- Meet future intercity travel demand that will be unmet by present transportation systems and increase capacity for intercity mobility.
- Maximize intermodal transportation opportunities by locating stations in areas with good access to local mass transit or other modes of transportation.
- Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
- Provide a sustainable reduction in travel time between major urban centers
- Increase the efficiency of the intercity transportation system.
- Reduce potential impacts on communities and the environment by having the alignment follow existing transportation or utility corridors to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases and generate revenues in excess of operations and maintenance costs.
- Provide intercity travel in a manner that minimizes urban sprawl, is sensitive to and protective of the region's natural resources, and reduces emissions and vehicle miles traveled for intercity trips.

Preserve wildlife corridors and mitigate potential impacts to wildlife movement where feasible in order to limit the extent to which the system may present an additional barrier to wildlife's natural movement.

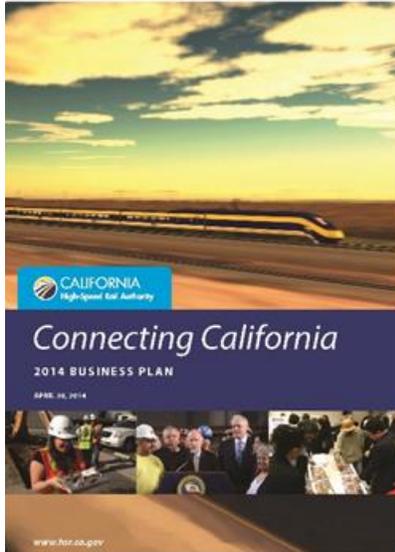
1.2.2 Consistency with Business Plan Objectives

1.2.2.1 Business Plan

The Authority publishes a business plan according to statute every two years that serves as the foundational document for implementing the state's high-speed rail system. The plan includes progress to date, updates information and forecasts and identifies key milestones and decisions. The plan also includes a description of the proposed service, expected patronage, operating and maintenance costs, anticipated costs and funding, environmental and construction schedules for the Phase 1 segments and program risks.

1.2.2.2 Previous Business Plans

In 2012, the Authority adopted its 2012 Business Plan that laid out a new framework for implementing the California high-speed rail system in concert with other state, regional and local rail investments, as part of a broader statewide rail modernization program. In that same year, the Legislature approved – and Governor Brown signed into law – Senate Bill 1029 (Budget Act of 2012) approving almost \$8 billion in federal and state funds for the construction of the first high-speed rail investment in the Central Valley and 15 bookend and connectivity projects throughout the state. In 2014, the Authority adopted its 2014 Business Plan which built on and updated the 2012 Business Plan, implementing the requirements of Senate Bill 1029.



The Authority issued a Draft 2014 Business Plan on February 7, 2014, received and considered public comments, and published the 2014 Business Plan on April 30, 2014. The 2014 Business Plan:

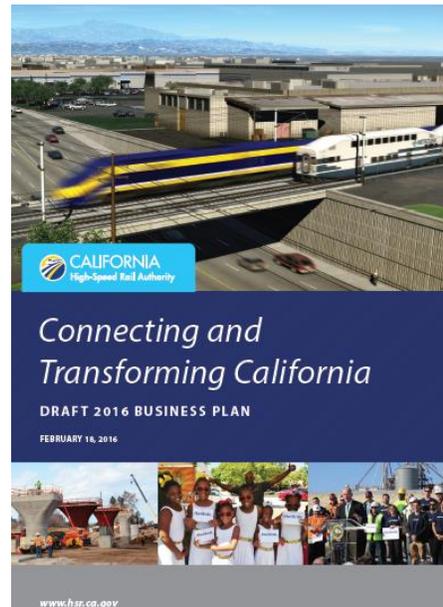
- Updated forecasts and estimates informed by rigorous external scrutiny
- Introduced a risk-based breakeven analysis that continued to show financial viability
- Confirmed that the system will be an attractive private sector investment opportunity

1.2.2.3 Draft 2016 Business Plan

On February 18, 2016, the Authority released its Draft 2016 Business Plan for a 60-day public comment period. At this time, the comment period is open and the Authority Board is anticipated to take up adoption of the 2016 Business Plan at its April 21, 2016 meeting.

The Draft 2016 Business Plan has three fundamental objectives:

- First, initiate high-speed rail passenger service as soon as possible, which will demonstrate the benefits of the project and begin generating revenues to then attract private sector participation and help fund extending the system beyond an initial line.
- Second, make strategic, concurrent investments throughout the system that will be linked together over time. By making discrete investments that connect state, regional and local rail systems, the project can provide immediate mobility, environmental, economic and community benefits. Together these prepare a solid foundation for high-speed rail and provide for early implementation of projects that will be required for HSR construction. The Authority will enter into partnering agreements with other transportation providers, aggregate federal, state and local funding sources and advance regional planning and coordination. This approach will yield the best and fastest results.



- Third, position the Authority to construct additional segments as funding becomes available. This requires completing the required environmental analyses for every mile of the program and securing environmental approvals as soon as possible. Additionally, environmental clearance positions concurrent investments in blended corridors for funding ahead of full segment implementation.

1.2.2.4 Difference between 2014 and Draft 2016 Business Plan

Following are the differences between the 2014 and Draft 2016 Business Plans:

- Funding - The funding authorized by the Governor and Legislature, by the federal government and the people of California is sufficient to deliver a high-speed rail line connecting the Silicon Valley to the Central Valley
- Schedule – The Authority now projects starting passenger service on the Silicon Valley to the Central Valley line in 2025 instead of on a line between Merced and the San Fernando Valley in 2022
- Cost Estimates – The capital cost estimates for building the Phase 1 system between San Francisco/Merced and Los Angeles/Anaheim are lower than prior estimates

1.2.2.5 SAA consistency with the Business Plan

The alternatives considered in this SAA are consistent with the goals and objectives laid out in the Draft 2016 Business Plan and previously iterated in the 2014 Business Plan. Advancing the environmental clearance of the program allows the program to be construction-ready which will maximize flexibility to capture new funding opportunities. Additionally, it will provide greater certainty about route and station locations to help local communities and transport partners with their planning decisions.

The Palmdale to Burbank alternatives will provide a connection between the Antelope Valley and the San Fernando Valley bringing high-speed rail service to the urban Los Angeles area with proposed stations at the Palmdale Transportation Center and near the Burbank Airport.

1.3 Authority Alternatives Analysis Criteria Applied in the Evaluation Process

The Authority evaluates project alternatives using system performance criteria that address the design of each alternative (i.e. engineering, logistics, construction costs, and feasibility factors) and correspond to the project purpose and need and objectives. Table 1.3-1 shows these performance objectives and criteria. Table 1.3-2 describes evaluation measures used to perform a comparative analysis of community issues and environmental resources. Quantitative information is provided where it is possible to estimate effects, and qualitative information is provided where quantification is not possible. A comparative analysis of each factor (design factors vs. community/environmental factors) was done independently prior to a balanced comparison between all performance criteria.

Table 1.3-1 Performance Objectives and Criteria

Objective	Criteria
Maximize ridership/revenue potential	Travel time/route length
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Operations and maintenance issues and costs

Source: Authority and FRA, 2011

Table 1.3-2 High-Speed Rail Alternatives Analysis Evaluation Measures

Measurement	Method	Source
A. Land use supports transit use, is consistent with existing, adopted local, regional, state, and federal plans, and is supported by existing or future growth areas as measured by:		
Development potential for transit-oriented development (TOD) within walking distance of station	Identify existing and proposed land uses within one-half mile of station locations. Identify if there are TOD districts, TOD overlay zones, mixed-use designations, or if local jurisdictions have identified station areas for redevelopment or economic development	Regional and local planning documents and land use analysis and input from local planning agencies
Consistency with other planning efforts and adopted plans	Qualitative—General analysis of applicable planning and policy documents	Land use analysis and input from planning agencies
B. Construction of the alternative is feasible in terms of engineering challenges and right-of-way constraints as measured by:		
Constructability, access for construction; within existing transportation right-of-way	Extent of feasible access to alignment for construction	Conceptual design plans and maps
Disruption to existing railroads	Right-of-way constraints and impacts on existing railroads	Conceptual design plans and maps
Disruption to and relocation of utilities	Number of utilities crossed	Conceptual design plans and maps
Identification of geological features, including capable faults and groundwater	Constructability, design measures, access to portals	Desktop studies; field investigation; geotechnical borings
C. The extent to which an alternative minimizes disruption to neighborhoods and communities (including environmental justice communities), right-of-way (ROW) acquisitions, dividing an established community, and conflicts with community resources, as measured by:		
Displacements	If possible, estimate number of properties by land use type that would be displaced, or acres of land within the right-of-way/station footprint, by type of land use: single-family, multifamily, retail/commercial, industrial, etc.	Identified by comparing the alignment conceptual design drawings with aerial photographs, zoning maps, GIS layers, and regional and local General Plan maps
Property with access affected	Estimate number of potential locations along the alignments or at station locations where, and the extent to which, access would be affected	Conceptual design plans and aerial photographs
Proximity to schools	Consistent with, and exceeding Public Resources Code Section 21151.4, identify the location of schools within 1,500 feet on each side of the construction footprint	Conceptual design plans, aerial photographs, GIS layers, and regional and local General Plan maps
Proximity to landfills	Consistent with Title 27 of the California Code of Regulations, identify the location of landfills within 0.25 mile of each side of the construction footprint	Conceptual design plans and aerial photographs

Measurement	Method	Source
Proximity to Section 4(f) resources	Identify protected parks, wildlife refuges, or historical sites to determine if a permanent, temporary, or constructive use would likely occur	Conceptual design plans, historic/archival and current aerial imagery, GIS layers, regional and local General Plan maps, and federal, state, and local cultural resources registries
Local traffic effects around stations	Identify potential locations where increases in traffic congestion or LOS are expected to occur	Existing traffic LOS from local jurisdictions
Local traffic effects at grade separations	Identify potential locations for at-grade separations where increase in traffic congestion or LOS are expected to occur	Existing traffic LOS from local jurisdictions

D. The extent to which an alternative avoids or minimizes potential impacts to environmental resources and natural resources, as measured by:

Waterways and wetlands, groundwater, aquifers, and natural preserves or biologically sensitive habitat areas affected	Identify new rail and roadway bridge crossings, tunnels, portals required; rough estimate of acres of wetlands, width of waterways crossed; acres and species of threatened and endangered habitat affected; acres of natural areas/critical habitat affected	Conceptual design plans and GIS layers; National Wetlands Inventory and National Hydrography Dataset
Cultural resources	Identify locations of National Register of Historic Places or California Historical Resources Information System listed properties; for archaeological resources, identify areas of high or moderate sensitivity based on previous studies conducted in the study area	Conceptual design plans and GIS layers; historic/archival and current aerial imagery; regional and local General Plan maps; and federal, state, and local cultural resources registries and cultural resource records search and surveys
Parklands	Estimate number and acres of parks that could be directly and indirectly affected—this would also include major trails that would be crossed	Conceptual design plans, local General Plans, aerial photographs, and GIS layers
Agricultural lands	Estimate acres of prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance within preliminary limits of disturbance	Conceptual design plans and GIS layers

E. The extent to which an alternative enhances environmental quality and minimizes potential impacts on the natural and built environments, as measured by:

Noise and vibration effects on sensitive receivers	Identify types of land use activities that would be affected by HSR pass-by noise and ground vibration	Results of screening-level assessment: inventory of potential receivers from site survey and aerial maps
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Measurement	Method	Source
Change in visual/scenic resources	Identify number of local and scenic corridors crossed and scenic/visual resources that would be affected by HSR elevated structures in scenic areas and shadows on sensitive resources (parks); identify locations where residential development is in close proximity to elevated HSR structures	Results of general assessment; survey of alignment corridors and planning documents from local and regional agencies
Maximized avoidance of areas with geological and soils constraints	Identify number of crossings of known seismic faults; estimate acres of encroachment into areas with highly erodible soils, acres of encroachment into areas with high landslide susceptibility; evaluate groundwater impacts	United States Geological Survey maps and available GIS data; California Department of Conservation's California Geologic Survey, Regional Geologic Hazards and Mapping Program; check Map Index to identify maps appropriate for HSR sections
Maximized avoidance of areas with potential hazardous materials	Identify hazardous materials/waste areas to avoid constraints	Data from previous records search conducted for other projects within the study area

Source: *Technical Memorandum, Alternatives Analysis Methods for Project EIR/EIS, Version 3*, Authority and FRA, 2011. Since the 2011 guidance, new criteria have been added for this analysis (proximity to schools, landfills, and Section 4(f) resources). GIS = geographic information system; HSR = high-speed rail; LOS = level(s) of service; TOD = transit-oriented development; ROW = right-of-way

On October 10, 2014, President Obama designated 346,177 acres of existing federal lands as the San Gabriel Mountains National Monument (National Monument) consistent with the Antiquities Act (16 USC 431-433). The National Monument covers 342,177 acres of the ANF and 4,002 acres of the neighboring San Bernardino National Forest. The alternatives have been developed to minimize impacts to the ANF and the National Monument by tunneling and locating tunnel portals to avoid surface level effects to these areas.

Further analysis of the alternatives' potential effects to the ANF and National Monument will be provided in forthcoming environmental documentation.

1.4 Collaborative Approach to Alternatives Evaluation

This SAA documents how each of the alternatives meets the purpose and need for the project. This SAA also describes how evaluation measures applied through a collaborative process helped the Authority determine recommendations for alternatives to be carried forward for environmental analysis and which did not meet the evaluation measures and will not be carried forward for further analysis.

The SAA process is intended to provide the Authority and the FRA with sufficient information and documentation on how evaluation measures and criteria have been applied to potential alternatives to optimize project objectives, minimize potential environmental impacts, and identify project information from the communities along the corridor. Figure 1.4-1 shows the collaborative approach to the alternatives evaluation. The three key areas of the collaborative approach are summarized below.



The collaborative approach balances project objectives, natural resources, and community concerns.

Figure 1.4-1 Collaborative Approach

1.4.1 Project Objectives

The project objectives that will lead to the selection of a preferred alternative are driven by safety, travel time, reliability, cost, environmental impacts, and operation of the HSR system. At each stage of development, the Authority performs extensive technical evaluation on proposed alternatives to make sure that they meet the objectives of the future operation of HSR service. Several of the key considerations that will ultimately drive the success of the project are also some of the most difficult to achieve, and they include:

- **Connecting major population areas**—Place stations near major urban/suburban centers to bring the train to the greatest number of people and maximize ridership of the system.
- **Network integration with existing systems**—Place stations next to existing and planned transportation centers in order to provide seamless multimodal transfers and system-wide transportation improvements.
- **Cost effectiveness**—Accomplish these goals cost-effectively and, to the extent possible, multiply the benefits of each dollar invested across the wider multimodal network and the broader community.

1.4.2 Community

The Authority has developed and is implementing an intensive stakeholder engagement program to support the development of alternatives for study during the environmental process and to ultimately inform the selection of a preferred alternative. To date, more than 220 meetings, briefings, and conversations have been held to gather, confirm, and understand key stakeholder concerns so they can be incorporated into the balancing process defined above and further described in Section 1.6.

1.4.3 Environmental Resources

Environmental resource considerations are guided by federal laws, state laws, and local considerations, which protect natural resources and inform decision makers and the public about potential environmental

Some of the major environmental concerns heard throughout the collaborative stakeholder engagement process

- ▶ Sensitive habitats and species
- ▶ Water and groundwater
- ▶ Noise and vibration
- ▶ Traffic
- ▶ Mountains and forests
- ▶ Environmental justice issues

effects of project alternatives. Environmental resources are largely protected by laws and regulations administrated by government agencies and are listed in Section 1.6. Feedback from community members and stakeholders also helps focus attention on environmental resources of concern.

1.4.4 Collaborative Approach Results

The collaborative approach process has led to an evolution of the alternatives considered for this Project Section since 2010. This collaborative approach will continue to inform the process through selection of a preferred alternative and decisions by the Authority and FRA under CEQA and NEPA.

Figure ES-5 shows an overview of major changes resulting from the collaborative approach, including the changes in geographic boundaries used for analysis. The AA process for this Project Section can be briefly summarized as follows:

- In 2010, the PAA built upon the 2005 Programmatic EIR/ EIS and recommended several alignments and seven station options for further environmental analysis.
- In 2012, an additional alignment alternative was added in the Palmdale area, and the Pacoima Wash Station Option was withdrawn primarily because of constructability and cost issues.
- In the spring of 2014, the SR 14 West alignment alternative was not carried forward in the Palmdale area because of the inability of its associated station (Palmdale West) to provide intermodal connections to existing inter-regional rail service; the inability to serve the planned transit-oriented development (TOD) uses at the PTC; the inability to provide a direct connection to the proposed High Desert Corridor (HDC)/XpressWest interstate HSR service; and a lack of local and regional support. Additionally, the San Fernando and Branford Street Station Options was not carried forward. The San Fernando Station Option was not carried forward because of the potential impacts on local business and residences and because the land use plans in the areas limited TOD potential. The Branford Street Station Option was not carried forward primarily because of potential impacts to nonaquatic biological resources.
- In 2014, the Palmdale to Los Angeles Project Section was split into the Palmdale to Burbank and Burbank to Los Angeles Project Sections through the scoping process. The Authority then proposed an eastern study area through the Angeles National Forest for Palmdale to Burbank. The Burbank to Los Angeles Project Section was decided to be analyzed at a later date. Therefore, within the Palmdale to Burbank Project Section, three new alternatives were proposed through the ANF, and the SR 14 Hybrid alternative was modified in the Acton area.
- In 2015, the Authority defined six alignment alternatives that would travel beneath the ANF (E1a, E1b, E2a, E2b, E3a, and E3b). The project team did not carry forward Alternatives SR 14-3 and SR 14-4 because of community impacts in the Acton area and adjusted the alignments in the Palmdale and from Lake Palmdale to Acton, as well as platform option locations at the PTC and Burbank Airport Stations

Building upon these recommendations, this 2016 SAA continues the evaluation process and makes recommendations that are summarized in Section 3.

1.4.5 Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act (49 U.S.C. Section 303) is a federal law that limits the use of certain parks, recreation areas, refuges and historic properties for transportation projects. Section 4(f) applies to transportation projects that require funding or other approvals by any USDOT agency, including FRA.

Section 4(f) states that land from a publicly owned park, recreation area, wildlife or waterfowl refuge, or a significant historic site can be used for a transportation project only if (1) there are no feasible and prudent alternatives to the use of these resources and all possible planning has been taken to minimize harm to the resource, or (2) the use would result in a de minimis impact on the Section 4(f) property. A finding of de minimis impact requires concurrence of the official with jurisdiction over the Section 4(f) property.

For purposes of this Supplemental Alternatives Analysis, FRA and the Authority have sought to identify potential Section 4(f) uses for each of the alternatives considered, based on the information available at this stage of the study. This analysis includes the use of a Geographic Information System (GIS) that incorporates existing data regarding locations of known parks, recreation areas, refuges, and historic sites. Field work to identify and evaluate potential Section 4(f) resources has not yet been completed. In addition, engineering at this stage is not advanced sufficiently to determine the extent of potential uses of these resources from a Section 4(f) perspective.

Potential Section 4(f) impacts have been identified in this document to advance the project design and work to avoid and/or minimize impacts to these resources going forward. This also allows the Authority to begin planning with resource owners to minimize harm to these resources, if needed.

After FRA and the Authority select a range of alternatives for detailed study, a full and complete Section 4(f) analysis will be completed for this project. As part of that analysis, determinations may change regarding the Section 4(f) status of properties considered in this report and additional Section 4(f) properties may be identified. In addition, more detailed information will be developed regarding the alternatives' effects on Section 4(f) resources. Where necessary, alternatives to avoid, minimize, and mitigate impacts on Section 4(f) resources will be considered. This analysis will be included in the Draft EIS/EIR.

1.5 Agency and Stakeholder Outreach

Agency and stakeholder input are a critical component alternatives analysis process. Input is necessary to gather specific and detailed information on how the proposed alignments can perform within each community and resource area, and how alternatives can avoid or minimize potential impacts. To gather this input, the Authority undertook a rigorous and robust outreach approach at the federal, regional, local, and stakeholder levels.

1.5.1 Federal Agency Engagement

The FRA is the federal lead agency for the project. As federal lead agency for the NEPA analysis, FRA is obligated to avoid and minimize impacts to the human and natural environment. FRA must also ensure that the project complies with applicable federal laws, regulations, policies, and executive orders. The protection of environmental and community resources are a major consideration alternatives development. A number of federal resource agencies are engaged in the process to work in conjunction with FRA and the Authority to identify resources of concern and develop an approach to protecting them. These resource agencies have consultation, oversight, and authority over many of the key environmental considerations that are included in the evaluation measures listed above.

FRA and the Authority has worked closely with federal resource agencies on an ongoing basis. In addition, one federal agency scoping meeting was tailored for resource agencies during the scoping period (discussed in detail in Section 1.5.8). One-on-one meetings have been held with federal agencies to keep them informed of progress on the project, including USEPA, USACE, USFWS, and USFS. In particular, the Authority has been in close and regular consultation with the USFS given that alignment alternatives are being considered to travel beneath portions of the ANF and/or the National Monument.

Table 1.5-1 Summary of Palmdale to Burbank Project Section Federal Agency Outreach Meetings (June 2014-May 2015)

No.	Date	Agencies	Category ¹	Jurisdiction
Briefings prior to Public Scoping Period				
1	June 25, 2014	USACE and USEPA	AS	Federal
2	July 22, 2014	USFS	AS	Federal
Briefings after Public Scoping Period				
3	October 27, 2014	USACE, USEPA, USFWS, and USFS	AS	Federal

No.	Date	Agencies	Category ¹	Jurisdiction
Briefings during/after Open House Meetings				
4	January 12, 2015	USFS	AS	Federal
5	February 17, 2015	USACE	AS	Federal
6	February 17, 2015	USFS	AS	Federal
7	March 10, 2015	USEPA	AS	Federal
8	April 21, 2015	USACE, USEPA, and USFWS	AS	Federal
9	April 28, 2015	USFS	AS	Federal
10	May 19, 2015	USFS	AS	Federal
11	May 20, 2015	USACE, USEPA, USFWS, and USFS	AS	Federal

USACE = United States Army Corps of Engineers; USEPA = United States Environmental Protection Agency; USFS = United States Forest Service; USFWS = United States Fish and Wildlife Service

¹ Category Key: AS = Agency Staff

1.5.2 State Agency Engagement

Several state agencies are engaged in the alternatives development process and work in conjunction with the Authority to identify and protect resources of concern. These agencies have consultation, oversight, and authority over many of the key environmental resources that are included in the Authority AA evaluation measures and which will be studied further during the environmental process. Some of these agencies include, but are not limited to:

- California State Historic Preservation Office (SHPO)
- California Department of Transportation
- California State Water Resources Control Board
- California Air Resources Board
- California Department of Toxic Substance Control
- California Department of Fish and Wildlife (CDFW)

1.5.3 Tribal and Interested Parties Consultation

Tribal consultation was undertaken in 2011-2012. After the public scoping period, one tribal informational meeting was held on September 25, 2014. The Authority and the FRA will continue to consult with both Federally recognized and non-Federally recognized Native American tribes, as well as other interested parties such as local historical interest groups, throughout the environmental process, in accordance with the Programmatic Agreement among the FRA, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the Authority regarding compliance with Section 106 of the National Historic Preservation Act, as it pertains to the California High-Speed Rail Project (PA, 2011).

1.5.4 Elected Officials and Local Government Staff Coordination

The Authority has maintained ongoing communications with all of the elected offices and cities throughout the Palmdale to Burbank Project Section through one-on-one briefings, group legislative staff briefings, webinars and presentations to City Councils, the San Fernando Council of Governments and other venues. In addition to the meetings listed in Table 1.5-2 below, the Authority has met on a monthly basis with Palmdale, Burbank, and Los Angeles to maintain open dialogue on critical issues.

Table 1.5-2 Summary of Palmdale to Burbank Project Section Elected and City Staff Outreach Meetings (June 2014-November 2015)

No.	Date	Meeting	Category ¹	Jurisdiction
Briefings prior to Public Scoping Period				
1	June 16, 2014	Los Angeles City Councilmember Felipe Fuentes	B	Los Angeles
Briefings during Public Scoping Period				
2	August 5, 2014	Los Angeles Department of Transportation and Planning Department	AS	Los Angeles
3	August 26, 2014	San Fernando	B	San Fernando
4	September 2, 2014	State Senator Fran Pavley's Office	B	Santa Clarita
5	September 2, 2014	Los Angeles City Councilmember Mitch O'Farrell's Office	B	Los Angeles
6	September 4, 2014	Los Angeles City Councilmember Gilbert Cedillo's Office	B	Los Angeles
7	September 8, 2014	U.S. Congressman Xavier Becerra's Office	B	Los Angeles
8	September 9, 2014	Joint Burbank Council and Transportation Commission meeting	STO	Burbank
9	September 9, 2014	Burbank Area Legislative Briefing	B	Burbank
10	September 12, 2014	Northern Valley Legislative Briefing	B	Los Angeles County
Briefings after Public Scoping Period				
11	October 6, 2014	Los Angeles River Cooperation Committee	STO	Los Angeles
12	October 30, 2014	Congressman McKeon's Office	B	Los Angeles County
13	November 12, 2014	San Fernando	B	San Fernando
14	November 14, 2014	Santa Clarita	B	Santa Clarita
15	November 19, 2014	Legislative Briefing—Burbank	B	Los Angeles County
16	November 20, 2014	Legislative Briefing—Santa Clarita	B	Los Angeles County
17	November 25, 2014	City Council Member Felipe Fuentes	B	Los Angeles
Briefings during/after Open House Meetings				
18	December 22, 2014	Office of Los Angeles County Supervisor Michael Antonovich	B	Los Angeles County
19	January 12, 2015	Office of Congresswoman Judy Chu	B	Los Angeles County
20	January 20, 2015	Office of Assembly member Patty Lopez	B	Los Angeles
21	January 20, 2015	San Fernando	B	San Fernando
22	January 21, 2015	Office of Los Angeles County Supervisor Kuehl	B	Los Angeles
23	January 21, 2015	Office of Los Angeles County Supervisor Solis	B	Los Angeles
24	January 26, 2015	Chairman Richard Tour with Santa Clarita (Mayor McLean, Councilmember Boydston)	B	Los Angeles County
25	January 26, 2015	Northern Corridor Cities Meetings	STO	Los Angeles
26	February 3, 2015	Burbank City Council Meeting	B	Burbank
27	February 17, 2015	Office of Congressman Tony Cardenas	B	Los Angeles

No.	Date	Meeting	Category ¹	Jurisdiction
28	February 18, 2015	Office of State Senator Bob Hertzberg	B	Los Angeles
29	February 19, 2015	Legislative Briefing	B	Los Angeles
30	March 3, 2015	Los Angeles City Mayor Garcetti's Office	B	Los Angeles
31	March 9, 2015	Office of Congressman Tony Cardenas	B	Los Angeles
32	March 11, 2015	Chairman Richard Tour of San Fernando (City Councilmembers)	B	Los Angeles
33	March 19, 2015	San Fernando Valley Council of Governments Board of Directors	B	Los Angeles County
34	April 8, 2015	Legislative Briefing	B	Los Angeles
36	April 8, 2015	Independent Cities Association—Board of Directors Member, Robert Gonzales	B	Los Angeles
37	April 9, 2015	Legislative Briefing	B	Los Angeles
38	April 9, 2015	San Fernando Valley Council of Governments Board of Directors	AS	Los Angeles County
39	April 30, 2015	San Fernando Valley Council of Governments Transportation Committee	STO	Los Angeles County
40	May 1, 2015	Office of Assembly Member Patty Lopez	B	Los Angeles County
41	May 1, 2015	Office of Los Angeles County Supervisor Sheila Kuehl	B	Los Angeles County
42	May 4, 2015	Office of Councilmember Felipe Fuentes	B	Los Angeles County
43	May 15, 2015	Legislative Briefing: Open House Preview	AS	Los Angeles County
44	May 18, 2015	Office of Los Angeles County Supervisor Michael Antonovich	B	Los Angeles County
45	May 22, 2015	Tour of the San Fernando—Authority Board Member Katherine Perez-Estolano, Joel Fajardo, Mayor, San Fernando, and Dave DePinto of SAFE	STO	Los Angeles and San Fernando
46	May 22, 2015	Office of Congressman Adam Schiff	B	Los Angeles County
47	May 22, 2015	Office of Congressman Steve Knight	B	Los Angeles County
48	June 2, 2015	San Fernando, Special City Council Meeting	B	Los Angeles County
49	July 16, 2015	San Fernando Valley Council of Governments Board of Directors	B	Los Angeles County
50	July 17, 2015	Briefing with Assembly Member Patty Lopez Staff	B	Los Angeles County
51	July 23, 2015	Burbank City Staff	AS	Los Angeles County
52	September 24, 2015	San Fernando Valley Council of Governments	STO	Los Angeles County
53	September 24, 2015	Office of Senator Bob Hertzberg	B	Los Angeles County
54	September 25, 2015	Briefing with Assembly Member Patty Lopez and Staff	B	Los Angeles County

No.	Date	Meeting	Category ¹	Jurisdiction
55	September 25, 2015	Office of Congresswoman Judy Chu	B	Los Angeles County
56	September 25, 2015	Office of Congressman Adam Schiff	B	Los Angeles County
57	October 5, 2015	Office of Senator Carol Liu	B	Los Angeles County
58	October 19, 2015	Council Member Felipe Fuentes	B	Los Angeles County
59	October 21, 2015	Mayor's Office, Los Angeles Meeting	B	Los Angeles County
60	October 26, 2015	Office of Councilmember Nury Martinez	B	Los Angeles County
61	November 19, 2015	Office of Congressman Tony Cardenas	B	Los Angeles County
62	November 19, 2015	Office of Congressman Brad Sherman	B	Los Angeles County

¹ Category Key: AS = Agency Staff; B = Briefing; GIO = General Interest Organization; PIM = Public Information Meeting; STO = Stakeholder Organization

1.5.5 Summary of Regional Agency Activities

The Authority has continued to work closely with the Los Angeles County Metropolitan Transportation Authority (Metro) and Metrolink staff throughout the AA process and often partners with Metro in various stakeholder discussions. Since June 2014, 8 formal discussions in the form of outreach coordination meetings with Metro and Metrolink took place between June 2014 and March 2016. In addition, the Authority held 3 general meetings with Metro staff on a range of issues including Rancho Vista between July 2014 and December 2015. The Authority also held 6 general meetings with Metrolink staff on a range of issues between July 2015 and December 2015.

Through these meetings with the Authority, Metro has stated its preference for locating the HSR tracks on the west side of the Metro right-of-way through the San Fernando Valley. Metro's main concern with locating the HSR tracks on the east side of the right-of-way is that the alignment would cut off existing and potential rail freight customers for Union Pacific Railroad (UPRR). UPRR has rights to operate on the right-of-way. (owned by the Southern California Regional Rail Authority (SCRRA)).

In Palmdale, Metro supports the City staff and City Council in its preference for either the SR 14 East or SR 14 Hybrid alignments because of the connection to the existing Palmdale Transportation Center (PTC) with passenger connections. As part of this coordination, the Authority has participated in 13 meetings with Palmdale which took place from July 2014 through February 2016. See Table 1.5-3 for a summary of regional agency outreach meetings.

Table 1.5-3 Summary of Palmdale to Burbank Project Section Regional Agency Outreach Meetings (June 2014-March 2016)

No.	Date	Category ¹	Jurisdiction
Meetings with Metro and Metrolink			
1	June 16, 2014	AS	SCRRA/Los Angeles County
2	July 21, 2014	AS	SCRRA/Los Angeles County
3	August 18, 2014	AS	SCRRA/Los Angeles County
4	September 15, 2014	AS	SCRRA/Los Angeles County
5	November 17, 2014	AS	SCRRA/Los Angeles County
6	December 15, 2014	AS	SCRRA/Los Angeles County
7	January 13, 2016	AS	SCRRA/Los Angeles County
8	March 1, 2016	AS	SCRRA/Los Angeles County
General Meetings with Metro Staff			
9	July 22, 2014	AS	Los Angeles County
10	July 22, 2014	AS	Los Angeles County
11	December 17, 2015	AS	Los Angeles County
General Meetings with Metrolink Staff			
12	July 8, 2015	AS	SCRRA
13	August 14, 2015	AS	SCRRA
14	September 9, 2015	AS	SCRRA
15	October 27, 2015	AS	SCRRA
16	November 18, 2015	AS	SCRRA
17	December 9, 2015	AS	SCRRA
Meetings with Palmdale			
18	July 8, 2014	AS	Palmdale
19	February 17, 2015	AS	Palmdale
20	February 19, 2015	AS	Palmdale
21	March 6, 2015	AS	Palmdale
22	March 23, 2015	AS	Palmdale
23	April 8, 2015	AS	Palmdale
24	September 8, 2015	AS	Palmdale
25	October 13, 2015	AS	Palmdale
26	November 10, 2015	AS	Palmdale
27	November 19, 2015	AS	Palmdale
28	December 8, 2015	AS	Palmdale
29	January 12, 2016	AS	Palmdale
30	February 25, 2016	AS	Palmdale

SCRRA = Southern California Regional Rail Authority
 Category Key: AS = Agency Staff

1.5.6 Stakeholder and Community Engagement

The Authority recognizes that the individuals most knowledgeable about any given community are the residents, business owners, and workforce of that community. Therefore, the Authority has undertaken a comprehensive community and stakeholder engagement program on the Palmdale to Burbank Project Section including, but not limited to, at-large public meetings, community working groups (CWGs) and briefings. The at-large meetings—public scoping and community open house meetings—are held for broad participation from all corridor communities and other members of the public to present the latest on the Palmdale to Burbank Project Section as well as provide an opportunity for the participants to have one-on-one dialogue with project team members and submit written feedback. These stakeholder engagement activities are held to gather input, hear concerns, and identify potential alignment refinements.

The CWGs function as focus groups and enhance the feedback generated at the at-large meetings through concentrated discussions with each of the project corridor communities. Each CWG is designed to be small enough for constructive collaboration (approximately 30 members) as the planning process moves toward development of the draft environmental document. CWG members provide important insight and feedback from their local communities to the Authority prior to and during the preparation of the draft environmental documents and serve as vital partners for disseminating information about the project and public meetings to their constituencies.

Starting with the efforts related to completion of the 2014 SAA and the preparation of this SAA, the Authority held more than 220 individual and group meetings in the Palmdale to Burbank area. As described below, this has included four rounds of open house and scoping meetings; CWG meetings; briefings to stakeholders, business, and civic organizations; and Authority Board meetings in September 2014 and June 2015. The open house, scoping meetings, and CWG meetings are summarized in Table 1.5-4. In addition, members of the Authority Board and Authority staff have visited the communities between Palmdale and Burbank and talked to representatives of these varied and unique areas. Every community along the alternatives has clearly expressed their views on the potential alternatives.

Throughout this period of discussion with stakeholders, the Authority gathered feedback regarding the technical aspects of the proposed alignments and station options along with general questions as to the statewide and section-specific process. The comments received at these meetings were collected and considered during the development of this document and the alternatives presented herein. Additionally, these comments will be used to refine and evaluate alternatives further in the environmental review process. This list is representative of stakeholder concerns received by the Authority. A comprehensive database containing all comments received during the project development process is kept by the Authority and regularly used during the development of alternatives to facilitate the review of stakeholder issues in conjunction with the review of project objectives and environmental resources. Appendix B contains an example of the comments received during the Round 1 CWG meetings.

Table 1.5-4 Community Meetings since Spring 2014

Date	Meeting Format	Number of Meetings
2014		
May/June	Open House	5
August	Public Scoping	7
December	Open House	7
2015		
February/March	CWG Round 1	8
April	CWG Round 2	9
May/June	Open House	9

CWG = community working group

1.5.7 Environmental Justice Engagement

The Authority promotes Environmental Justice in its programs, policies and activities to avoid, minimize or mitigate disproportionately high human health and environmental effects, including social and economic, effects on minority and low-income populations. The Authority’s policy is to duly emphasize the fair and meaningful involvement of all stakeholders and promote equal access. Within the Palmdale to Burbank Project Section, the Authority has demonstrated this commitment as follows:

- Bilingual (English/Spanish) noticing via mail and flyer and bilingual meeting materials for all public outreach meetings.
- Display advertising for public outreach meetings in community newspapers in Armenian, Korean, Russian, Spanish and Thai.
- Simultaneous language interpretation for Armenian, Korean, Russian, Spanish and Thai at stakeholder meetings based on recognized population thresholds.
- Bilingual staff on-hand to provide interpretation services in Spanish, Korean and other languages.
- Request forms for provision of materials in multiple languages.
- All-Spanish CWG in Pacoima at community request.
- All-Spanish presentation to Pacoima Beautiful, a local community organization.
- Completely bi-lingual meeting (English/Spanish) with real-time interpretation for Communities Against Displacement meeting, per their request.

Stakeholder comments covered a wide range of topics including, but not limited to:

- ▶ Alignment proposals
- ▶ Bicycle/pedestrian
- ▶ Business resources
- ▶ Connectivity
- ▶ Consistency with other plans
- ▶ Construction issues
- ▶ Earthquakes
- ▶ Economic impacts
- ▶ Eminent domain
- ▶ Engineering design
- ▶ Environmental process
- ▶ Equestrian issues
- ▶ Funding
- ▶ Future development plans
- ▶ Geologic faults
- ▶ Grade crossings
- ▶ Groundwater (and floodplains)
- ▶ Habitat
- ▶ Hazardous sites
- ▶ Health
- ▶ Historic architectural resources
- ▶ Impacts to Angeles National Forest
- ▶ Land acquisition
- ▶ Legal/litigation
- ▶ Mitigation
- ▶ Noise/vibration
- ▶ Operational issues
- ▶ Property values
- ▶ Rare, threatened, or endangered species
- ▶ Ridership
- ▶ Right-of-way
- ▶ Schools and churches
- ▶ Station design
- ▶ Streams and springs
- ▶ Technology
- ▶ Traffic
- ▶ Visual resources
- ▶ Wells
- ▶ Wildlife

In addition, as noted in subsequent sections, the Authority has undertaken ongoing engagement with numerous stakeholder organizations representing a wide range of community interests and perspectives.

1.5.8 Summary of Agency and Public Scoping Meetings

Agency and public scoping meetings are held to receive comments on which alternatives should be advanced for further refinement and evaluation in the environmental review process and which impact areas should be studied. Agency and public scoping activities for the Palmdale to Burbank and Burbank to Los Angeles Project Sections' environmental documents were conducted between July 25, 2014, and September 12, 2014 (public scoping period). During this time period, the Authority held seven scoping meetings between August 5, 2014, and August 19, 2014. The scoping meetings were attended by 916 participants who submitted a total of 140 comment forms—107 for the Palmdale to Burbank Project Section and 33 for the Burbank to Los Angeles Project Section. In addition, one federal agency scoping meeting was tailored for resource agencies. One-on-one follow-up meetings have been held with federal agencies to keep them informed of progress on the project, including USEPA, USACE, USFWS, and USFS. Federal cooperating agencies for the NEPA EIS are the Surface Transportation Board (STB), USACE, USFS, and the Bureau of Land Management (BLM).

The scoping comments and questions collected at the meetings and submitted via mail and through the Authority's website comment form are included in the Palmdale to Burbank Scoping Report, which is available for public review on the Authority's website at the following location under the "2014 Scoping Report" dropdown heading: http://www.hsr.ca.gov/Programs/Statewide_Rail_Modernization/Project_Sections/palmdale_burbank.html. Comments received during the Palmdale to Burbank Project Section scoping process identified and commented on potential environmental impacts, mitigation measures, and alternatives. The information on impacts, mitigation measures, and proposed alternatives developed through the scoping process will inform the analysis the Authority and FRA will present in the draft environmental document. Additional public scoping details for the Palmdale to Burbank Project Section are also provided in the scoping report described above.

1.5.9 Summary of Community Open House Meetings

In addition to agency and public scoping meetings (required under NEPA), the Authority wanted to share additional information regarding the project and receive further input from community members through the collaborative process. Therefore, the Authority held additional voluntary community engagement activities after the scoping period ended in the form of two rounds of open house meetings for the Palmdale to Burbank Project Section. These meetings included seven community open houses in December 2014 and nine in May and June 2015. At these meetings, the Authority presented information gathered about this Project Section and the refinement of alternatives brought about by the review and balancing of project objectives, environmental resources, and stakeholder concerns.

The Authority used the feedback received during these meetings to develop the alternatives and recommendations in this report. The feedback will also be used to help inform and support work ultimately required to select a preferred alternative. A summary of these meetings is provided below, including information about the May and June 2014 SAA meetings and the August 2014 scoping meetings. These summaries document how community feedback has helped inform previous corridor planning activities as well as the planning activities documented in this SAA.

Meeting Title: 2014 SAA Update

Duration: May 20–June 5, 2014

Number of meetings: 5

Total Attendees: Over 300

Meeting Format: Open House, Question and Answer

Informative presentation

Participants directly addressed Authority staff during Q&A

Graphics and exhibits available at viewing stations

One-on-one dialogue between the public and technical staff

Language interpreters at all meetings based on language needs

Meeting Locations: Palmdale, Santa Clarita, San Fernando, Burbank, Los Angeles

Meeting Title: Scoping Amendment

Duration: August 5–19, 2014

Number of meetings: 7

Total Attendees: Over 1,500

Meeting Format: Scoping Meeting, Open House

Informative presentation

Graphics and exhibits available at viewing stations

One-on-one dialogue between the public and technical staff

Language interpreters at all meetings based on language needs

Meeting Locations: Palmdale, Acton, Santa Clarita, Sylmar, Lakeview Terrace, Burbank, Los Angeles

Meeting Title: Alignment Update

Duration: December 2-13, 2014

Number of meetings: 7

Total Attendees: Approximately 963

Meeting Format: Open House

Information provided through graphics and exhibits available at viewing stations.

One-on-one dialogue between the public and technical staff to discuss the latest project updates and answer stakeholder questions.

Language interpreters were made available at all meetings based on language needs identified through U.S. Census data.

Meeting Locations : Palmdale, Acton, Santa Clarita, Sun Valley, Sylmar, Lake View Terrace, Burbank, Los Angeles, San Fernando

Meeting Title: 2015 SAA Update

Duration: May 16–June 6, 2015

Number of meetings: 9

Total Attendees: Approximately 1,260

Meeting Format: Open House and Presentation

Information provided through public presentation and graphics and exhibits available at viewing stations.

One-on-one dialogue between the public and technical staff to discuss the latest project updates and answer stakeholder questions.

Language interpreters were made available at all meetings based on language needs identified through U.S. Census data.

One of the meetings was conducted in Spanish and English.

Two meetings offered live webcasts: one in English and the other in Spanish and English.

Meeting Locations: Pacoima, Palmdale, Acton, Santa Clarita, Tujunga, Sun Valley, Sylmar, Lake View Terrace, Burbank, Los Angeles, San Fernando

1.5.10 Summary of Community Working Group Meetings

The stakeholder open houses in December 2014 revealed that more focused working sessions would be beneficial with the community to discuss the complexities of track alignments, potential impacts, and design modifications that could avert or decrease impacts. Therefore, following the December 2014 open house meetings, the Authority developed nine CWGs throughout the Palmdale to Burbank Project Section to engage stakeholders on an ongoing basis to discuss issues that are of concern. The CWGs are informal, voluntary groups of stakeholders representing a broad range of local interests organized as focus groups to expand stakeholder input into the HSR planning process. The groups are comprised of community representatives from various constituencies in proximity to the Palmdale to Burbank Project Section and local interest groups involved in transportation, environmental sustainability, and social issues in the region.

The Authority developed and held two rounds of CWG meetings, including eight CWG meetings in February and March 2015 and nine CWG meetings in April 2015. As part of the first round of meetings, a CWG meeting was held in Sun Valley for the communities of Sun Valley and Pacoima. At the request of the communities, an additional CWG was formed for Pacoima and conducted entirely in Spanish with English interpretation services offered for non-Spanish-speaking participants. Each round of meetings brought together approximately 250 community representatives. Below is the listing of the nine CWGs:

- Palmdale
- Acton/Agua Dulce
- Santa Clarita Valley
- Sylmar
- San Fernando
- Foothill Communities
- Pacoima (Spanish and English)
- Sun Valley
- Burbank

At each of these meetings, an informative presentation was given to the participants. Participants directly addressed Authority staff during a question and answer period about the project and the process.

CWG Round 1—Focus on listening to ideas, concerns, and questions

- ▶ February 23: Sun Valley Community Church, Sun Valley
- ▶ February 24: San Fernando Regional Pool Facility, San Fernando
- ▶ February 25: Los Angeles Mission College, Sylmar
- ▶ March 2: Chimbole Cultural Center, Palmdale
- ▶ March 3: Santa Clarita Activities Center, Santa Clarita
- ▶ March 4: Buena Vista Branch Library, Burbank
- ▶ March 7: Acton-Agua Dulce Unified School District, Acton
- ▶ March 9: Sun Valley Library, Sun Valley

CWG Round 2—Focus on response to ideas and concerns from Round 1 and open houses

- ▶ April 13: Buena Vista Branch Library, Burbank
 - ▶ April 14: Sun Valley Community Church, Sun Valley
 - ▶ April 16: Tia Chucha's Centro Cultural, Sylmar
 - ▶ April 20: Sun Valley Branch Library, Sun Valley
 - ▶ April 21: Pacoima City Hall, Pacoima
 - ▶ April 22: Santa Clarita Activities Center, Santa Clarita
 - ▶ April 23: San Fernando Regional Pool Facility, San Fernando
 - ▶ April 25: Acton-Agua Dulce Unified School District, Acton
 - ▶ April 27: Chimbole Cultural Center, Palmdale
-

1.5.11 Summary of Corridor Stakeholder Activities

The Authority held recurring meetings with stakeholders, communities, and community organizations across the Palmdale to Burbank Project Section. These meetings varied from one-on-one discussions to group settings and presentations. All meetings provided information about the project and collected information about existing conditions and current and future area projects in an effort to broaden the understanding of key issues in each location. Table 1.5-5 presents key themes, concerns, and related projects collected during these meetings, while Table 1.5-6 summarizes the number and extent of the meetings. An example of feedback recorded during a San Fernando CWG Round 1 meeting is shown in Appendix C.

Authority staff address attendees at the San Fernando Community Working Group Round 1 meeting



Table 1.5-5 Key Stakeholder Themes, Concerns, and Project Coordination

Stakeholder Issues	
City of Palmdale	
Themes	The unique character of the high desert, the legacy of the aerospace industry, and educational, economic, station area, and manufacturing opportunities
Concerns	Station connectivity, right-of-way, business and job opportunities, operational noise and vibration impacts, flooding, height restrictions on Sierra Highway (near Plant 42)
Project Coordination	Effective coordination with local projects, including High Desert Corridor, Rancho Vista Grade Separation, city transit-oriented development planning, and Palmdale Airport
Unincorporated Los Angeles County—Acton/Agua Dulce	
Themes	The unique rural character and independence of these communities
Concerns	Above-ground alignments, noise/vibration and aesthetics, visual, schools, residences, equestrian resources, groundwater and wells, property values, quality of life, flooding, equestrian uses, air quality, Native American/cultural resources and wildlife
Project Coordination	Effective coordination with local projects, including Vincent Grade Metrolink Station improvements, Southern California Edison transmission lines, and the Los Angeles County General Plan Update
Santa Clarita	
Themes	Unique set of tight-knit communities and neighborhoods across the Santa Clarita Valley, suburban and equestrian environments and employment centers
Concerns	Above-ground alignments (particularly SR14), property values, visual, noise/vibration, natural resources, construction impacts, access and safety, businesses, churches, schools, and other community-specific locations, including the Sand Canyon community, the Vista Canyon Development, and the Placerita and Ellesmere Canyon areas
Project Coordination	Effective coordination with local projects, including Metrolink improvements, the Vista Canyon Development, and the Disney Golden Oaks Ranch Expansion
Los Angeles—Sylmar	
Themes	Unique, diverse social/demographic make-up of the community
Concerns	Above-ground alignments (particularly SR14), environmental justice, noise, health, safety, aesthetic, businesses/tax base, property values, residential, businesses, right-of-way requirements, traffic congestion, grade separation impacts, possible interference with water crossings/aquifers, horse crossings, and bike path along rail corridor, community connectivity, construction impacts
Project Coordination	Effective coordination with local projects, including Metro Double Track Project
San Fernando	
Themes	Unique history, size, and tight-knit/compact/quaint nature and social/demographic make-up of the community
Concerns	Above-ground alignments (particularly SR14), environmental justice, cultural/historic resources, utilities, air quality, noise/vibration, safety, aesthetics, businesses/tax base, property values, right-of-way requirements, pedestrian access, bike path, emergency service access, impact on schools and community connectivity
Project Coordination	Effective coordination with local projects, including Metro Double Track Project (on the Antelope Valley Line between Sylmar and San Fernando) and Metro East San Fernando Valley Transit Corridor (in Van Nuys Blvd. Corridor)
Unincorporated Los Angeles County—Kagel Canyon	
Themes	The unique hillside character of the community and its history

Stakeholder Issues	
Concerns	Above-ground alignments, noise/vibration and aesthetics, residences, equestrian resources, groundwater, wells and aquifers, seismic /geologic considerations, landfill uses, and property values
Project Coordination	Effective coordination with local projects, including the I-210 Pavement Rehabilitation Project and the Big Tujunga Wash Mitigation Bank
Los Angeles—Pacoima	
Themes	Unique social/demographic make-up of the community
Concerns	Above-ground alignments (particularly SR14), environmental justice, noise, safety, aesthetics, air quality, businesses/tax base/jobs, property values, eminent domain, right-of-way requirements, traffic congestion, grade separation impacts, possible interference with water crossings, bike path along rail corridor, pedestrian access, and community connectivity
Project Coordination	Effective coordination with local projects, including Metro Double Track Project, Metro East San Fernando Valley Transit Corridor, Los Angeles County Tuxford Drainage improvements, Van Nuys Boulevard Great Street between Laurel Canyon and San Fernando, and People Street Plaza at Bradley Avenue
Los Angeles—Shadow Hills, Lake View Terrace, and Sunland/Tujunga	
Themes	Unique hillside and rural equestrian character of the community
Concerns	Above-ground and tunnel alignments, noise/vibration and aesthetics, residences, equestrian resources, groundwater, springs and wells (including Tujunga Wash), construction impacts, air quality, seismic/geologic considerations, forest and natural lands, wildlife (including endangered species), soil stability, emergency access, recreation/trails, economic impacts, eminent domain, flood plains and property values
Project Coordination	Effective coordination with local projects, including the I-210 Pavement Rehabilitation Project and the Big Tujunga Wash Mitigation Bank
Los Angeles—Sun Valley	
Themes	Unique social/demographic make-up of the community
Concerns	Above-ground alignments, environmental justice, noise, safety, aesthetics, businesses/tax base, property values, right-of-way requirements, traffic congestion, grade separation impacts, construction impacts and possible interference with water crossings, Hansen Dam and aquifers
Project Coordination	Effective coordination with local projects, including the Metro Double Track Project, Sun Valley Watershed Projects, One Water Projects
Burbank	
Themes	Unique history, intersection of aerospace, media center, and strong hometown character
Concerns	Station connectivity, traffic and circulation, noise/vibration, and business and job opportunities, Superfund site issues, operational safety
Project Coordination	Effective coordination with local projects, including LinkBurbank, the relocated Burbank Airport Terminal, and the Hollywood Way Metrolink Station, EcoDistrict, Los Angeles River Revitalization

The information in this table is not exhaustive in nature but rather provides a representative snapshot of each location. The summaries are based on comments that have been submitted at the recent Stakeholder Open House Meetings described in this document.

In addition, the Authority Board Chair and Board Members have taken tours of the local area, both with local community leaders and with Authority staff, to learn about these unique communities and gain a deeper understanding of the various alternatives.

Table 1.5-6 Summary of Palmdale to Burbank Project Section Key Stakeholder Outreach Meetings (June 2014–March 2015)

No.	Date	Meeting	Category ¹	Jurisdiction
Briefings prior to Public Scoping Period				
1	July 17, 2014	Foothill Trails District Neighborhood Council	STO	Los Angeles
2	July 21, 2014	Burbank Transportation Committee	STO	Burbank
3	July 23, 2014	Walt Disney Studios	STO	Burbank
Briefings during Public Scoping Period				
4	July 30, 2014	Acton/Agua Dulce Town Council	STO	Los Angeles County
5	August 12, 2014	Los Angeles River/Natural Resources Defense Council Working Group	STO	Los Angeles
6	August 13, 2014	Sunland-Tujunga Neighborhood Council	STO	Los Angeles
7	August 20, 2014	Pacoima Neighborhood Council	STO	Los Angeles
8	August 27, 2014	Shadow Hills Property Owners Association	STO	Los Angeles
9	August 27, 2014	Little Tokyo Leadership	GIO	Los Angeles
10	August 28, 2014	Sylmar Neighborhood Council	STO	Los Angeles
Briefings after Public Scoping Period				
11	September 16, 2014	Authority Board Meeting: Palmdale to Burbank Project Section Update and Overview of Public Scoping Process	PIM	Los Angeles County
12	September 18, 2014	North Hollywood North East Neighborhood Council	STO	Los Angeles
13	October 16, 2014	Burbank Chamber of Commerce	GIO	Burbank
14	November 4, 2014	Burbank and Glendale Transportation Management Organizations	STO	Burbank
15	November 13, 2014	Valley Alliance of Neighborhood Councils	STO	Los Angeles
Briefings during/after Open House Meetings				
16	December 5, 2014	Walt Disney Studios	STO	Burbank
17	December 10, 2014	Acton-Agua Dulce Unified School District—Meeting with Dr. Brent Woodard, Superintendent	STO	Los Angeles County
18	December 12, 2014	Antelope Valley African American Chamber of Commerce	GIO	Los Angeles County
19	January 8, 2015	Shadow Hills Property Owners Association - David DePinto	STO	Los Angeles
20	January 13, 2015	Foothill Communities Stakeholder Meeting	PIM	Los Angeles
21	January 20, 2015	Valley Industry and Commerce Association	GIO	Los Angeles County
22	January 21, 2015	Los Angeles Business Council Institute—Legislative Committee	GIO	Los Angeles County
23	January 31, 2015	Sunland-Tujunga Neighborhood Council - Town Hall Meeting	STO	Los Angeles County
24	February 7, 2015	Los Angeles Neighborhood Council Coalition	STO	Los Angeles

No.	Date	Meeting	Category ¹	Jurisdiction
25	February 18, 2015	Pacoima Neighborhood Council	STO	Los Angeles
26	February 19, 2015	Crescenta Valley Town Council	STO	Los Angeles
27	February 19, 2015	Foothill Trails Neighborhood Council	STO	Los Angeles
28	February 23, 2015	Tour of Shadow Hills Community Area—Chairperson Dan Richard visited and toured Kagel Canyon, Tujunga Wash, and Shadow Hills with members of the community	STO	Los Angeles
29	February 26, 2015	San Fernando Valley Town Hall—Imagining Our Transportation Future	STO	Los Angeles County
30	February 26, 2015	Follow-up meeting w/ Foothill community leaders	STO	Los Angeles County
31	February 28, 2015	Communities Against Displacement Stakeholder Meeting (Pacoima, San Fernando, and Sylmar)	STO	Los Angeles and San Fernando
32	March 5, 2015	Angeles National Golf Club	STO	Los Angeles and San Fernando
33	March 5, 2015	Ongoing follow-up meeting w/ Foothill community leaders	STO	Los Angeles and San Fernando
34	March 11, 2015	California State University Northridge—Transportation/Urban Planning Students	GIO	Los Angeles
35	March 18, 2015	Shadow Hills Property Owners Association (SHPOA) / Save Angeles Forest for Everyone (S.A.F.E.)	STO	Los Angeles and San Fernando
36	March 26, 2015	Pacoima Beautiful (All-Spanish Presentation)	STO	Los Angeles
37	April 8, 2015	San Fernando Road Business Alliance	STO	Los Angeles and San Fernando
38	April 15, 2015	Presentation: Valley Industry and Commerce Association Government Affairs Committee	AS/STO	Los Angeles County
39	April 30, 2015	Small group meeting with Foothill Communities representatives	STO	Los Angeles
40	May 12, 2015	Santa Clarita Stakeholders	STO	Santa Clarita
41	May 12, 2015	Valley Industry and Commerce Association Transportation Committee	STO	Los Angeles County
42	June 2, 2015	Los Angeles Area Chamber Transportation & Goods Movement Council	GIO	Los Angeles County
43	August 1, 2015	Friends 4 HSR SoCal- Champions for High Speed Rail (kick-off meeting)	STO	Los Angeles County
44	August 6, 2015	Palmdale Kiwanis Club	STO	Los Angeles County
45	August 27, 2015	St. Didacus Catholic Stakeholder Meeting	STO	Los Angeles County
46	October 14, 2015	Field Visit and Tour with SAFE Community Representatives	STO	Los Angeles County

No.	Date	Meeting	Category ¹	Jurisdiction
47	December 2, 2015	S.A.F.E. High Speed Rail Status Meeting	STO	Los Angeles County

Source: Arrellano Associates, 2015

USACE = United States Army Corps of Engineers; USEPA = United States Environmental Protection Agency; USFS = United States Forest Service; USFWS = United States Fish and Wildlife Service

¹Category Key: AS = Agency Staff; B = Briefing; GIO = General Interest Organization; PIM = Public Information Meeting; STO = Stakeholder Organization

1.5.12 Summary of June 2015 Board Meeting

The Authority held a Board meeting on June 9, 2015, during which Authority staff presented an overview of the 2015 Palmdale to Burbank SAA and provided an update of progress in the corridor. A summary of the public comment session pertaining to the 2015 SAA is provided below:

Elected Officials and Partner Agencies

- Representative for one California State Senator and two California State Assembly members
- Representative for member of Los Angeles County Board of Supervisors
- Mayors of Palmdale, Burbank, San Fernando, and Santa Clarita; Mayor Pro Tem of San Fernando
- Councilmembers from Los Angeles, Anaheim, San Fernando, and Santa Clarita
- Executive Director, Southern California Association of Governments
- Summary of comments: Use extreme caution when considering any route through the Angeles National Forest because of potential environmental impacts. Santa Clarita Valley strongly opposes the SR 14 alignment alternative because of community impacts. Support for the tunnel alignment from Palmdale to Burbank. Concerns for impacts in San Fernando. Concerns for impacts on Santa Clarita’s residents. Commend the Authority for work completed to date (three speakers). Support for the blended approach in Southern California. Support for more tunnel-oriented, less community-intrusive routes.

Palmdale

- Five speakers
- Summary of comments: support for the HSR system (four speakers). Concern regarding Americans with Disabilities Act (ADA) compliance and tunneling costs.

Acton and Agua Dulce

- 25 speakers
- Summary of comments: concerns for community impacts in Acton and Agua Dulce (25 speakers), including community character and eminent domain. Concerns regarding flooding and wildlife. Many indicated a preference for HSR to go underground.

Santa Clarita

- 15 speakers
- Summary of comments: concerns for community impacts of the SR 14 alternatives in Santa Clarita (15 speakers), particularly the Sand Canyon area. Concerns included property values, eminent domain, and construction impacts. Some supported the East Corridor alternatives instead. Concern for HSR construction costs.

Sylmar

- Two speakers
- Summary of comments: concerns for community impacts of the SR 14 alternatives in Sylmar (two speakers), including community connectivity and air quality.

San Fernando

- 13 speakers, including the City Manager
- Summary of comments: do not support SR 14 alternatives through San Fernando due to concerns for community impacts in San Fernando (ten speakers), including community character, eminent domain, and construction impacts. Overall support for the HSR system in general.

Pacoima

- 13 speakers
- Summary of comments: concerns for community impacts in Pacoima (11 speakers), including quality of life, environmental justice, and community connectivity. Support for HSR, if a tunnel alignment is selected.

Foothill Communities (Kagel Canyon, Lake View Terrace, Shadow Hills, Sunland-Tujunga)

- 43 speakers
- Summary of comments: concerns for community impacts (23 speakers), including construction impacts, eminent domain, property values, and recreation/trails. Does not support HSR (10 speakers), with some citing high construction costs. Concerns for the impacts of tunneling on the Angeles National Forest (seven speakers), including impacts on wildlife. Support for HSR, if a tunnel alignment is selected.

2 Description and Analysis of Alternatives

2.1 Introduction

This section presents a series of maps and tables, along with narrative descriptions of previously studied alternatives and alternatives proposed to be carried forward for further study. The Authority used the collaborative approach described in Section 1 to develop each of the alternatives. The tables are used to present detailed evaluation data on the different alternatives over a range of criteria. The Authority developed the data tables using a centerline approach. This means that the analysis is based on a common centerline between the southbound and northbound HSR tracks. This is an appropriate approach for the SAA analysis that screens a relatively large number of alternatives.

Section 2 at a Glance-In this section you will find the following information:

- ▶ Background-Provides a brief background on the past alternatives analysis reports.
- ▶ Refinements since the 2015 Supplemental Alternatives Analysis (SAA)-Alignments from the SAA have been refined; these refinements are described and evaluated
- ▶ Evaluation Categories (partial list)
- ▶ Design and constructability Issues
- ▶ Aquatic resources
- ▶ Biological resources
- ▶ Noise and vibration
- ▶ Schools
- ▶ Communities and environmental justice
- ▶ Section 4(f) and 6(f) properties
- ▶ Recommendation on alignments to carry forward for further analysis.

2.2 Background

In the 2010 PAA, the Palmdale to Los Angeles Section Project was analyzed for potential alignment alternatives, platform locations, and design options from the City of Palmdale to Los Angeles Union Station. The 2011 SAA reevaluated the Palmdale to Los Angeles Section Project from LAUS to Sylmar, and the 2012 SAA focused solely on the Sylmar to Palmdale area. The 2014 SAA reevaluated all alignment alternatives and station options for the Palmdale to Los Angeles Section Project and recommended splitting the Palmdale to Los Angeles Section Project into a Palmdale to Burbank Section Project and a Burbank to Los Angeles Section Project. The 2015 SAA introduced refinements to rail alignments along the SR14 corridor as well as several East Corridor alignments.

Figure 2.2-1 shows the alternatives that the 2015 SAA recommended to be carried forward for further refinement and evaluation in the environmental review process. Appendix B provides an all-inclusive list of the alternatives previously identified through the AA process, along with the recommendations of this SAA (labeled as “SAA 2016”). The table in Appendix B covers three sections: the PAA; the SAAs from 2011, 2012, and 2014; and the SAAs from 2015 and 2016.

During the June 9, 2015 Board meeting, issues were raised regarding the alternatives presented in the 2015 SAA. Subsequent to the Board meeting, the Authority contracted with a new Regional Consultant (RC) to explore ways to refine the alternatives so as to address concerns raised at the Board meeting and through previous stakeholder outreach. This SAA reflects refinements to the alignments and stations presented in the 2015 SAA.

The alignments and stations shown below were recommended for further evaluation in 2015 and were used as a starting point for the 2016 SAA work.

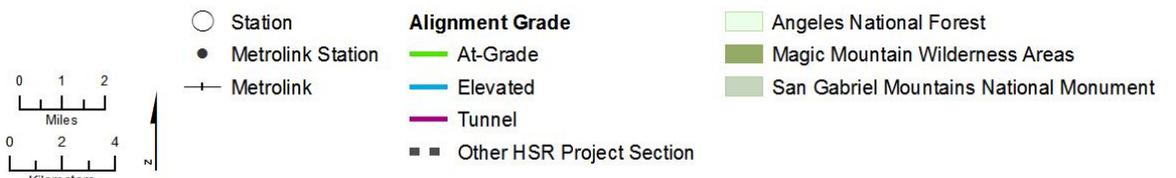
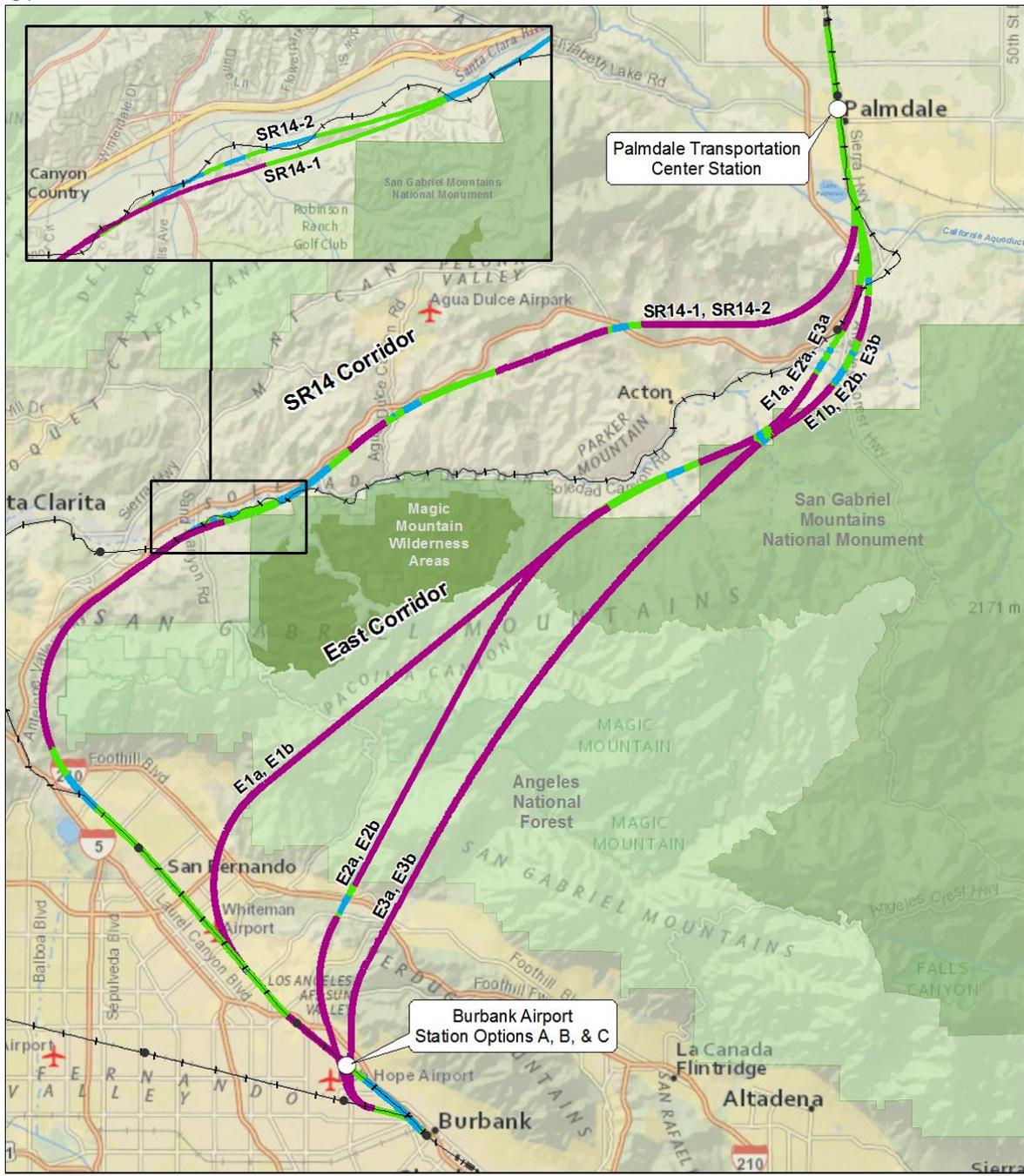


Figure 2.2-1 Alignment and Station Alternatives Carried Forward in the 2015 SAA

2.3 SR14 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis

2.3.1 Overview of SR14 Alignment Alternatives Carried Forward in 2015 SAA

The Authority published a SAA for the Palmdale to Burbank Section Project in June 2015. The SAA provided narrative descriptions of four different SR-14 corridor alignments. Analysis in the 2015 SAA did not carry forward two SR14 corridor alignments (SR14-3 and SR14-4) because of high potential for displacement, noise, visual impacts, and Acton-area school impacts.

The 2015 SAA carried forward two SR-14 corridor alignments (SR14-1 and SR14-2), citing lower potential for impacts to schools and other sensitive noise receptors relative to two other alignments considered but not carried forward. Figure 2.3-1 depicts the SR14-1 and SR14-2 alignments. The 2015 SAA provides detailed descriptions of each of these alignments.

As shown in Figure 2.3-1, these alignments are the same except for the area between roughly Soledad Canyon Road and Sand Canyon Roads, south of SR-14, the Santa Clara River, and the Antelope Valley Metrolink corridor. Key differences between SR14-1 and SR14-2 are excerpted below from the 2015 SAA.³

SR14-1

West of Agua Dulce Canyon Road, SR14-1 would enter an approximately 1.3-mile tunnel. Southwest of the tunnel, SR14-1 would travel at-grade and on elevated structures for approximately four miles. Grade separations would be provided where SR14-1 would cross the existing railroad, Soledad Canyon Road, and Lang Station Road. Near Lang Station Road, SR14-1 would cross just outside the corner of San Gabriel Mountains National Monument within the Angeles National Forest on elevated tracks.

Approximately 0.4 mile within the city of Santa Clarita, SR14-1 would enter an approximately 8.7 mile tunnel and travel south under Santa Clarita and portions of unincorporated County of Los Angeles. The tunnel would pass underneath the corner of the Angeles National Forest. The tunnel would end north of the I-210 freeway. SR14-1 would then transition to an elevated structure over the I-210 Freeway, Foothill Boulevard, and Roxford Street. SR14-1 would continue south and transition into the existing railroad right-of-way at-grade for approximately 11 miles before entering the proposed Burbank Airport Station.

SR14-2

West of Agua Dulce Canyon Road, SR14-2 would also enter an approximately 1.3-mile tunnel. Southwest of the tunnel, SR14-2 would travel at-grade and on elevated structures for approximately 5.7 miles (1.7 miles longer than SR14-1). Similar to SR14-1, grade separations would be provided where SR14-2 would cross the existing railroad, Soledad Canyon Road, and Lang Station Road. Near Lang Station Road, SR14-2 would cross just outside the corner of San Gabriel Mountains National Monument within the Angeles National Forest on elevated tracks.

Approximately 2.1 miles within the city of Santa Clarita, SR14-2 would enter an approximately 7.0 mile tunnel and travel south under Santa Clarita and portions of unincorporated County of Los Angeles. The tunnel would pass underneath the corner of the Angeles National Forest. From the tunnel southward, SR14-2 would be the same as SR14-1.

³ California High Speed Rail Authority, Palmdale to Burbank Supplemental Alternatives Analysis, June 2015. Available at: http://www.hsr.ca.gov/docs/brdmeetings/2015/brdmtg_060915_Item3_ATTACHMENT_Supplemental_Alt_Analysis_PalmBurb_Project_Section.pdf

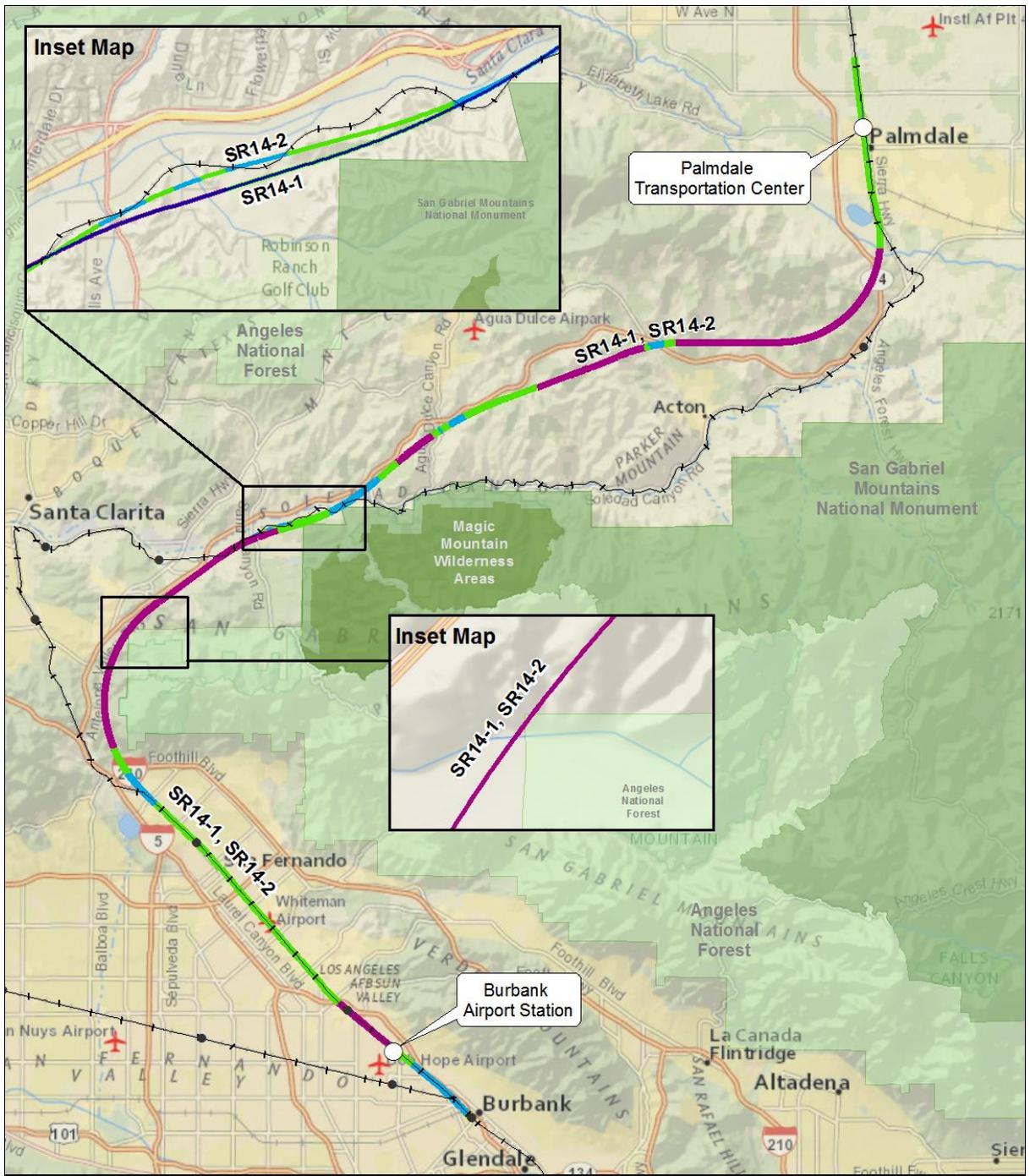


Figure 2.3-1 SR14 Alignment Alternatives Carried Forward in 2015 SAA

2.3.1.1 Key Design and Environmental Issues Identified in 2015 SAA

The 2015 SAA included a table (Table 1.7-2) summarizing design and environmental factors used in the evaluation of alignments and station areas. Detailed design and environmental information is provided in Appendix A, Table 1 of the 2015 SAA. The Authority opted to not carry forward SR14-3 and SR14-4 for the primary reason of potential impacts to Acton area schools and their related community functions. Of particular concern, SR14-3 and SR14-4 would have passed at grade in close proximity to both Vasquez High School and High Desert Middle School in Acton. Potential impacts to High Desert Middle School (specific to SR14-3 and SR14-4), were of substantial concern since the school serves a variety of community functions for Acton.

Table 3.1-1 of the 2015 SAA explained why SR14-1 and SR14-2 were carried forward in the 2015 SAA. SR14-1 had relatively low potential for impacts to schools and noise sensitive receptors. SR14-2 had relatively low potential for impacts to aquatic resources and schools.

2.3.2 Refinement since the 2015 SAA

Beginning in July 2015, the Authority began to look for opportunities to improve one or both of the SR14 alignments in terms of design, operations, and environmental impacts. These improvements were initially focused on reducing environmental impacts and improving operational performance and travel time. The Authority reviewed the critical environmental issues associated with SR14-1 and SR14-2, in particular, the high potential for effects to environmental justice communities in the northeast San Fernando Valley (including the City of San Fernando). Adhering closely to the SR14 corridor increased the mileage and thus travel time between Palmdale and Burbank, particularly relative to the Eastern Corridor alignments, which were proposed to take a more direct (and underground) route.

2.3.3 Refined Alternative: SR14 Refined

The refinement process led to the introduction of a refined alignment, SR14 Refined. Figure 2.3-2 shows SR14 Refined in comparison to SR14-1 and SR14-2. SR14 Refined would be similar to SR14-1 and SR14-2 from Avenue O in Palmdale until the Vincent Substation area, where it would differ slightly from the SR14-1 and SR14-2 alignments. SR14 Refined would continue in a tunnel, periodically surfacing to cross SR14 and Escondido Canyon Road, Big Springs Road, the Pacific Crest Trail, Agua Dulce Canyon, and Soledad Canyon. As shown in Figure 2.3-2, SR14 Refined would diverge from SR14-1 and SR14-2 just north of Soledad Canyon Road. The Santa Clara River crossing of SR14 Refined would be just south of Soledad Canyon Road; this crossing would be substantially shorter than the crossings associated with SR14-1 and SR14-2.

Moreover, whereas SR14 Refined enters a tunnel after crossing the river, SR14-1 and SR14-2 would continue on a combination of at-grade and viaduct tracks in the bed of the Santa Clara River. After crossing the Santa Clara River, SR14 Refined would enter an approximately 9.8 mile long tunnel that travels south, underneath portions of the National Monument, the ANF, and the City of Los Angeles, specifically the suburban neighborhood of Pacoima. This tunnel would be 9.8 miles in length, with a maximum overburden of 2,100 feet. SR14 Refined would surface just east of the existing Antelope Valley Metrolink Corridor near Montague Street. From there, SR14 Refined would continue at-grade until crossing the Los Angeles County Flood Control Channel on viaduct. SR14 Refined would continue on viaduct, following near South San Fernando Boulevard, where it would enter the Metrolink Corridor around Sheldon Street. Continuing south on viaduct tracks along the Metrolink Corridor, SR14 Refined would then travel southeast at-grade, from just south of Allegheny Street and enter the proposed Burbank Airport Station Option A. Burbank Airport Station Option A would not preclude the inclusion of a Metrolink station in the future. From here, the alignment would continue at-grade along the Metrolink Corridor, west of the existing train tracks, until reaching Alameda Avenue. At Alameda Avenue, the alignment would join with the at-grade alignment proposed within the Burbank to Los Angeles Project Section.

Appendix A provides a detailed evaluation comparing the SR14-1, SR14-2, and SR14 Refined alignments. Table 2.3-1 below displays a subset of the information in Appendix A, focusing on the criteria most relevant in differentiating between alternatives. For most measurement criteria in Appendix A, tunnel

profiles, as compared to non-tunnel profiles, are anticipated to have few or no surface level effects due to tunnel depths (ranging well over 1000 feet in several locations). Such tunnels would be constructed via boring, the depth below surface would avoid or minimize various of rail construction and operation, such as noise, vibration. Forthcoming environmental documentation, supported by ongoing geotechnical investigations, will help the Authority ascertain if any such surface level effects may occur.

As shown in Table 2.3-1, non-tunnel portions of SR14 Refined (in other words, at grade or elevated structures) would result in fewer residential and business displacements than SR14-1 and SR14-2. This is largely due to SR14 Refined avoiding surface impacts in the San Fernando Valley by tunneling under the ANF. By avoiding non-tunnel tracks in the northeast San Fernando Valley (including San Fernando, Sylmar, and Pacoima) and Santa Clarita, SR14 Refined would affect fewer minority or environmental justice communities than either SR14-1 and SR14-2. Tunneling under the ANF to avoid environmental justice and minority communities would result in non-tunnel portions of SR14 Refined being located within close proximity of fewer schools, and would result in fewer noise and vibration effects to residential properties and schools than either SR14-1 or SR14-2.

As shown Table 2.3-1, with an increased percentage of the SR14 Refined alignment underground, the visual impact of SR14 Refined would be reduced relative to SR14-1 and SR14-2 which have elevated tracks through San Fernando Valley communities. Due to the density and diversity of cities in the northeast San Fernando Valley, the refinement process identified an alignment to avoid many disproportional environmental impacts to environmental justice and minority communities. Additionally, as noted in Table 2.3-1, relative to SR14-1 and SR14-2, SR14 Refined would have a reduced overall length (approximately 5 miles shorter). As described in Chapter 1 above, one of the HSR project objectives is to provide a sustainable reduction in travel time between major urban centers. By reducing the sharpness of curves and overall alignment length, SR14 Refined improves future high-speed rail operations by making the alignment less circuitous, thus allowing for more efficient, quicker service. SR14 Refined would have a substantially shorter journey time owing to the shorter alignment length.

In an effort to avoid environmental effects in diverse, urban communities, as described above, SR14 Refined would tunnel underneath portions of the National Monument and the ANF. However, SR14 Refined would avoid contact entirely with the Magic Mountain Wilderness Area.

As shown in Table 2.3-1, non-tunnel portions of SR14 Refined would cross 7.0 acres of the ANF, while the 12.7 mile tunnel would be underneath 134.3 acres of the Angeles National Forest. See Section 3 for a comparison of SR14 Refined with East Corridor alignments. SR14-1 and SR14-2 also enter the boundaries of the ANF in a tunnel that crosses 0.7 acres of the ANF. While SR14 Refined has increased the amount of alignment within the ANF boundaries relative to SR14-1 and SR14-2, the alignment has been designed to have the least amount of travel through USFS boundaries, including minimal interface with the National Monument and no contact with the Magic Mountain Wilderness Area, while maintaining a shorter alignment length.

Portions of the ANF include areas that have been developed with various uses, including roads, residences, electrical transmission lines, and mining. Specifically, the Lang Station mining operation is within the boundaries of the ANF, near where SR14 Refined would transition into a tunnel underneath the ANF. The extent of any soil or groundwater contamination in this area would be fully examined during the environmental review process. If the SR14 Refined alignment is selected for construction, it would present the opportunity to remediate any potential hazardous contamination that may exist in the area and engage in habitat restoration at the Lang Station mining operation. Because SR14-1 and SR14-2 would not encounter the Lang Station mining operation, SR14 Refined presents a unique opportunity to restore the mine.

As mentioned above and shown on Figure 2.3-2, SR14 Refined diverges from SR14-1 and SR14-2 just north of Soledad Canyon Road and has a shorter crossing over the Santa Clara River. This refined river crossing avoids placing infrastructure, such as supports for elevated tracks, in the Santa Clara River as much as possible. Table 2.3-1 demonstrates that this refinement results in fewer issues related to floodplains, perennial streams, and wetlands. Additionally, the amount of critical habitat for Arroyo Toad

disturbed by SR14 Refined is greatly reduced as compared to SR14-1 and SR14-2, and critical habitat for the Coastal California Gnatcatcher is avoided entirely.

For all of the design reasons articulated above, and shown in Table 2.3-1, SR14 Refined would result in fewer issues related to health and safety risks. In addition to avoiding all oil and gas wells, SR14 Refined would also avoid all naturally occurring oil wells. This would be a substantial reduction in oil and gas related issues compared to SR14-1 and SR14-2. Finally, while most of the surrounding region is subject to some degree of fire hazard, the California Department of Forestry and Fire Protection maps areas of significant fire hazard based on fuels, terrain, and weather. SR14 Refined would place fewer miles of non-tunnel tracks, relative to SR14-1 or SR14-2, within regions considered to be high, or very high, fire hazard severity zones.

Table 2.3-1 SR14 Corridor – Summary of Non-tunnel (Surface and Aerial) Evaluation Measurement Criteria¹

Measurement Criteria	SR 14-1	SR 14-2	SR14 Refined
Design			
Total Length (Palmdale to Burbank)	49.0 miles	49.0 miles	44.2 miles
Total Journey Time *as compared to the baseline (E1a)	+3 minutes 12 seconds	+3 minutes 18 seconds	+1 minute 3 seconds
Total Bored Tunnel Length	20.7 miles	18.9 miles	24.2 miles
Longest Bored Tunnel Length	8.9 miles	7.2 miles	9.8 miles
Overburden	Not available	Not available	2,100 feet
Constructability	<p>Metrolink realignment at Lake Palmdale and Antelope Valley Line. Would require Una Lake to be relocated.</p> <p>Tunneling under California Aqueduct.</p> <p>Low point in long tunnel.</p> <p>Long viaducts crossing the SR14 in Acton and the Santa Clara River.</p> <p>13 grade separations</p> <p>Tunnel beneath residential communities may require easements.</p> <p>Construction of trench next to airports facilities, closure of the airport perimeter road and potential loss of aircraft parking bays.</p>	<p>Similar to SR14-1.</p> <p>Additional Metrolink realignments required in Santa Clarita.</p>	<p>Metrolink realignment at Lake Palmdale and Antelope Valley Line. Would require Una Lake to be relocated.</p> <p>Tunneling under California Aqueduct.</p> <p>Tunneling under Angeles National Forest.</p> <p>Alignment avoids oil & gas risk areas in Santa Clarita.</p> <p>Shorter total length</p> <p>Shorter viaducts</p> <p>5 grade separations/tunnels beneath residential communities may require easements.</p> <p>Reduced impact on Metrolink/UP operations during construction.</p> <p>Construction of trench next to airports facilities, closure of the airport perimeter road and the potential loss of aircraft parking bays.</p> <p>Improved constructability of Santa Clara River</p>

Measurement Criteria	SR 14-1	SR 14-2	SR14 Refined
			viaduct. Improved constructability with fewer grade separations.
Disruption to Communities			
Residential Displacements (within 100 feet on either side of the centerline)	14 multi-family 119 single-family	14 multi-family 141 single-family	6 multi-family 87 single-family
Business Displacements (within 100 feet on either side of the centerline)	262 commercial parcels 258 industrial parcels	263 commercial parcels 260 industrial parcels	137 commercial parcels 173 industrial parcels
Proximity to Schools (Within 1,500 feet on either side of the centerline)	Total: 17	Total: 18	Total: 9
Noise and Vibration			
Residential Properties Within 2,500 feet from the centerline of alignment	21,717	22,232	14,328
Visual and Scenic Resources			
Visual Character/ Views and Vistas	Approximately 57% would be visible. The alignment and track type would be the same as SR14-2 except in the vicinity of the Robinson Ranch Golf Course (Golf Course). SR14-1 would be tunneled near the Golf Course and thus have less visible track than SR14-2. This portion of the alignment would be visible from SR-14 and by recreational patrons using the Golf Course. SR14-1, SR14-2, and SR 14 Refined would all have track visible from the Pacific Crest Trail. SR14-1 and SR14-2 would both be visible in San Fernando and Burbank as both alignments would travel aboveground. SR14-1 would have less potential for impacts to visual resources than SR14-2 because it would have less visible track and less visibility from Robinson Ranch Golf Club and from travelers on SR 14.	Approximately 61% would be visible. SR14-2 would have the same alignment and track type as SR14-1 except in the vicinity of the Robinson Ranch Golf Club. SR14-2 would have more track on viaduct than SR14-1 in the vicinity of the Golf Course, which would be visible to motorists along SR-14 and recreational patrons at the golf course	Approximately 45% would be visible. SR14 Refined would have a similar alignment and track type as SR14-1 and SR14-2 except in the vicinity of the Robinson Ranch Golf Course and in the approach to Burbank. SR14 Refined would have the least amount of visible track as it would enter a tunnel before reaching the Robinson Ranch Golf Course and remain in a tunnel until reaching Burbank. SR14 Refined would have the least potential for impacts to visual resources because it would have no visibility from the Golf Course, and the least visibility from travelers on SR-14 and from motorists and residents in San Fernando and Burbank.

Measurement Criteria	SR 14-1	SR 14-2	SR14 Refined
Environmental Resources			
Potential Section 4(f) Resources	<p><u>Cultural Resources:</u> 21 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer).</p> <p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale Lang Southern Pacific Station, Lang East Branch of the California Aqueduct, Palmdale vicinity Lopez Adobe, San Fernando <p><u>Parklands</u> Tunnel 84.2 acres Includes: (Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space)</p> <p>0.7 acres of Angeles National Forest</p> <p>0 acres of National Monument</p> <p>Non-tunnel 19.2 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial, Eastern Greenbelt Open Space,</p>	<p><u>Cultural Resources:</u> 21 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer).</p> <p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale Lang Southern Pacific Station, Lang East Branch of the California Aqueduct, Palmdale vicinity Lopez Adobe, San Fernando <p><u>Parklands</u> Tunnel 84.2 acres Includes: (Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space)</p> <p>0.7 acres of Angeles National Forest</p> <p>0 acres of National Monument</p> <p>Non-tunnel 20.0 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial, Eastern</p>	<p><u>Cultural Resources:</u> 20 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer).</p> <p>Only 3 of 28 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 100-foot buffer of the approximate centerline.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest <p><u>Parklands</u> Tunnel 43.3 acres Includes: (Bureau of Land Management Land, Eastern Greenbelt Open Space, Hubert H. Humphrey Memorial Park, Rio Dulce, Roger Jessup Recreation Center, Unnamed site - Mountains Recreation and Conservation Authority)</p> <p>134.3 acres of Angeles National Forest</p> <p>55.8 acres of National Monument</p> <p>Non-tunnel 16.5 acres (Includes: Eastern Greenbelt Open Space, Rio Dulce, Unnamed site - Mountains Recreation</p>

Measurement Criteria	SR 14-1	SR 14-2	SR14 Refined
	Rio Dulce, Whitney Elsmere Open Space)	Greenbelt Open Space, Lost Canyon River Trail Open Space, Rio Dulce, Whitney Elsmere Open Space)	and Conservation Authority) 11.1 acres of Angeles National Forest 11.1 acres of National Monument
Environmental Justice	<u>Minority</u> – Greater potential to encounter an EJ community of concern <u>Elderly</u> – Lesser potential to encounter an EJ community of concern <u>LEP</u> – Greater potential to encounter an EJ community of concern <u>Poverty</u> - Greater potential to encounter an EJ community of concern	<u>Minority</u> – Greater potential to encounter an EJ community of concern <u>Elderly</u> – Lesser potential to encounter an EJ community of concern <u>LEP</u> – Greater potential to encounter an EJ community of concern <u>Poverty</u> - Greater potential to encounter an EJ community of concern	<u>Minority</u> – Lesser potential to encounter an EJ community of concern <u>Elderly</u> – Lesser potential to encounter an EJ community of concern <u>LEP</u> – Greater potential to encounter an EJ community of concern <u>Poverty</u> – Greater potential to encounter an EJ community of concern
Aquatic Resources	<ul style="list-style-type: none"> Reservoirs: 0.3 acre Streams, Creeks, Canals: 7.7 miles Wetland Habitat: 34.7 acres 	<ul style="list-style-type: none"> Lakes, Ponds, Rivers: 3.5 acres Reservoirs: 0.3 acre Streams, Creeks, Canals: 8.1 miles Wetland Habitat: 34.8 acres 	<ul style="list-style-type: none"> Lakes, Ponds, Rivers: 6.9 acres Reservoirs: 0 acre Streams, Creeks, Canals: 5.1 miles Wetland Habitat: 12.1 acres
Critical Habitat	<ul style="list-style-type: none"> Arroyo Toad: 77 acres Coastal California Gnatcatcher: 21 acres 	<ul style="list-style-type: none"> Arroyo Toad: 78 acres Coastal California Gnatcatcher: 21 acres 	<ul style="list-style-type: none"> Arroyo Toad: 64 acres
Floodplains (Miles of non-tunnel alignment within 100-year flood zones)	3.56 miles	4.1 miles	2.48 miles
Perennial Streams	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 5.66 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 6.6 miles</p> <p>Perennial streams directly crossed: 0</p>	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 6.9 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 7.03 miles</p> <p>Perennial streams directly crossed: 0</p>	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 1.65 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 3.7 miles</p> <p>Perennial streams directly crossed: 0</p>
Hazardous Materials	<p>Tunnel</p> <ul style="list-style-type: none"> 4.4 miles are within formations with naturally occurring oil 0.5 miles are within 1,000 linear feet of oil and gas wells <p>Non-tunnel</p> <ul style="list-style-type: none"> 1.3 miles are within formations with 	<p>Tunnel</p> <ul style="list-style-type: none"> 4.4 miles are within formations with naturally occurring oil 0.5 miles are within 1,000 linear feet of oil and gas wells <p>Non-tunnel</p> <ul style="list-style-type: none"> 1.3 miles are within formations with 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells <p>Non-tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with

Measurement Criteria	SR 14-1	SR 14-2	SR14 Refined
	naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells	naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells	naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells
Fire Risk	• 0.04 miles are within a high fire hazard severity zone • 9.6 miles are within a very high fire hazard severity zone	• 0.04 miles are within a high fire hazard severity zone • 11.3 miles are within a very high fire hazard severity zone	• 0.02 miles are within a high fire hazard severity zone • 6.75 miles are within a very high fire hazard severity zone

¹ All potential impacts listed are for non-tunnel tracks, except where noted.

Note: These potential impacts to aquatic resources in this table assume that tunneling methods in any areas of significant groundwater, where surface aquatic resources are supported by that groundwater, will avoid material groundwater table lowering.

2.3.4 Recommendation

Based on the foregoing, as well as previous studies (the 2010 PAA, 2011 SAA, 2012 SAA, 2014 SAA, and the 2015 SAA), the recommendation is to not carry forward the SR14-1 and SR14-2 alignments and to carry the SR14 Refined alignment forward for further study. Figure 2.3-2 shows SR14 Refined.

SR14 was carefully designed to minimize surface encounters with sensitive community and environmental resources, by tunneling in a more direct route between Palmdale and Burbank. The amount of SR14 alignment (tunnel and non-tunnel) within the ANF is far smaller than the East Corridor alignments, with a smaller maximum overburden as well. Due to tunneling, visibility of SR14 from the ANF, the National Monument, and Magic Mountain Wildness Area would be very little. In coordination with the USFS, geotechnical investigations are currently being completed within the ANF. The purpose of the geotechnical investigations is to obtain subsurface field data to help evaluate the tunnel portion of alignments with respect to potential environmental impacts (i.e., groundwater, hydrogeology and surface water resources), design constraints, and construction constraints.

A comparative evaluation of all alternatives carried forward will be conducted and prepared as part of the draft environmental document that will be circulated for public review and comment.



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016

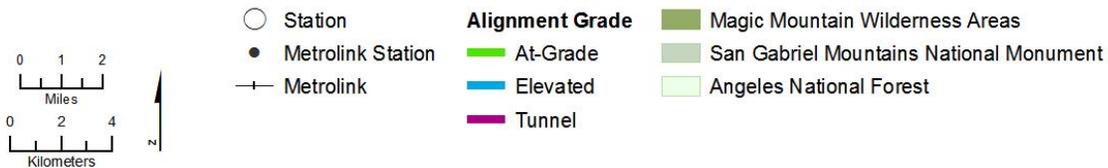


Figure 2.3-2 SR14 Refined Compared to SR14-1 and SR14-2

2.4 E1 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis

2.4.1 Overview of E1 Alignment Alternatives Carried Forward in 2015 SAA

The 2015 SAA provided narrative descriptions for several East Corridor alignments, including two E1 alignment alternatives. As part of the East Corridor study area initial design development, multiple potential alignment alternatives were identified and considered, including those suggested by the public. The Authority considered the E1 alignments based on initial engineering feasibility requirements. Via the 2015 SAA, the Authority elected to carry forward these two East Corridor alignments (E1a and E1b) as potentially shorter and more direct routes between Palmdale and Burbank relative to alignments following the SR 14. Figure 2.4-1 depicts the E1a and E1b alignments. The 2015 SAA provides detailed descriptions of each of these alignments.

As shown in Figure 2.4-1, these alignments would tunnel under the western portions of the Angeles National Forest (ANF) and portions of the San Gabriel Mountains National Monument (National Monument). The E1a and E1b alignments would be the same from Palmdale, past Lake Palmdale, and over the California Aqueduct. Starting at the California Aqueduct, the E1a and E1b alignments would diverge around Vincent Substation, but rejoin at Aliso Canyon Road. E1a would run to the west of Vincent Substation; E1b would run to the east. The excerpts below from the 2015 SAA highlight the key differences between E1a and E1b between the California Aqueduct and Aliso Canyon Road.

E1a and E1b – California Aqueduct to Aliso Canyon Road

South of the California Aqueduct, E1a would continue south and cross under the interchange between Sierra Highway and SR 14, approximately 330 feet east of SR 14. Approximately 250 feet south of the intersection of Sierra Highway and Angeles Forest Highway, E1a would cross under the Metrolink Antelope Valley line. E1a would continue south, between West Carson Mesa Road and Angeles Forest Highway, crossing under Vincent View Road to the east of the Vincent Grade/Acton Metrolink Station. The alternative would run to the west of the Vincent Substation (an electrical substation operated by Southern California Edison) and cross under Foreston Drive.

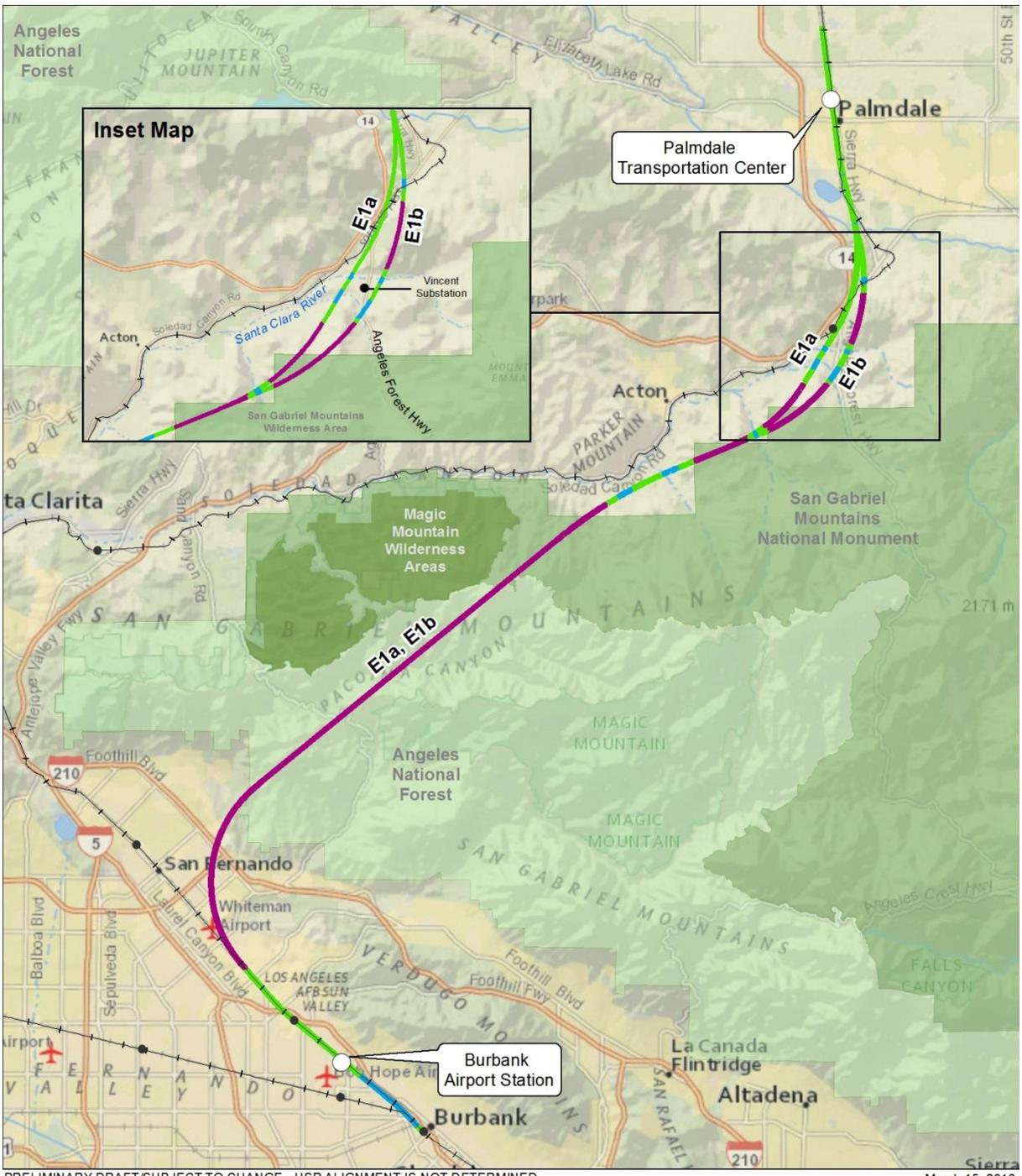
South of the Vincent Substation, E1a would enter an approximately 1.9 mile tunnel, then resume an at-grade approximately 0.4 miles east of Aliso Canyon Road, on the east side of a tributary to the Santa Clara River. E1a would stay above ground for about 0.5 miles, crossing the Santa Clara River tributary and Aliso Canyon Road. After crossing Aliso Canyon Road, E1a and E1b would rejoin and enter a 1.6 mile tunnel that would travel beneath the ANF.

South of the California Aqueduct, E1b would also cross Sierra Highway and the Metrolink Antelope Valley line, but would run approximately 0.35 mile east of SR 14. South of East Carson Mesa Road, E1b would enter an approximately 1.4-mile tunnel, then a section of at-grade and elevated structures east of the Vincent Substation.

South of Vincent Substation, E1b would cross over Angeles Forest Highway and enter an approximately 2.1-mile tunnel bearing southwest, exiting on the east side of the Santa Clara River. E1b would then be at-grade or on elevated structures for approximately 0.5 mile, crossing the Santa Clara River and Aliso Canyon Road. After crossing Aliso Canyon Road, E1b would rejoin E1a and enter a 1.6-mile tunnel that would travel beneath the ANF.

E1a and E1b – Aliso Canyon Road to Burbank

After crossing Aliso Canyon Road, E1a and E1b would follow the same vertical and horizontal profiles to the Burbank HSR station and Alameda Street (terminus of the Palmdale to Burbank section). Each would travel southwesterly in a tunnel beneath the ANF, Pacoima and Lopez Canyons, the I-210 freeway, and the Antelope Valley Metrolink alignment paralleling San Fernando Road. The E1a and E1b joint alignment would rise to surface level in the Sun Valley Area near the Hansen Dam Spreading Grounds and then continue within the Metrolink right-of-way to the proposed Burbank HSR station along San Fernando Road (just outside Burbank city limits). E1a and E1b would continue above-ground or elevated structures to connect with the Burbank to Los Angeles section.



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 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

March 15, 2016

Figure 2.4-1 E1 Alignment Alternatives Carried Forward in 2015 SAA

2.4.1.1 Key Design and Environmental Issues Identified in 2015 SAA

The 2015 SAA included a table (Table 3.1-1) summarizing design and environmental factors used in the evaluation of alignments and station areas. Appendix A, Table 1 of the 2015 SAA provides detailed design and environmental information. Via the 2015 SAA, the Authority opted to carry forward both E1a and E1b, noting that both alternatives had relatively low potential for impacts to aquatic resources, critical habitat, and special-status wildlife.

2.4.2 Refinement since the 2015 SAA

Following the 2015 SAA, the Authority began to look for opportunities to improve the E1 alignments. The Authority initially focused on reducing environmental impacts while improving operational capability and travel time, including reconsiderations of track curvature, maximum depth of tunneling, and the associated overlying weight load of earth material (maximum overburden). In particular, E1a and E1b would be at substantial depths below ground surface; tunnels would thus potentially be exposed to high levels of groundwater pressure, affecting overall constructability. Such hydrogeological and geotechnical conditions could affect tunnel design. Accordingly, the Authority prepared a Geophysical/Geotechnical Investigation Plan for Tunnel Feasibility Exploration (GI Plan), which describes geophysical exploration and testing within portions of the ANF and the National Monument. In early 2016, the Authority commenced initial surveying efforts and will analyze samples from core holes to measure in-situ groundwater pressures, the orientations of rock mass discontinuities and fracture density, hydraulic conductivity, and direction of water flow. Ongoing analysis through 2016 will identify potential hydrologic effects and provide the Authority with further information regarding potential constraints.

2.4.3 Refined Alternative: E1 Refined

The Authority initiated the refinement process that led to the introduction of a refined alignment, E1 Refined. Figure 2.4-2 shows E1 Refined in comparison to E1a and E1b. E1 Refined would be similar to E1a and E1b from the Palmdale HSR station to the Vincent Substation area. From the Vincent Substation area, E1 Refined would follow generally the same vertical and horizontal profile as E1a. However, approaching Aliso Canyon and the Santa Clara River tributary, E1 Refined would diverge from E1a. After crossing the Santa Clara River tributary and Aliso Canyon Road on elevated structures, E1 Refined would enter a short tunnel, reemerging in Arrastre Canyon, and then enter a 16.8 mile tunnel (the longest within this alignment) initially bearing southwest, continuing beneath the ANF as well as beneath the National Monument. Near the mouth of Pacoima Canyon, the tunnel would turn to the south, passing to the west of the Kagel Canyon area, then beneath the I-210 freeway near the interchange with SR-118. E1 Refined would eventually join/travel beneath the Antelope Valley Metrolink right-of-way, and then cross beneath the I-5 freeway. E1 Refined would surface near Branford Street to an at-grade profile within the existing Antelope Valley Metrolink right-of-way, joining the E1a and E1b alignments. E1 Refined would travel along the existing Metrolink rail corridor adjacent to San Fernando Road, through adjacent industrial and commercial areas until reaching the proposed Burbank HSR station just outside the Burbank city limits.

Appendix A provides a detailed evaluation comparing the E1a, E1b, and E1 Refined alignments across all evaluation measures identified in Table 2.4-1. Table 2.4-1 below displays a subset of information in Appendix A, focusing on the criteria most relevant in differentiating between alternatives. For most measurement criteria in Appendix A, tunnel profiles, as compared to non-tunnel profiles, are anticipated to have few or no surface level effects due to tunnel depths (ranging well over 1000 feet in several locations). Such tunnels would be constructed via boring; the depth below surface would avoid or minimize various potential impacts of rail construction and operation, such as noise, vibration. Forthcoming environmental documentation, supported by ongoing geotechnical investigations, will help the Authority ascertain if any such surface level effects may occur. E1 Refined would be 42.2 miles in total length, with a total of 23.1 miles of tunnels. E1 Refined would be about 1 mile longer than E1a or E1b. However, near the Arrastre Canyon area, E1 Refined would have an additional four to six miles within tunnels relative to E1a and E1b. The additional tunneling length for E1 Refined would reduce the amount of at-grade or elevated alignment overall, but would not have at-grade elevations within ANF or

the National Monument. E1 Refined would then continue via tunnel beneath the ANF and National Monument, thereby reducing associated potential surface effects.

E1 Refined offers some potential environmental improvements in comparison to E1a and E1b, but the environmental resource data outlined in Table 2.4-1 is mostly comparable for E1a, E1b, and E1 Refined. The E1 Refined would avoid potential impacts to critical biological habitat of the Arroyo Toad in comparison to the E1a and E1b alignments. The number of miles of elevated and at-grade alignment within a floodplain or within 1 mile of perennial streams or springs would be reduced. E1 Refined would have less area within a fire hazard area in comparison to E1a and E1b alternatives. Additionally, portions of the E1 Refined within tunnels would cross fewer faults than E1a and E1b. Portions of the E1 Refined not within tunnels that are at-grade or elevated would have similar fault crossings, but would cross fewer landslide hazard and liquefaction zones

The Authority developed the E1 Refined alternative mostly with effort to optimize the alignment design constraints discussed above with regard to constructability. The optimized design of E1 Refined would reduce overburden by approximately 700 feet as E1a and E1b would have an overburden of approximately 2,748 feet; E1 Refined would be shallower at 2,062 feet. This reduction of overburden would reduce the grade in the tunnel by reducing the depth that the E1 Refined alignment would need to decline and incline.

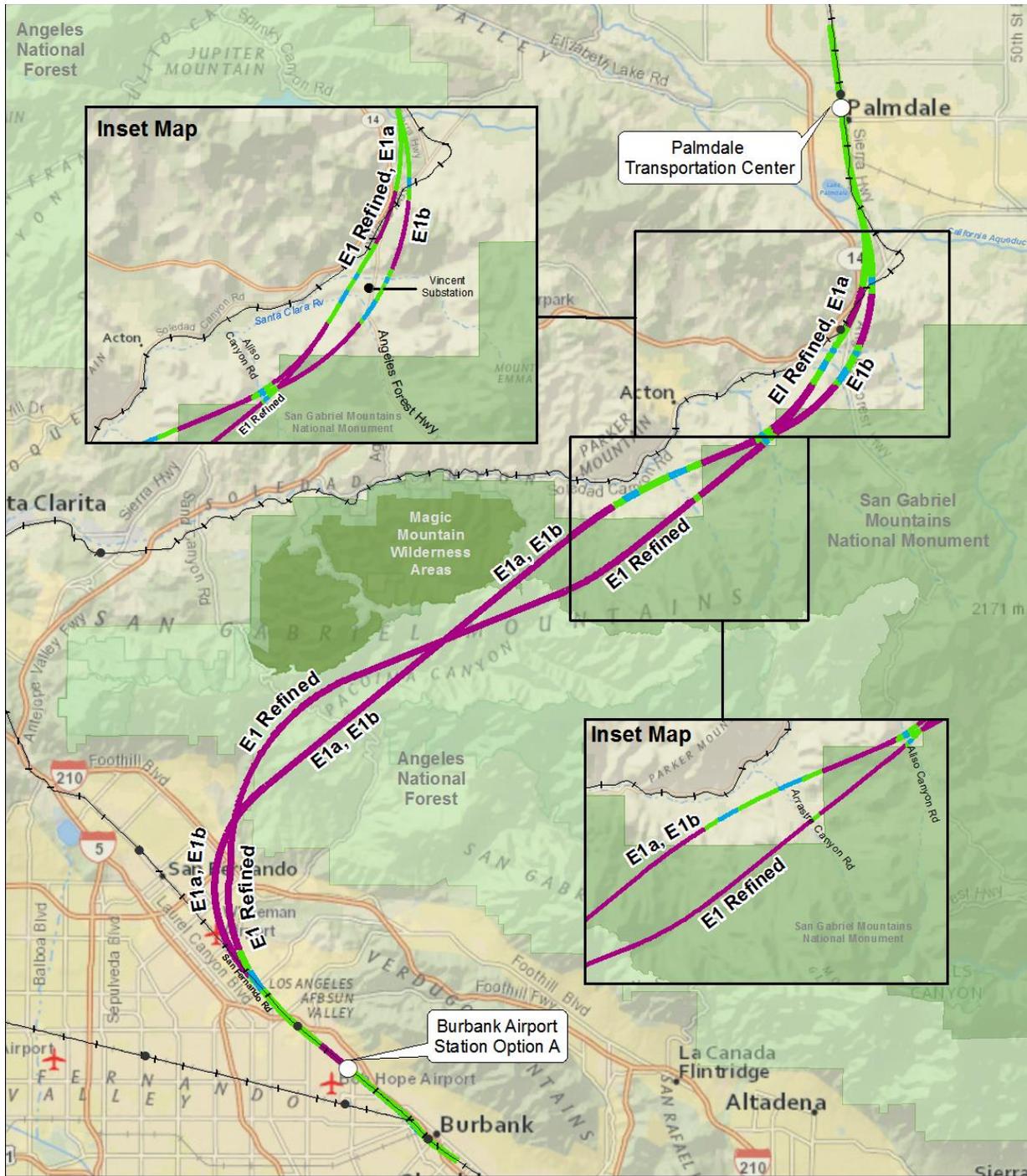
Table 2.4-1 E1 Alignment Alternatives – Summary of Selected Evaluation Measurement Criteria – Non-tunnel (Surface and Aerial)

Measurement Criteria	E1a	E1b	E1 Refined
Design			
Total Travel Time (Palmdale to Burbank)	Baseline = 0 seconds	+ 6 seconds	+18 seconds
Total Length (Palmdale to Burbank)	41.2 miles	41.6 miles	42.2 miles
Total Bored Tunnel Length	20.2 miles	22.0 miles	23.1 miles
Longest Bored Tunnel Length	13.8 miles	13.8 miles	16.8 miles
Overburden	2,748 feet	Comparable to E1a	2,062 feet
Environmental Resources			
Critical Habitat	Arroyo Toad: 7 acres	Arroyo Toad: 7 acres	No Critical Habitat
Potential Section 4(f) Resources	<u>Cultural Resources:</u> 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.	<u>Cultural Resources:</u> 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the	<u>Cultural Resources:</u> 12 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer). Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot

Measurement Criteria	E1a	E1b	E1 Refined
	<p>1. Palmdale Ditch, Palmdale</p> <p>2. East Branch of the California Aqueduct, Palmdale vicinity</p> <p>3. Angeles National Forest</p> <p>Parklands</p> <p>Tunnel</p> <p>10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon)</p> <p>303.9 acres of Angeles National Forest</p> <p>119.2 acres of National Monument</p> <p>Non-tunnel</p> <p>9.1 acres of Bureau of Land Management Land</p>	<p>alternative alignment.</p> <p>1. Palmdale Ditch, Palmdale</p> <p>2. East Branch of the California Aqueduct, Palmdale vicinity</p> <p>3. Angeles National Forest</p> <p>Parklands</p> <p>Tunnel</p> <p>10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon)</p> <p>315.7 acres of Angeles National Forest</p> <p>131.3 acres of National Monument</p> <p>Non-tunnel</p> <p>9.1 acres of Bureau of Land Management Land</p>	<p>buffer of the approximate centerline.</p> <p>1. Palmdale Ditch, Palmdale</p> <p>2. East Branch of the California Aqueduct, Palmdale vicinity</p> <p>3. Angeles National Forest</p> <p>Parklands</p> <p>Tunnel</p> <p>3.1 acres (Includes: Hubert H. Humphrey Memorial Park, Roger Jessup Recreation Center)</p> <p>365.9 acres of Angeles National Forest</p> <p>157.6 acres of National Monument</p> <p>Non-tunnel</p> <p>No impacts to parklands</p>
Geological and Soil Constraints	<p>0.96 miles are within 150 feet of CGS landslide hazard zones</p> <p>0.95 miles are within a liquefaction zone</p> <p>1.59 miles are within 0.5 miles of a Methane Producing Landfill</p> <p>4 faults cross the alignment</p> <p>0.52 miles are within Alquist-Priolo Fault Zones</p> <p>7.46 miles are within inundation zones</p>	<p>0.97 miles are within 150 feet of CGS landslide hazard zones</p> <p>0.82 miles are within a liquefaction zone</p> <p>1.59 miles are within 0.5 miles of a Methane Producing Landfill</p> <p>4 faults cross the alignment</p> <p>0.52 miles are within Alquist-Priolo Fault Zones</p> <p>7.47 miles are within inundation zones</p>	<p>0.42 miles are within 150 feet of CGS landslide hazard zones</p> <p>0.67 miles are within a liquefaction zone</p> <p>0 miles are within 0.5 miles of a Methane Producing Landfill</p> <p>4 faults cross the alignment</p> <p>0.52 miles are within Alquist-Priolo Fault Zones</p> <p>5.3 miles are within inundation zones</p>
Floodplains (Miles of non-tunnel alignment within 100-year flood zones)	2.74 miles	2.6 miles	2.44 miles
Perennial Streams, Springs, and Groundwater wells	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 2.93 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 4.1 miles</p>	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 2.43 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.74 miles</p>	<p>Miles of non-tunnel alignment within 1 mile of perennial streams: 1.01 miles</p> <p>Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.56 miles</p>

Measurement Criteria	E1a	E1b	E1 Refined
	Miles of non-tunnel alignment within 1 mile of springs: 2.93 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 4.41 miles Miles of non-tunnel alignment within 1 mile of active groundwater wells: 5.6 miles	Miles of non-tunnel alignment within 1 mile of springs: 2.03 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 3.71 miles Miles of non-tunnel alignment within 1 mile of active groundwater wells: 5.61 miles	Miles of non-tunnel alignment within 1 mile of springs: 1.99 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 3.47 miles Miles of non-tunnel alignment within 1 mile of active groundwater wells: 4.06 miles
Hazardous Materials	7.08 miles are within 50 linear feet of rail alignments Crosses 5 contaminated sites	7.0 miles are within 50 linear feet of rail alignments Crosses 4 contaminated sites	5.43 miles are within 50 linear feet of rail alignments Crosses 5 contaminated sites
Fire Risk	0.29 miles are within a high fire hazard severity zone 8.1 miles are within a very high fire hazard severity zone	0.36 miles are within a high fire hazard severity zone 6.61 miles are within a very high fire hazard severity zone	0.29 miles are within a high fire hazard severity zone 6.45 miles are within a very high fire hazard severity zone

¹ All potential impacts listed are for non-tunnel tracks, except where noted



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 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016

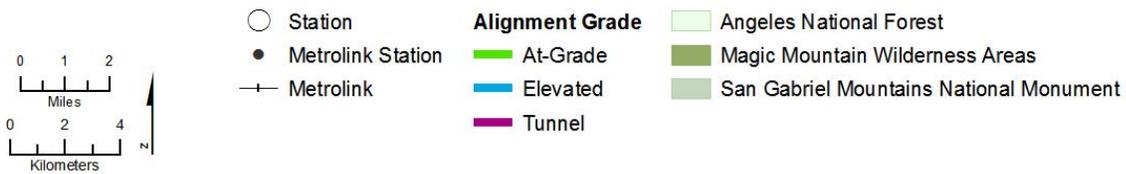


Figure 2.4-2 E1 Refined Compared to E1a and E1b

2.4.4 Recommendation

Based on the foregoing, as well as previous studies (the 2010 PAA, 2011 SAA, 2012 SAA, 2014 SAA, and 2015 SAA), the recommendation is to change the E1 corridor alignments to the E1 Refined alternative and only carry E1 Refined alignment forward. Figure 2.4-2 shows E1 Refined.

E1 Refined was carefully designed to improve design and constructability by reducing the grade in the tunnel, and reducing the extent of overburden. Overall travel time would be reduced under E1 Refined owing to the reduced track curvature (which would allow for higher travel speeds). The additional tunneling length for E1 Refined would reduce the amount of at-grade or elevated alignment overall, but would require some at-grade alignment within a portion of the National Monument.

E1 Refined would then continue via tunnel beneath the ANF and National Monument, thereby reducing associated potential surface effects. E1a and E1b would have mostly at-grade or elevated alignment near the Arrastre Canyon area, but would not have at-grade elevations within the National Monument. E1 Refined offers some potential environmental improvements in comparison to E1a and E1b, but would be mostly comparable to E1a, E1b. Coordination with the USFS, geotechnical investigations are currently being completed within the ANF. The purpose of the geotechnical investigations is to obtain subsurface field data to help evaluate the tunnel portion of alignments with respect to potential environmental impacts (i.e., groundwater, hydrogeology and surface water resources), design constraints, and construction constraints.

A comparative evaluation of alternatives carried forward will be conducted and prepared as part of the draft environmental document that will be circulated for public review and comment.

2.5 E2 Alignment Alternatives: Refinements since the 2015 Supplemental Alternatives Analysis

2.5.1 Overview of E2 Alignment Alternatives Carried Forward in 2015 SAA

The 2015 SAA provided narrative descriptions for several East Corridor alignments, including two E2 alignment alternatives. As part of the East Corridor study area initial design development, multiple potential alignment alternatives were identified and considered, including those suggested by the public. The Authority considered the E2 alignments based on initial engineering feasibility requirements. Via the 2015 SAA, the Authority elected to carry forward the two E2 alignment alternatives (E2a and E2b) to consider a shorter and more direct alignment in comparison to the SR 14 alignment alternatives. Figure 2.5-1 depicts the E2a and E2b alignments. The 2015 SAA provides detailed descriptions of each of these alignments.

As shown in Figure 2.5-1, the E2 alignments would tunnel under the ANF and the National Monument. The E2a and E2b alignments are the same as the E1 alignments from Palmdale, past Lake Palmdale, and over the California Aqueduct. Starting at the California Aqueduct, the E2a and E2b alignments would diverge around the Vincent Substation, and rejoin at Aliso Canyon Road. E2a would run to the west of the Vincent Substation; E2b would run to the east. The excerpts below from the 2015 SAA highlight the key differences between E2a and E2b between the California Aqueduct and Aliso Canyon Road.

E2a and E2b – California Aqueduct to Aliso Canyon Road

South of the California Aqueduct, E2a would continue south and would cross the interchange between Sierra Highway and SR14, approximately 300 feet east of SR14. Approximately 250 feet south of the intersection of Sierra Highway and Angeles Forest Highway, E2a would cross the Metrolink Antelope Valley line. E2a would continue south running between West Carson Mesa Road and Angeles Forest Highway, crossing Vincent View Road to the east of the Vincent Grade/Acton Metrolink Station. E2a would run to the west of the Vincent Substation.

South of Vincent Substation, E2a would enter an approximately 1.5 mile tunnel, then resume an at-grade approximately 0.4 miles east of Aliso Canyon Road on the east side of a tributary to the Santa Clara River. E2a would continue above ground for about 0.5 miles, crossing over the tributary and Aliso Canyon Road. After crossing Aliso Canyon Road, E2a and E2b would rejoin and enter a 1.6 mile tunnel that would travel beneath the Angeles National Forest.

South of California Aqueduct, E2b would cross Pearblossom Highway and the Metrolink Antelope Valley line near Pearblossom Highway's intersection with SR14. South of East Carson Mesa Road, E2b would enter an approximate 1.2 mile tunnel, then a section of at-grade and elevated structures east of the Vincent Substation.

South of Vincent Substation, E2b would cross Angeles Forest Highway and enter an approximate 1.8 mile tunnel bearing southwest, exiting on the east side of the Santa Clara River. E2b would then be at-grade or on elevated structures for approximately 0.5 mile, crossing the Santa Clara River tributary and Aliso Canyon Road. After crossing Aliso Canyon Road, E2b would rejoin E2a and enter a 1.6-mile tunnel that would travel beneath the Angeles National Forest.

E2a and E2b – Aliso Canyon Road to Burbank

After crossing Aliso Canyon Road, E2a and E2b would follow the same vertical and horizontal profiles to the Burbank HSR Station. E2a and E2b would surface and travel at-grade or on short elevated structures through the Arrastre Canyon area and then enter a 14.3 mile long tunnel bearing southwest under the Angeles National Forest. The tunnel's south portal would be outside the National Forest boundary in the Lake View Terrace residential neighborhood (Los Angeles) along Dominica Avenue. Through the Lake View Terrace neighborhood, E2a and E2b would be at-grade and on structures in-between Wheatland and Dominica Avenues. E2a and E2b would then transition to an elevated structure, crossing over Foothill Boulevard, the I-210 freeway, and Big Tujunga Wash Mitigation Area. The Los Angeles County Flood Control District owns the Big Tujunga Wash Mitigation Area; the area provides suitable habitat for a number of threatened or endangered species. South of Big Tujunga Wash, E2a and E2b would be located within a 4-mile tunnel beneath the Shadow Hills neighborhood (City of Los Angeles). Turning more sharply south, E2a and E2b would then be in a shallow tunnel beneath existing industrial and commercial areas, eventually crossing beneath the Metrolink Antelope Valley alignment and into an underground Burbank HSR station south of San Fernando Road. South of the station, E2a and E2b would cross under North Hollywood Way, emerging at-grade along the Metrolink Ventura County line just west of Burbank Junction.



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 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

March 16, 2016

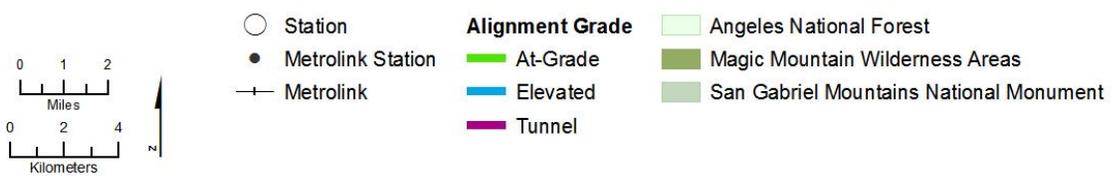


Figure 2.5-1 E2 Alignment Alternatives Carried Forward in 2015 SAA

2.5.1.1 Key Design and Environmental Issues Identified in 2015 SAA

The 2015 SAA included a table (Table 3.1-1) summarizing design and environmental factors used in the evaluation of alignments and station areas. Appendix A, Table 1 of the 2015 SAA provides detailed design and environmental information. The Authority carried forward both E2a and E2b. Table 3.1-1 showed that E2a was carried forward, noting it had a relatively low potential for impacts to aquatic resources, schools, and noise sensitive receptors. Similarly, E2b was carried forward, because it had relatively low potential for impacts to schools and noise sensitive receptors.

2.5.2 Refinement since the 2015 SAA

Following the 2015 SAA, the Authority began to look for opportunities to improve the E2 alignments. The Authority initially focused on reducing environmental impacts while improving operational capability and travel time, including reconsiderations of track curvature to result in shorter total length. E2a and E2b would also be at substantial depths below ground surface; tunnels would thus potentially be exposed to high levels of groundwater pressure, affecting overall constructability. As described above regarding the E1 alignments, such hydrogeological and geotechnical conditions could affect tunnel design. Accordingly, the Authority prepared a Geophysical/Geotechnical Investigation Plan for Tunnel Feasibility Exploration (GI Plan), which describes geophysical exploration and testing within portions of the ANF and the National Monument. In early 2016, the Authority commenced initial surveying efforts and will analyze samples from core holes to measure in-situ groundwater pressures, the orientations of rock mass discontinuities and fracture density, hydraulic conductivity, and direction of water flow. Ongoing analysis through 2016 will identify potential hydrologic effects and provide the Authority with further information regarding potential constraints. Additionally, the Authority sought to reduce or avoid impacts to the Bootlegger Canyon Road residential community of Acton, the Big Tujunga Wash Mitigation Area, and refine alignment to reduce impacts in residential areas including the Lake View Terrace residential neighborhood.

2.5.3 Refined Alternative: E2 Refined

The Authority initiated the refinement process that led to the introduction of a refined alignment, E2 Refined. Figure 2.5-2 shows E2 Refined in comparison to E2a and E2b. E2 Refined would be similar to E2a and E2b from Avenue O in Palmdale to the Vincent Substation area. From the Vincent Substation area, E2 Refined would follow generally the same vertical and horizontal profile as E2a. However, approaching Aliso Canyon and the Santa Clara River, E2 Refined would diverge from E2a. After crossing the Santa Clara River and Aliso Canyon Road on elevated structures, E2 Refined would enter a short tunnel, reemerging in Arrastre Canyon, and then enter a 14.3 mile tunnel that would travel in the southwesterly direction, continuing beneath the ANF as well as beneath the National Monument, before turning more to the south beneath Kagel Canyon. The tunnel would reemerge in the Lake View Terrace residential neighborhood, northerly of the E2a/E2b alignment, on an elevated structure that would cross Foothill Boulevard, the I-210 freeway, and Big Tujunga Wash Mitigation Area.

South of Big Tujunga Wash Mitigation Area, E2 Refined would enter a tunnel under the Shadow Hills neighborhood of the City of Los Angeles, a semi-rural residential area located adjacent to the Verdugo Mountains. There are two station options in Burbank (see Section 2.7 for descriptions). E2 Refined would remain underground after crossing the Big Tujunga Wash, and enter Station Option B underground.

Appendix A provides a detailed evaluation comparing the E2a, E2b, and E2 Refined alignments across all evaluation measures identified in Table 2.5-1. Table 2.5-1 below displays a subset of information in Appendix A, focusing on the criteria most relevant in differentiating between alternatives. For most measurement criteria in Appendix A, tunnel profiles, as compared to non-tunnel profiles, are anticipated to have few or no surface level effects due to tunnel depths (ranging well over 1000 feet in several locations). Such tunnels would be constructed via boring; the depth below surface would avoid or minimize various potential impacts of rail construction and operation, such as noise, vibration. Forthcoming environmental documentation, supported by in-progress (as of April 2016) geotechnical investigations, will help the Authority ascertain if any such surface level effects could possibly occur.

E2 Refined would be 38.8 miles in total length, with a total of 24.3 miles of tunnels at a similar depth as E2a and E2b. The longest bored tunnel length would be 14.3 miles. When compared to E2a and E2b, E2 Refined would have a similar overall length. However, E2 Refined would have an additional two miles within tunnels when compared to E2a and E2b near Arrastre Canyon. The additional tunneling length for E2 Refined would reduce the amount of at-grade or elevated alignment overall, but would not have at-grade elevations within ANF or the National Monument. E2 Refined would then continue via tunnel beneath the ANF and National Monument, thereby reducing associated potential surface effects.

E2 Refined offers some potential environmental improvements in comparison to E2a and E2b, but the environmental resource data outlined in Table 2.5-1 is mostly comparable for E2a, E2b, and E2 Refined. E2 Refined would have reduced potential impacts to critical biological habitat, wetlands, streams, creeks, and canals in comparison to E2a and E2b, likely owing to the increase amount of the alignment within a tunnel. Additionally, E2 Refined would be less visible than E2a and E2b as more of the alignment would be located within a tunnel. E2 Refined would have less area within a designated fire hazard area relative to E2a and E2b alternatives. Portions of the E2 Refined not within tunnels that are at-grade or elevated would have similar fault crossings, but would cross fewer landslide hazard and liquefaction zones.

While E2 Refined would still cross over the Big Tujunga Wash, the Authority developed E2 Refined to optimize design to avoid crossing over a designated mitigation area within the Wash that is owned by Los Angeles County Flood Control District. E2 Refined would have more potential business displacements than E2a and E2b; potential residential displacements would be less than E2a and E2b.

Overall, the design of E2 Refined would remain generally similar to E2a and E2b with regard to constructability, overburden, and total length.

Table 2.5-1 E2 Alignment Alternatives – Selected Evaluation Measurement Criteria – Non Tunnel (Surface and Aerial).

Measurement Criteria	E2a	E2b	E2 Refined
Design			
Total Bored Tunnel Length	19.5 miles	21.3 miles	24.3 miles
Longest Bored Tunnel Length	12.3 miles	12.3 miles	14.3 miles
Journey Time (Palmdale to Burbank) *as compared to the baseline (E1a)	+ 6 seconds	+12 seconds	+17 seconds
Environmental Resources			
Lakes, Ponds, Rivers, Reservoirs, Wetland Habitat (acres)	Lakes, Ponds, Rivers: 3.5 acres Reservoirs: 0 acres Wetland Habitat: 28.5 acres	Lakes, Ponds, Rivers: 3.5 acres Reservoirs: 0 acres Wetland Habitat: 28.2 acres	Lakes, Ponds, Rivers: 3.2 acres Reservoirs: 0 acres Wetland Habitat: 26.7 acres
Streams, Creeks, Canals (miles)	Streams, Creeks, Canals: 6.8 miles	Streams, Creeks, Canals: 6.8 miles	Streams, Creeks, Canals: 5.4 miles

Measurement Criteria	E2a	E2b	E2 Refined
Critical Habitat (acres)	Arroyo Toad: 16 Santa Ana Sucker: 75 Southern Willow Flycatcher: 82	Arroyo Toad: 16 Santa Ana Sucker: 75 Southern Willow Flycatcher: 82	Arroyo Toad: 0 Santa Ana Sucker: 80 Southern Willow Flycatcher: 84
Potential Section 4(f) Resources	<p><u>Cultural Resources:</u> 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest <p>Parklands Tunnel 0.3 acres of Robert E. Gross Park 320.2 acres of Angeles National Forest 105.8 acres of National Monument</p> <p>Non-tunnel 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land)</p>	<p><u>Cultural Resources:</u> 10 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest <p>Parklands Tunnel 0.3 acres of Robert E. Gross Park 332.0 acres of Angeles National Forest 118.8 acres of National Monument</p> <p>Non-tunnel 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land)</p>	<p><u>Cultural Resources:</u> 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest <p>Parklands Tunnel 363.9 acres of Angeles National Forest 162.7 acres of National Monument</p> <p>Non-tunnel 11.1 acres of Hansen Dam Open Space</p>
Residential Displacements (within 100 feet on either side of the centerline)	13 multi-family 122 single-family	12 multi-family 119 single-family	8 multi-family 92 single-family
Business Displacements (within 100 feet on either side of the centerline)	96 commercial parcels 105 industrial parcels	96 commercial parcels 104 industrial parcels	118 commercial parcels 170 industrial parcels

Measurement Criteria	E2a	E2b	E2 Refined
Visual Character/ Views and Vistas	Approximately 48% would be visible, which is the most of any of the East Corridor Alternatives. E2a would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale. The E2a alignment would be more visible than E2b in vicinity of the Vincent Substation and Metrolink Station in Unincorporated Los Angeles County, which would be visible to motorists on SR-14 and the Sierra Highway, as well as to rural residents in the area. E2a and E2b would be at-grade near Arrastre Canyon and thus be visible to motorists traveling Soledad Canyon Road and Arrastre Canyon Road, as well as to visitors at the Soledad Canyon RV and Camping Resort. E2a and E2b would also be visible to residences of Lake View Terrace and have potential to be visible to residences and recreators at Hansen Dam Recreation Center and Orcas Park.	Approximately 44% would be visible. E2b would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale. E2b would have a similar track type and alignment centerline configuration as E2a, though a greater proportion of E2b would not be tunneled, particularly near the Vincent Substation and Metrolink Station. Therefore, E2b has slightly less potential to impact visual resources and contrast with visual character than E2a.	Approximately 37% would be visible. E2 Refined would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale. E2 Refined would have the same alignment and track type as E2a near the Vincent Substation and Metrolink Station, and thus would be more visible to motorists on SR-14 and the Sierra Highway, as well as to rural residents in the area than E2b. E2 Refined would be tunneled until Lake View Terrace area, and would have a similar alignment and track type to E2a and E2b in this area. E2 Refined has the least potential to impact visual resources.
Geological and Soil Constraints	0.96 miles are within 150 feet of CGS landslide hazard zones 0.97 miles are within a liquefaction zone 0 miles are within 0.5 miles of a Methane Producing Landfill 4 faults cross the alignment 0.7 miles are within Alquist-Priolo Fault Zones 3.1 miles are within inundation zones	0.96 miles are within 150 feet of CGS landslide hazard zones 0.84 miles are within a liquefaction zone 0 miles are within 0.5 miles of a Methane Producing Landfill 4 faults cross the alignment 2.32 miles are within Alquist-Priolo Fault Zones 3.1 miles are within inundation zones	0.42 miles are within 150 feet of CGS landslide hazard zones 0.68 miles are within a liquefaction zone 0 miles are within 0.5 miles of a Methane Producing Landfill 5 faults cross the alignment 0.74 miles are within Alquist-Priolo Fault Zones 5.26 miles are within inundation zones
Perennial Streams	Miles of non-tunnel alignment within 1 mile of	Miles of non-tunnel alignment within 1 mile of	Miles of non-tunnel alignment within 1 mile of

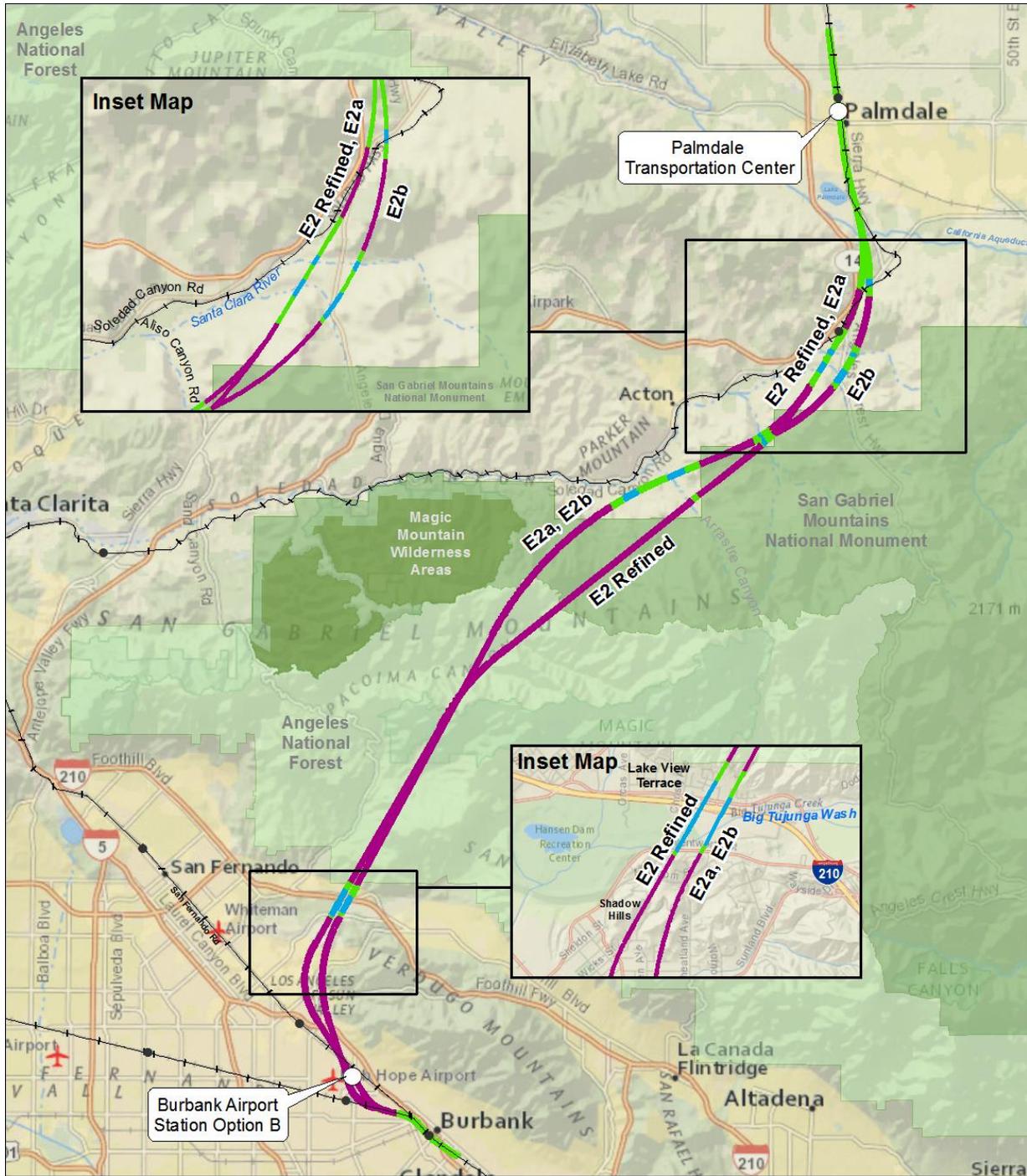
Measurement Criteria	E2a	E2b	E2 Refined
	perennial streams: 3.38 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.05 miles	perennial streams: 3.38 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.17 miles	perennial streams: 2.09 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.69 miles
Hazardous Materials	2.0 miles are within 50 linear feet of rail alignments Crosses 4 contaminated sites	1.91 miles are within 50 linear feet of rail alignments Crosses 4 contaminated sites	0.07 miles are within 50 linear feet of rail alignments Crosses 4 contaminated sites
Fire Risk	0.29 miles are within a high fire hazard severity zone 9.05 miles are within a very high fire hazard severity zone	0.36 miles are within a high fire hazard severity zone 7.56 miles are within a very high fire hazard severity zone	0.29 miles are within a high fire hazard severity zone 6.41 miles are within a very high fire hazard severity zone

2.5.4 Recommendation

Based on the foregoing, as well as previous studies (the 2010 PAA, 2011 SAA, 2012 SAA, 2014 SAA, and 2015 SAA), the recommendation is to change the E2 corridor alignments to the E2 Refined alignment and carry forward E2 Refined. Figure 2.5-2 shows E2 Refined.

E2 Refined was carefully designed to improve reduce potential surface impacts by increasing tunnel length and avoid the mitigation area within the Big Tujunga Wash. E2 Refined offers some potential environmental improvements in comparison to E2a and E2b, but would be mostly comparable to E2a, E2b. Coordination with the USFS, and geotechnical investigations are currently being completed within the ANF. The purpose of the geotechnical investigations is to obtain subsurface field data to help evaluate the tunnel portion of alignments with respect to potential environmental impacts (i.e., groundwater, hydrogeology, and surface water resources), design constraints, and construction constraints. Overall, the design of E2 Refined would remain generally similar to E2a and E2b with regard to constructability, overburden, and total length.

A comparative evaluation of all alternatives carried forward will be conducted and prepared as part of the draft environmental document that will be circulated for public review and comment.



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016

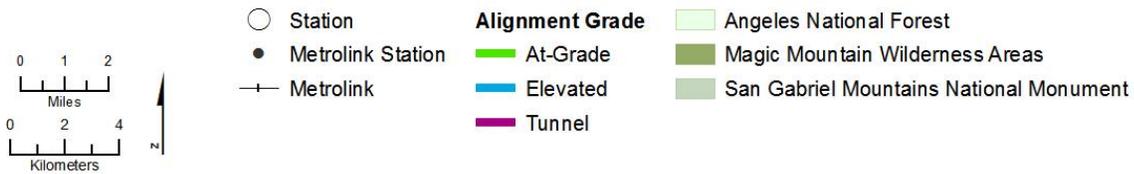


Figure 2.5-2 E2 Refined Compared to E2a and E2b

2.6 E3 Alignment Alternatives: Refinements since the June 2015 Supplemental Alternatives Analysis

2.6.1 Overview of E3 Alignment Alternatives Carried Forward in 2015 SAA

The 2015 SAA provided narrative descriptions of two different E3 corridor alignments and carried forward both of these E3 alignments (E3a and E3b), citing their low potential for impacts to aquatic resources, schools, and noise-sensitive receptors. Figure 2.6-1 depicts the E3a and E3b alignments. The 2015 SAA provides detailed descriptions of each of these alignments.

As shown in Figure 2.6-1, these alignments are the same from Palmdale, past Lake Palmdale, and over the California Aqueduct. Starting at the California Aqueduct, the E3a and E3b alignments diverge around Vincent Substation, and rejoin at Aliso Canyon Road. E3a would run to the west of the Vincent Substation area; E3b would run to the east. The excerpts below from the 2015 SAA highlight the key differences between E3a and E3b between the California Aqueduct and Aliso Canyon Road.

E3a and E3b – California Aqueduct to Aliso Canyon Road

South of the California Aqueduct, E3a would continue south and would cross the interchange between Sierra Highway and SR 14, approximately 255 feet east of SR 14. Continuing south, E3a would cross an existing parking lot and vacant areas, before crossing the intersection of Sierra Highway and Angeles Forest Highway. Approximately 250 feet south of the intersection of Sierra Highway and Angeles Forest Highway, E3a would cross the Metrolink Antelope Valley line. E3a would continue south running between West Carson Mesa Road and Angeles Forest Highway, crossing Vincent View Road to the east of the Vincent Grade/Acton Metrolink Station, but to the west of the Vincent Substation.

South of Vincent Substation, E3a would enter a 1.6-mile tunnel, rising to an at-grade profile outside the Angeles National Forest approximately 0.5 miles east of the intersection of Aliso Canyon Road and West Avenue Y8. E3a would continue above ground in a southwesterly direction for approximately 0.5 miles, crossing Aliso Canyon Road. South of Aliso Canyon Road, E3a would then enter a 13-mile-long tunnel and would be the same as E3b for the remainder of the distance to Burbank.

South of the California Aqueduct, E3b would cross Pearblossom Highway and the Metrolink Antelope Valley Line near Pearblossom Highway's intersection with SR 14, requiring new bridge structures. South of East Carson Mesa Road, E3b would enter an approximately 1.2-mile tunnel, rising to an at-grade profile as it passes east of the Vincent Substation. South of the Vincent Substation, E3b would cross Angeles Forest Highway and enter an approximately 2-mile tunnel bearing southwest. Part way into this tunnel, E3b would cross into a portion of the ANF.

E3b would emerge from the tunnel north of Aliso Canyon Road, where it would continue at grade and on elevated structures for about 0.5 miles, crossing Aliso Canyon Road. South of Aliso Canyon Road, E3b would enter a tunnel approximately 13 miles long, from the outside of the ANF, where it would be the same as the E3a alternative.

E3a and E3b – Aliso Canyon Road to Burbank

After crossing Aliso Canyon Road, E3a and E3b would follow the same vertical and horizontal profiles to the Burbank HSR Station and Alameda Street. Each would travel southwesterly in a tunnel beneath the ANF (including portions of the National Monument) the Lake View Terrace neighborhood, the I-210 Freeway and Big Tujunga Wash. E3a and E3b would transition from bored tunnel to cut-and-cover tunnel approximately 200 feet south of I-5. The joint alignment would then continue in a cut-and-cover profile between Claybeck Avenue and North Hollywood Way through an existing residential neighborhood. South of San Fernando Road, the joint alignment would enter the proposed below-ground station area, which would roughly parallel North Hollywood Way.



E3 Map:
 June 2015 SAA Alignments

Figure 2.6-1 E3 Alignment Alternatives Carried Forward in the 2015 SAA

2.6.2 Key Design and Environmental Issues Identified in 2015 SAA

The 2015 SAA included a table (Table 3.1-1) summarizing design and environmental factors used in the evaluation of alignments and station areas. Detailed design and environmental information is provided in Appendix A, Table 1 of the 2015 SAA. The Authority opted to carry forward E3a and E3b since each alignment was shown to have a low potential for impacts to aquatic resources, schools, and noise-sensitive receptors.

2.6.3 Refinement since the 2015 SAA

Beginning in July 2015, the Authority began to look for opportunities to improve one or both of the E3 alignments. These improvements were initially focused on reducing the extent of overburden, which reached about 3,000 feet below ground surface between Aliso Canyon Road and the Sunland-Tujunga area. Reducing overburden is a key factor in improving overall constructability and cost. Other improvements were centered on improving operational capability and travel time, which were of particular concern in the Burbank station area. In the Burbank station area, the E3a and E3b alignments followed relatively tight curves into and out of the station platform, reducing maximum travel speeds, and thus increasing overall travel time. The proposed underground Burbank station area was also considered for refinements in terms of the known presence of contaminated soils and groundwater in the vicinity, as well as the potential for residential displacement impacts in the Sun Valley area along Hollywood Way.

During the refinement process, the Authority explored possible modifications to improve E3a and E3b. The Authority considered a modified or best possible E3 alignment that would have followed E3a from Palmdale into a 14-mile-long tunnel heading southwest after crossing Aliso Canyon Road. This tunnel would have continued in a southwesterly direction, diverging from the tunnels under the E3a and E3b alternatives southeast of Parker Mountain near Edison Road, taking a more northwestern path through the ANF. This potential alignment would have passed under the I-210 Freeway and Big Tujunga Wash, west of the Green Verdugo Reservoir, and under La Tuna Canyon Road, and then would have merged with the E3a and E3b alignment. The alignment would have continued in a southern direction in a cut-and-cover tunnel, running roughly parallel to North Hollywood Way, into the underground Burbank HSR station. South of the station, the alignment would have followed the same vertical and horizontal alignment as E3a and E3b, continuing in a cut-and-cover tunnel to the Antelope Valley Metrolink alignment, turning east and eventually coming to grade near Burbank Junction.

The potential E3 alignment considered by the Authority as part of the refinement process had the same key design, constructability, and operational issues as the E3a and E3b alternatives. Compared to the E3a and E3b alignment, the total tunnel length for the potential alignments was intermediate (22.3 miles), and the total alignment length (37.3 miles) and longest bored tunnel length (14.2 miles) would have been longer. However, unlike E3a and E3b, which would have a cut-and-cover trench through Angeles National Golf Club, the potential alternative would not have affected the golf club. The potential alignment involved more grade separations than the E3a and E3b alternatives, but fewer roadway realignments. While the potential alignment would have had lower overburden (2,750 feet) than the E3a and E3b alternatives (about 3,000 feet), the refined maximum overburden of the potential alignment would have remained higher than of all the East Corridor and SR-14 corridor alignments. However, the potential alignment would have curved more gradually than E3a and E3b into the Burbank station platform, allowing for faster travel speeds.

While non-tunnel portions of the potential alignment would have had fewer residential displacements, it would have had more business displacements, and more schools in close proximity, than E3a and E3b. The potential alignment would have had more noise-sensitive receptors located near the centerline of the alignment that could have been affected by noise and vibration than E3a and E3b. All E3 alignments would impact communities of environmental justice concern; however, the potential alternative would have affected an additional community of environmental justice concern relative to E3a and E3b.

While the potential alignment would have had the most direct route of any of the alternative alignments explored during the refinement process, it would have had the highest maximum overburden, constrained design, the longest construction schedule, major restrictions during operation, and increased

maintenance costs. The potential alignment was not greatly able to improve constructability or operations, deep tunnel construction would have posed a higher risk to feasibility, and significant operational challenges exist in Burbank. As a result of the refinement process, no alternative alignment was identified as an improvement over E3a or E3b, so no refined alternatives were proposed by the Authority for the E3 alignments.

2.6.4 Recommendation

Based on the foregoing, as well as previous studies (the 2010 PAA, 2011 SAA, 2012 SAA, 2014 SAA, and 2015 SAA), the recommendation is not to carry forward either of the E3 corridor alignments for further study.

2.7 Station Alternatives

2.7.1 Overview of Station Alternatives Carried Forward in 2015 SAA

The 2015 SAA provided narrative descriptions of one Palmdale station alternative (Palmdale Transportation Center or PTC) and three Burbank Airport Station alternatives (Station Options A, B, and C). Via the 2015 SAA, the Authority carried forward each of these station options.

2.7.1.1 Palmdale Transportation Center (PTC)

The 2015 SAA carried forward the PTC as the Palmdale station alternative. The PTC currently serves as a Metrolink commuter rail station with service to Los Angeles Union Station. The proposed HSR station at the PTC site would be located on the west side of the existing Metrolink corridor, in the vicinity of a mix of civic, residential, and institutional (school) uses.

2.7.1.2 Burbank Airport Station Options A, B, and C

The 2015 SAA carried forward three station site options for the Burbank Bob Hope Airport (Options A, B, and C). Option A had been introduced within the 2014 SAA. Option A is located in-line with the existing Antelope Valley Metrolink Corridor. The 2015 SAA retained Option A but shifted the station site to the northwest, further north along the Metrolink alignment. Option A was intended to serve the SR14 and E1 alignment alternatives. As of the 2015 SAA, Option A was not compatible with any of the E2 or E3 alignment alternatives.

The 2015 SAA introduced and then carried forward Options B and C, each of which were proposed as underground stations. Option B was found to be compatible with E2 alignment alternatives, but was not compatible with SR14, E1, or E3 alignment alternatives. Option B is proposed to be located immediately south of San Fernando Road, adjacent to the proposed replacement terminal for the Burbank Bob Hope Airport.

Option C was found to be compatible with E3 alignment alternatives, but incompatible with SR14, E1, or E2 alignment alternatives. Similar to Option B, Option C was proposed to be located immediately south of San Fernando Road adjacent to the proposed Burbank Bob Hope Airport Replacement Terminal.

2.7.2 Key Design and Environmental Issues Identified in 2015 SAA

As noted above, the Authority opted through the 2015 SAA to carry forward all four of the station alternatives discussed above.

In carrying forward the PTC, the Authority found that the PTC would provide connectivity between proposed HSR service as well as Metrolink and the planned High Desert Corridor project, which could include a rail connection to Las Vegas via the XpressWest project.

In carrying forward Options A, B, and C, the Authority found that each had relatively low potential for commercial and residential impacts owing to their locations in close proximity to the existing and proposed Burbank Bob Hope Airport terminal.

2.7.3 Refinement since the 2015 SAA

2.7.3.1 Palmdale Transportation Center

No major changes to the PTC have been proposed as part of the alternatives refinement process following the 2015 SAA. The proposed PTC location has not changed since the 2015 SAA, and is proposed to be located near the existing PTC.

2.7.3.2 Burbank Airport Station Options A, B, and C

The refinement process undertaken since the 2015 SAA has led to changes to the Burbank Airport Station Options.

Station Option A would be located within a retained cut along the Antelope Metrolink right-of-way, immediately north of San Fernando Road as well as the site designated for the proposed Burbank Airport replacement terminal. Owing to its in-line location, Station Option A is compatible with the SR14 Refined and E1 Refined alignments. Station Option A has not changed substantially since the 2015 SAA.

Station Option B would be located underground, just south of San Fernando Road, more immediately adjacent to the site designated for the relocated Burbank Airport terminal. Station Option B was originally configured to be compatible with only E2 alignment options. As part of the refinement process following the 2015 SAA, the underground location of Station Option B has shifted to the west, making it closer to the proposed Burbank Airport replacement terminal, thereby enhancing the opportunity for multi-modal connectivity.

Station Option C was similar to Station Option B, but compatible only with the E3 alignment.

2.7.4 Recommendation

Based on the foregoing, as well as previous studies (the 2010 PAA, 2011 SAA, 2012 SAA, 2014 SAA, and 2015 SAA), the recommendation is to carry forward the PTC as the Palmdale station alternative and Burbank Airport Station Options A and B.

Based on the earlier recommendation of not carrying forward any E3 alignment alternatives, this SAA recommends that Burbank Airport Station Option C not be carried forward.

3 Alternatives Evaluation

This SAA evaluates three alignment alternatives using the Authority measurement criteria, listed in full in Table 1.4-2. However, the Palmdale to Burbank corridor is highly urbanized, and there are limited options to feasibly introduce HSR infrastructure; therefore, the potential impacts are primarily related to the built environment, rather than natural resources.

Section 3 at a Glance—In this section you will find the following information:

- ▶ Key Differences Between Design Options
- ▶ Areas of No Difference

The following sections focus on the distinguishing criteria, which are summarized in Table 3-1. These criteria, along with other environmental resources areas, will be evaluated in full in the project-level environmental document. Potential Section 4(f) resources require additional analysis to determine whether they would be protected under Section 4(f) or would result in a de minimis finding.

Table 3-1 Summary of Distinguishing Evaluation Measurement Criteria

Measurement	SR14 Refined	E1 Refined	E2 Refined
Constructability			
Maximize constructability	No extension of California Aqueduct Syphon required No realignment of Sierra Highway, Angeles Forest Highway, SR14 on/off ramp and Metrolink just North of the Vincent Grade/Acton Metrolink station required Shorter total length and shorter viaducts. Reduced impact on Metrolink/UP operations during construction Avoids oil & gas risk areas in Santa Clarita	Minimum overburden (reduced groundwater pressure) Optimized fault crossings and portal and potential intermediate access location	No trenching near airport facilities requiring closure of airport perimeter road and loss of aircraft parking bays
Land Use			
Consistency with existing land uses	Same as E1 Refined except it would be inconsistent with existing land uses near Vasquez Rocks and the Pacific Coast Trail	Inconsistent with existing land uses in unincorporated Los Angeles County, Los Angeles, and Burbank	Same as E1 Refined except it would be inconsistent with existing land uses near Tujunga Wash
Disruption to Communities			
Displacements	Fewest multi-family residential displacements	Fewest single-family residential displacements	Most single-family residential displacements Fewest commercial displacements Most industrial displacements

Measurement	SR14 Refined	E1 Refined	E2 Refined
Natural Resources			
Proximity to Section 4(f) Resources	Least tunneling and non-tunneling in proximity to ANF Most tunneling in proximity to non-ANF 4(f) resources	Most tunneling in proximity to ANF	
Parklands	Most tunnel and non-tunnel acreage through parklands	Least effects to parklands	
Environmental Quality			
Hazards	More contaminated sites in proximity to tunnel and non-tunnel areas than E1 Refined	Fewest non-tunnel and tunnel proximity to contaminated sites	Tunneling in proximity to oil and gas wells Avoids contaminated sites between Burbank Station and Osborne Street Most overall contaminated sites within ½ of tunnels and non-tunneled areas
Biological/Aquatic Resources	No impacts to critical habitat (tunnel) Decreased impacts to critical habitat (non-tunnel)	No impacts to critical habitat (tunnel and non-tunnel)	Increased non-tunnel impacts to wetland habitat Most potential impacts to critical habitat (tunnel and non-tunnel)
Cultural Resources	Increased recorded Archaeological Sites	Decreased recorded Archaeological Sites	

3.1 Key Differences Between Options

The following comparisons focus on the potential impacts of the three refined alignment alternatives:

Constructability

SR14 Refined would avoid construction in many communities in northeast San Fernando Valley and would have the shortest tunnel section length under the ANF with a maximum overburden that is slightly greater than E1 Refined. SR14 Refined would have a shorter track length, shorter viaducts, would not require realignment of Sierra Highway or the Angeles Forest Highway, and would reduce impacts to Metrolink/UP operations during construction. SR14 would also avoid oil and gas risk areas in Santa Clarita. E1 Refined would have the longest tunnel section length under the ANF which would present challenging construction access and have a more complex and longer construction duration. However, E1 Refined would have the least maximum overburden, reducing groundwater pressure. E1 Refined would have optimized fault crossings, tunnel portals, and would have potential intermediate access locations for tunneling. E2 Refined would not require trenching near airport facilities requiring the closure of the perimeter road and loss of aircraft parking bays.

Land Use

Each alternative would be inconsistent with existing land uses in unincorporated Los Angeles County, Los Angeles, and Burbank. Additionally, SR14 Refined would be inconsistent with existing land uses near Vasquez Rocks and the Pacific Coast Trail and E2 Refined would be inconsistent with existing land uses near Tujunga Wash.

Disruption to Communities

SR14 Refined would have the fewest single-family residential displacements. E1 Refined would have the most single-family residential displacements. E1 Refined and E2 Refined would have similar amounts business displacements, but more than SR14 Refined.

Natural Resources/Section 4(f) Resources

SR14 Refined would have the most tunnel and non-tunnel acreage within identified parklands, while E1 Refined and E2 refined would have similar acreage within parklands.

E1 Refined would have the most tunnel miles in proximity to the ANF, while E2 Refined would have non-tunnel alignment in proximity to the Hansen Dam Open Space. SR14 Refined would increase tunneling near 4(f) resources, although it would have the least amount of tunnel and non-tunnel tracks in proximity to the ANF.

Environmental Quality

E2 Refined has the potential to impact oil and gas wells in the vicinity of the alignment; however, there would be no impacts related to contaminated sites between Burbank Station and Osborne Street. Overall, the most contaminated sites are within ½ of both tunneled and non-tunneled areas of E2 Refined. Both SR 14 Refined and E1 Refined would be located in close proximity to 210 contaminated sites Between Burbank Station and Osborne Street, approximately 73 of these sites are located within a ½ mile of proposed tunnels. E1 Refined has the overall fewest contaminated sites in proximity to both tunneled and non-tunneled areas.

E2 Refined has the potential to impact 1 acre of critical habitat with tunneled areas, and 80 acres with non-tunneled locations. E2 Refined also has the greatest potential to impact wetland habitat relative to the other alternatives. SR 14 Refined has the potential to impact 64 acres of critical habitat in non-tunneled areas; no critical habitat is listed near tunneled areas. E1 Refined has no potential impacts to critical habitat and the smallest potential impact to wetland habitat.

20 previously recorded archaeological sites are within the archaeological study area for SR 14 Refined (100-foot buffer from the alignment centerline). Only 12 previously recorded archaeological sites are within the archaeological study area for both E1 Refined and E2 Refined.

3.2 Areas of No Substantial Difference

At the current level of design and analysis, the three alternative alignments measure similarly under several criteria. Table 3-2 lists the evaluation criteria where the alternative alignments have no substantial differences.

Table 3-2 Evaluation Criteria with No Difference Between Alignments

Category	Measurement
Performance Objectives	Ridership/revenue potential Connectivity and accessibility
Constructability	Disruption to existing railroads Disruption to and relocation of utilities
Land Use	Inconsistencies with other planning efforts and adopted plans
Communities	Property with access affected Proximity to schools Proximity to landfills Station area traffic Grade separations

Category	Measurement
Natural Resources	Waterways Cultural resources Agricultural lands
Environmental Quality	Geology and soils Hazardous materials Noise and Vibration Visual/Scenic resources Geology and Soils

4 Recommendation

Section 4 at a Glance—In this section you will find the following information:

Alignment Alternatives Carried Forward or Not Carried Forward

Station Alternatives Carried Forward or Not Carried Forward

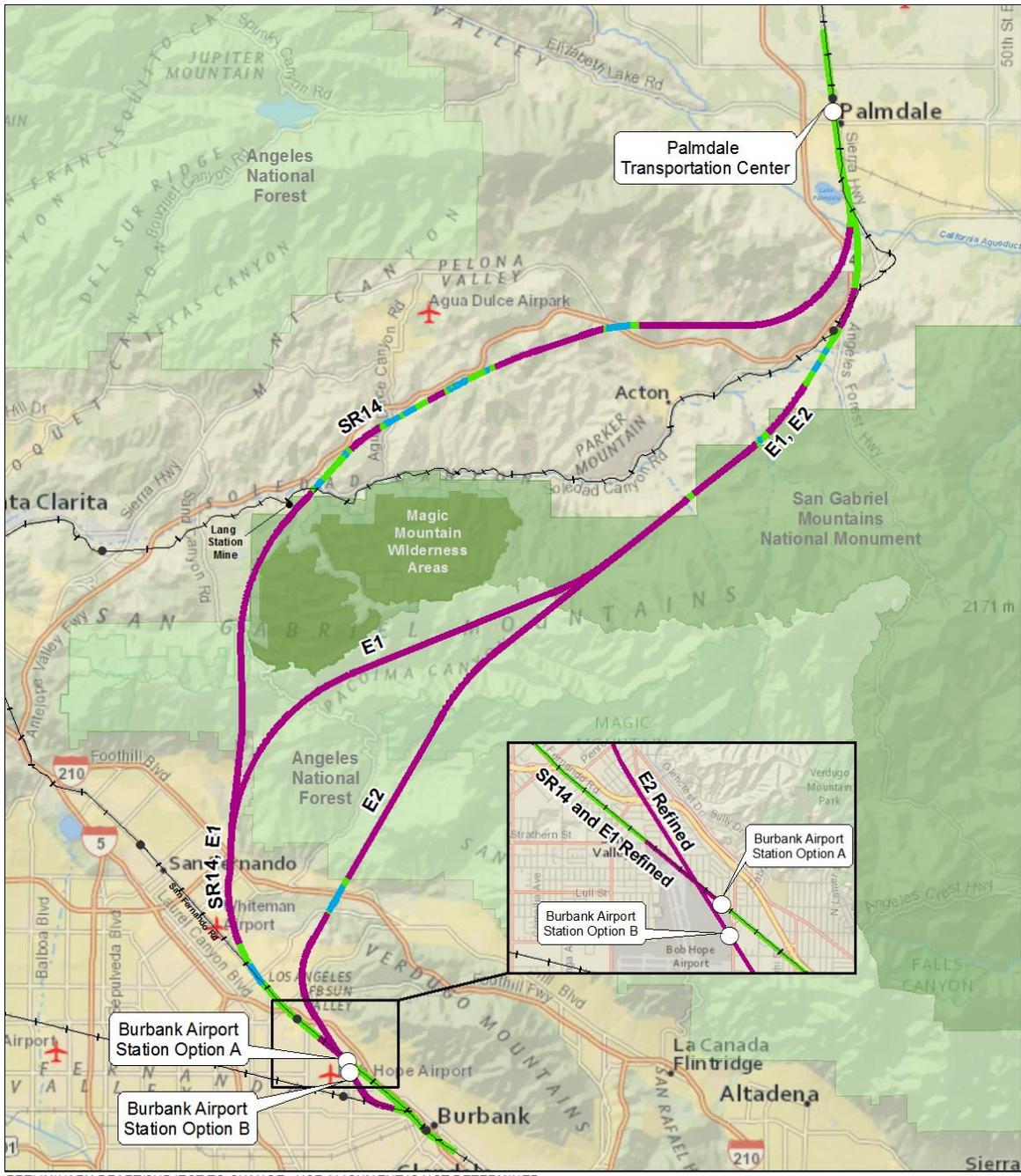
Based on the 2010 PAA, 2011 SAA, 2012 SAA, the 2014 SAA, the 2015 SAA, and this SAA, the alignment and station alternatives either not being carried forward for further consideration or recommended for further refinement and evaluation in the Palmdale to Burbank environmental review process are listed below and summarized in Table 4-1. Alternatives carried forward for further consideration are shown in Figure 4-1. A comparative evaluation of all alternatives carried forward will be conducted and prepared as part of the draft environmental document that will be circulated for public review and comment. This analysis will be based on more advanced engineering drawings for each alignment.

4.1 Alignment Alternatives

- SR14-1– not carried forward
- SR14-2 – not carried forward
- SR 14 Refined – carried forward; hereinafter referred to as **SR14**
- E1a – not carried forward
- E1b – not carried forward
- E1 Refined – carried forward; hereinafter referred to as **E1**
- E2a – not carried forward
- E2b – not carried forward
- E2 Refined – carried forward; hereinafter referred to as **E2**
- E3a – not carried forward
- E3b – not carried forward

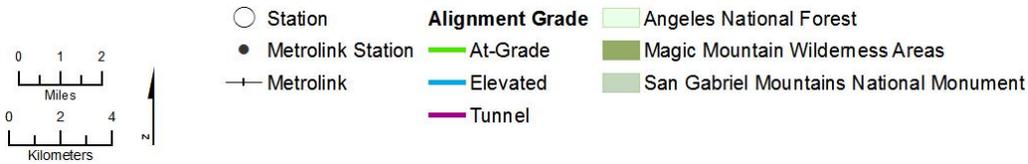
4.2 Station Alternatives

- Palmdale Transportation Center – carried forward
- Burbank Airport Station Option A– carried forward
- Burbank Airport Station Option B– carried forward
- Burbank Airport Station Option C – not carried forward



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HSR ALIGNMENT IS NOT DETERMINED
 Source: CHSR 2015. Image Source: Esri/National Geographic 2016

April 3, 2016



The alternatives displayed on this map are recommended to be carried forward for further consideration in technical studies and the draft environmental document.

Figure 4-1 Alignment and Station Alternatives Carried Forward

Table 4-1 Alternatives Evaluation Summary

Alignment and Station Alternatives	SAA Decision		Reasons Not Carried Forward						Additional Observations/Comments
	Carried Forward	Not Carried Forward	Construction	Incompatibility	Right-of-Way	Connectivity/Accessibility	Community Impact	Environment	
SR 14 Alignments									
SR 14-1		X					X		Potential impacts to residential and business displacements, schools, noise sensitive receptors, visual resources, and environmental justice communities.
SR 14-2		X					X		Potential impacts to residential and business displacements, schools, noise sensitive receptors, visual resources, and environmental justice communities.
SR14	X								Reduced potential for impacts to residential and business displacements, schools, noise sensitive receptors, visual resources, and environmental justice communities. Additionally, there would be reduced impacts associated with oil and gas wells, floodplains and perennial streams, and fire hazard zones.
East Corridor Alignments									
E1a		X							Improved upon by E1 in several design and environmental factors
E1b		X							
E1	X								
E2a		X							Improved upon by E2 in several design and environmental factors
E2b		X							
E2	X								
E3a		X	X						Concerns regarding constructability, operational feasibility and travel time.
E3b		X	X						Concerns regarding constructability, operational feasibility and travel time.

Alignment and Station Alternatives	SAA Decision		Reasons Not Carried Forward						Additional Observations/Comments
	Carried Forward	Not Carried Forward	Construction	Incompatibility	Right-of-Way	Connectivity/Accessibility	Community Impact	Environment	
Station Alternatives									
Palmdale Transportation Center	X								Would provide connectivity to Metrolink and High Desert Corridor project
Burbank Airport Station Option A	X								Being located near the Bob Hope Airport and commercial and industrial development, there is low potential for community and environmental impacts
Burbank Airport Station Option B	X								Relocated closer to the proposed Bob Hope Airport replacement terminal
Burbank Airport Station Option C		X		X					Not compatible with any alignment alternatives carried forward in this SAA

Appendix A

Detailed Evaluation Tables for SR14 and East Corridor Alignments

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Detailed Evaluation Table for SR 14 Originals (SR14-1 and SR14-2) vs. SR 14 Refined

Table A-1 SR14 Alignment Alternatives Detailed Evaluation Table

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
Design Objectives:			
Journey time (Palmdale to Burbank) *as compared to the baseline (E1a)	+3 minutes 12 seconds	+3 minutes 18 seconds	+1 minute 3 seconds
Total Length (Palmdale to Burbank)	49.0 miles	49.0 miles	44.2 miles
Intermodal Connections	Achieves the HSR objective of integrating HSR with existing intercity and regional rail routes at Palmdale and Burbank, provides a direct connection to Metrolink services.	Same as SR14-1	Same as SR14-1
Total Bored Tunnel Length	20.7 miles	18.9 miles	24.2 miles
Longest Bored Tunnel Length	8.9 miles	7.2 miles	9.8 miles
Operating Costs	TBD	TBD	TBD
Capital Costs (Excluding Right of Way Acquisition) *as compared to the baseline (SR14-2)	1.03	Baseline= 1.00	1.09
Constructability	Metrolink realignment at Lake Palmdale and Antelope Valley Line. Would require Una Lake to be relocated. Tunneling under California Aqueduct. Low point in long tunnel. Long viaducts crossing the SR14 in Acton and the Santa Clara River. 13 grade separations tunnel beneath residential communities may require easements. Construction of trench next to airports facilities, closure of the airport perimeter road and potential loss of aircraft parking bays.	Similar to SR14-1. Additional Metrolink realignments required in Santa Clarita.	Metrolink realignment at Lake Palmdale and Antelope Valley Line. Would require Una Lake to be relocated. Tunneling under California Aqueduct. Tunneling under Angeles National Forest Alignment avoids oil & gas risk areas in Santa Clarita Shorter total length Shorter viaducts 5 grade separations/tunnels beneath residential communities may require easements. Reduced impact on Metrolink/UP operations during construction Construction of trench next to airports facilities, closure of the airport perimeter road and the potential loss of aircraft parking bays. Improved constructability of Santa Clara River viaduct Improved constructability with fewer grade separations
Land Use			
Consistency with other planning efforts ¹	<p>Existing Land Uses</p> <p>This alternative is inconsistent with existing land uses in the City of Palmdale where non-tunnel segments of the alignment would displace existing businesses, residences, and other land uses. The alignment also traverses through Una Lake.</p> <p>The alternative is inconsistent with existing land uses in unincorporated Los Angeles County where at-grade and elevated segments of the alignment would displace existing residences and, in other locations, run directly adjacent to existing residences.</p> <p>The alternative is inconsistent with existing land uses in the City of Santa Clarita, City of San Fernando, City of Los Angeles, and City of Burbank where non-tunnel segments of the alignment would displace existing industrial, commercial, and residential land uses.</p> <p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the following plans, largely due to the required acquisition of parcels planned for future industrial, commercial, and residential land uses:</p>	<p>Existing Land Uses</p> <p>Same as SR14-1, except that this alternative's alignment would transition into a tunnel just east of the City of Santa Clarita, preventing any surface impacts on existing land uses in that community.</p> <p>Planned Land Uses</p> <p>Same as SR14-1 except that this alternative would not affect consistency with the City of Santa Clarita General Plan.</p>	<p>Existing Land Uses</p> <p>Same as SR14-1, except that this alternative only traverses below a small portion of the City of Santa Clarita in a tunnel and completely bypasses the City of San Fernando. Therefore, this alternative would not affect existing land uses in either Santa Clarita or San Fernando. Also, because this alternative would bypass several areas of the City of Los Angeles that are traversed by the SR14-1 and SR14-2 alternatives (including the communities of Sylmar, Arleta, and western Pacoima), potential impacts in these communities would be substantially reduced.</p> <p>Planned Land Uses</p> <p>Same as SR14-1, except that this alternative would not affect consistency with the City of San Fernando or City of Santa Clarita General Plans. Impacts related to consistency with the City of Los Angeles General Plan would be concentrated in Sun Valley adjacent to the City of Burbank. Unlike under the SR14-1 and SR14-2 alternatives, impacts to consistency with the adopted City of Los Angeles General Plan would not occur in the communities of Sylmar, Arleta, and western Pacoima.</p>

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	<ul style="list-style-type: none"> City of Burbank General Plan Burbank Center Plan (City of Burbank) City of Los Angeles General Plan City of Palmdale General Plan Avenue S Corridor Area Plan (City of Palmdale) City of San Fernando General Plan City of Santa Clarita General Plan Los Angeles County General Plan <ul style="list-style-type: none"> In addition to planned land use patterns, this alternative would require a substantial reconfiguration of the existing roadway network in the City of Palmdale. Therefore, this alternative is inconsistent with the City of Palmdale's General Plan Circulation Element. 		
Disruption to Communities			
Disruption to Existing Railroad ²	Total number of places where SR14-1 would cross and disrupt existing railroad lines: 8. SR14-1 would parallel existing railroad lines operated by Union Pacific in the City of Palmdale. SR14-1 would cross a Union Pacific line just north of the intersection of Avenue S East and Sierra Highway and just south of this intersection, near the southern city limit of the City of Palmdale. As SR14-1 nears the city of Santa Clarita, it would cross rail lines operated by Union Pacific five more times. SR14-1 and a line operated by Union Pacific cross and are parallel again starting near the intersection of San Fernando Road and Olden Street in the city of Los Angeles.	Total number of places where the SR14-2 alternative would cross and disrupt existing railroad lines: 12. The SR14-2 alternative would parallel existing railroad lines operated by Union Pacific in the City of Palmdale. The SR14-2 alternative would cross a Union Pacific line just north of the intersection of Avenue S East and Sierra Highway and just south of this intersection, near the southern city limit of the City of Palmdale. As SR14-1 nears the city of Santa Clarita, it would cross rail lines operated by Union Pacific nine more times. SR14-1 and the line operated by Union Pacific cross and are parallel again starting near the intersection of San Fernando Road and Olden Street in the city of Los Angeles.	Total number of places where SR 14 Refined would cross and disrupt existing railroad lines: 5. SR 14 Refined would parallel existing railroad lines operated by Union Pacific in the city of Palmdale. SR 14 Refined would cross a Union Pacific line just north of the intersection of Avenue S East and Sierra Highway and just south of this intersection, near the southern city limit of the City of Palmdale. This alternative would cross a railroad line operated by Union Pacific again less than a mile east of the City of Santa Clarita. SR 14 Refined would cross railroad lines operated by Union Pacific again in the City of Los Angeles near the intersection of San Fernando Road and Sheldon Street. The SR 14 Refined would cross railroad lines operated by Union Pacific one more time in the City of Burbank near the intersection of North Victory Place and North Lake Street.
Disruption to, and Relocation of, Utilities	<p>Major parallel storm channel relocation in Palmdale (all alignments)</p> <p>Major crossings at Palmdale grade seps. (relocate): 42" sewers, 42" gas, 42" water (all)</p> <p>3-230kV OH elec. crossings at transition from tunnel to viaduct in Acton</p> <p>OH elec. crossing viaduct, potential conflict (Lang Station Rd)</p> <p>Crossings – natural streams, twice 2-30" gas over tunnel, cut & cover?</p> <p>18 ft. diam. MWD water feeder tunnel crossing CHSR tunnel</p> <p>Parallel >7,000 ft. 230kV OH elec., CHSR partly at grade, relocate</p> <p>Parallel – number of major storm channel conflicts at grade in San Fernando (N to S): 54", 16"Wx10'H, 22"Wx12'H, 87", 45", 16"Wx10'H RCB, 7"Wx10'H + 10"W x10'H</p> <p>Parallel – 20" oil in R/W through most of Burbank (all alignments, longer for SR14-1 & 2)</p> <p>Parallel – telecom /fiber optic in R/W through most of Burbank (all alignments, longer for SR14-1 & 2)</p> <p>Major & minor crossings at grade, incl. 48" water, 8"Wx5'H RCB storm</p> <p>Parallel – 48", 36"-51", 36", 42", 48" storm, various sewer, water, gas</p> <p>Parallel to CHSR & Metrolink – Lockheed Channel</p> <p>Major storm crossings (all alignments): 84", 54", 102", 60" storm</p> <p>Other crossings (all alignments): 24" water, 115kV OH elec., gas</p> <p>Notes:</p> <p>1) Parallel conflicts w/in R/W to be relocated unless otherwise negotiated</p> <p>2) SR14-1 & SR14-2 require minimal cut & cover, therefore significantly less disruptive to utility conflicts than SR 14 Refined, except that there are more conflicts for SR14-1 & SR14-2.</p> <p>3) E1-E3 options are less accessible to water supply to tunnels during construction than SR14 options (~400,000 gal/day/portal)</p>	<p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>OH elec. crossing viaduct twice, potential conflict (Oaks Springs Cyn. Rd., Sand Cyn. Rd.)</p> <p>N/A</p> <p>Same as SR14-1 (18 ft. diam. MWD water feeder tunnel crossing CHSR tunnel)</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Same as SR14-1 (Parallel – 20" oil in R/W through most of Burbank)</p> <p>Same as SR14-1</p>	<p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>Same as SR14-1 (Parallel – 20" oil in R/W through most of Burbank) + cut & cover will necessitate relocation, but significantly shorter conflict than SR14-1 & SR14-2</p> <p>Same as SR14-1 + cut & cover will necessitate relocation, but significantly shorter conflict than SR14-1 & SR14-2</p> <p>Crossings (esp. gravity) may become a significant issue through cut & cover construction</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Same as SR14-1</p> <p>Minimizes utility disruption compared to other SR14 alignments</p> <p>SR14 Refined has fewer total impacts to utilities than SR14-1 and SR14-2.</p>

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
Residential Easements (within 100 feet on either side of the centerline)	Tunnel 18 multi-family 384 single-family	Tunnel 17 multi-family 352 single-family	Tunnel 30 multi-family 1,020 single-family
Residential Displacements (within 100 feet on either side of the centerline)	Non-tunnel 14 multi-family 119 single-family	Non-tunnel 14 multi-family 141 single-family	Non-tunnel 6 multi-family 87 single-family
Business Easements (within 100 feet on either side of the centerline)	Tunnel 17 commercial parcels 18 industrial parcels	Tunnel 17 commercial parcels 17 industrial parcels	Tunnel 47 commercial parcels 50 industrial parcels
Business Displacements (within 100 feet on either side of the centerline)	Non-tunnel 262 commercial parcels 258 industrial parcels	Non-tunnel 263 commercial parcels 260 industrial parcels	Non-tunnel 137 commercial parcels 173 industrial parcels
Proximity to Schools ³ (Within 1,500 feet on either side of the centerline)	Tunnel • Total: 5 Includes: ○ 1 private/charter school ○ 4 public elementary schools Non-tunnel • Total: 17 Includes: ○ 1 adult education facility ○ 1 public high school ○ 1 special curriculum school/program ○ 2 guidance/tutoring programs ○ 2 public middle schools ○ 3 colleges/universities ○ 3 public elementary schools ○ 4 private/charter schools	Tunnel • Total: 4 Includes: ○ 1 private/charter school ○ 3 public elementary schools Non-tunnel • Total: 18 Includes: ○ 1 adult education facility ○ 1 public high school ○ 1 special curriculum school/program ○ 2 guidance/tutoring programs ○ 2 public middle schools ○ 3 colleges/universities ○ 4 public elementary schools ○ 4 private/charter schools	Tunnel • Total: 10 Includes: ○ 1 public elementary school ○ 1 public middle school ○ 1 special curriculum school/program ○ 2 early childhood and Head Start facilities ○ 2 guidance/tutoring programs ○ 3 private/charter schools Non-tunnel • Total: 9 Includes: ○ 1 private/charter school ○ 2 public high schools ○ 3 colleges/universities ○ 3 public elementary schools
Proximity to Landfills ⁴ (Within ¼-mile on either side of the centerline)	Tunnel • 1 active transfer/processing facility Non-tunnel • 3 active transfer/processing facilities • 1 closed disposal facility	Tunnel • 1 active transfer/processing facility Non-tunnel • 3 active transfer/processing facilities • 1 closed disposal facility	Tunnel • 1 active composting facility • 2 closed disposal facilities • 4 active transfer/processing facilities Non-tunnel • 1 active transfer/processing facility
Highway Grade Separations and Closures	13 Grade separations, 10 realignments	Same as SR14-1.	8 Grade separations 1 realignment
Environmental Resources			
Potential Section 4(f) ⁵ and 6(f) Resources ⁶ (Please note that for Cultural Resources there is a potential for both direct and indirect impacts to	Cultural Resources 21 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer). 29 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable	Cultural Resources 21 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer). 29 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.	Cultural Resources 20 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer). 28 previously recorded historic architectural resources are located within 150 feet of the approximate centerline of the alternative alignment. Only 3 of 28 historic architectural resources previously recorded are listed in, or determined eligible

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.) ⁷	<p>distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale Lang Southern Pacific Station, Lang East Branch of the California Aqueduct, Palmdale vicinity Lopez Adobe, San Fernando <p>Parklands⁸ (Publicly owned and publicly accessible) within 100 feet of the alignment:</p> <p>Tunnel</p> <p>84.2 acres (Includes Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space)</p> <p>0.7 acres of Angeles National Forest</p> <p>0 acres of National Monument</p> <p>Non-tunnel</p> <p>10.5 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial, Eastern Greenbelt Open Space, Whitney Elsmere Open Space)</p>	<p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale Lang Southern Pacific Station, Lang East Branch of the California Aqueduct, Palmdale vicinity Lopez Adobe, San Fernando <p>Parklands (Publicly owned and publicly accessible) within 100 feet of the alignment:</p> <p>Tunnel</p> <p>84.2 acres (Includes: Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space)</p> <p>0.7 acres of Angeles National Forest</p> <p>0 acres of National Monument</p> <p>Non-tunnel</p> <p>11.3 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial Eastern Greenbelt Open Space, Whitney Elsmere Open Space, Lost Canyon River Trail Open Space)</p>	<p>for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 100-foot buffer of the approximate centerline.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest <p>Parklands (Publicly owned and publicly accessible) within 100 feet of the alignment:</p> <p>Tunnel</p> <p>37.6 acres (includes: Bureau of Land Management Land, Eastern Greenbelt Open Space, Hubert H. Humphrey Memorial Park, Roger Jessup Recreation Center)</p> <p>134.3 acres of Angeles National Forest</p> <p>55.8 acres of National Monument</p> <p>Non-tunnel</p> <p>10.8 acres of Eastern Greenbelt Open Space</p> <p>11.1 acres of Angeles National Forest</p> <p>11.1 acres of National Monument</p>
<p>Biological/Aquatic Resources</p> <p>Potential impacts are calculated using the following distances:</p> <p>Plants: 100-feet</p> <p>Aquatic Resources: 250-ft</p> <p>Wildlife: 1,000-ft</p>	<p><u>Aquatic Resources</u></p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0.4 acre</p> <p>Reservoirs: 0 acre</p> <p>Streams, Creeks, Canals: 3.2 mile</p> <p>Wetland Habitat: 9.1 acre</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 3.5 acre</p> <p>Reservoirs: 0.3 acre</p> <p>Streams, Creeks, Canals: 7.7 mile</p> <p>Wetland Habitat: 34.7 acre</p> <p><u>Biological Resources</u></p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>Coastal California Gnatcatcher: 1045</p> <p>Non-tunnel</p> <p>Arroyo Toad: 77</p> <p>Coastal California Gnatcatcher: 21</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 679</p> <p>Arroyo Toad: 0</p> <p>Blainville's Horned Lizard: 410</p> <p>Burrowing Owl: 465</p> <p>California Red-Legged Frog: 416</p> <p>California Vole: 1410</p> <p>Cooper's Hawk: 949</p> <p>Desert Woodrat: 0</p>	<p><u>Aquatic Resources</u></p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0.4 acre</p> <p>Reservoirs: 0 acre</p> <p>Streams, Creeks, Canals: 3.0 mile</p> <p>Wetland Habitat: 9.1 acre</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 3.5 acre</p> <p>Reservoirs: 0.3 acre</p> <p>Streams, Creeks, Canals: 8.1 mile</p> <p>Wetland Habitat: 34.8 acre</p> <p><u>Biological Resources</u></p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>Coastal California Gnatcatcher: 1045</p> <p>Non-tunnel</p> <p>Arroyo Toad: 78</p> <p>Coastal California Gnatcatcher: 21</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 575</p> <p>Arroyo Toad: 0</p> <p>Blainville's Horned Lizard: 304</p> <p>Burrowing Owl: 465</p> <p>California Red-Legged Frog: 311</p> <p>California Vole: 1164</p> <p>Cooper's Hawk: 704</p> <p>Desert Woodrat: 0</p>	<p><u>Aquatic Resources</u></p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0 acre</p> <p>Reservoirs: 9.0 acre</p> <p>Streams, Creeks, Canals: 4.6 mile</p> <p>Wetland Habitat: 23.2 acre</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 6.9 acre</p> <p>Reservoirs: 0 acre</p> <p>Streams, Creeks, Canals: 5.1 mile</p> <p>Wetland Habitat: 12.1 acre</p> <p><u>Biological Resources</u></p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>None listed</p> <p>Non-tunnel</p> <p>Arroyo Toad: 64</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 468</p> <p>Arroyo Toad: 0</p> <p>Bell's Vireo: 0</p> <p>Blainville's Horned Lizard: 121</p> <p>Burrowing Owl: 1517</p> <p>California Red-Legged Frog: 152</p> <p>California Vole: 1728</p> <p>Cooper's Hawk: 368</p> <p>Desert Woodrat: 20</p>

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	Ferruginous Hawk: 742 Golden Eagle: 1266 Lawrence's Goldfinch: 1410 Mohave Ground Squirrel: 0 Northern Harrier: 1701 Pallid Bat: 1728 Prairie Falcon: 1728 Rufous-Crowned Sparrow: 241 Silver-Haired Bat: 1489 Southern Grasshopper Mouse: 241 Tricolored Blackbird: 465 Two-Striped Gartersnake: 436 Western Mastiff Bat: 1726 Western Pond Turtle: 1304 Western Spadefoot: 362 Yellow Warbler: 1168 Yellow-Breasted Chat: 0 Yuma Myotis: 1420 Non-tunnel American Badger: 482 Arroyo Toad: 14 Blainville's Horned Lizard: 164 Burrowing Owl: 3701 California Red-Legged Frog: 175 California Vole: 3719 Cooper's Hawk: 1107 Desert Woodrat: 0 Ferruginous Hawk: 461 Golden Eagle: 1228 Lawrence's Goldfinch: 3834 Mohave Ground Squirrel: 38 Northern Harrier: 4194 Pallid Bat: 4226 Prairie Falcon: 4204 Rufous-Crowned Sparrow: 173 Silver-Haired Bat: 3838 Southern Grasshopper Mouse: 216 Tricolored Blackbird: 3601 Two-Striped Gartersnake: 192 Western Mastiff Bat: 4227 Western Pond Turtle: 3215 Western Spadefoot: 128 Yellow Warbler: 3050 Yellow-Breasted Chat: 18 Yuma Myotis: 3247 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Arroyo Chub Bell's Sage Sparrow	Ferruginous Hawk: 633 Golden Eagle: 1017 Lawrence's Goldfinch: 1164 Mohave Ground Squirrel: 0 Northern Harrier: 1457 Pallid Bat: 1480 Prairie Falcon: 1480 Rufous-Crowned Sparrow: 155 Silver-Haired Bat: 1241 Southern Grasshopper Mouse: 155 Tricolored Blackbird: 465 Two-Striped Gartersnake: 331 Western Mastiff Bat: 1477 Western Pond Turtle: 1058 Western Spadefoot: 256 Yellow Warbler: 1009 Yellow-Breasted Chat: 0 Yuma Myotis: 1175 Non-tunnel American Badger: 597 Arroyo Toad: 14 Blainville's Horned Lizard: 243 Burrowing Owl: 3701 California Red-Legged Frog: 254 California Vole: 3945 Cooper's Hawk: 1333 Desert Woodrat: 0 Ferruginous Hawk: 583 Golden Eagle: 1498 Lawrence's Goldfinch: 4061 Mohave Ground Squirrel: 38 Northern Harrier: 4459 Pallid Bat: 4496 Prairie Falcon: 1480 Rufous-Crowned Sparrow: 235 Silver-Haired Bat: 4108 Southern Grasshopper Mouse: 277 Tricolored Blackbird: 3601 Two-Striped Gartersnake: 270 Western Mastiff Bat: 4497 Western Pond Turtle: 3441 Western Spadefoot: 206 Yellow Warbler: 3215 Yellow-Breasted Chat: 18 Yuma Myotis: 3474 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Arroyo Chub Bell's Sage Sparrow	Ferruginous Hawk: 447 Golden Eagle: 518 Lawrence's Goldfinch: 1747 Mohave Ground Squirrel: 0 Northern Harrier: 2021 Pallid Bat: 2044 Prairie Falcon: 2040 Rufous-Crowned Sparrow: 144 Silver-Haired Bat: 2053 Southern Grasshopper Mouse: 144 Tricolored Blackbird: 1390 Two-Striped Gartersnake: 207 Western Mastiff Bat: 2036 Western Pond Turtle: 1058 Western Spadefoot: 49 Yellow Warbler: 1607 Yellow-Breasted Chat: 4 Yuma Myotis: 1770 Non-tunnel American Badger: 182 Arroyo Toad: 14 Blainville's Horned Lizard: 87 Burrowing Owl: 1964 California Red-Legged Frog: 101 California Vole: 1947 Cooper's Hawk: 956 Desert Woodrat: 0 Ferruginous Hawk: 190 Golden Eagle: 1008 Lawrence's Goldfinch: 2091 Mohave Ground Squirrel: 38 Northern Harrier: 2246 Pallid Bat: 2252 Prairie Falcon: 2259 Rufous-Crowned Sparrow: 98 Silver-Haired Bat: 1873 Southern Grasshopper Mouse: 145 Tricolored Blackbird: 1968 Two-Striped Gartersnake: 116 Western Mastiff Bat: 2253 Western Pond Turtle: 1477 Western Spadefoot: 12 Yellow Warbler: 1386 Yellow-Breasted Chat: 17 Yuma Myotis: 1479 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Prairie Falcon Silvery Legless Lizard

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	<p>Prairie Falcon Silvery Legless Lizard Southern California Rufous-Crowned Sparrow Unarmored Threespine Stickleback Western Spadefoot</p> <p>Non-tunnel Arroyo Chub Bell's Sage Sparrow Big Free-Tailed Bat Coastal Horned Lizard Coastal California Gnatcatcher Least Bell's Vireo Prairie Falcon Southern California Rufous-Crowned Sparrow Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback Western Spadefoot</p> <p>Special-Status Plants (CNDDB Occurrences) Tunnel Southern Coast Live Oak Riparian Forest Southern Riparian Scrub</p> <p>Non-tunnel Davididson's Bush-Mallow Plummer's Mariposa-Lily Riversidean Alluvial Fan Sage Scrub Slender Mariposa-Lily Slender-Horned Spineflower Southern Coast Live Oak Riparian Forest Southern Riparian Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, Santa Susana Mountains/Simi Hills SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>Prairie Falcon Silvery Legless Lizard Southern California Rufous-Crowned Sparrow Unarmored Threespine Stickleback Western Spadefoot</p> <p>Non-tunnel Arroyo Chub Bell's Sage Sparrow Big Free-Tailed Bat Coastal Horned Lizard Coastal California Gnatcatcher Least Bell's Vireo Prairie Falcon Southern California Rufous-Crowned Sparrow Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback Western Spadefoot</p> <p>Special-Status Plants (CNDDB Occurrences) Tunnel Southern Coast Live Oak Riparian Forest Southern Riparian Scrub</p> <p>Non-tunnel Davididson's Bush-Mallow Plummer's Mariposa-Lily Riversidean Alluvial Fan Sage Scrub Slender Mariposa-Lily Slender-Horned Spineflower Southern Coast Live Oak Riparian Forest Southern Riparian Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, Santa Susana Mountains/Simi Hills SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>Non-tunnel Arroyo Chub Bell's Sage Sparrow Big Free-Tailed Bat Coastal Horned Lizard Coastal California Gnatcatcher Least Bell's Vireo Prairie Falcon Santa Ana Sucker Southern California Rufous-Crowned Sparrow Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback</p> <p>Special-Status Plants (CNDDB Occurrences) Tunnel Davidson's Bush-Mallow Nevin's Barberry Slender-Horned Spineflower Southern Coast Live Oak Riparian Forest Southern Riparian Scrub Southern Sycamore Alder Riparian Woodland</p> <p>Non-tunnel Plummer's Mariposa-Lily Riversidean Alluvial Fan Sage Scrub Slender Mariposa-Lily Slender-Horned Spineflower Southern Cottonwood Willow Riparian Forest Southern Riparian Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>
<p>Cultural Resources (Please note that for Cultural Resources there is a potential for both direct and indirect impacts to resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the</p>	<p>164 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 21 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>29 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale 	<p>164 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 21 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>29 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 4 of 29 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale Lang Southern Pacific Station, Lang East Branch of the California Aqueduct, Palmdale vicinity 	<p>146 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 21 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>28 previously recorded historic architectural resources are located within 150 feet of the approximate centerline of the alternative alignment.</p> <p>Only 3 of 28 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 100-foot buffer of the approximate centerline.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.)	2. Lang Southern Pacific Station, Lang 3. East Branch of the California Aqueduct, Palmdale vicinity 4. Lopez Adobe, San Fernando	4. Lopez Adobe, San Fernando	
Parklands ⁹ (Within 100 feet of the alignment)	<p>Tunnel</p> <ul style="list-style-type: none"> 84.2 acres (Includes: Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space) 0.7 acres of Angeles National Forest 0 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> 19.2 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial, Eastern Greenbelt Open Space, Rio Dulce, Whitney Elsmere Open Space) 	<p>Tunnel</p> <ul style="list-style-type: none"> 84.2 acres (Includes: Eastern Greenbelt Open Space, Elsmere Canyon Park, Whitney Canyon Park, Whitney Elsmere Open Space) 0.7 acres of Angeles National Forest 0 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> 20.0 acres (Includes: Agua Dulce Canyon Parkland, Bureau of Land Management Land, Cesar Chavez Memorial, Eastern Greenbelt Open Space, Lost Canyon River Trail Open Space, Rio Dulce, Whitney Elsmere Open Space) 	<p>Tunnel</p> <ul style="list-style-type: none"> 43.3 acres (Includes: Bureau of Land Management Land, Eastern Greenbelt Open Space, Hubert H. Humphrey Memorial Park, Rio Dulce, Roger Jessup Recreation Center, Unnamed site - Mountains Recreation and Conservation Authority) 134.3 acres of Angeles National Forest 55.8 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> 16.5 acres (Includes: Eastern Greenbelt Open Space, Rio Dulce, Unnamed site - Mountains Recreation and Conservation Authority) 11.1 acres of Angeles National Forest 11.1 acres of National Monument
Agricultural Lands ¹⁰ (Within 100 feet of the alignment)	<p>Tunnel</p> <ul style="list-style-type: none"> 77 acres of grazing land 4 acres of prime farmland <p>Non-tunnel</p> <ul style="list-style-type: none"> 19 acres of grazing land 4 acres of unique farmland 	<p>Tunnel</p> <ul style="list-style-type: none"> 77 acres of grazing land 4 acres of prime farmland <p>Non-tunnel</p> <ul style="list-style-type: none"> 19 acres of grazing land 4 acres of unique farmland 	<p>Tunnel</p> <ul style="list-style-type: none"> 63 acres of grazing land <p>Non-tunnel</p> <p>None</p>
Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013)..¹¹</p> <p>Minority Populations¹²</p> <p>The Los Angeles County 'minority' population average is 72.2 percent.¹³ The study area 'minority' population average is 84.2 percent. Since the study area 'minority' population average is greater than the Los Angeles County 'minority' population average, the overall alignment would have greater potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 8.9 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p>	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 83.7 percent. Since the study area 'minority' population average is greater than the Los Angeles County 'minority' population average, the overall alignment would have greater potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 8.8 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English</p>	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 66.0 percent. Since the study area 'minority' population average is less than the Los Angeles County 'minority' population average, the overall alignment would have less potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 10.2 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with</p>

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	<p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 19.3 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 20.9 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Greater potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty - Greater potential to encounter an EJ community of concern 	<p>proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 19.1 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 20.6 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Greater potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty - Greater potential to encounter an EJ community of concern 	<p>limited English proficiency is 17.6 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 20.2 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Lesser potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty – Greater potential to encounter an EJ community of concern
Community Resources Potentially Significant to Communities of Environmental Justice Concern	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 2 government facilities • 4 community group facilities • 4 social services facilities • 5 arts and recreation facilities • 16 municipal services facilities • 31 education facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 10 government facilities • 20 municipal services facilities • 24 public safety facilities • 40 arts and recreation facilities • 40 education facilities • 55 health and mental health facilities • 70 social services facilities • 136 community group facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 2 government facilities • 4 community group facilities • 5 arts and recreation facilities • 6 social services facilities • 16 municipal services facilities • 31 education facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 10 government facilities • 20 municipal services facilities • 24 public safety facilities • 40 arts and recreation facilities • 40 education facilities • 55 health and mental health facilities • 68 social services facilities • 136 community group facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 2 government facilities • 3 municipal services facilities • 3 public safety facilities • 8 community group facilities • 15 arts and recreation facilities • 24 social services facilities • 34 health and mental health facilities • 40 education facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 5 government facilities • 10 public safety facilities • 14 arts and recreation facilities • 14 health and mental health facilities • 19 education facilities • 26 municipal services facilities • 48 social services facilities • 129 community group facilities
Displacement of Community Resources Potentially Significant to Communities of Environmental	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 community group facility 	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 community group facility 	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 municipal services facility

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
Justice Concern ¹⁴	<ul style="list-style-type: none"> 1 municipal services facility 1 public safety facility 3 education facilities 5 social services facilities 9 health and mental health facilities <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 2 education facilities 	<ul style="list-style-type: none"> 1 municipal services facility 1 public safety facility 3 education facilities 5 social services facilities 9 health and mental health facilities <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 2 education facilities 	<ul style="list-style-type: none"> 1 education facility 1 social services facility 1 health and mental health facility <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 health and mental health facility 2 social services facilities 4 education facilities 6 arts and recreation facilities
Noise and Vibration	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 507</p> <p>Hotel – 7</p> <p>School – 2</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 21,717</p> <p>Animal Kennel – 1</p> <p>Cemetery – 3</p> <p>Church – 28</p> <p>Day Care – 5</p> <p>Hospital – 2</p> <p>Hotel – 40</p> <p>Library – 2</p> <p>Park – 12</p> <p>School – 33</p> <p>Senior Center/Nursing Home – 11</p> <p>Shelter – 2</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 474</p> <p>Hotel – 7</p> <p>School – 2</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 22,232</p> <p>Animal Kennel – 1</p> <p>Cemetery – 3</p> <p>Church – 28</p> <p>Day Care – 5</p> <p>Hospital – 2</p> <p>Hotel – 39</p> <p>Library – 2</p> <p>Park – 12</p> <p>School – 32</p> <p>Senior Center/Nursing Home – 11</p> <p>Shelter – 2</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 1,439</p> <p>Cemetery – 1</p> <p>Church – 1</p> <p>Hospital – 1</p> <p>Hotel – 4</p> <p>School – 2</p> <p>Senior Center/Nursing Home – 1</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 14,328</p> <p>Animal Kennel – 1</p> <p>Cemetery – 1</p> <p>Church – 23</p> <p>Day Care – 7</p> <p>Hospital – 1</p> <p>Hotel – 31</p> <p>Library – 2</p> <p>Park – 5</p> <p>School – 18</p> <p>Senior Center/Nursing Home – 7</p> <p>Shelter – 2</p>
<p>Change in Visual and Scenic Resources¹⁵</p> <p><u>Visual Character</u> The most potential for impacts to visual character is where the alignment has a high vertical profile such as viaduct.</p> <p><u>Views and Vistas</u> The presence of viaducts in the vicinity of areas with views and vistas would have the potential for adverse impacts.</p>	<p>Below is a summary of the potential visual impacts from each of the three alternatives considered in this analysis.</p> <p>SR14-1 – Approximately 57% would be visible.¹⁶ The alignment and track type would be the same as SR14-2 except in the vicinity of the Robinson Ranch Golf Course (Golf Course). SR14-1 would be tunneled near the Golf Course and thus have less visible track than SR14-2. This portion of the alignment would be visible from SR-14 and from recreators using the Golf Course. SR14-1, SR14-2, and SR 14 Refined would all have track visible from the Pacific Crest Trail. SR14-1 and SR14-2 would both be visible in San Fernando and Burbank as both alignments would travel aboveground. SR14-1 would have less potential for impacts to visual resources than SR14-2 because it would have less visible track and less visibility from Robinson Ranch Golf Club and from travelers on SR 14.¹⁷</p> <p>SR14-2 – Approximately 61% would be visible. It would have the same alignment and track type as SR14-1 except in the vicinity of the Robinson Ranch Golf Club. SR14-2 would have more track on viaduct than SR14-1 in the vicinity of the Golf Course, which would be visible to motorists along SR-14 and recreators at the golf course.</p> <p>SR 14 Refined – Approximately 45% would be visible. It would have a similar alignment and track type as SR14-1 and SR14-2 except in the vicinity of the Robinson Ranch Golf Course and in the approach to Burbank. SR 14 Refined would have the least amount of visible track as it would enter a tunnel before reaching the Robinson Ranch Golf Course and remain in a tunnel until reaching Burbank. SR 14 Refined would have the least potential for impacts to visual resources because it would have no visibility from the Golf Course, and the least visibility from travelers on SR-14 and from motorists and residents in San Fernando and Burbank.</p>		
Geological and Soil Constraints	<p>Tunnel</p> <ul style="list-style-type: none"> 1.7 miles are within 150 feet of CGS landslide hazard zones 0.1 miles are within a liquefaction zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 1.7 miles are within 150 feet of CGS landslide hazard zones 0.1 miles are within a liquefaction zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 1.9 miles are within 150 feet of CGS landslide hazard zones 0.1 miles are within a liquefaction zone

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
Geotechnical Constraints	<ul style="list-style-type: none"> 0.03 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 3 faults cross the alignment 0 miles are within Alquist-Priolo Fault Zones 1.9 miles are within inundation zones <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0 miles are within 150 feet of CGS landslide hazard zones 0.4 miles are within a liquefaction zone 2.5 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 7 faults cross the alignment 1.3 miles are within Alquist-Priolo Fault Zones 8.9 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>	<ul style="list-style-type: none"> 0.03 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 3 faults cross the alignment 0 miles are within Alquist-Priolo Fault Zones 1.9 miles are within inundation zones <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0 miles are within 150 feet of CGS landslide hazard zones 0.4 miles are within a liquefaction zone 2.5 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 7 faults cross the alignment 1.3 miles are within Alquist-Priolo Fault Zones 8.9 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>	<ul style="list-style-type: none"> 3.9 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 7 faults cross the alignment 0.9 miles are within Alquist-Priolo Fault Zones 4.7 miles are within inundation zones <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0.03 miles are within 150 feet of CGS landslide hazard zones 0.3 miles are within a liquefaction zone 0 miles are within 0.5 miles of a City of Los Angeles Methane Hazard Zone 5 faults cross the alignment 0.5 miles are within Alquist-Priolo Fault Zones 5.2 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>
Groundwater Resources Source of data: Perennial springs, seeps and streams – USGS NHD Sub-watersheds: Los Angeles County GIS Data Portal Domestic wells: County of Los Angeles DPW	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 9 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly above tunnel: 0 Miles of tunnel alignment within 1 mile of springs: 2.03 miles Miles of tunnel alignment between 1 and 2 miles of springs: 1.69 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 1.15 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 3.69 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 6.35 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 100-year flood zones: 0.69 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 9 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 Miles of non-tunnel alignment within 1 mile of springs: 0 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 0.39 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 5.66 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 6.6 miles Perennial streams directly crossed: 0 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 9 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly above tunnel: 0 Miles of tunnel alignment within 1 mile of springs: 2.03 miles Miles of tunnel alignment between 1 and 2 miles of springs: 1.69 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 0.26 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 2.94 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 4.72 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 100-year flood zones: 0.27 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 9 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 miles Miles of non-tunnel alignment within 1 mile of springs: 0 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 0.39 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 6.9 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 7.03 miles Perennial streams directly crossed: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 13.19 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Linear miles of non-tunnel alignment within 100-year flood zones: 4.1 miles 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 10 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly above tunnel: 0 Miles of tunnel alignment within 1 mile of springs: 2.03 miles Miles of tunnel alignment between 1 and 2 miles of springs: 2.8 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 4.87 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 7.76 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 7.64 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Linear miles of tunnel within 100-year flood zones: 0.45 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 7 out of 12 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 miles Miles of non-tunnel alignment within 1 mile of springs: 0 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 0.37 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 1.65 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 3.7 miles Perennial streams directly crossed: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 4.06 <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Linear miles of non-tunnel alignment within 100-year flood zones: 2.48 miles

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	<p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 11.5 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 3 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 100-year flood zones: 3.56 miles 		
Hazardous Materials	<p>Tunnel</p> <ul style="list-style-type: none"> 4.4 miles are within formations with naturally occurring oil 0.5 miles are within 1,000 linear feet of oil and gas wells 0.03 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. 2.2 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. Contaminated sites: <ul style="list-style-type: none"> Between Burbank Station and Osborne Street, approximately 210 contaminated sites (approximately 28 listed on Envirostor and 182 listed on Geotracker) are located within a ½ mile buffer of the proposed alignment. Approximately 24 of these sites are located within a ½ mile of proposed tunnels. The Envirostor listings for all of the sites include State Response, Voluntary Cleanup, School Cleanup, Evaluation, Military Sites, and Corrective Actions and do not include School Investigations, Military Evaluation, and Tiered Permits. The Geotracker listings for all of the sites include LUST, Cleanup Programs, and Land Disposal. They do not include Permitted USTs, Irrigated Lands, WDR Sites, and Oil & Gas Monitoring (addressed separately). In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. For the rest of the alignment, approximately 68 contaminated sites are located within a ½ mile buffer of alignment. Approximately 13 of these sites are located within a ½ mile of proposed tunnels. The San Fernando Valley Superfund Area 1 is located through approximately 3.16 miles of the alignment. Tunneling is proposed in approximately 0.63 miles of the 3.16 miles. The San Fernando Valley Superfund Area 2 is located through approximately 1.26 miles of the alignment. No tunneling is proposed in the area. <p>Non-Tunnel</p> <ul style="list-style-type: none"> 1.3 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.12 miles are within 50 linear feet of highways 11.8 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites <ul style="list-style-type: none"> Of the 210 contaminated sites located within a ½ mile buffer of the alignment between Burbank Station and Osborne Street, approximately 186 sites are located within a ½ mile buffer of the non-tunnel areas. In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 68 contaminated sites, approximately 55 sites are located within a ½ 	<p>Tunnel</p> <ul style="list-style-type: none"> 4.4 miles are within formations with naturally occurring oil 0.5 miles are within 1,000 linear feet of oil and gas wells 0.03 miles are within 50 linear feet of highways 1.96 miles are within 50 linear feet of rail alignments Contaminated sites: <ul style="list-style-type: none"> Same as SR14-1. <p>Non-Tunnel</p> <ul style="list-style-type: none"> 1.3 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.12 miles are within 50 linear feet of highways 12.5 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites: <ul style="list-style-type: none"> Same as SR14-1. 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.12 miles are within 50 linear feet of highways 2.4 miles are within 50 linear feet of rail alignments Contaminated sites: <ul style="list-style-type: none"> Between Burbank Station and Osborne Street, approximately 210 contaminated sites (approximately 28 listed on Envirostor and 182 listed on Geotracker) are located within a ½ mile buffer of the proposed alignment. Approximately 79 of these sites are located within a ½ mile of proposed tunnels. In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. For the rest of the alignment, approximately 24 contaminated sites are located within a ½ mile buffer of alignment. Approximately 21 of these sites are located within a ½ mile of proposed tunnels. The San Fernando Valley Superfund Area 1 is located through approximately 3.16 miles of the alignment. Tunneling is not proposed in the area. The San Fernando Valley Superfund Area 2 is located through approximately 1.26 miles of the alignment. Tunneling is not proposed in the area. <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.08 miles are within 50 linear feet of highways 5.28 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites: <ul style="list-style-type: none"> Of the approximately 210 contaminated sites located within a ½ mile buffer of the alignment between Burbank Station and Osborne Street, approximately 131 are located within a ½ mile buffer of the non-tunnel areas. In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 24 contaminated sites, approximately 3 sites are located within a ½ mile of the non-tunnel areas. San Fernando Valley Superfund Area 1 and Area 2 – same as SR14-1.

Measurement Criteria	SR 14 Corridor		
	SR14-1	SR14-2	SR 14 Refined
	<p>mile of the non-tunnel areas.</p> <ul style="list-style-type: none"> Non-tunneling is proposed in approximately 2.53 of the 3.16 miles of alignment located within the San Fernando Valley Superfund Area 1. The San Fernando Valley Superfund Area 2 is present through approximately 1.26 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. 		
Fire Risk	<p>Tunnel</p> <ul style="list-style-type: none"> 0.2 miles are within a high fire hazard severity zone 20.4 miles are within a very high fire hazard severity zone <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0.04 miles are within a high fire hazard severity zone 9.6 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0.2 miles are within a high fire hazard severity zone 18.8 miles are within a very high fire hazard severity zone <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0.04 miles are within a high fire hazard severity zone 11.3 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0.2 miles are within a high fire hazard severity zone 21.6 miles are within a very high fire hazard severity zone <p>Non-Tunnel</p> <ul style="list-style-type: none"> 0.02 miles are within a high fire hazard severity zone 6.7 miles are within a very high fire hazard severity zone
Agency and Public Input	As noted in the SAA document, since May 2014, the Authority has conducted numerous meetings and outreach activities with agencies, elected officials, media outlets, stakeholders, and the general public. Public input is mixed, with some preferring an SR 14 alternative over an East Corridor alternative, and others preferring an East Corridor alternative over an SR 14 alternative.		Public opinion about SR14 Refined has not yet been solicited.

Note: Throughout this evaluation table, particular measurement criteria are separated by tunnel and non-tunnel vertical profiles. For most measurement criteria, tunnel profiles, as compared to non-tunnel profiles, are anticipated to have no potential surface impacts.
Note: By preparing this alternatives analysis, the Authority is not waiving any rights it may have related to Surface Transportation Board jurisdiction and regulation of this proposed project under the Interstate Commerce Commission Termination Act of 1995, including that Act's preemptive effect on CEQA.

1 The USFS has developed a Land Management Plan for the Angeles National Forest that identifies land use zones. These uses range from Developed Areas Interface to Back Country to Critical Biological areas. The proposed alignments would be evaluated to ensure that conflict with the identified land uses in the Land Management Plan are minimized, for example, by utilizing existing access roads whenever possible. The future environmental documents will conduct a detailed analysis on the consistency of alignments alternatives with the Angeles National Forest Land Management Plan.

2 This analysis is based on a comparison of the alternative alignments and GIS data from the California Department of Transportation, "California Rail Network," last updated October 31, 2013, available for download here: http://www.dot.ca.gov/hq/tsip/gis/datalibrary/Metadata/Rail_13.html, accessed February 22, 2016.

3 This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files.

4 This analysis is based on GIS data from the California Department of Resources Recycling and Recovery (CalRecycle), this data is updated continuously, available for download here: <http://www.calrecycle.ca.gov/SWFacilities/Directory/Search.aspx#DOWNLOAD>, accessed February 22, 2016.

5 Section 4(f) will be applicable to all parks and recreational areas that are both publically owned and open to the public, while Section 6(f) will be applicable to lands acquired with Land and Water Conservation Act funds. Additionally, final determination of national, state, or local significance, the nature of Section 4(f) impacts, as well as determining if any of these lands were acquired with Land and Water Conservation Act funds will be determined in the environmental document.

6 The County of Los Angeles is currently reviewing SEA designations. If proposed SEAs are adopted by the County, then potential impacts from the HSR Project would be to the proposed acreages. Please note, proposed acres are not additive, if the proposed SEAs are adopted, then the potential impact numbers will be those listed under the proposed listing.

7 This table reflects the identification of several resource types near the centerline of proposed alignments as "tunnel" or "non-tunnel." Generally, few or no surface level effects are anticipated for "tunnel" sections, particularly where tunnels would be several hundred or more than one thousand feet below ground surface. Forthcoming environmental documentation, supported by ongoing geotechnical investigations, will help the Authority ascertain if any such surface level effects may occur.

8 Parklands analyses are based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of publicly owned and publicly accessible parklands within a 100 foot buffer of the alternative alignments.

9 This analysis is based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of parklands (all categories except facilities with no public access) within a 100 foot buffer of the alternative alignments.

10 This analysis is based on GIS data from the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP), available for download here: <http://www.conservation.ca.gov/dlrp/fmmp/products/Pages/DownloadGISdata.aspx>, accessed February 22, 2016. Acreages described were determined by calculating the amount of FMMP mapped land within a 100 foot buffer of the alternative alignments. The following categories of FMMP land were excluded from this analysis: "Urban and Built-Up Land", "Other Land", "Water", "Area not mapped."

11 In the 2010 Census, 2,728,321 people were identified as white and not Hispanic. Therefore, since 'minority' = (total population) – (white and not Hispanic), and the total population was 9,818,605; 7,090,284 people (72.2 percent of the total population) in Los Angeles county are considered to be a 'minority.'

12 'Minority' = Total population – white and not Hispanic

13 This is the countywide average: White and Hispanic countywide (2,208,278)/Hispanic population countywide (4,687,889) = 47.1 percent of the Hispanic population is also white.

14 This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files. Facilities in the following categories were considered in this analysis: arts and recreation, community groups, education, emergency response, government, health and mental health, municipal services, public safety, social services. To determine potential displacements, facilities on parcels that intersect a 100 foot buffer of the alignment centerline were considered.

15 Potential visual impacts associated with the SR-14 Corridor alignment alternatives are similar throughout the study area. This assessment focuses on a comparative analysis of areas where the three alignment alternatives diverge most in terms of 1) the location of the centerline – where one alternative might be closer to a sensitive visual resource than another, and 2) the proposed track type (viaduct, at-grade, or tunnel). For this analysis area, sensitive viewers are assumed to be residents and recreators. Therefore, residential areas and recreation sites and facilities within the project area represent sensitive viewing locations.

16 Percent visible: This is the percentage of the alignment alternative that is above ground versus tunneled. A higher percent visible corresponds to a higher potential impact to visual resources. Greater proportion of visible track type indicates the alternative has a higher probability to be seen, and that the design of the structure could contrast with surrounding visual character.

17 Sensitive Viewing Locations where the Project would be visible: Residential areas and recreation sites are assumed to be sensitive viewing locations for the proposed project. Sensitive viewing locations in areas where the alignment would be tunneled were not considered, since the alignment is assumed to not be visible at these locations. It should be noted that all SR14 Corridor alternatives would be tunneled (not visible) in the vicinity of the Angeles National Forest.

Detailed Evaluation Tables for E1 Originals vs. E1 Refined Alignment

Detailed Evaluation Tables

Table A2: E1 Alignment Alternative Detailed Evaluation Table

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
Design Objectives:			
Journey time (Palmdale to Burbank)	Baseline = 0 seconds	+6 seconds	+18 seconds
Total Length (Palmdale to Burbank)	41.2 miles	41.6 miles	42.2 miles
Intermodal Connections	Achieves the HSR objective of integrating HSR with existing intercity and regional rail routes at Palmdale and Burbank, provides a direct connection to Metrolink services.	Same as E1a	Same as E1a
Total Bored Tunnel Length	20.2 miles	22.0 miles	23.1 miles
Longest Bored Tunnel Length	13.8 miles	13.8 miles	16.8 miles
Operating Costs	TBD	TBD	TBD
Capital Costs (Excluding Right of Way Acquisition) *as compared to the baseline (SR14-2)	1.11	1.15	1.17
Constructability	Sierra Highway realignment at Lake Palmdale. Metrolink realignment at Lake Palmdale and Antelope Valley Line. Una Lake relocation. California Aqueduct Syphon would have to be extended because of direct impacts. Realignments of Sierra Highway, Angeles Forest Highway, SR14 on/off ramp and Metrolink just North of the Vincent Grade/Acton Metrolink station. Has a deep and long tunnel through the ANF mountainous areas which would present challenging construction access. Shallow tunnel beneath residential community's houses may require easements. Construction of trench next to airport facilities, closure of airport perimeter road and potential loss of aircraft parking bays.	Same as E1a except is east of Vincent substation so realignments around the Vincent Grade/Acton Metrolink station are not required. Additional tunnel and longer viaducts crossing south of Palmdale.	Same as E1a except for the following refinements: Minimum overburden (reduced groundwater pressure) Optimized fault crossings Optimized portal and potential intermediate access location
Land Use			
Consistency with other planning efforts ¹	<p>Existing Land Uses</p> <p>This alternative is inconsistent with existing land uses in the City of Palmdale where non-tunnel segments of the alignment would displace existing businesses, residences, and other land uses. The alignment also traverses through Una Lake.</p> <p>The alternative is inconsistent with existing land uses in unincorporated Los Angeles County where non-tunnel segments of the alignment would displace existing residences and, in other locations, run directly adjacent to existing residences.</p> <p>The alternative is inconsistent with existing land uses in the City of Los Angeles and City of Burbank where non-tunnel segments of the alignment would displace existing industrial, commercial, and residential land uses.</p> <p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the following plans, largely due to the required acquisition of parcels planned for future industrial, commercial, and residential land uses:</p> <ul style="list-style-type: none"> • City of Burbank General Plan • Burbank Center Plan (City of Burbank) • City of Los Angeles General Plan • City of Palmdale General Plan • Avenue S Corridor Area Plan (City of Palmdale) 	<p>Existing Land Uses</p> <p>Same as E1a.</p> <p>Planned Land Uses</p> <p>Same as E1a.</p>	<p>Existing Land Uses</p> <p>Same as E1a.</p> <p>Planned Land Uses</p> <p>Same as E1a.</p>

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<ul style="list-style-type: none"> Los Angeles County General Plan <p>In addition to planned land use patterns, this alternative would require a dramatic reconfiguration of the existing roadway network in the City of Palmdale. Therefore, this alternative is inconsistent with the City's General Plan Circulation Element.</p>		
Disruption to Communities			
Disruption to Existing Railroad ²	<p>Total number of places where the E1a alternative would cross and disrupt existing railroad lines: 7</p> <p>The E1a alternative would parallel existing railroad lines operated by Union Pacific and Metrolink in the City of Palmdale. This alternative first crosses an existing railroad line (operated by Union Pacific and Metrolink) near the southern city limit of the City of Palmdale, near the intersection of Avenue S East and Sierra Highway. The alignment crosses this railroad line again approximately a quarter mile south of Una Lake in unincorporated Los Angeles county. The third intersection is less than a half mile north of the existing Vincent Grade/Action Metrolink Station, in the community of Acton. Near the intersection of Branford Street and San Fernando Road in the city of Los Angeles, the E1a alternative crosses and begins to parallel an existing railroad line operated by Union Pacific and Metrolink. While closely paralleling this existing railroad line operated by Union Pacific and Metrolink, the E1a alternative alignment crosses existing railroad lines three more times before meeting the Burbank station.</p>	<p>Total number of places where the E1b alternative would cross and disrupt existing railroad lines: 7</p> <p>Same as E1a except the crossing near the existing Vincent Grade/Action Metrolink Station in the community of Acton would be approximately 3,200 feet northeast of the point where the E1a alternative crosses this existing railroad line operated by Union Pacific and Metrolink.</p>	<p>Total number of places where the E1 Refined alternative would cross and disrupt existing railroad lines: 5</p> <p>The northernmost three crossings would be the same as E1a. As the E1 Refined alignment begins to closely parallel an existing railroad line operated by Union Pacific and Metrolink, it crosses this line near the intersection of Sheldon Street and San Fernando Road in the city of Los Angeles. The alignment crosses another existing railroad line operated by Union Pacific and Metrolink in the city of Burbank near the intersection of North Victory Place and North Lake Street.</p>
Disruption to, and Relocation of, Utilities	<p>Relocation of a portion of the 12' wide open channel/boxed storm drain culvert (City of Burbank) will be necessary. This relocation will shift it to the other side of the existing Metrolink rail. It is parallel with the proposed Burbank station and the existing Metrolink tracks that run east-west.</p> <p>General local utility relocations will be necessary to facilitate the alignment; mostly water, sewer, gas, and drainage facilities.</p> <p>Greater overall impacts due to retaining wall/trenching along the alignment of several larger utilities, including 20" oil lines, 16" gas transmission lines, large storm drains (>48" gravity), and sanitary sewer lines (gravity).</p>	Same as E1a for all	Same as E1a for all
Residential Easements and/or Displacements (within 100 feet on either side of the centerline)	<p>Tunnel</p> <ul style="list-style-type: none"> 9 multi-family 304 single-family 	<p>Tunnel</p> <ul style="list-style-type: none"> 12 multi-family 311 single-family 	<p>Tunnel</p> <ul style="list-style-type: none"> 14 multi-family 918 single-family
Residential Easements and/or Displacements (within 100 feet on either side of the centerline)	<p>Non-tunnel</p> <ul style="list-style-type: none"> 11 multi-family 82 single-family 	<p>Non-tunnel</p> <ul style="list-style-type: none"> 10 multi-family 72 single-family 	<p>Non-tunnel</p> <ul style="list-style-type: none"> 9 multi-family 79 single-family
Business Easements and/or Displacements (within 100 feet on either side of the centerline)	<p>Tunnel</p> <ul style="list-style-type: none"> 15 commercial parcels 33 industrial parcels 	<p>Tunnel</p> <ul style="list-style-type: none"> 16 commercial parcels 33 industrial parcels 	<p>Tunnel</p> <ul style="list-style-type: none"> 47 commercial parcels 49 industrial parcels
Business Easements and/or Displacements (within 100 feet on either side of the centerline)	<p>Non-tunnel</p> <ul style="list-style-type: none"> 135 commercial parcels 171 industrial parcels 	<p>Non-tunnel</p> <ul style="list-style-type: none"> 135 commercial parcels 172 industrial parcels 	<p>Non-tunnel</p> <ul style="list-style-type: none"> 137 commercial parcels 169 industrial parcels
Proximity to Schools (Within 1,500 feet on either side of the centerline)	<p>Tunnel</p> <ul style="list-style-type: none"> Total: 9 Includes: <ul style="list-style-type: none"> 1 special curriculum school/program facility 	<p>Tunnel</p> <ul style="list-style-type: none"> Total: 9 Includes: <ul style="list-style-type: none"> 1 special curriculum school/program facility 	<p>Tunnel</p> <ul style="list-style-type: none"> Total: 10 Includes: <ul style="list-style-type: none"> 1 public school facility

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
centerline) ³	<ul style="list-style-type: none"> o 1 early childhood education and head start facility o 2 guidance and tutoring program facilities o 2 private/charter school facilities o 3 adult education facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • Total: 8 • Includes: <ul style="list-style-type: none"> o 1 public high school facility o 1 private/charter school facility o 3 public elementary school facilities • 3 college/university facilities 	<ul style="list-style-type: none"> o 1 early childhood education and head start facility o 2 guidance and tutoring program facilities o 2 private/charter school facilities o 3 adult education facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • Total: 8 • Includes: <ul style="list-style-type: none"> o 1 public high school facility o 1 private/charter school facility o 3 public elementary school facilities • 3 college/university facilities 	<ul style="list-style-type: none"> o 1 public middle school facility o 1 special curriculum school/program facility o 2 early childhood education and head start facilities o 2 guidance and tutoring program facilities o 3 private/charter school facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • Total: 9 • Includes: <ul style="list-style-type: none"> o 1 private/charter school facility o 2 public high school facilities o 3 college/university facilities • 3 public elementary school facilities
Proximity to Landfills (Within ¼-mile on either side of the centerline) ⁴	<p>Tunnel</p> <ul style="list-style-type: none"> • 1 active composting facility • 1 closed disposal facility • 2 active transfer/processing facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 2 closed disposal facilities • 10 active transfer/processing facilities 	<p>Tunnel</p> <ul style="list-style-type: none"> • 1 active composting facility • 1 closed disposal facility • 2 active transfer/processing facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 2 closed disposal facilities • 10 active transfer/processing facilities 	<p>Tunnel</p> <ul style="list-style-type: none"> • 1 active composting facility • 2 closed disposal facility • 4 active transfer/processing facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 active transfer/processing facilities
Highway Grade Separations and Closures	10 grade separations 9 roadway realignments.	8 grade separations, 8 roadway realignments.	8 grade separations
Environmental Resources			
Potential Section 4(f) (Please note that for Cultural Resources there is a potential for both direct and indirect impacts to resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.) ^{5, 6, 7}	<p>Cultural Resources</p> <p>12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>21 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest <p>Parklands⁸</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon) • 303.9 acres of Angeles National Forest • 119.2 acres of National Monument • <p>Non-tunnel</p> <ul style="list-style-type: none"> • 9.1 acres of Bureau of Land Management Land 	<p>Cultural Resources</p> <p>12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>21 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest <p>Parklands</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon) • 315.7 acres of Angeles National Forest • 131.3 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> • 9.1 acres of Bureau of Land Management Land 	<p>Cultural Resources</p> <p>12 previously recorded Archaeological Sites are located within the archaeology study area (inclusive of project alignment approximate centerline and a 100-foot buffer). previously recorded historic architectural resources are located within 150 feet of the approximate centerline of the alternative alignment.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest <p>Parklands</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 3.1 acres (Includes: Hubert H. Humphrey Memorial Park, Roger Jessup Recreation Center) • 365.9 acres of Angeles National Forest • 157.6 acres of National Monument <p>Non-tunnel</p> <p>No impacts to parklands</p>
Biological/Aquatic Resources Potential impacts are calculated using the following distances: Plants: 100-feet Aquatic Resources: 250-ft	<p>Aquatic Resources</p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0 acre Reservoirs: 0.4 acre Streams, Creeks, Canals: 3.7 miles Wetland Habitat: 18.8 acres</p>	<p>Aquatic Resources</p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0 acre Reservoirs: 0.4 acre Streams, Creeks, Canals: 4.2 miles Wetland Habitat: 18.8 acres</p>	<p>Aquatic Resources</p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0.8 acre Reservoirs: 9.0 acres Streams, Creeks, Canals: 5.4 miles Wetland Habitat: 27.3 acres</p>

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
Wildlife: 1,000-ft	<p>Non-tunnel Lakes, Ponds, Rivers: 3.6 acres Reservoirs: 0 acres Streams, Creeks, Canals: 5.5 miles Wetland Habitat: 7.7 acres</p> <p>Biological Resources Critical Habitat (acres) Non-tunnel Arroyo Toad: 7</p> <p>Special-Status Wildlife (CWHR, acres) Tunnel American Badger: 143 Arroyo Toad: 4 Blainville's Horned Lizard: 30 Burrowing Owl: 1,004 California Red-Legged Frog: 185 California Vole: 1,009 Cooper's Hawk: 257 Desert Woodrat: 74 Ferruginous Hawk: 123 Golden Eagle: 259 Lawrence's Goldfinch: 1,152 Mohave Ground Squirrel: 0 Northern Harrier: 1,048 Pallid Bat: 1,263 Prairie Falcon: 1,263 Rufous-Crowned Sparrow: 57 Silver-Haired Bat: 1,264 Southern Grasshopper Mouse: 61 Tricolored Blackbird: 945 Two-Striped Gartersnake: 229 Western Mastiff Bat: 1,220 Western Pond Turtle: 1,180 Western Spadefoot: 44 Yellow Warbler: 1,146 Yellow-Breasted Chat: 0 Yuma Myotis: 1,202</p> <p>Non-tunnel American Badger: 338 Arroyo Toad: 1 Blainville's Horned Lizard: 170 Burrowing Owl: 3,351 California Red-Legged Frog: 190 California Vole: 2,402 Cooper's Hawk: 1,116 Desert Woodrat: 0 Ferruginous Hawk: 331 Golden Eagle: 1,137</p>	<p>Non-tunnel Lakes, Ponds, Rivers: 3.6 acres Reservoirs: 0 acres Streams, Creeks, Canals: 5.5 miles Wetland Habitat: 7.4 acres</p> <p>Biological Resources Critical Habitat (acres) Non-tunnel Arroyo Toad: 7</p> <p>Special-Status Wildlife (CWHR, acres) Tunnel American Badger: 299 Arroyo Toad: 13 Blainville's Horned Lizard: 174 Burrowing Owl: 1,004 California Red-Legged Frog: 329 California Vole: 1,150 Cooper's Hawk: 408 Desert Woodrat: 83 Ferruginous Hawk: 279 Golden Eagle: 413 Lawrence's Goldfinch: 1,294 Mohave Ground Squirrel: 0 Northern Harrier: 1,202 Pallid Bat: 1,417 Prairie Falcon: 1,417 Rufous-Crowned Sparrow: 201 Silver-Haired Bat: 1,418 Southern Grasshopper Mouse: 214 Tricolored Blackbird: 945 Two-Striped Gartersnake: 373 Western Mastiff Bat: 1,374 Western Pond Turtle: 1,180 Western Spadefoot: 44 Yellow Warbler: 1,144 Yellow-Breasted Chat: 0 Yuma Myotis: 1,353</p> <p>Non-tunnel American Badger: 266 Arroyo Toad: 1 Blainville's Horned Lizard: 115 Burrowing Owl: 2,357 California Red-Legged Frog: 133 California Vole: 2,281 Cooper's Hawk: 992 Desert Woodrat: 0 Ferruginous Hawk: 260 Golden Eagle: 998</p>	<p>Non-tunnel Lakes, Ponds, Rivers: 3.2 acres Reservoirs: 0 acres Streams, Creeks, Canals: 5.2 miles Wetland Habitat: 7.9 acres</p> <p>Biological Resources Critical Habitat (acres) No impacts to critical habitat</p> <p>Special-Status Wildlife (CWHR, acres) Tunnel American Badger: 246 Arroyo Toad: 14 Blainville's Horned Lizard: 110 Burrowing Owl: 1,482 California Red-Legged Frog: 130 California Vole: 1,510 Cooper's Hawk: 258 Desert Woodrat: 28 Ferruginous Hawk: 218 Golden Eagle: 196 Lawrence's Goldfinch: 1,491 Mohave Ground Squirrel: 0 Northern Harrier: 1,603 Pallid Bat: 1,750 Prairie Falcon: 1,747 Rufous-Crowned Sparrow: 41 Silver-Haired Bat: 1,751 Southern Grasshopper Mouse: 53 Tricolored Blackbird: 1,354 Two-Striped Gartersnake: 168 Western Mastiff Bat: 1,703 Western Pond Turtle: 1,531 Western Spadefoot: 41 Yellow Warbler: 1,516 Yellow-Breasted Chat: 2 Yuma Myotis: 1,620</p> <p>Non-tunnel American Badger: 205 Arroyo Toad: 0 Blainville's Horned Lizard: 124 Burrowing Owl: 1,987 California Red-Legged Frog: 141 California Vole: 2,018 Cooper's Hawk: 1,033 Desert Woodrat: 0 Ferruginous Hawk: 203 Golden Eagle: 1,048 Lawrence's Goldfinch: 2,159</p>

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<p>Lawrence's Goldfinch: 2,540 Mohave Ground Squirrel: 38 Northern Harrier: 2,759 Pallid Bat: 2,754 Prairie Falcon: 2,764 Rufous-Crowned Sparrow: 196 Silver-Haired Bat: 2,368 Southern Grasshopper Mouse: 239 Tricolored Blackbird: 2,281 Two-Striped Gartersnake: 208 Western Mastiff Bat: 2,755 Western Pond Turtle: 1,624 Western Spadefoot: 15 Yellow Warbler: 1,717 Yellow-Breasted Chat: 1 Yuma Myotis: 1,925</p> <p>Special-Status Wildlife (CNDDDB Occurrences) <i>Tunnel</i> (None listed)</p> <p><i>Non-tunnel</i> Big Free-Tailed Bat Crotch Bumble Bee Least Bell's Vireo Rosy Boa Silvery Legless Lizard Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow Nevin's Barberry Plummer's Mariposa-Lily Slender-horned Spineflower</p> <p><i>Non-tunnel</i> (None listed)</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>Lawrence's Goldfinch: 2,418 Mohave Ground Squirrel: 38 Northern Harrier: 2,622 Pallid Bat: 2,617 Prairie Falcon: 2,628 Rufous-Crowned Sparrow: 139 Silver-Haired Bat: 2,230 Southern Grasshopper Mouse: 182 Tricolored Blackbird: 2,287 Two-Striped Gartersnake: 151 Western Mastiff Bat: 2,618 Western Pond Turtle: 1,627 Western Spadefoot: 15 Yellow Warbler: 1,649 Yellow-Breasted Chat: 1 Yuma Myotis: 1,800</p> <p>Special-Status Wildlife (CNDDDB Occurrences) <i>Tunnel</i> Coast Horned Lizard</p> <p><i>Non-tunnel</i> Big Free-Tailed Bat Coast Horned Lizard Crotch Bumble Bee Least Bell's Vireo Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow Nevin's Barberry Plummer's Mariposa-Lily Slender-Horned Spineflower</p> <p><i>Non-tunnel</i> (None listed)</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>Mohave Ground Squirrel: 38 Northern Harrier: 2,303 Pallid Bat: 2,292 Prairie Falcon: 2,306 Rufous-Crowned Sparrow: 148 Silver-Haired Bat: 1,903 Southern Grasshopper Mouse: 187 Tricolored Blackbird: 1,991 Two-Striped Gartersnake: 159 Western Mastiff Bat: 2,293 Western Pond Turtle: 1,246 Western Spadefoot: 12 Yellow Warbler: 1,381 Yellow-Breasted Chat: 0 Yuma Myotis: 1,540</p> <p>Special-Status Wildlife (CNDDDB Occurrences) <i>Tunnel</i> (None listed)</p> <p><i>Non-tunnel</i> Big Free-Tailed Bat Least Bell's Vireo Rosy Boa Silvery Legless Lizard Tricolored Blackbird Loggerhead Shrike</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow Nevin's Barberry Slender-Horned Spineflower</p> <p><i>Non-tunnel</i> (None listed)</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>
Cultural Resources (Please note that for Cultural Resources there is a potential for both direct and	Archaeological Resources 72 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.	Archaeological Resources 72 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.	Archaeological Resources 72 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
indirect impacts to resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.)	<p>Architectural Resources</p> <p>21 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest 	<p>Architectural Resources</p> <p>21 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest 	<p>Architectural Resources</p> <p>21 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 21 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All four NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> 1. Palmdale Ditch, Palmdale 2. East Branch of the California Aqueduct, Palmdale vicinity 3. Angeles National Forest
Parklands ⁹ (Within 100 feet of the alignment)	<p>Parklands</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon) • 303.9 acres of Angeles National Forest • 119.2 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> • 9.1 acres of Bureau of Land Management Land 	<p>Parklands</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 10.0 acres (Includes: David M. Gonzales Recreation Center, Lopez Canyon) • 315.7 acres of Angeles National Forest • 131.3 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> • 9.1 acres of Bureau of Land Management Land 	<p>Parklands</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 3.1 acres (Includes: Hubert H. Humphrey Memorial Park, Roger Jessup Recreation Center) • 365.9 acres of Angeles National Forest • 157.6 acres of National Monument <p>Non-tunnel</p> <p>No impacts to parklands</p> <ul style="list-style-type: none"> •
Agricultural Lands (Within 100 feet of the alignment) ¹⁰	<p>Tunnel</p> <ul style="list-style-type: none"> • 29 acres of grazing land <p>Non-tunnel</p> <p>None</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 29 acres of grazing land <p>Non-tunnel</p> <p>None</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 46 acres of grazing land • 8 acres of prime farmland <p>Non-tunnel</p> <p>None</p>
Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).¹¹</p> <p>Minority Populations^{12, 13}</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 72.6 percent. Since the study area 'minority' population average is greater than the Los Angeles County 'minority' population average, the overall alignment would have greater potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 9.8 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming</p>	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 72.6 percent. Since the study area 'minority' population average is greater than the Los Angeles County 'minority' population average, the overall alignment would have greater potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 9.8 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze</p>	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 66.0 percent. Since the study area 'minority' population average is less than the Los Angeles County 'minority' population average, the overall alignment would have less potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 10.3 percent. Since the study area 'elderly' population average is less than the Los Angeles County 'elderly' population average, the overall alignment would have less potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p>

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<p>environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 17.1 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 21.6 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Greater potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty - Greater potential to encounter an EJ community of concern 	<p>potential surface-level effects to such communities.</p> <p>Limited English Proficiency The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 17.1 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 21.6 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Greater potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty – Greater potential to encounter an EJ community of concern 	<p>Limited English Proficiency The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 17.5 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 20.1 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> • Minority Percentage – Lesser potential to encounter an EJ community of concern • Elderly Percentage – Lesser potential to encounter an EJ community of concern • LEP – Greater potential to encounter an EJ community of concern • Poverty Greater potential to encounter an EJ community of concern
Community Resources Potentially Significant to Communities of Environmental Justice Concern ¹⁴	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 1 government facility • 3 public safety facilities • 4 municipal services facilities • 11 community group facilities • 12 arts and recreation facilities • 20 education facilities • 20 health and mental health facilities • 34 social services facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 7 government facilities • 17 arts and recreation facilities • 17 public safety facilities • 20 health and mental health facilities • 25 municipal services facilities • 27 community group facilities • 30 education facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 1 government facility • 3 public safety facilities • 4 municipal services facilities • 11 community group facilities • 12 arts and recreation facilities • 20 education facilities • 20 health and mental health facilities • 34 social services facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 7 government facilities • 17 public safety facilities • 19 arts and recreation facilities • 20 health and mental health facilities • 25 municipal services facilities • 27 community group facilities • 30 education facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> • 1 government facility • 2 public safety facilities • 3 municipal services facilities • 10 community group facilities • 20 education facilities • 21 arts and recreation facilities • 28 social services facilities • 33 health and mental health facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> • 1 emergency response facility • 7 government facilities • 15 arts and recreation facilities • 17 health and mental health facilities • 17 public safety facilities • 24 municipal services facilities • 29 education facilities • 32 community group facilities

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<ul style="list-style-type: none"> 56 social services facilities 	<ul style="list-style-type: none"> 56 social services facilities 	<ul style="list-style-type: none"> 58 social services facilities
Displacement of Community Resources Potentially Significant to Communities of Environmental Justice Concern	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 social services facility 1 municipal services facility 1 arts and recreation facility 6 health and mental health facilities <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 education facility 2 community group facilities 3 arts and recreation facilities 	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 social services facility 1 municipal services facility 1 arts and recreation facility 6 health and mental health facilities <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 education facility 2 community group facilities 3 arts and recreation facilities 	<p>The following community resources are located within the 100-feet from center of alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 arts and recreation facility 1 education facility 1 health and mental health facility 1 municipal services facility 1 social services facility <p>The following community resources are located within the 100-feet from center of alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 health and mental health facility 2 social services facilities 4 education facilities 11 arts and recreation facilities
Noise and Vibration	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 928</p> <p>Cemetery – 1</p> <p>Church – 2</p> <p>Park – 1</p> <p>School – 2</p> <p>Senior Center/Nursing Home – 2</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 13,288</p> <p>Animal Kennel – 1</p> <p>Cemetery – 1</p> <p>Church – 20</p> <p>Day Care – 7</p> <p>Hospital – 2</p> <p>Hotel – 33</p> <p>Library – 2</p> <p>Park – 7</p> <p>School – 21</p> <p>Senior Center/Nursing Home – 7</p> <p>Shelter – 2</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 924</p> <p>Cemetery – 1</p> <p>Park – 1</p> <p>School – 1</p> <p>Senior Center/Nursing Home – 2</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 13,338</p> <p>Animal Kennel – 2</p> <p>Cemetery – 1</p> <p>Church – 20</p> <p>Day Care – 7</p> <p>Hospital – 2</p> <p>Hotel – 33</p> <p>Library – 2</p> <p>Park – 7</p> <p>School – 21</p> <p>Senior Center/Nursing Home – 7</p> <p>Shelter – 2</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 1,331</p> <p>Cemetery – 1</p> <p>Hotel – 4</p> <p>Senior Center/Nursing Home – 1</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 14,324</p> <p>Animal Kennel – 1</p> <p>Cemetery – 1</p> <p>Church – 23</p> <p>Day Care – 7</p> <p>Hospital – 1</p> <p>Hotel – 31</p> <p>Library – 2</p> <p>Park – 5</p> <p>School – 17</p> <p>Senior Center/Nursing Home – 7</p> <p>Shelter – 2</p>
Change in Visual and Scenic Resources ¹⁵ <u>Visual Character</u> The most potential for impacts to visual character is where the alignment has a high vertical profile such as viaduct. <u>Views and Vistas</u> The presence of viaducts in the	<p>Below is a summary of the potential visual impacts from each of the three alternatives considered in this analysis.</p> <p>E1a – Approximately 51% would be visible.¹⁶ E1a would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale.. E1a and E1b only diverge south of Palmdale near Acton. Where the two diverge, E1a would have slightly more visibility due to the extent of trenched and viaduct track type (compared only to E1b)</p> <p>E1b – Approximately 47% would be visible. It would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale, but the alignment would be further east of E1a southeast of the Acton area. A larger proportion of E1b would be tunnel or trenched in this area as compared to E1a, thus contributing to the lower overall percentage of visible track than E1a. The visible track in the Acton area travels through areas of similar existing visual character, so there are no high priority differences between views of either proposed track alignments. Both E1a and E1b would be tunneled within the boundaries of the Angeles National Forest, and both would share similar centerline and track types within developed areas of Burbank.</p> <p>E1 Refined - Approximately 45% would be visible. It would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale, and would have the same alignment and track as E1a in the Acton area, and thus would be more visible than E1b in this area. The E1 Refined alignment would then travel further southeast and in more extensive tunnels than E1a and E1b in Unincorporated Los Angeles County, resulting in slightly less overall visibility than E1a. E-1 Refined would be tunneled within the boundaries of the Angeles National Forest similar to E1a and E1b, and would share similar centerline and track types within developed areas of Burbank.</p>		

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
vicinity of areas with views and vistas would have the potential for adverse impacts.			
Geological and Soil Constraints Geotechnical Constraints	<p>Tunnel</p> <ul style="list-style-type: none"> • 1.03 miles are within 150 feet of CGS landslide hazard zones • 0.12 miles are within a liquefaction zone • 2.07 miles are within 0.5 miles of a Methane Producing Landfill • 9 faults cross the alignment • 0.93 miles are within Alquist-Priolo Fault Zones • 3.44 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.96 miles are within 150 feet of CGS landslide hazard zones • 0.95 miles are within a liquefaction zone • 1.59 miles are within 0.5 miles of a Methane Producing Landfill • 4 faults cross the alignment • 0.52 miles are within Alquist-Priolo Fault Zones • 7.46 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 2.57 miles are within 150 feet of CGS landslide hazard zones • 0.05 miles are within a liquefaction zone • 2.07 miles are within 0.5 miles of a Methane Producing Landfill • 9 faults cross the alignment • 0.93 miles are within Alquist-Priolo Fault Zones • 3.44 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.97 miles are within 150 feet of CGS landslide hazard zones • 0.82 miles are within a liquefaction zone • 1.59 miles are within 0.5 miles of a Methane Producing Landfill • 4 faults cross the alignment • 0.52 miles are within Alquist-Priolo Fault Zones • 7.47 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 0.72 miles are within 150 feet of CGS landslide hazard zones • 0.04 miles are within a liquefaction zone • 3.86 miles are within 0.5 miles of a Methane Producing Landfill • 6 faults cross the alignment • 1.3 miles are within Alquist-Priolo Fault Zones • 4.4 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.42 miles are within 150 feet of CGS landslide hazard zones • 0.67 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 4 faults cross the alignment • 0.52 miles are within Alquist-Priolo Fault Zones • 5.3 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards and methane mitigation.</p>
Groundwater Resources Source of data: Perennial springs, seeps and streams – USGS NHD Sub-watersheds: Los Angeles County GIS Data Portal Domestic wells: County of Los Angeles DPW	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 3 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 8 out of 11 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0; however, one spring is located less than 10 feet from the alignment. • Miles of tunnel alignment within 1 mile of springs: 9.53 miles • Miles of tunnel alignment between 1 and 2 miles of springs: 6.05 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of perennial streams: 5.2 miles • Miles of tunnel alignment between 1 and 2 miles of perennial streams: 9.53 miles • Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of active groundwater wells: 5.11 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 100-year flood zones: 0.0 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 7 out of 11 total subwatersheds in the alignment 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 9 out of 11 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0; however, one spring is located less than 10 feet from the alignment. • Miles of tunnel alignment within 1 mile of springs: 9.22 miles • Miles of tunnel alignment between 1 and 2 miles of springs: 8.19 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of perennial streams: 5.2 miles • Miles of tunnel alignment between 1 and 2 miles of perennial streams: 9.9 miles • Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of active groundwater wells: 5.11 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 100-year flood zones: 0.0 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 7 out of 11 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly crossed: 0 • Miles of non-tunnel alignment within 1 mile of springs: 2.03 miles • Miles of non-tunnel alignment between 1 and 2 miles of springs: 3.71 miles 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 3 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 7 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0 • Miles of tunnel alignment within 1 mile of springs: 5.32 miles • Miles of tunnel alignment between 1 and 2 miles of springs: 12.16 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of perennial streams: 7.67 miles • Miles of tunnel alignment between 1 and 2 miles of perennial streams: 8.94 miles • Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 1 mile of active groundwater wells: 7.55 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of tunnel alignment within 100-year flood zones: 0.02 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 7 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly crossed: 0 • Miles of non-tunnel alignment within 1 mile of springs: 1.99 miles • Miles of non-tunnel alignment between 1 and 2 miles of springs: 3.47 miles

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<p>the alignment</p> <p>Springs</p> <ul style="list-style-type: none"> • Springs directly crossed: 0 • Miles of non-tunnel alignment within 1 mile of springs: 2.93 miles • Miles of non-tunnel alignment between 1 and 2 miles of springs: 4.41 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of perennial streams: 2.43 miles • Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.61 miles • Perennial streams directly crossed: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of active groundwater wells: 5.6 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 100-year flood zones: 2.74 miles 	<p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of perennial streams: 2.43 miles • Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.74 miles • Perennial streams directly crossed: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of active groundwater wells: 5.61 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 100-year flood zones: 2.6 miles 	<p>Perennial Streams</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of perennial streams: 1.01 miles • Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.56 miles • Perennial streams directly crossed: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 1 mile of active groundwater wells: 4.06 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> • Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> • Miles of non-tunnel alignment within 100-year flood zones: 2.44 miles
Hazardous Materials	<p>Tunnel</p> <ul style="list-style-type: none"> • 0.14 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.05 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. • 0.69 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. • Contaminated sites: <ul style="list-style-type: none"> ○ Between Burbank Station and Osborne Street, approximately 210 contaminated sites (28 listed on Envirostor and 182 listed on Geotracker) are located within a ½ mile buffer of the proposed alignment. Approximately 28 of these sites are located within a ½ mile of proposed tunnels. The Envirostor listings for all of the sites include State Response, Voluntary Cleanup, School Cleanup, Evaluation, Military Sites, and Corrective Actions and do not include School Investigations, Military Evaluation, and Tiered Permits. The Geotracker listings for all of the sites include LUST, Cleanup Programs, and Land Disposal. They do not include Permitted USTs, Irrigated Lands, WDR Sites, and Oil & Gas Monitoring (addressed separately). ○ In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. ○ For the rest of the alignment, approximately 24 contaminated sites are located within a ½ mile buffer of alignment. Approximately 20 of these sites are located within a ½ mile of proposed tunnels. <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.05 miles are within 50 linear feet of highways • 7.08 miles are within 50 linear feet of rail alignments • Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. • Contaminated sites 	<p>Tunnel</p> <ul style="list-style-type: none"> • 0.14 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.05 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. • 0.69 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. • Contaminated sites: <ul style="list-style-type: none"> ○ Between Burbank Station and Osborne Street, approximately 210 contaminated sites (28 listed on Envirostor and 182 listed on Geotracker) are located within a ½ mile buffer of the proposed alignment. Approximately 28 of these sites are located within a ½ mile of proposed tunnels. ○ In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. ○ For the rest of the alignment, approximately 24 contaminated sites are located within a ½ mile buffer of alignment. Approximately 21 of these sites are located within a ½ mile of proposed tunnels. <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.05 miles are within 50 linear feet of highways • 7.0 miles are within 50 linear feet of rail alignments • Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. • Contaminated sites: <ul style="list-style-type: none"> ○ Of the approximately 210 contaminated sites located within a ½ mile buffer of the alignment between Burbank Station and Osborne Street, approximately 182 are located within a ½ mile buffer of the non-tunnel areas. ○ In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. ○ For the rest of the alignment, of the approximately 24 contaminated sites, approximately 3 sites are located within a ½ mile of the non-tunnel areas. ○ San Fernando Valley Superfund Area 1 and Area 2 – same as E1a. 	<p>Tunnel</p> <ul style="list-style-type: none"> • 0 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.09 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. • 2.36 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. • Contaminated sites: <ul style="list-style-type: none"> ○ Between Burbank Station and Osborne Street, approximately 210 contaminated sites (28 listed on Envirostor and 182 listed on Geotracker) are located within a ½ mile buffer of the proposed alignment. Approximately 73 of these sites are located within a ½ mile of proposed tunnels. ○ In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. ○ For the rest of the alignment, approximately 18 contaminated sites are located within a ½ mile buffer of alignment. Approximately 16 of these sites are located within a ½ mile of proposed tunnels. <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0 miles are within formations with naturally occurring oil • 0 miles are within 1,000 linear feet of oil and gas wells • 0.05 miles are within 50 linear feet of highways • 5.43 miles are within 50 linear feet of rail alignments • Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. • Contaminated sites: <ul style="list-style-type: none"> ○ Of the approximately 210 contaminated sites located within a ½ mile buffer of the alignment between Burbank Station and Osborne Street, approximately 137 are located within a ½ mile buffer of the non-tunnel areas. ○ In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. ○ For the rest of the alignment, of the approximately 18 contaminated sites, approximately 2 sites are located within a ½ mile of the non-tunnel areas. ○ The San Fernando Valley Superfund Area 1 is present through approximately 3.16 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. ○ The San Fernando Valley Superfund Area 2 is present through approximately 1.89 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area.

Table A-2: E1 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E1a	E1b	E1 Refined
	<ul style="list-style-type: none"> Of the 210 contaminated sites located within a ½ mile buffer of the alignment between Burbank Station and Osborne Street, approximately 182 sites are located within a ½ mile buffer of the non-tunnel areas. In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 24 contaminated sites, approximately 4 sites are located within a ½ mile of the non-tunnel areas. The San Fernando Valley Superfund Area 1 is present through approximately 3.16 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. The San Fernando Valley Superfund Area 2 is present through approximately 1.26 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. 		
Fire Risk	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 17.36 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.29 miles are within a high fire hazard severity zone 8.1 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 19.2 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.36 miles are within a high fire hazard severity zone 6.61 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 19.92 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.29 miles are within a high fire hazard severity zone 6.45 miles are within a very high fire hazard severity zone
Agency and Public Input	TBD		TBD

Note: Throughout this evaluation table, particular measurement criteria are separated by tunnel and non-tunnel vertical profiles. For most measurement criteria, tunnel profiles, as compared to non-tunnel profiles, are anticipated to have no potential surface impacts.

Note: By preparing this alternatives analysis, the Authority is not waiving any rights it may have related to Surface Transportation Board jurisdiction and regulation of this proposed project under the Interstate Commerce Commission Termination Act of 1995, including that Act's preemptive effect on CEQA.

¹ The USFS has developed a Land Management Plan for the Angeles National Forest that identifies land use zones. These uses range from Developed Areas Interface to Back Country to Critical Biological areas. The proposed alignments would be evaluated to ensure that conflict with the identified land uses in the Land Management Plan are minimized, for example, by utilizing existing access roads whenever possible. The future environmental documents will conduct a detailed analysis on the consistency of alignments alternatives with the Angeles National Forest Land Management Plan.

² This analysis is based on a comparison of the alternative alignments and GIS data from the California Department of Transportation, "California Rail Network," last updated October 31, 2013, available for download here: http://www.dot.ca.gov/hq/tsip/gis/datalibrary/Metadata/Rail_13.html, accessed February 22, 2016.

³ This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files.

⁴ This analysis is based on GIS data from the California Department of Resources Recycling and Recovery (CalRecycle), this data is updated continuously, available for download here: <http://www.calrecycle.ca.gov/SWFacilities/Directory/Search.aspx#DOWNLOAD>, accessed February 22, 2016.

⁵ Section 4(f) will be applicable to all parks and recreational areas of national, state, or local significance that are both publically owned and open to the public, while Section 6(f) will be applicable to lands acquired with Land and Water Conservation Act funds. Additionally, final determination of national, state, or local significance, the nature of Section 4(f) impacts, as well as determining if any of these lands were acquired with Land and Water Conservation Act funds will be determined in the environmental document.

⁶ The County of Los Angeles is currently reviewing SEA designations. If proposed SEAs are adopted by the County, then potential impacts from the HSR Project would be to the proposed acreages. Please note, proposed acres are not additive, if the proposed SEAs are adopted, then the potential impact numbers will be those listed under the proposed listing.

⁷ This table reflects the identification of several resource types near the centerline of proposed alignments as "tunnel" or "non-tunnel." Generally, few or no surface level effects are anticipated for "tunnel" sections, particularly where tunnels would be several hundred or more than one thousand feet below ground surface. Forthcoming environmental documentation, supported by ongoing geotechnical investigations, will help the Authority ascertain if any such surface level effects may occur.

⁸ Parklands analyses are based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of publicly owned and publicly accessible parklands within a 100 foot buffer of the alternative alignments.

⁹ This analysis is based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of parklands (all categories except facilities with no public access) within a 100 foot buffer of the alternative alignments.

¹⁰ This analysis is based on GIS data from the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP), available for download here: <http://www.conservation.ca.gov/dlrp/frmp/products/Pages/DownloadGISdata.aspx>, accessed February 22, 2016. Acreages described were determined by calculating the amount of FMMP mapped land within a 100 foot buffer of the alternative alignments. The following categories of FMMP land were excluded from this analysis: "Urban and Built-Up Land", "Other Land", "Water", "Area not mapped."

¹¹ In the 2010 Census, 2,728,321 people were identified as white and not Hispanic. Therefore, since 'minority' = (total population) – (white and not Hispanic), and the total population was 9,818,605; 7,090,284 people (72.2 percent of the total population) in Los Angeles county are considered to be a 'minority.'

¹² Minority = Total population – white and not Hispanic

¹³ This is the countywide average: White and Hispanic countywide (2,208,278)/Hispanic population countywide (4,687,889) = 47.1 percent of the Hispanic population is also white.

¹⁴ This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files. Facilities in the following categories were considered in this analysis: arts and recreation, community groups, education, emergency response, government, health and mental health, municipal services, public safety, social services.

¹⁵ Potential visual impacts associated with the E1 Corridor alignment alternatives are similar throughout the study area. This assessment focuses on a comparative analysis of areas where the three alignment alternatives diverge most in terms of 1) the location of the centerline – where one alternative might be closer to a sensitive visual resource than another, and 2) the proposed track type (viaduct, at-grade, or tunnel). For this analysis area, sensitive viewers are assumed to be residents and recreators. Therefore, residential areas and recreation sites and facilities within the project area represent sensitive viewing locations.

¹⁶ Percent visible: This is the percentage of the alignment alternative that is above ground versus tunneled. A higher percent visible corresponds to a higher potential impact to visual resources. Greater proportion of visible track type indicates the alternative has a higher probability to be seen, and that the design of the structure could contrast with surrounding visual character.

Detailed Evaluation Table for E2 Originals vs. E2 Refined Alignment

Detailed Evaluation Table

Table A-3 E2 Alignment Alternative Detailed Evaluation Table

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
Design Objectives:			
Journey time (Palmdale to Burbank) *as compared to the baseline (E1a)	+6 seconds	+12 seconds	+17 seconds
Total Length (Palmdale to Burbank)	37.7 miles	38.2 miles	38.8 miles
Intermodal Connections	Achieves the HSR objective of integrating HSR with existing intercity and regional rail routes at Palmdale and Burbank, provides a direct connection to Metrolink services.	Same as E2a	Same as E2a
Total Bored Tunnel Length	19.5 miles	21.3 miles	24.3 miles
Longest Bored Tunnel Length	12.3 miles	12.3 miles	14.3 miles
Operating Costs	TBD	TBD	TBD
Capital Costs (Excluding Right of Way Acquisition) *as compared to the baseline (SR14-2)	1.04	1.09	1.03
Constructability	<p>Similar constructability as E1a but more complex and longer construction duration due to longer tunnel:</p> <ul style="list-style-type: none"> Sierra Highway realignment at Lake Palmdale. Metrolink realignment at Lake Palmdale and Antelope Valley Line. Una Lake relocation. California Aqueduct Syphon would have to be extended because of direct impacts. Realignments of Sierra Highway, Angeles Forest Highway, SR14 on/off ramp and Metrolink just North of the Vincent Grade/Acton Metrolink station. Has a deep and long tunnel through the ANF mountainous areas which would present challenging construction access. Shallow tunnel beneath residential community's houses may require easements. <p>Need to allocate crossovers north of Burbank station in a bored tunnel section.</p> <p>Depressed Station proposed inside airport property. Runway 8/26 to be closed during construction due to cut & cover section.</p> <p>Four-track tunnel (cut & cover) between Burbank station and Ventura Line corridor.</p>	Same as E2a except at Vincent Substation follows E1b.	Same as E2a except for the following refinements: <ul style="list-style-type: none"> Optimized portal locations and Tujunga Wash crossing Construction of Burbank Station will not affect the operation of the airport runways
Land Use			
Consistency with other planning efforts ¹	<p>Existing Land Uses</p> <p>This alternative is inconsistent with existing land uses in the City of Palmdale where non-tunnel segments of the alignment would displace existing businesses, residences, and other land uses. The alignment also traverses through Una Lake.</p> <p>The alternative is inconsistent with existing land uses in unincorporated Los Angeles County where non-tunnel segments of the alignment would displace existing residences.</p> <p>The alternative is inconsistent with existing land uses in the City of Los Angeles and City of Burbank where non-tunnel segments of the alignment would displace existing industrial, commercial, and residential land uses.</p>	<p>Existing Land Uses</p> <p>Same as E2a.</p> <p>Planned Land Uses</p> <p>Same as E2a.</p>	<p>Existing Land Uses</p> <p>Same as E2a except that, in the City of Los Angeles, non-tunnel land use impacts would occur in the community of Sun Valley (just north of Burbank) in addition to areas of the City impacted by E2a and E2b elsewhere. Also, land use impacts in the City of Burbank would shift eastward and would extend in a northwesterly direction to the City's northern border with the City of Los Angeles.</p> <p>Planned Land Uses</p> <p>Same as E2a.</p>

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<p>Planned Land Uses</p> <p>The alternative is inconsistent with portions of the following plans, largely due to the required acquisition of parcels planned for future industrial, commercial, and residential land uses:</p> <ul style="list-style-type: none"> • City of Burbank General Plan • Burbank Center Plan (City of Burbank) • City of Los Angeles General Plan • City of Palmdale General Plan • Avenue S Corridor Area Plan (City of Palmdale) • Los Angeles County General Plan <p>In addition to planned land use patterns, this alternative would require a dramatic reconfiguration of the existing roadway network in the City of Palmdale. Therefore, this alternative is inconsistent with the City's General Plan Circulation Element.</p>		
Disruption to Communities			
Disruption to Existing Railroad ²	<p>Total number of places where the E2a alternative would cross and disrupt existing railroad lines: 5</p> <p>The E2a alternative would parallel existing railroad lines operated by Union Pacific and Metrolink in the City of Palmdale. Traveling north to south, this alternative first crosses an existing railroad line (operated by Union Pacific and Metrolink) near the southern city limit of the City of Palmdale, near the intersection of Avenue S East and Sierra Highway. The alignment crosses this railroad line again approximately a quarter mile south of Una Lake in unincorporated Los Angeles county. The third intersection is less than a half mile north of the existing Vincent Grade/Action Metrolink Station, in the community of Acton. The fourth crossing is in the city of Los Angeles, near the intersection of San Fernando Road and Ferncola Avenue. The final crossing is in the city of Burbank near the intersection of West Vanowen Street and North Catalina Street, adjacent to Gross Park.</p>	<p>Total number of places where the E2b alternative would cross and disrupt existing railroad lines: 5</p> <p>Same crossings as E2a except the crossing near the existing Vincent Grade/Action Metrolink Station in the community of Acton would be approximately 3,200 feet northeast of the point where the E2a alternative crosses this existing railroad line operated by Union Pacific and Metrolink.</p>	<p>Total number of places where the E2 Refined alternative would cross and disrupt existing railroad lines: 5</p> <p>The northernmost three crossings would be the same as E2a.</p> <p>When the E2 Refined enters the city of Los Angeles and begins to parallel an existing rail line operated by Union Pacific and Metrolink, it crosses this line in the community of Sun Valley, adjacent to Roscoe Elementary School, near the intersection of San Fernando Road and Strathern Street. The E2 Refined crosses an existing rail line operated by Union Pacific and Metrolink one more time in the city of Burbank, adjacent to Interstate 5, near the intersection of North Lake Street and North Victory Place.</p>
Disruption to, and Relocation of, Utilities	<p>Major parallel storm channel relocation in Palmdale (all alignments)</p> <p>Major crossings at Palmdale grade seps (relocate): 42" sewers, 42" gas, 42" water (all)</p> <p>Parallel – 20" oil in R/W through most of Burbank (all alignments), cut & cover necessitates relocation, shorter conflict than E1 & SR14</p> <p>Parallel – telecom /fiber optic in R/W through most of Burbank (all alignments), cut & cover necessitates relocation, shorter conflict than E1 & SR14</p> <p>Parallel and crossing – Lockheed Channel</p> <p>Major storm crossings (all alignments): 84", 54", 102", 60" storm</p> <p>Other crossings (all alignments): 24" water, 115kV OH elec, gas</p> <p>Crossings (esp gravity) may become a significant issue through cut & cover construction</p> <p>Notes:</p> <ol style="list-style-type: none"> 1) Utilities not yet mapped outside of SR14-1 corridor 2) Parallel conflicts w/in R/W to be relocated unless otherwise negotiated 3) E1-E3 options are less accessible to water supply to tunnels during construction than SR14 options (~400,000 gal/day/portal) 	Same as E2a for all	Same as E2a for all
Residential Easements (within 100 feet on either side of the centerline)	<p>Tunnel</p> <ul style="list-style-type: none"> • 24 multi-family • 372 single-family 	<p>Tunnel</p> <ul style="list-style-type: none"> • 27 multi-family • 371 single-family 	<p>Tunnel</p> <ul style="list-style-type: none"> • 7 multi-family • 141 single-family
Residential Displacements (within 100 feet on either side of the centerline)	<p>Non-tunnel</p> <ul style="list-style-type: none"> • 13 multi-family • 122 single-family 	<p>Non-tunnel</p> <ul style="list-style-type: none"> • 12 multi-family • 119 single-family 	<p>Non-tunnel</p> <ul style="list-style-type: none"> • 8 multi-family • 92 single-family

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
Business Easements (within 100 feet on either side of the centerline)	Tunnel <ul style="list-style-type: none"> 20 commercial parcels 34 industrial parcels 	Tunnel <ul style="list-style-type: none"> 21 commercial parcels 34 industrial parcels 	Tunnel <ul style="list-style-type: none"> 29 commercial parcels 58 industrial parcels
Business Displacements (within 100 feet on either side of the centerline)	Non-tunnel <ul style="list-style-type: none"> 96 commercial parcels 105 industrial parcels 	Non-tunnel <ul style="list-style-type: none"> 96 commercial parcels 104 industrial parcels 	Non-tunnel <ul style="list-style-type: none"> 118 commercial parcels 170 industrial parcels
Proximity to Schools (Within 1,500 feet on either side of the centerline) ³	Tunnel <ul style="list-style-type: none"> Total: 6 Includes: <ul style="list-style-type: none"> 1 early childhood education and head start facility 2 public elementary school facilities 3 private/charter school facilities Non-tunnel <ul style="list-style-type: none"> Total: 5 Includes: <ul style="list-style-type: none"> 2 public high school facilities 3 college and university facilities 	Tunnel <ul style="list-style-type: none"> Total: 6 Includes: <ul style="list-style-type: none"> 1 early childhood education and head start facility 2 public elementary school facilities 3 private/charter school facilities Non-tunnel <ul style="list-style-type: none"> Total: 5 Includes: <ul style="list-style-type: none"> 2 public high school facilities 3 college and university facilities 	Tunnel <ul style="list-style-type: none"> Total: 2 Includes: <ul style="list-style-type: none"> 2 public elementary school facilities Non-tunnel <ul style="list-style-type: none"> Total: 8 Includes: <ul style="list-style-type: none"> 1 private/charter school facility 2 public elementary school facilities 2 public high school facilities 3 college and university facilities
Proximity to Landfills (Within ¼-mile on either side of the centerline) ⁴	Tunnel <ul style="list-style-type: none"> None Non-tunnel <ul style="list-style-type: none"> 1 active transfer/processing facility 	Tunnel <ul style="list-style-type: none"> None Non-tunnel <ul style="list-style-type: none"> 1 active transfer/processing facility 	Tunnel <ul style="list-style-type: none"> 1 active disposal facility 2 closed disposal facilities 2 active transfer/processing facilities Non-tunnel <ul style="list-style-type: none"> 1 active transfer/processing facility
Highway Grade Separations and Closures	7 grade separations, 10 roadway realignments.	Same as E2a	7 new Grade separations, plus 1 realignment/modification
Environmental Resources			
Potential Section 4(f) (Please note that for Cultural Resources there is a potential for both direct and indirect impacts to resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.) ^{5, 6, 7}	Cultural Resources Archaeological Resources 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Architectural Resources Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment. <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest Parklands ⁸ Tunnel <ul style="list-style-type: none"> 0.3 acres of Robert E. Gross Park 320.2 acres of Angeles National Forest 	Cultural Resources Archaeological Resources 10 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Architectural Resources Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment. <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest Parklands Tunnel <ul style="list-style-type: none"> 0.3 acres of Robert E. Gross Park 332.0 acres of Angeles National Forest 118.8 acres of National Monument 	Cultural Resources Archaeological Resources 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment. Architectural Resources Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment. <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest Parklands Tunnel <ul style="list-style-type: none"> 363.9 acres of Angeles National Forest 162.7 acres of National Monument Non-tunnel

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<ul style="list-style-type: none"> 106.8 acres of National Monument <p>Non-tunnel</p> <ul style="list-style-type: none"> 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land) 	<p>Non-tunnel</p> <ul style="list-style-type: none"> 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land) 	<ul style="list-style-type: none"> 11.1 acres of Hansen Dam Open Space
<p>Biological/Aquatic Resources</p> <p>Potential impacts are calculated using the following distances:</p> <p>Plants: 100-feet</p> <p>Aquatic Resources: 250-ft</p> <p>Wildlife: 1,000-ft</p>	<p>Aquatic Resources</p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 5.9 miles</p> <p>Wetland Habitat: 17.4 acres</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 3.5 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 6.8 miles</p> <p>Wetland Habitat: 28.5 acres</p> <p>Biological Resources</p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>Santa Ana Sucker: 2</p> <p>Southern Willow Flycatcher: 2</p> <p>Non-tunnel</p> <p>Arroyo Toad: 16</p> <p>Santa Ana Sucker: 75</p> <p>Southern Willow Flycatcher: 82</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 143</p> <p>Arroyo Toad: 7</p> <p>Blainville's Horned Lizard: 44</p> <p>Burrowing Owl: 1,288</p> <p>California Red-Legged Frog: 162</p> <p>California Vole: 1,373</p> <p>Cooper's Hawk: 323</p> <p>Desert Woodrat: 49</p> <p>Ferruginous Hawk: 142</p> <p>Golden Eagle: 325</p> <p>Lawrence's Goldfinch: 1,461</p> <p>Mohave Ground Squirrel: 0</p> <p>Northern Harrier: 1,360</p> <p>Pallid Bat: 1,615</p> <p>Prairie Falcon: 1615</p> <p>Rufous-Crowned Sparrow: 112</p> <p>Silver-Haired Bat: 1,615</p> <p>Southern Grasshopper Mouse: 113</p> <p>Tricolored Blackbird: 1,288</p> <p>Two-Striped Gartersnake: 256</p>	<p>Aquatic Resources</p> <p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 6.4 miles</p> <p>Wetland Habitat: 17.4 acres</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 3.5 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 6.8 miles</p> <p>Wetland Habitat: 28.2 acres</p> <p>Biological Resources</p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>Santa Ana Sucker: 2</p> <p>Southern Willow Flycatcher: 2</p> <p>Non-tunnel</p> <p>Arroyo Toad: 16</p> <p>Santa Ana Sucker: 75</p> <p>Southern Willow Flycatcher: 82</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 299</p> <p>Arroyo Toad: 16</p> <p>Blainville's Horned Lizard: 188</p> <p>Burrowing Owl: 1,288</p> <p>California Red-Legged Frog: 306</p> <p>California Vole: 1,515</p> <p>Cooper's Hawk: 474</p> <p>Desert Woodrat: 59</p> <p>Ferruginous Hawk: 298</p> <p>Golden Eagle: 479</p> <p>Lawrence's Goldfinch: 1,602</p> <p>Mohave Ground Squirrel: 0</p> <p>Northern Harrier: 1,514</p> <p>Pallid Bat: 1,769</p> <p>Prairie Falcon: 1,769</p> <p>Rufous-Crowned Sparrow: 256</p> <p>Silver-Haired Bat: 1,769</p> <p>Southern Grasshopper Mouse: 267</p> <p>Tricolored Blackbird: 1,288</p>	<p>Tunnel</p> <p>Lakes, Ponds, Rivers: 0.8 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 7.5 miles</p> <p>Wetland Habitat: 23.3 acres</p> <p>Non-tunnel</p> <p>Lakes, Ponds, Rivers: 3.2 acres</p> <p>Reservoirs: 0 acres</p> <p>Streams, Creeks, Canals: 5.4 miles</p> <p>Wetland Habitat: 26.7 acres</p> <p>Biological Resources</p> <p>Critical Habitat (acres)</p> <p>Tunnel</p> <p>Santa Ana Sucker: 1</p> <p>Southern Willow Flycatcher: 1</p> <p>Non-tunnel</p> <p>Santa Ana Sucker: 80</p> <p>Southern Willow Flycatcher: 84</p> <p>Special-Status Wildlife (CWHR, acres)</p> <p>Tunnel</p> <p>American Badger: 340</p> <p>Arroyo Toad: 5</p> <p>Blainville's Horned Lizard: 188</p> <p>Burrowing Owl: 883</p> <p>California Red-Legged Frog: 300</p> <p>California Vole: 1,137</p> <p>Cooper's Hawk: 745</p> <p>Desert Woodrat: 56</p> <p>Ferruginous Hawk: 286</p> <p>Golden Eagle: 691</p> <p>Lawrence's Goldfinch: 1,220</p> <p>Mohave Ground Squirrel: 0</p> <p>Northern Harrier: 1,187</p> <p>Pallid Bat: 1,637</p> <p>Prairie Falcon: 1,637</p> <p>Rufous-Crowned Sparrow: 169</p> <p>Silver-Haired Bat: 1,637</p> <p>Southern Grasshopper Mouse: 174</p> <p>Tricolored Blackbird: 814</p> <p>Two-Striped Gartersnake: 389</p> <p>Western Mastiff Bat: 1,369</p> <p>Western Pond Turtle: 1,315</p>

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	Western Mastiff Bat: 1,475 Western Pond Turtle: 1,589 Western Spadefoot: 117 Yellow Warbler: 1,506 Yellow-Breasted Chat: 2 Yuma Myotis: 1,611 Non-tunnel American Badger: 259 Arroyo Toad: 1 Blainville's Horned Lizard: 166 Burrowing Owl: 1,291 California Red-Legged Frog: 185 California Vole: 1,415 Cooper's Hawk: 1,114 Desert Woodrat: 0 Ferruginous Hawk: 269 Golden Eagle: 1,136 Lawrence's Goldfinch: 1,556 Mohave Ground Squirrel: 38 Northern Harrier: 1,710 Pallid Bat: 1,705 Prairie Falcon: 1,719 Rufous-Crowned Sparrow: 192 Silver-Haired Bat: 1,319 Southern Grasshopper Mouse: 238 Tricolored Blackbird: 1,300 Two-Striped Gartersnake: 208 Western Mastiff Bat: 1,706 Western Pond Turtle: 641 Western Spadefoot: 0 Yellow Warbler: 750 Yellow-Breasted Chat: 17 Yuma Myotis: 938 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Western Pond Turtle Non-tunnel Arroyo Chub Big Free-Tailed Bat Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Crotch Bumble Bee Least Bell's Vireo Rosy Boa	Two-Striped Gartersnake: 401 Western Mastiff Bat: 1,629 Western Pond Turtle: 1,589 Western Spadefoot: 117 Yellow Warbler: 1,504 Yellow-Breasted Chat: 2 Yuma Myotis: 1,763 Non-tunnel American Badger: 187 Arroyo Toad: 1 Blainville's Horned Lizard: 110 Burrowing Owl: 1,294 California Red-Legged Frog: 128 California Vole: 1,290 Cooper's Hawk: 989 Desert Woodrat: 0 Ferruginous Hawk: 197 Golden Eagle: 996 Lawrence's Goldfinch: 1,432 Mohave Ground Squirrel: 38 Northern Harrier: 1,570 Pallid Bat: 1,564 Prairie Falcon: 1,579 Rufous-Crowned Sparrow: 135 Silver-Haired Bat: 1,178 Southern Grasshopper Mouse: 182 Tricolored Blackbird: 1,302 Two-Striped Gartersnake: 150 Western Mastiff Bat: 1,566 Western Pond Turtle: 641 Western Spadefoot: 0 Yellow Warbler: 679 Yellow-Breasted Chat: 17 Yuma Myotis: 810 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Western Pond Turtle Non-tunnel Arroyo Chub Big Free-Tailed Bat Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Crotch Bumble Bee Least Bell's Vireo	Western Spadefoot: 122 Yellow Warbler: 1,328 Yellow-Breasted Chat: 1 Yuma Myotis: 1,560 Non-tunnel American Badger: 126 Arroyo Toad: 0 Blainville's Horned Lizard: 46 Burrowing Owl: 2,035 California Red-Legged Frog: 62 California Vole: 1,938 Cooper's Hawk: 880 Desert Woodrat: 0 Ferruginous Hawk: 161 Golden Eagle: 888 Lawrence's Goldfinch: 2,080 Mohave Ground Squirrel: 38 Northern Harrier: 2,190 Pallid Bat: 2,217 Prairie Falcon: 2,231 Rufous-Crowned Sparrow: 76 Silver-Haired Bat: 1,821 Southern Grasshopper Mouse: 149 Tricolored Blackbird: 2,077 Two-Striped Gartersnake: 125 Western Mastiff Bat: 2,218 Western Pond Turtle: 1,327 Western Spadefoot: 12 Yellow Warbler: 1,380 Yellow-Breasted Chat: 43 Yuma Myotis: 1,461 Special-Status Wildlife (CNDDDB Occurrences) Tunnel Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Western Pond Turtle Two-Striped Garter Snake Non-tunnel Arroyo Chub Big Free-Tailed Bat Coast Horned Lizard Coastal California Gnatcatcher Coastal Whiptail Least Bell's Vireo Rosy Boa San Diego Black-Tailed Jackrabbit Santa Ana Speckled Dace Santa Ana Sucker

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<p>San Diego Black-Tailed Jackrabbit Santa Ana Speckled Dace Santa Ana Sucker Silvery Legless Lizard Southern California Arroyo Chub/Santa Ana Sucker * Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback Western Pond Turtle</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow Riversidian Alluvial Fan Sage Scrub</p> <p><i>Non-tunnel</i> Riversidian Alluvial Fan Sage Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>San Diego Black-Tailed Jackrabbit Santa Ana Speckled Dace Santa Ana Sucker Silvery Legless Lizard Southern California Arroyo Chub/Santa Ana Sucker * Southern California Threespine Stickleback Stream Tricolored Blackbird Unarmored Threespine Stickleback Western Pond Turtle</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow Riversidian Alluvial Fan Sage Scrub</p> <p><i>Non-tunnel</i> Riversidian Alluvial Fan Sage Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>	<p>Silvery Legless Lizard Southern California Arroyo Chub/Santa Ana Sucker * Tricolored Blackbird Western Pond Turtle Loggerhead Shrike</p> <p>Special-Status Plants (CNDDDB Occurrences) <i>Tunnel</i> Davidson's Bush-Mallow</p> <p><i>Non-tunnel</i> Riversidian Alluvial Fan Sage Scrub</p> <p>Significant Ecological Areas (SEA) Alignment travels through the Los Angeles County designated San Andreas SEA, Santa Clara River SEA, and the Tujunga Valley/Hansen Dam SEA. Designated SEAs warrant special management because they contain important biological value.</p>
<p>Cultural Resources (Please note that for Cultural Resources there is a potential for both direct and indirect impacts to resources (consisting of archaeological and historic architecture sites) for tunnel and non-tunnel profiles of the alignment alternatives; therefore, the potentially impacted cultural resources were not separated by the tunnel and non-tunnel profiles of the alignment alternatives.)</p>	<p>Archaeological Resources 72 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>Architectural Resources 22 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest 	<p>Archaeological Resources 72 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 10 archaeological resources are located within 100 feet of the approximate centerline of the alternative Alignment.</p> <p>Architectural Resources 22 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest 	<p>Archaeological Resources 68 previously recorded Archeological Sites are located within ½ mile of alternative alignment. 12 archaeological resources are located within 100 feet of the approximate centerline of the alternative alignment.</p> <p>Architectural Resources 22 previously recorded historic architectural resources are located within 150 feet of the proposed environmental footprint or within a reasonable distance from improvements that could potentially diminish the significance of the property.</p> <p>Only 3 of 22 historic architectural resources previously recorded are listed in, or determined eligible for listing in the National Register of Historic Places (NRHP). All three NRHP-listed or eligible properties are located within a 150-foot buffer of the approximate centerline of the alternative alignment.</p> <ol style="list-style-type: none"> Palmdale Ditch, Palmdale East Branch of the California Aqueduct, Palmdale vicinity Angeles National Forest
<p>Parklands⁹ (Within 100 feet of the alignment)</p>	<p>Parklands <i>Tunnel</i></p> <ul style="list-style-type: none"> 0.3 acres of Robert E. Gross Park 320.2 acres of Angeles National Forest 106.8 acres of National Monument <p><i>Non-tunnel</i></p> <ul style="list-style-type: none"> 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land) 	<p>Parklands <i>Tunnel</i></p> <ul style="list-style-type: none"> 0.3 acres of Robert E. Gross Park 332.0 acres of Angeles National Forest 118.8 acres of National Monument <p><i>Non-tunnel</i></p> <ul style="list-style-type: none"> 18.0 acres (Includes: Hansen Dam Open Space, Bureau of Land Management Land) 	<p>Parklands <i>Tunnel</i></p> <ul style="list-style-type: none"> 363.9 acres of Angeles National Forest 162.7 acres of National Monument <p><i>Non-tunnel</i></p> <ul style="list-style-type: none"> 11.1 acres of Hansen Dam Open Space

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
Agricultural Lands ¹⁰ (Within 100 feet of the alignment)	<p>Tunnel</p> <ul style="list-style-type: none"> None <p>Non-tunnel</p> <ul style="list-style-type: none"> None 	<p>Tunnel</p> <ul style="list-style-type: none"> None <p>Non-tunnel</p> <ul style="list-style-type: none"> None 	<p>Tunnel</p> <ul style="list-style-type: none"> 0.1 acre of prime farmland <p>Non-tunnel</p> <ul style="list-style-type: none"> None
Demographics, Socioeconomic Composition, and Communities of Environmental Justice Concern	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).¹¹</p> <p>Minority Populations^{12 13}</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 65.6 percent. Since the study area 'minority' population average is less than the Los Angeles County 'minority' population average, the overall alignment would have less potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 11.6 percent. Since the study area 'elderly' population average is greater than the Los Angeles County 'elderly' population average, the overall alignment would have greater potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 14.0 percent. Since the study area limited English proficiency population average is less than the Los Angeles County limited English proficiency population average, the overall alignment would have less potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 23.9 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> Minority Percentage – Lesser potential to encounter an EJ 	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 65.7 percent. Since the study area 'minority' population average is less than the Los Angeles County 'minority' population average, the overall alignment would have less potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 11.6 percent. Since the study area 'elderly' population average is greater than the Los Angeles County 'elderly' population average, the overall alignment would have greater potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 14.0 percent. Since the study area limited English proficiency population average is less than the Los Angeles County limited English proficiency population average, the overall alignment would have less potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 23.9 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> Minority Percentage – Lesser potential to encounter an EJ community of concern Elderly Percentage – Greater potential to encounter an EJ community of concern LEP – Lesser potential to encounter an EJ community of concern Poverty – Greater potential to encounter an EJ community of concern 	<p>Tunnel</p> <p>For this criterion, few or no surface-level effects are anticipated to effect communities near the tunnel sections.</p> <p>Non-tunnel</p> <p>The study area for this evaluation criterion includes a half-mile boundary surrounding the non-tunnel segments of the alignment.</p> <p>For this analysis, data was collected from the decennial Census (2010) and the American Community Survey (2009 – 2013).</p> <p>Minority Populations</p> <p>The Los Angeles County 'minority' population average is 72.2 percent. The study area 'minority' population average is 61.1 percent. Since the study area 'minority' population average is less than the Los Angeles County 'minority' population average, the overall alignment would have less potential to encounter 'minority' populations. 'Minority' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Elderly Populations</p> <p>The Los Angeles County population average that is over 65 years of age ('elderly' population) is 10.9 percent. The study area 'elderly' population average is 11.0 percent. Since the study area 'elderly' population average is greater than the Los Angeles County 'elderly' population average, the overall alignment would have greater potential to encounter 'elderly' populations. 'Elderly' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Limited English Proficiency</p> <p>The Los Angeles County population average that is over 5 years of age with limited English proficiency is 15.2 percent. The study area population average that is over 5 years of age with limited English proficiency is 16.4 percent. Since the study area limited English proficiency population average is greater than the Los Angeles County limited English proficiency population average, the overall alignment would have greater potential to encounter limited English proficiency populations. Limited English proficiency populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Poverty</p> <p>The Los Angeles County household population average with income in the past 12 months below the poverty level ('poverty' population) is 16.2 percent. The study area 'poverty' population average is 19.9 percent. Since the study area 'poverty' population average is greater than the Los Angeles County 'poverty' population average, the overall alignment would have greater potential to encounter 'poverty' populations. 'Poverty' populations on a localized level may be considered environmental justice communities of concern. Forthcoming environmental documentation would analyze potential surface-level effects to such communities.</p> <p>Impacted EJ Community Summary</p> <ul style="list-style-type: none"> Minority Percentage – Lesser potential to encounter an EJ community of concern Elderly Percentage – Greater potential to encounter an EJ community of concern LEP – Greater potential to encounter an EJ community of concern Poverty - Greater potential to encounter an EJ community of concern

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<p>community of concern</p> <ul style="list-style-type: none"> Elderly Percentage – Greater potential to encounter an EJ community of concern LEP – Lesser potential to encounter an EJ community of concern <p>Poverty – Greater potential to encounter an EJ community of concern</p>		
Community Resources Potentially Significant to Communities of Environmental Justice Concern ¹⁴	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 government facility 2 public safety facilities 4 health and mental health facilities 5 municipal services facilities 9 arts and recreation facilities 9 education facilities 10 social services facilities 11 community group facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> 6 government facilities 14 arts and recreation facilities 14 health and mental health facilities 16 public safety facilities 17 community group facilities 20 education facilities 21 municipal services facilities 45 social services facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 government facility 2 public safety facilities 4 health and mental health facilities 5 municipal services facilities 9 arts and recreation facilities 9 education facilities 10 social services facilities 11 community group facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> 6 government facilities 14 health and mental health facilities 16 arts and recreation facilities 16 public safety facilities 17 community group facilities 20 education facilities 21 municipal services facilities 45 social services facilities 	<p>The alignment buffer area (1/2-mile from center of alignment) contains:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 government facility 1 health and mental health facility 1 public safety facility 4 municipal services facilities 7 community group facilities 8 education facilities 8 social services facilities 14 arts and recreation facilities <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 emergency response facility 6 government facilities 14 arts and recreation facilities 17 health and mental health facilities 17 public safety facilities 22 municipal services facilities 25 education facilities 30 community group facilities 54 social services facilities
Displacement of Community Resources Potentially Significant to Communities of Environmental Justice Concern	<p>The following community resources are located within 100-feet from the center of this alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 arts and recreation facility 1 health and mental health facility 1 social services facility <p>The following community resources are located within 100-feet from the center of this alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 community group facility 1 education facility 1 health and mental health facility 1 social services facility 6 arts and recreation facilities 	<p>The following community resources are located within 100-feet from the center of this alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 arts and recreation facility 1 health and mental health facility 1 social services facility <p>The following community resources are located within 100-feet from the center of this alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 community group facility 1 education facility 1 health and mental health facility 1 social services facility 6 arts and recreation facilities 	<p>The following community resources are located within 100-feet from the center of this alignment and would be potentially displaced:</p> <p>Non-tunnel</p> <ul style="list-style-type: none"> 1 health and mental health facility 1 social services facility 1 municipal services facility 1 arts and recreation facility <p>The following community resources are located within 100-feet from the center of this alignment and would potentially require easements:</p> <p>Tunnel</p> <ul style="list-style-type: none"> 1 community group facility 2 education facilities 10 arts and recreation facilities
Noise and Vibration	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 860</p> <p>Day Care – 1</p> <p>Hotel – 2</p> <p>School – 1</p> <p>Senior Center/Nursing Home – 3</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 856</p> <p>Day Care – 1</p> <p>Hotel – 2</p> <p>Senior Center/Nursing Home – 3</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 7,665</p>	<p>Tunnel</p> <p>Within 300 feet from the centerline of alignment</p> <p>Residential – 278</p> <p>Hotel – 1</p> <p>Senior Center/Nursing Home – 1</p> <p>Non-tunnel</p> <p>Within 2,500 feet from the centerline of alignment</p> <p>Residential – 14,178</p> <p>Animal Kennel – 1</p>

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	Residential – 7,680 Animal Kennel – 1 Cemetery – 1 Church – 10 Day Care – 5 Hospital – 1 Hotel – 14 Park – 6 School – 13 Senior Center/Nursing Home – 4 Shelter – 2	Animal Kennel – 1 Cemetery – 1 Church – 10 Day Care – 5 Hospital – 1 Hotel – 14 Park – 6 School – 13 Senior Center/Nursing Home – 4 Shelter – 2	Cemetery – 1 Church – 22 Day Care – 5 Hospital – 1 Hotel – 29 Library – 1 Park – 5 School – 15 Senior Center/Nursing Home – 7 Shelter – 2
Change in Visual and Scenic Resources ¹⁵ <u>Visual Character</u> The most potential for impacts to visual character is where the alignment has a high vertical profile such as viaduct. <u>Views and Vistas</u> The presence of viaducts in the vicinity of areas with views and vistas would have the potential for adverse impacts.	Below is a summary of the potential visual impacts from each of the three alternatives considered in this analysis. E2a – Approximately 48% would be visible ¹⁶ , which is the most of any of the East Corridor Alternatives. It would have the same alignment and track type as all of the East Corridor alignments in the City of Palmdale. The E2a alignment would be more visible than E2b in vicinity of the Vincent Substation and Metrolink Station in Unincorporated Los Angeles County, which would be visible to motorists on SR-14 and the Sierra Highway, as well as to rural residents in the area. E2a and E2b would be at-grade near Arrastre Canyon and thus be visible to motorists traveling Soledad Canyon Road and Arrastre Canyon Road, as well as to visitors at the Soledad Canyon RV and Camping Resort. E2a and E2b would also be visible to residences of Lake View Terrace and have potential to be visible to residences and recreators at Hansen Dam Recreation Center and Orcas Park. E2b – Approximately 44% would be visible. It would have the same alignment and track type as all of the East Corridor alignments in Palmdale. E2b would have a similar track type and alignment centerline configuration as E2a, though a greater proportion of E2b would not be tunneled, particularly near the Vincent Substation and Metrolink Station. Therefore, E2b has slightly less potential to impact visual resources and contrast with visual character than E2a. E2 Refined – Approximately 37% would be visible. It would have the same alignment and track type as all of the East Corridor alignments in Palmdale. E2 Refined would have the same alignment and track type as E2a near the Vincent Substation and Metrolink Station, and thus would be more visible to motorists on SR-14 and the Sierra Highway, as well as to rural residents in the area than E2b. E2 Refined would be tunneled until Lake View Terrace area, and would have a similar alignment and track type to E2a and E2b in this area. E2 Refined has the least potential to impact visual resources.		
Geological and Soil Constraints Geotechnical Constraints	<p>Tunnel</p> <ul style="list-style-type: none"> • 1.07 miles are within 150 feet of CGS landslide hazard zones • 0.1 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 8 faults cross the alignment • 0.4 miles are within Alquist-Priolo Fault Zones • 3.73 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.96 miles are within 150 feet of CGS landslide hazard zones • 0.97 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 4 faults cross the alignment • 0.7 miles are within Alquist-Priolo Fault Zones • 3.1 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards.</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 2.61 miles are within 150 feet of CGS landslide hazard zones • 0.03 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 8 faults cross the alignment • 0.4 miles are within Alquist-Priolo Fault Zones • 3.73 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.96 mile is within 150 feet of CGS landslide hazard zones • 0.84 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 4 faults cross the alignment • 2.32 miles are within Alquist-Priolo Fault Zones • 3.1 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards.</p>	<p>Tunnel</p> <ul style="list-style-type: none"> • 0.72 miles are within 150 feet of CGS landslide hazard zones • 0.04 miles are within a liquefaction zone • 1.26 miles are within 0.5 miles of a Methane Producing Landfill • 8 faults cross the alignment • 0.38 miles are within Alquist-Priolo Fault Zones • 2.99 miles are within inundation zones <p>Non-tunnel</p> <ul style="list-style-type: none"> • 0.42 miles are within 150 feet of CGS landslide hazard zones • 0.68 miles are within a liquefaction zone • 0 miles are within 0.5 miles of a Methane Producing Landfill • 5 faults cross the alignment • 0.74 miles are within Alquist-Priolo Fault Zones • 5.26 miles are within inundation zones <p>Key issues will be those associated with seismically induced hazards.</p>
Groundwater Resources Source of data: Perennial springs, seeps and streams – USGS NHD Sub-watersheds: Los Angeles County GIS Data Portal Domestic wells: County of Los Angeles DPW	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 7 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0 • Miles of tunnel alignment within 1 mile of springs: 10.11 miles 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 8 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0 • Miles of tunnel alignment within 1 mile of springs: 9.81 miles • Miles of tunnel alignment between 1 and 2 miles of springs: 7.74 miles 	<p>Tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> • Number of watersheds crossed: 4 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> • Number of subwatersheds crossed: 8 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> • Springs directly above tunnel: 0 • Miles of tunnel alignment within 1 mile of springs: 10.12 miles • Miles of tunnel alignment between 1 and 2 miles of springs: 7.86 miles

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<ul style="list-style-type: none"> Miles of tunnel alignment between 1 and 2 miles of springs: 5.6 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 4.34 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 7.35 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 4.99 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 100-year flood zones: 0.06 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 5 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 8 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 Miles of non-tunnel alignment within 1 mile of springs: 3.55 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 4.73 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 3.38 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.05 miles Perennial streams directly crossed: 1 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 2.21 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 100-year flood zones: 3.06 miles 	<p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 4.34 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 7.72 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 4.99 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 100-year flood zones: 0.06 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 5 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 8 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 Miles of non-tunnel alignment within 1 mile of springs: 2.65 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 4.03 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 3.38 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.17 miles Perennial streams directly crossed: 1 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 2.21 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 100-year flood zones: 2.92 miles 	<p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of perennial streams: 4.77 miles Miles of tunnel alignment between 1 and 2 miles of perennial streams: 7.58 miles Perennial streams directly above tunnel: 0 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 1 mile of active groundwater wells: 4.07 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of tunnel alignment within 100-year flood zones: 0.36 miles <p>Non-tunnel</p> <p>Watersheds</p> <ul style="list-style-type: none"> Number of watersheds crossed: 5 out of 5 total watersheds in the alignment <p>Subwatersheds</p> <ul style="list-style-type: none"> Number of subwatersheds crossed: 8 out of 10 total subwatersheds in the alignment <p>Springs</p> <ul style="list-style-type: none"> Springs directly crossed: 0 Miles of non-tunnel alignment within 1 mile of springs: 1.76 miles Miles of non-tunnel alignment between 1 and 2 miles of springs: 3.63 miles <p>Perennial Streams</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of perennial streams: 2.09 miles Miles of non-tunnel alignment between 1 and 2 miles of perennial streams: 1.69 miles Perennial streams directly crossed: 1 <p>Active Groundwater Wells</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 1 mile of active groundwater wells: 4.92 miles <p>Groundwater Subbasins</p> <ul style="list-style-type: none"> Number of groundwater subbasins crossed: 2 <p>Floodplains</p> <ul style="list-style-type: none"> Miles of non-tunnel alignment within 100-year flood zones: 2.83 miles
Hazardous Materials	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0.32 miles are within 1,000 linear feet of oil and gas wells 0.02 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. 0.36 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. Contaminated sites: <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0.32 miles are within 1,000 linear feet of oil and gas wells 0.02 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. 0.36 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. Contaminated sites: <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0.38 miles are within 1,000 linear feet of oil and gas wells 0.04 miles are within 50 linear feet of highways. There is a potential to encounter aerially deposited lead (ADL) in shallow soils near major highways due to the past use of leaded fuel. Although leaded fuel has been prohibited in California since the 1980s, ADL may still be present in soils adjacent to highways in use prior to that time. 0.6 miles are within 50 linear feet of rail alignments. There is a potential to encounter soil impacted by hydrocarbons, lead, and arsenic in shallow soils near rail alignments from spilled oil and treatment of railroad ties. Contaminated sites: <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites (1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. For the rest of the alignment, approximately 172 contaminated sites are located within a ½

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

Measurement Criteria	East Corridor		
	E2a	E2b	E2 Refined
	<p>(1 listed on Envirostor and 113 listed on Geotracker) are located within a ½ mile buffer of the alignment. No tunneling is proposed in this area. The Envirostor listings for all of the sites include State Response, Voluntary Cleanup, School Cleanup, Evaluation, Military Sites, and Corrective Actions and do not include School Investigations, Military Evaluation, and Tiered Permits. The Geotracker listings for all of the sites include LUST, Cleanup Programs, and Land Disposal. They do not include Permitted USTs, Irrigated Lands, WDR Sites, and Oil & Gas Monitoring (addressed separately).</p> <ul style="list-style-type: none"> For the rest of the alignment, approximately 148 contaminated sites are located within a ½ mile buffer of alignment. Approximately 70 of these sites are located within a ½ mile of proposed tunnels. The San Fernando Valley Superfund Area 1 is located through approximately 3.66 miles of the alignment. Tunneling is proposed in approximately 2.65 miles of the 3.66 miles. <p>Non-tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.04 miles are within 50 linear feet of highways 2.0 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 148 contaminated sites, approximately 78 sites are located within a ½ mile of the non-tunnel areas. Non-tunneling is proposed in approximately 1.01 of the 3.66 miles of alignment located within the San Fernando Valley Superfund Area 1. The San Fernando Valley Superfund Area 2 is present through approximately 1.26 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. 	<ul style="list-style-type: none"> For the rest of the alignment, approximately 148 contaminated sites are located within a ½ mile buffer of alignment. Approximately 71 of these sites are located within a ½ mile of proposed tunnels. The San Fernando Valley Superfund Area 1 is located through approximately 3.66 miles of the alignment. Tunneling is proposed in approximately 2.65 miles of the 3.66 miles. <p>Non-tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.04 miles are within 50 linear feet of highways 1.91 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 148 contaminated sites, approximately 77 sites are located within a ½ mile of the non-tunnel areas. Non-tunneling is proposed in approximately 1.01 of the 3.66 miles of alignment located within the San Fernando Valley Superfund Area 1. The San Fernando Valley Superfund Area 2 is present through approximately 1.26 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area. 	<p>mile buffer of alignment. Approximately 52 of these sites are located within a ½ mile of proposed tunnels.</p> <ul style="list-style-type: none"> The San Fernando Valley Superfund Area 1 is located through approximately 3.66 miles of the alignment. Tunneling is proposed in approximately 0.47 miles of the 3.66 miles. <p>Non-tunnel</p> <ul style="list-style-type: none"> 0 miles are within formations with naturally occurring oil 0 miles are within 1,000 linear feet of oil and gas wells 0.07 miles are within 50 linear feet of highways 4.78 miles are within 50 linear feet of rail alignments Demolition of existing structures may encounter asbestos, lead-paint, and other hazardous materials requiring proper disposal. Contaminated sites <ul style="list-style-type: none"> In the Palmdale area (just south of Lake Palmdale to Palmdale Station), approximately 114 contaminated sites are located within a ½ mile of the non-tunnel areas. For the rest of the alignment, of the approximately 172 contaminated sites, approximately 120 sites are located within a ½ mile of the non-tunnel areas. Non-tunneling is proposed in approximately 3.19 of the 3.66 miles of alignment located within the San Fernando Valley Superfund Area 1. The San Fernando Valley Superfund Area 2 is present through approximately 1.89 miles of the Burbank area of the alignment. Non-tunneling is proposed for the entire area.
Fire Risk	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 18.39 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.29 miles are within a high fire hazard severity zone 9.05 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 20.23 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.36 miles are within a high fire hazard severity zone 7.56 miles are within a very high fire hazard severity zone 	<p>Tunnel</p> <ul style="list-style-type: none"> 0 miles are within a high fire hazard severity zone 19.83 miles are within a very high fire hazard severity zone <p>Non-tunnel</p> <ul style="list-style-type: none"> 0.29 miles are within a high fire hazard severity zone 6.41 miles are within a very high fire hazard severity zone
Agency and Public Input	As noted in the SAA document, since May 2014, the Authority has conducted numerous meetings and outreach activities with agencies, elected officials, media outlets, stakeholders, and the general public. Public input is mixed, with some preferring an SR 14 alternative over an East Corridor alternative, and others preferring an East Corridor alternative over an SR 14 alternative.		TBD

Note: Throughout this evaluation table, particular measurement criteria are separated by tunnel and non-tunnel vertical profiles. For most measurement criteria, tunnel profiles, as compared to non-tunnel profiles, are anticipated to have no potential surface impacts.
 Note: By preparing this alternatives analysis, the Authority is not waiving any rights it may have related to Surface Transportation Board jurisdiction and regulation of this proposed project under the Interstate Commerce Commission Termination Act of 1995, including that Act's preemptive effect on CEQA.

¹ The USFS has developed a Land Management Plan for the Angeles National Forest that identifies land use zones. These uses range from Developed Areas Interface to Back Country to Critical Biological areas. The proposed alignments would be evaluated to ensure that conflict with the identified land uses in the Land Management Plan are minimized, for example, by utilizing existing access roads whenever possible. The future environmental documents will conduct a detailed analysis on the consistency of alignments alternatives with the Angeles National Forest Land Management Plan.

Table A-3 E2 Alignment Alternative Detailed Evaluation Table (continued)

² This analysis is based on a comparison of the alternative alignments and GIS data from the California Department of Transportation, "California Rail Network," last updated October 31, 2013, available for download here: http://www.dot.ca.gov/hq/tsip/gis/datalibrary/Metadata/Rail_13.html, accessed February 22, 2016.

³ This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files.

⁴ This analysis is based on GIS data from the California Department of Resources Recycling and Recovery (CalRecycle), this data is updated continuously, available for download here: <http://www.calrecycle.ca.gov/SWFacilities/Directory/Search.aspx#DOWNLOAD>, accessed February 22, 2016.

⁵ Section 4(f) will be applicable to all parks and recreational areas of national, state, or local significance that are both publically owned and open to the public, while Section 6(f) will be applicable to lands acquired with Land and Water Conservation Act funds. Additionally, final determination of national, state, or local significance, the nature of Section 4(f) impacts, as well as determining if any of these lands were acquired with Land and Water Conservation Act funds will be determined in the environmental document.

⁶ The County of Los Angeles is currently reviewing SEA designations. If proposed SEAs are adopted by the County, then potential impacts from the HSR Project would be to the proposed acreages. Please note, proposed acres are not additive, if the proposed SEAs are adopted, then the potential impact numbers will be those listed under the proposed listing.

⁷ This table reflects the identification of several resource types near the centerline of proposed alignments as "tunnel" or "non-tunnel." Generally, few or no surface level effects are anticipated for "tunnel" sections, particularly where tunnels would be several hundred or more than one thousand feet below ground surface. Forthcoming environmental documentation, supported by ongoing geotechnical investigations, will help the Authority ascertain if any such surface level effects may occur.

⁸ Parklands analyses are based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of publicly owned and publicly accessible parklands within a 100 foot buffer of the alternative alignments.

⁹ This analysis is based on data in the California Protected Areas Database (CPAD), available for download here: <http://www.calands.org/data>, accessed February 22, 2016. Acreages described were determined by calculating the amount of parklands (all categories except facilities with no public access) within a 100 foot buffer of the alternative alignments.

¹⁰ This analysis is based on GIS data from the California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP), available for download here: <http://www.conservation.ca.gov/dlrp/fmmp/products/Pages/DownloadGISdata.aspx>, accessed February 22, 2016. Acreages described were determined by calculating the amount of FMMP mapped land within a 100 foot buffer of the alternative alignments. The following categories of FMMP land were excluded from this analysis: "Urban and Built-Up Land", "Other Land", "Water", "Area not mapped."

¹¹ In the 2010 Census, 2,728,321 people were identified as white and not Hispanic. Therefore, since 'minority' = (total population) – (white and not Hispanic), and the total population was 9,818,605; 7,090,284 people (72.2 percent of the total population) in Los Angeles county are considered to be a 'minority.'

¹² Minority = Total population – white and not Hispanic

¹³ This is the countywide average: White and Hispanic countywide (2,208,278)/Hispanic population countywide (4,687,889) = 47.1 percent of the Hispanic population is also white.

¹⁴ This analysis is based on data in the Locations/Points of Interest (LMS data) database, last updated January 2016, available for download here: <https://egis3.lacounty.gov/dataportal/2016/01/14/locationspoints-of-interest-lms-data/>, accessed February 22, 2016. This data was compiled from the following sources of data: 211 LA County (<http://211lacounty.org/>), HSIP Freedom from the HIFLD working group: <http://www.hifldwg.org/>, County Services Locator: <http://maps.lacounty.gov/location/search>, Schools from California Department of Education, other GIS files. Facilities in the following categories were considered in this analysis: arts and recreation, community groups, education, emergency response, government, health and mental health, municipal services, public safety, social services.

¹⁵ Potential visual impacts associated with the E2 Corridor alignment alternatives are similar throughout the study area. This assessment focuses on a comparative analysis of areas where the three alignment alternatives diverge most in terms of 1) the location of the centerline – where one alternative might be closer to a sensitive visual resource than another, and 2) the proposed track type (viaduct, at-grade, or tunnel). For this analysis area, sensitive viewers are assumed to be residents and recreators. Therefore, residential areas and recreation sites and facilities within the project area represent sensitive viewing locations.

¹⁶ Percent visible: This is the percentage of the alignment alternative that is above ground versus tunneled. A higher percent visible corresponds to a higher potential impact to visual resources. Greater proportion of visible track type indicates the alternative has a higher probability to be seen, and that the design of the structure could contrast with surrounding visual character.

Appendix B

Table B-1: Palmdale to Burbank Corridor Alignment Alternatives and Station Options

Alignment Alternatives and Station Options	Carried Forward	Not Carried Forward
PAA (2010)¹		
SR 14 East Alignment Alternative	X	
SR 14 West Alignment Alternative	X	
SR 14 South Alignment Alternative		X
Soledad Canyon Alignment Alternative		X
Palmdale East/Palmdale Transportation Center Station Option	X	
Palmdale West Station Option	X	
SAA (2011, 2012, 2014)		
SR 14 East Alignment Alternative	2011 SAA, 2012 SAA, 2014 SAA	
SR 14 Hybrid Alignment Alternative	2012 SAA, 2014 SAA	
SR 14 West Alignment Alternative	2011 SAA, 2012 SAA	2014 SAA
Palmdale East/Palmdale Transportation Center Station Option	All AAs	
Palmdale West Station Option	2011 SAA, 2012 SAA	2014 SAA
Santa Clarita North Alignment Alternative	2012 SAA, 2014 SAA	
Santa Clarita South Alignment Alternative	2012 SAA, 2014 SAA	
Sand Canyon River Alignment Alternative		2012 SAA
HSR to the East of Metrolink Alignment Alternative	All AAs	
HSR to the West of Metrolink Alignment Alternative	2014 SAA (reintroduced)	PAA
San Fernando Station Option	PAA, 2011 SAA, 2012 SAA	2014 SAA
Pacoima Wash Station Option		2011 SAA
Branford Street Station Option	PAA, 2011 SAA, 2012 SAA	2014 SAA
Burbank Airport Station Option	All AAs	
Burbank Metrolink Station Option	PAA	2011 SAA
Grade Crossing Profile Options through the San Fernando Valley		
Profile A – predominantly at-grade with HSR elevated	All AAs	
Profile B1 – predominantly at-grade with roads elevated	All AAs	
Profile B2 – predominantly at-grade with roads depressed	All AAs	
Profile C – predominantly at-grade with HSR depressed	All AAs	
SAA¹ (2015, 2016)		
SR 14-1 (SR 14 Hybrid - SCN-SFW)	2015 SAA	2016 SAA
SR 14-2 (SR 14 Hybrid - SCS-SFW)	2015 SAA	2016 SAA
SR 14-3 (SR 14 East - SCN-SFW)		2015 SAA
SR 14-4 (SR 14 East - SCS-SFW)		2015 SAA
SR14 Refined	2016 SAA	
E1a	2015 SAA	2016 SAA
E1b	2015 SAA	2016 SAA
E1 Refined	2016 SAA	
E2a	2015 SAA	2016 SAA
E2b	2015 SAA	2016 SAA
E2 Refined	2016 SAA	
E3a	2015 SAA	2016 SAA

Alignment Alternatives and Station Options	Carried Forward	Not Carried Forward
E3b	2015 SAA	2016 SAA
<i>Burbank Airport Station Platform Options</i>		
Platform Option A	2015 SAA	
Platform Option B	2015 SAA	
Platform Option C	2015 SAA	2016 SAA

Table B-1: Palmdale to Burbank Corridor Alignment Alternatives and Station Options

Sources: Palmdale to Los Angeles Preliminary Alternative Analysis, 2010; Palmdale to Los Angeles Supplemental Alternative Analyses, 2011, 2012, and 2014, Palmdale to Burbank Supplemental Alternatives Analysis 2015.

AA = Alternatives Analysis; HSR = high-speed rail; PAA = Preliminary Alternatives Analysis; SAA = Supplemental Alternatives Analysis; SCS-SFW = Santa Clarita South-San Fernando West; SCN-SFW = Santa Clarita North-San Fernando West; SR = State Route

¹The PAA and 2015 SAA analyzed the alternatives under a different geographic context than the other SAAs. Therefore, they are standalone portions of this table.

Appendix C

Example of discussion notes taken from the San Fernando Community Working Group Meeting 1



CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

PALMDALE TO BURBANK PROJECT SECTION

SAN FERNANDO
COMMUNITY WORKING GROUP
S.E.B.R. J. A. R. Y 24, 2015

COMMUNITY VALUES

- ▶ EQUITABLE RAIL PRICES
- ▶ "TIGHT KNOT" ▶ HISTORIC
- ▶ CONSENSUS ▶ HARD WORKING
- ▶ WHOLE COMMUNITY ▶ SOLECATION
- ▶ RESPECT FOR RESOURCES ▶ INVESTMENT
- ▶ STRONG COMMUNITY ▶ "COMING BACK"
- ▶ JUSTICE - EJ ▶ RECOGNITION
- ▶ MAY BERRY ▶ DEEP ROOTS
- CARING ▶ PRESERVATION
- CLOSE ▶ LONG STANDING
- SMALL ▶ FAMILIES
- ▶ COMFORT ▶ HOMETOWN
- ▶ CHARMING ▶ HOMETOWN
- ▶ HOMEOWNERS ▶ UNIQUE

- ▶ PROVIDE GREATER OPPORTUNITIES FOR COMMUNITY INVOLVEMENT
- ▶ ENSURE UNDERSTANDING OF COMMUNITY
- ▶ PROVIDE MAIN CONCEPTS
- ▶ UTILIZE ROW VS MAXIMIZE
- ▶ ROW WHO DETERMINES IMPACTS
- ▶ ENSURE BOARD NOTES ARE ACCESSIBLE
- ▶ TOTAL NUMBER TRACKS 2452 - 2400K ROWS 100'
- ▶ CONSIDER ONLY 1-TRACK
- ▶ CLARIFY APPROVED COST
- ▶ ARE COSTS RELATED TO CONSTRUCTION & LEGAL COSTS INCLUDED IN TOTAL
- ▶ FINANCIAL MODELS IN BUSINESS PLAN
- ▶ CAUSING IMPACTS FROM UTILIZATION OF BENEFICIAL REGION
- ▶ LOOK AT SITUATION THAT BEST COMMUNITY
- ▶ BART FOLLOWS ALL BE PROBABLY ENSURE PROPER SAFETY MATHS CONSTRUCTION PUBLIC SAFETY TRENCH OPTION 2452 GROW ROW FOR CONSTRUCTION & OPERATING
- ▶ KILL HSR BE PROFITABLE FINANCIAL MODELS IN BUSINESS PLAN



VEGAS OPTION

TRENCH & INCLUDE ALL AMBL SITES

POTENTIAL

- ▶ MITIGATION WILL NOT ADDRESS ALL ISSUES - COMMUNITY WILL STILL BE DIVIDED
- ▶ CONSIDER OTHER ALL ALTERNATIVES FOR COMPLETE STUDY
- ▶ WHERE CAN COMMUNITY ACCESS DATA LETTERS
- ▶ **PROTECT WEBSITE**
- ▶ LOCAL COMMUNITY WILL NOT BE FUTURE RIDERS
- ▶ WHAT ARE BUSINESS IMPACTS - AFFECTS LOCAL ECONOMY
- ▶ ENSURE LOW ENFORCEMENT & FIRST RESPONDER COORD WHEN OPERATING
- ▶ EVALUATE ALL ALTERNATIVES AGAINST COMMUNITY VISION

Appendix C List

California High Speed Rail Authority
Palmdale to Burbank Project Section
San Fernando Community Working Group
February 24, 2015

Community Values

- Equitable [unreadable text]
- “Tight knit”
- Consensus
- Whole Community
- Respect for Resources
- Strong Community
- Justice – EJ
- Mayberry
 - Caring
 - Close
 - Small
- Comfort
- Charming
- Home Ownership
- Historic
- Hard Working
- Education
- Investment “Coming Back”
- Recognition
- Deep Roots
- Preservation
- Long Standing Families
- Hometown
- Unique

-
- Provide Greater Opportunities for Involving Community
 - Ensure Understanding of Community
 - Provide [unreadable text] Concepts
 - Utilize Row vs. Maximize
 - [unreadable text] Who Determines Impacts
 - Ensure Board Meeting are Accessible
 - Total Number Tracks
 - 2 HSR – 2 [unreadable text]
 - Requires 100’
 - Consider Only [unreadable text]
 - Clarify Approved Cost
 - Are Costs Related to [unreadable text] and Legal Costs Included in Total
 - Fares – What are:
 - Costs for Operation
 - Public Subsidies vs. Private Investors
 - Look at Solutions that [unreadable text] Community
 - Ongoing Community Impacts [unreadable text]
 - Bar – [unreadable text] Will Be Problematic
 - Ensure [unreadable text] Safety Matter
 - Infrastructure can Impact Public Safety
 - Gas Lines
 - Trench Option
 - Requires Greater [unreadable text] for Construction and Operating
 - Will HSR be Profitable
 - Financial Models in Business Plan
 - Mitigation will not Address all Issues – Community Will Still be Divided
 - Consider other [unreadable text] Alternatives for Complete Study
 - Where Can Community Access Data Letters
 - Protect Website
 - Local Community Will Not be Future Riders
 - What are Business Impacts – Affects Local Economy
 - Ensure Law Enforcement and First Responder Coordination when Operating
 - Evaluate all Alternatives Against Community Vision