3.0 Affected Environment, Environmental Consequences, and Mitigation Measures

This chapter provides the analysis of the potential project-related environmental effects that would occur with development of the DesertXpress project. Sections 3.1 through 3.16 of this Environmental Impact Statement (EIS) describe the affected environment of the project as it relates to each specific environmental issue, the environmental consequences resulting from implementation of the proposed action and alternatives, and mitigation measures that would reduce impacts of the proposed action and alternatives.

Issues Addressed in this Draft EIS

The following environmental topics are addressed in this chapter:

- 3.1 Land Use and Community Impacts
- 3.2 Growth
- 3.3 Farmlands/Agricultural Lands
- 3.4 Utilities/Emergency Services
- 3.5 Traffic
- 3.6 Visual Resources
- 3.7 Cultural and Paleontological Resources
- 3.8 Hydrology and Water Quality
- 3.9 Geology and Soils
- 3.10 Hazardous Materials
- 3.11 Air Quality and Global Climate Change
- 3.12 Noise
- 3.13 Energy
- 3.14 Biological Resources
- 3.15 Section 4(f)
- 3.16 Cumulative Impacts

Format of Issue Sections

Each environmental issue section contains a discussion of regulations and standards, methods of evaluation, affected environment, environmental consequences, and mitigation measures and/or recommended mitigation strategies.

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3.1 LAND USE & COMMUNITY IMPACTS

This section pertains to the land use implications of the action alternatives. The section also includes an analysis of potential community effects, including a required environmental justice analysis.

This section discusses existing and proposed land uses, as well as minority and low-income populations near the action alternatives. Regulations pertaining to both land use and environmental justice are described. This section also includes an evaluation of environmental consequences from the action alternatives, and provides mitigation measures as appropriate.

In general, project effects related to land use include the potential to divide the existing communities of Lenwood, Yermo, and Sloan, potential conflicts with pockets of existing residential uses near the rail alignments, conflicts with the Mojave National Preserve, and environmental justice effects. Mitigation measures from other sections such as 3.11 Air Quality and Global Climate Change, 3.12 Noise and Vibration, 3.5 Traffic and Transportation, 3.6 Visual Resources, and 3.4 Utilities/Emergency Services, would minimize land use related impacts.

3.1.1 REGULATORY REQUIREMENTS

As stated in Chapter 1, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. Such laws include the California Environmental Quality Act (CEQA).[1] As a result of the declaratory order, no Environmental Impact Report (EIR) is required and thus has not been prepared. Nevertheless, this EIS analyzes the proposed project's direct and indirect effects related to land use, taking into account the potential consistency with planned and existing land uses. Federal, state, and local land use plans and policies are considered here.

Federal agencies governing land use in the project area and immediate vicinity are: the United States (U.S.) Department of Interior, Bureau of Land Management (BLM), the U.S. Department of Defense, and the National Park Service (NPS).

State and local agencies with land use jurisdiction in the project area are: the California Department of Transportation, Nevada Department of Transportation, San Bernardino County, California, Clark County, Nevada, the cities of Victorville and Barstow, California, and the City of Las Vegas, Nevada.

Agencies and government bodies are listed and their relevant objectives, policies, programs, and goals are described below.

[1] STB Finance Docket No. 34914, DesertXpress Enterprises, LLC – Petition for Declaratory Order

3.1.1.1 Bureau of Land Management

In 1976 Congress passed The Federal Land Policy and Management Act (FLPMA), which directs how the BLM manages public lands. The BLM has set forth guidelines for public land use planning and management designed to:

- Protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values;
- Where appropriate, preserve and protect certain lands in their natural condition;
- Provide food and habitat for fish and wildlife and domestic animals;
- Provide for outdoor recreation and human occupancy and use.

As authorized by FLPMA, the BLM issues right-of-way (ROW) grants for transportation and other facilities which are in the public interest, as outlined under the ROW regulations at 43 CFR 2801.9 et seq. A project applicant must complete an "Application for Transportation and Utility Systems and Facilities on Federal Lands." A ROW grant authorizes rights and privileges for a specific land use for a specific period of time. The BLM must ensure the protection of resource values under the conditions of the grant.[2] Relevant BLM resource management plans are discussed below.

California Desert Conservation Area Plan Resource Management Plan

The California Desert Conservation Area Plan (CDCA Plan) manages 25 million acres of land in southern California as designated by Congress in 1976 through the FLPMA.[3] About 10 million acres are administered by the BLM. All proposed features within the State of California (rail alignments, stations, maintenance facilities, etc.) would be located within the CDCA Plan area.

CDCA Plan areas are managed under the California Desert Protection Act of 1994, the 1964 Wilderness Act, and BLM's national wilderness management policy, all of which mandate a high degree of protection and restrict access and use. The CDCA Plan establishes goals for protection and use of the desert and designates land with multiple use classes. The plan sets forth goals, specific actions, and management needs for each resource in the desert.

All of the public lands in the CDCA Plan under BLM management[4] have been designated geographically into four multiple-use classes. The classification was based on the sensitivity of resources and the types of uses for each geographic area. Each multiple-use class describes a different type and level or degree of use which is permitted within that particular geographic area.

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[2] U.S. Department of the Interior, Bureau of Land Management. Rights-of-Way. Website accessed in 2007. http://www.blm.gov/wo/st/en/prog/energy/rights-of-way.html.

[3] A map of the CDCA is available on the BLM's California Division website: http://www.blm.gov/style/medialib/blm/ca/pdf/caso/publications.Par.67970.File.dat/CDCA.pdf

[4] Except for a few small and scattered parcels (approximately 300,000 acres) that are managed on a case-by-case basis,

Multiple Use Class C: Class C has two purposes. First, it shows those areas which are being 'preliminarily recommended" as suitable for wilderness designation by Congress. This process is fully explained in the Wilderness Element in this Plan. Second, it will be used in the future to show those areas formally designated as wilderness by Congress. The Class C guidelines are different from the guidelines for other classes. They summarize the kinds of management likely to be used in these areas in the CDCA when and if they are formally designated wilderness by Congress.

These guidelines will be considered in the public process of preparing the final Wilderness Study Reports. But the final management decisions depend on Congressional direction in the legislation which makes the formal designation.

Multiple-Use Class L (Limited Use): This Class protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.

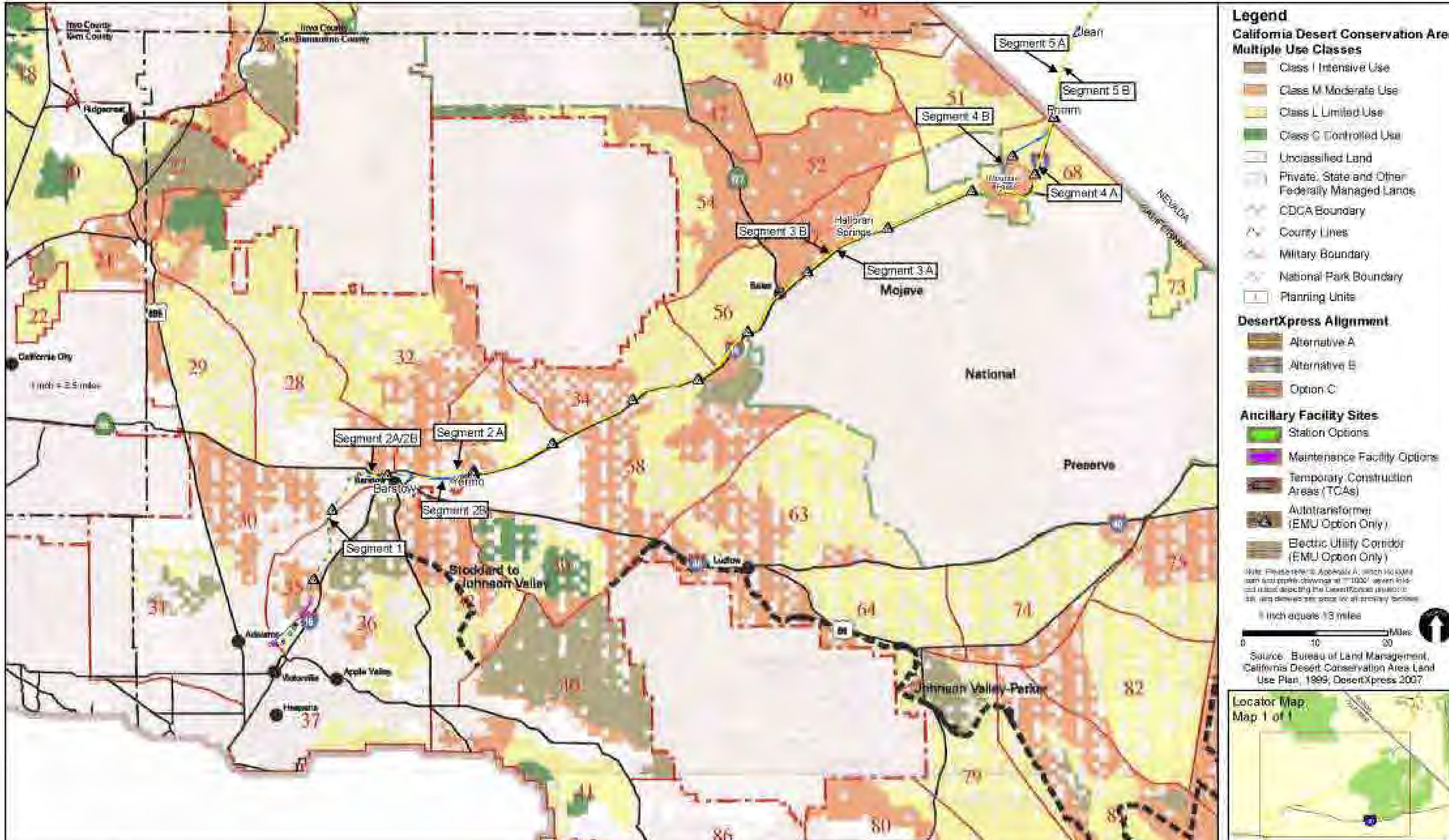
Multiple-Use Class M (Moderate Use): This class is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety or present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.

Multiple Use Class I (Intensive use): Its purpose is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of impacted areas will occur insofar as possible.

Figure 3-1.1 depicts the multiple use classifications near the alignment. As shown in Figure 3-1.1, the majority of the alignment that passes through the CDCA planning area is in either unclassified, Class M, or Class L land. Near Victorville, a small portion of the alignment runs through Class I land.

As part of the CDCA Plan, the BLM also established 85 Areas of Critical Environmental Concern (ACECs) in the desert covering about 750,000 acres. No project feature would be located within an ACEC, but five ACEC are within one mile of proposed alignments. The locations of ACEC relative to the study area are shown on Figures 3-14.1 through 3-14.5 within Chapter 3.14, Biological Resources, as well as on large-scaled maps provided in Appendix A-2. The ACECs near the action alternatives are further described below.

Calico Early Man ACEC: The 898-acre Calico Early Man ACEC is designated as a National Register of Historic Places property and is north of Segments 2A/2B.



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Bureau of Land Management (BLM) Multiple Use Classifications, California Desert Conservation Area

FIG 3-1.1

It was designated as an ACEC by the 1980 CDCA Plan. A management plan was prepared in 1984 that designated a network of vehicle access routes to protect an ancient human occupation.

Manix ACEC: The 2,897-acre Manix ACEC, located about 20 miles northeast of Barstow along the Mojave River south of Segments 3A/3B, was established in 1990 by the BLM to protect paleontological and cultural resources. This site also contains blowsand habitat for the Mojave fringe-toed lizard. No management plan has been prepared for this ACEC.

Afton Canyon ACEC: The 4,726-acre Afton Canyon ACEC protects riparian habitats and is southeast of Segments 3A/3B. The Afton Canyon Natural Area Management Plan (1989) was prepared in cooperation with the California Department of Fish and Game and covers a larger area than the ACEC. The plan protects the riparian community of the Mojave River, scenic values, desert habitat in the Cady Mountains, which is habitat for bighorn sheep as well as nest sites for prairie falcon and golden eagle.

Cronese Basin ACEC: The BLM designated the 10,226-acre Cronese Basin ACEC, north of I-15 between Barstow and Baker and north of Segments 3A/3B in the 1980 CDCA Plan. A management plan was published in 1985. This ACEC protects cultural and natural resources, including ephemeral wetlands, which serve as stopover points for migratory water birds and nesting sites during wet years. Mesquite hummocks and desert willow washes add to the biological importance, and the dunes and sand sheets are occupied habitat for the Mojave fringe-toed lizard.[5]

Halloran Wash ACEC: The 1,860-acre Halloran Wash ACEC was established by the BLM in 1980. The ACEC protects sensitive cultural resources in Halloran Wash at the south end of Shadow Valley just north of I-15. The ACEC is north of Segments 3A/3B.[6]

Within the project area, two resource management plans (RMPs) amend the CDCA Plan and provide for the recovery of the desert tortoise and other threatened species. These plans are: the West Mojave Plan and the Northern and Eastern Mojave Plan. Within each of these planning areas are desert wildlife management areas (DWMAs), which have been established to manage habitat conservation. The DWMAs, managed by the BLM, are also

[5] U.S. Department of the Interior, Bureau of Land Management. Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. Volume 2. January 2005. Website accessed in 2007.

http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-2-Complete-Bookmarks.pdf

[6] BLM 2003. Defense Advanced Research Projects (DARPA) Grand Challenge Environmental Assessment. December 2003. Website accessed in 2008. http://www.blm.gov/ca/pdfs/barstow_pdfs/darpa/chapter_3_affected_environment.pdfBLM 2003

considered ACECs. Figure 3-1.2 shows BLM RMP areas and DWMAs relative to the study area. The RMPs near the alignment are described below.

> ***West Mojave Plan:*** The West Mojave Plan (WMP) is the largest habitat conservation plan (HCP) in the U.S. The Plan covers 9.3 million acres in San Bernardino, Kern, Los Angeles, and Inyo counties. The BLM published the plan in 2005 and the Record of Decision was signed in March 2006.[7]
>
> The WMP provides goals, policies, and measures to conserve and protect more than 100 listed or sensitive wildlife species and their habitats, including the desert tortoise and Mojave ground squirrel. To protect sensitive species, several DWMAs were established (See Figure 3-1.2). The plan also provides a streamlined program for public agencies and private parties to comply with requirements of the state and Federal Endangered Species Acts.[8]
>
> As shown on Figure 3-1.2, project features within the WMP Area include all of Segments 1 and 2, a substantial portion of Segment 3, and the Victorville passenger station and OMSF site options.
>
> ***BLM: Northern and Eastern Mojave Plan:*** The Northern and Eastern Mojave Plan (NEMO) planning area covers 2.7 million acres of BLM-managed public lands in eastern San Bernardino and Inyo counties and the eastern edge of Mono County.
>
> The plan manages sensitive species and habitats on public lands administered by the BLM. NEMO also designates routes of travel in Desert Wildlife Management Areas consistent with Federal regulations. The Record of Decision for NEMO was signed in December 2002.
>
> As shown on Figure 3-1.2, project features within the NEMO plan area include a substantial portion of Segment 3, the Baker MOW facility site, all of Segment 4, and a portion of Segment 5.

Desert Tortoise Recovery Plan

On June 28, 1994, the US Fish and Wildlife Service approved the final Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan) (Service 1994). The Recovery Plan divides the range of the desert tortoise into 6 recovery units and recommends establishment of 14 DWMAs throughout the recovery units. Within each DWMA, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. As part of the actions needed to accomplish recovery, the Recovery

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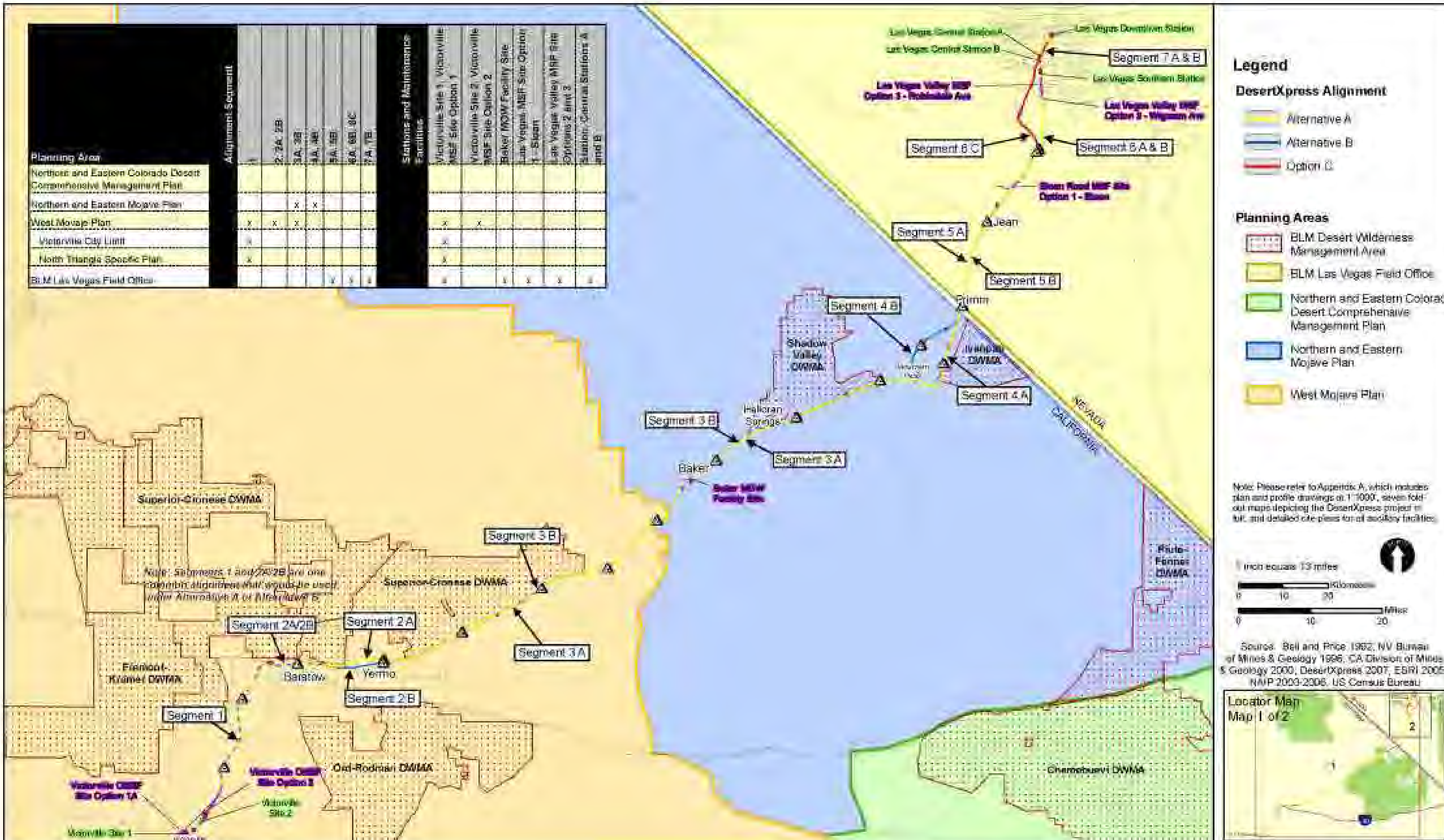
[7] U.S. Department of the Interior, Bureau of Land Management. Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. Volume 2. January 2005. Website accessed in 2007.

http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-2-Complete-Bookmarks.pdf

[8] U.S. Department of the Interior, Bureau of Land Management. Press Release: Long-Awaited West Mojave Conservation Plan Released. March 24, 2005. Website accessed in 2007.

http://www.blm.gov/ca/news/2005/03/nr/CDD34_westmojaveplan.html

Planning Area	Alignment Segment	1	2, 2A, 2B	3A, 3B	4A, 4B	5A, 5B	6A, 6B, 6C	7A, 7B	Stations and Maintenance Facilities	Victorville Site 1, Victorville MSF Site Option 1	Victorville Site 2, Victorville MSF Site Option 2	Baker MOW Facility Site	Las Vegas MSF Site Option 1 - Sloan	Las Vegas Valley MSF Site Options 2 and 3	Station, Central Stations A and B
Northern and Eastern Colorado Desert Comprehensive Management Plan															
Northern and Eastern Mojave Plan				x	x										
West Movaje Plan		x	x	x						x	x				
Victorville City Limit		x								x					
North Triangle Specific Plan		x								x					
BLM Las Vegas Field Office						x	x	x		x		x	x	x	x



U.S. Department of Transportation Federal Railroad Administration

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BLM Planning Areas

FIG 3-1.2

Source: Geografics Consulting 10/03/08

Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (Service 1994).

BLM Las Vegas Field Office Resource Management Plan

Public lands identified near the alignment in Nevada are located within the Las Vegas Field Office Resource Management Plan (1998). The plan reduces impacts to sensitive resources by providing a system of development for transportation, including legal access to private in-holdings, communications, flood control, major utility transmission lines, and related facilities. Public land is available at the discretion of the agency for ROWs.[9] As shown in Figure 3-1.2, portions of segments 5, 6 and 7 fall within the boundary of this plan, along with all Nevada MSF and station site options.

3.1.1.2 National Park Service

The Mojave National Preserve (Preserve) is a unit of the National Park Service (NPS), an agency within the United States Department of the Interior, which was established by the Organic Act of 1916. The Preserve is a large expanse of desert lands that represents a combination of Great Basin, Sonoran, and Mojave Desert ecosystems. The Preserve contains diverse mountain ranges, the Kelso dune system, dry lake beds, and evidence of volcanic activity (domes, lava flows, and cinder cones). Plant and animal life complement the geological features. Several wilderness areas are located within the Preserve. Providence Mountain State Recreation Area (Mitchell Caverns), the University of California's Granite Mountains Natural Reserve, and the California State University's Desert Studies Center at Soda Springs are also within its boundaries.

The NPS adopted the Mojave National Preserve General Management Plan in April 2002. The plan is an overall management strategy for a ten-to fifteen-year period. The plan provides policies and actions to protect land, preserve the park's natural and cultural resources, and set forth limits on land uses.

Near the Nipton Road exit of I-15, a 1.55 mile portion of Segment 4A would traverse the Preserve.

Redwood National Park Act of 1978

The Redwood National Park Act of 1978 established the Sweeney Granite Mountain Research Center (SGMDRC) as a part of the National Reserve System, a network of natural areas throughout California that support university-level teaching, research, and public service. The University of California maintains more than thirty Natural Reserves distributed throughout the state which encompass a wide variety of habitats. The SGMDRC, one of the National Reserve areas is located within the present day Mojave National Preserve.

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[9] U.S. Department of the Interior, Bureau of Land Management. Las Vegas Field Office Resource Management Plan. Website accessed in 2007. http://www.nv.blm.gov/vegas/Environmental/Projects/Volume_1.PDF

California Desert Protection Act of 1994 (PL 103-433)

The California Desert Protection Act designated approximately 7.7 million acres of BLM-owned land as wilderness and added approximately 3 million acres to the Nation Park System. This act established the Mojave National Preserve as a new unit of the National Park system.

NPS Management Policies, 2006

The 2006 NPS Management Policies provide NPS with a policy framework for managing National Parks. Policies 1.4.6, 1.6, 9.1.1.3, and 9.1.3.1, which are especially relevant to the DesertXpress project, are discussed here.

While Congress has given discretion to allow impacts within parks, their discretion is limited by the statutory requirement that NPS must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. Policy 1.4.6 identifies park resources and values that are subject to the no-impairment standard which include the park's scenery, natural and historic objects, wildlife, and people's opportunity to enjoy such resources. Policy 1.6 recognizes that impacts in national parks can result from activities outside of park boundaries. This policy states that NPS will use all available tools to protect park resources and values from unacceptable impacts. Policy 9.1.1.4 requires that new structures reflect the important cultural resources and local character. Policy 9.1.3.1, regarding construction sites, mentions that construction sites will be limited to the smallest feasible area and requires specific processes during construction that will limit the damage to park resources, conserve energy, and increase safety.

NPS-28, Cultural Resource Management, Ch. 8, 4.a. Design Compatibility

NPS-28 is a set of guidelines that elaborates on NPS Management Policies 2006 and offers guidance in their application in order to establish, maintain, and refine NPS cultural resource programs.

NPS-28, Chapter 8, Policy 4.a, Design Compatibility, states that development adjacent to historic structures should be designed to complement the historic structures' visual and physical characteristics. A new structure should be visibly unobtrusive in terms of scale, texture, and continuity of style.

3.1.1.3 U.S. Department of Defense

The Barstow Marine Corps Logistics Base serves as a storage, distribution, and maintenance depot for Marine Corps facilities in the western United States. Equipment, weapons, and supplies are warehoused, repaired, remanufactured, and redistributed at this base, which is the primary Marine Corps facility with this function west of the Mississippi. The depot is composed of three locations east of Barstow, located one to three miles south of I-15. Military facilities include the 2,000-acre Yermo Annex; the Main Base at the Nebo Facility (two miles west of the Yermo Annex); and the Marine Corps Rifle Range (in between the two bases, south of I-40). The Barstow Marine Corps Logistics

Base covers 4,000 acres, and employs 2,500 people.[10] The base prepared a Military Integrated Resource Management Plan to guide the management of the desert tortoise. This plan is discussed in Chapter 3.14, Biological Resources.

Although the Marine Corps Logistics Base is located in the general vicinity of the proposed rail alignments, none of the action alternatives would directly or indirectly affect the Base because at its closest the action alternatives would be over a mile away, on the opposite (north) side of I-15 relative to the Base.

3.1.1.4 California Regulations

County of San Bernardino, California

The San Bernardino County General Plan governs land use planning and development in the unincorporated areas of the privately owned lands in the county. The plan contains goals, policies, and implementing actions for land use issues. The General Plan is the product of an update completed in March 2007. The General Plan divides the largest county in land area in the U.S. into regions: Mountain, Valley, and Desert. All project features within California would be located within the Desert Region of the San Bernardino County General Plan.

The Victorville station and OMSF site would be located within the Victor Valley Subregional planning area. The County anticipates significant growth in this and the adjacent Barstow subregion, mostly within incorporated areas. Please also see Chapter 3.2, Growth, for a more detailed discussion of anticipated growth trends throughout the study area.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial. SCAG maintains the Regional Transportation Plan and the Regional Transportation Improvement Program. Please refer to Chapter 3.5, Traffic and Transportation, for a discussion on regional transportation plans.

San Bernardino Associated Governments

The San Bernardino Associated Governments (SANBAG) is a council of 25 local governments that acts as the transportation planning agency for San Bernardino County. SANBAG's responsibilities include regional planning of local and regional roadway improvements and related studies.

City of Victorville, California

The Victorville City Council approved the Victorville General Plan on July 15, 1997. City land use goals include maintaining a balanced community with a diversified economic

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[10] Center for Land Use Interpretation 2007. Barstow Marine Corps Logistics Base Nebo. Website accessed in 2007. http://ludb.clui.org/ex/i/CA4992/

base, providing adequate city services and maintaining an aesthetically pleasing community.[11]

Two sites in Victorville are being considered for the passenger station; two additional nearby sites are contemplated for the operations, maintenance, and storage facility (OMSF).

Station site option 1 would be located near the southern Stoddard Wells Road intersection with I-15, within the corporate limits of the City of Victorville. The related OMSF site is also within city limits.

Station site option 2 would be located near the northern Stoddard Wells Road intersection with I-15 outside of the City limits but within Victorville's sphere of influence. North and east of station option 2 is OMSF option B, which is also outside the City limits (on land regulated by San Bernardino County). The City of Victorville and San Bernardino County both anticipate future growth and development in these areas; some or all of the land for station option 2 and OMSF site B would likely be annexed to the City of Victorville if developed.[12]

North Mojave Community Plan and North Triangle Specific Plan

Figure 3-1.3 shows the locations of the North Mojave Community Plan, a planning area within the Victorville Plan, as well as the North Triangle Specific Plan, a proposed specific plan area within the North Mojave Plan area.

The Specific Plan is expected to be adopted in 2008 and integrated into the Victorville General Plan Update, expected to be completed in 2008 or 2009.[13] The Specific Plan anticipates the inclusion of transportation related facilities, such as the passenger station and OMSF.

City of Barstow, California

Portions of the proposed rail alignment (portions of segments 1, and 2A/2B) would travel through the City of Barstow or areas of the City's sphere of influence and adjacent "Area of Interest." The rail alignments would be located near but outside of two of the City's specific plan areas (Sun Valley Business Park and Lenwood).

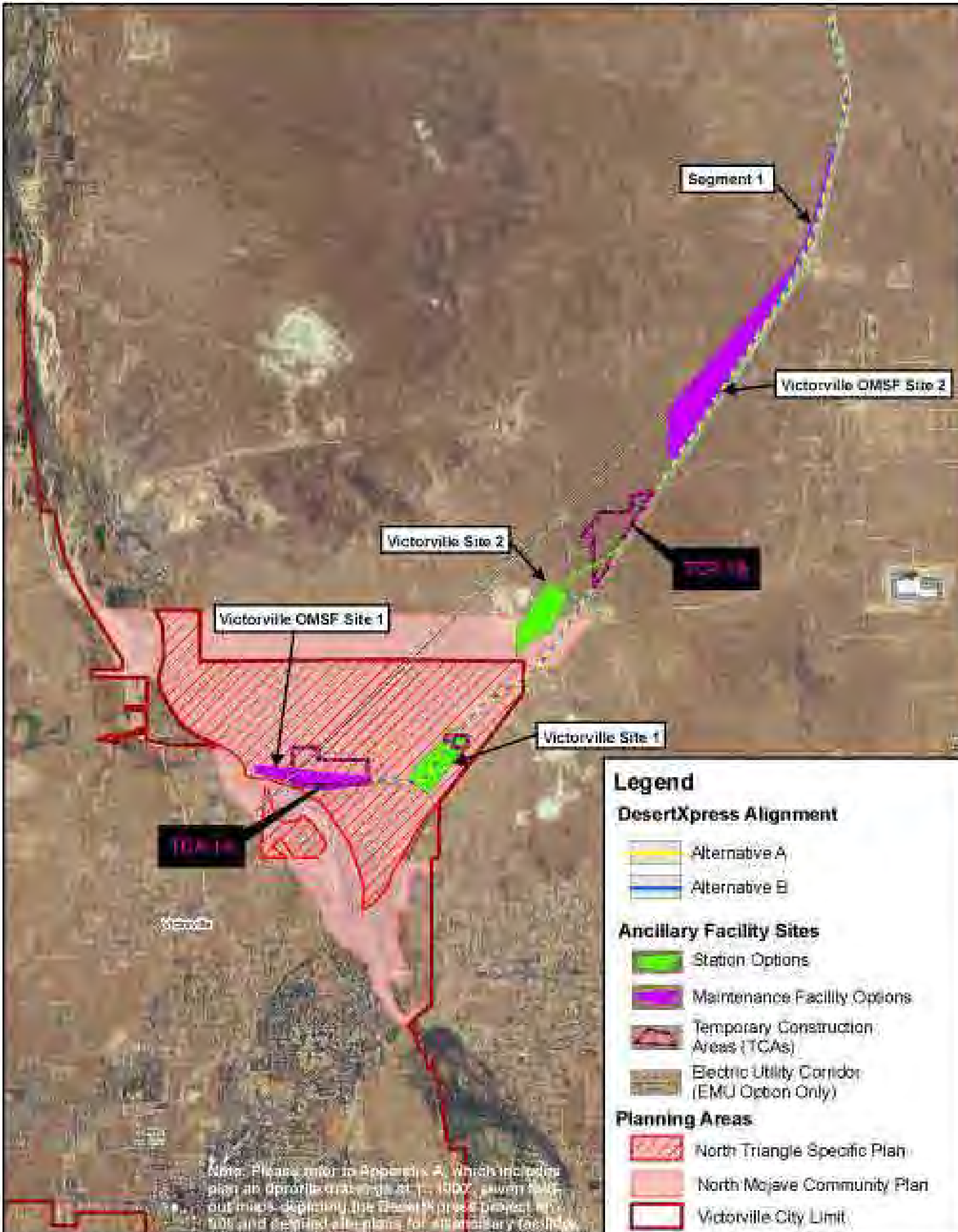
The Land Use Element of the City of Barstow General Plan (1996) identifies six Principal Growth Areas where most of the city growth over the next 20 years is expected to take place. The proposed rail alignment would traverse through or near two of these areas:

- Lenwood Specific Plan area: The City anticipates additional urban commercial and industrial growth in this area.

[11] City of Victorville General Plan. Website accessed in 2007. http://www.ci.victorville.ca.us/about/general-plan.html

[12] John Roberts, Victorville Planning Department, personal communication, July 2007.

[13] John Roberts, Victorville Planning Department, personal communication, July 2007.



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Victorville: North Mojave and North Triangle Plan Areas

FIG 3-1.3

Highway 58 Area North of Mojave River: The City anticipates that improved roadway access to this area will make it more attractive for commercial developments along freeway corridors with potential low density residential development contingent on the availability of water and other resources.

3.1.1.5 Nevada Regulations

Clark County, Nevada Regulations

Land use planning in Clark County, Nevada is regulated by the Clark County Comprehensive Plan. With the exception of northern portions of Segment 7 and the Downtown passenger station option, all project features within the State of Nevada would be located on land regulated by the Comprehensive Plan. Many areas are further regulated by community district plan areas within the Comprehensive Plan. Please see Figure 3-1.4 which shows the Comprehensive Plan Area and the related district plans, each of which are discussed below.

From the California border northeasterly towards the City of Las Vegas, the proposed rail alignments and the Sloan Road maintenance facility site option would be in the "South County" area of the Comprehensive Plan.

Clark County Comprehensive Plan: Enterprise Land Use Plan

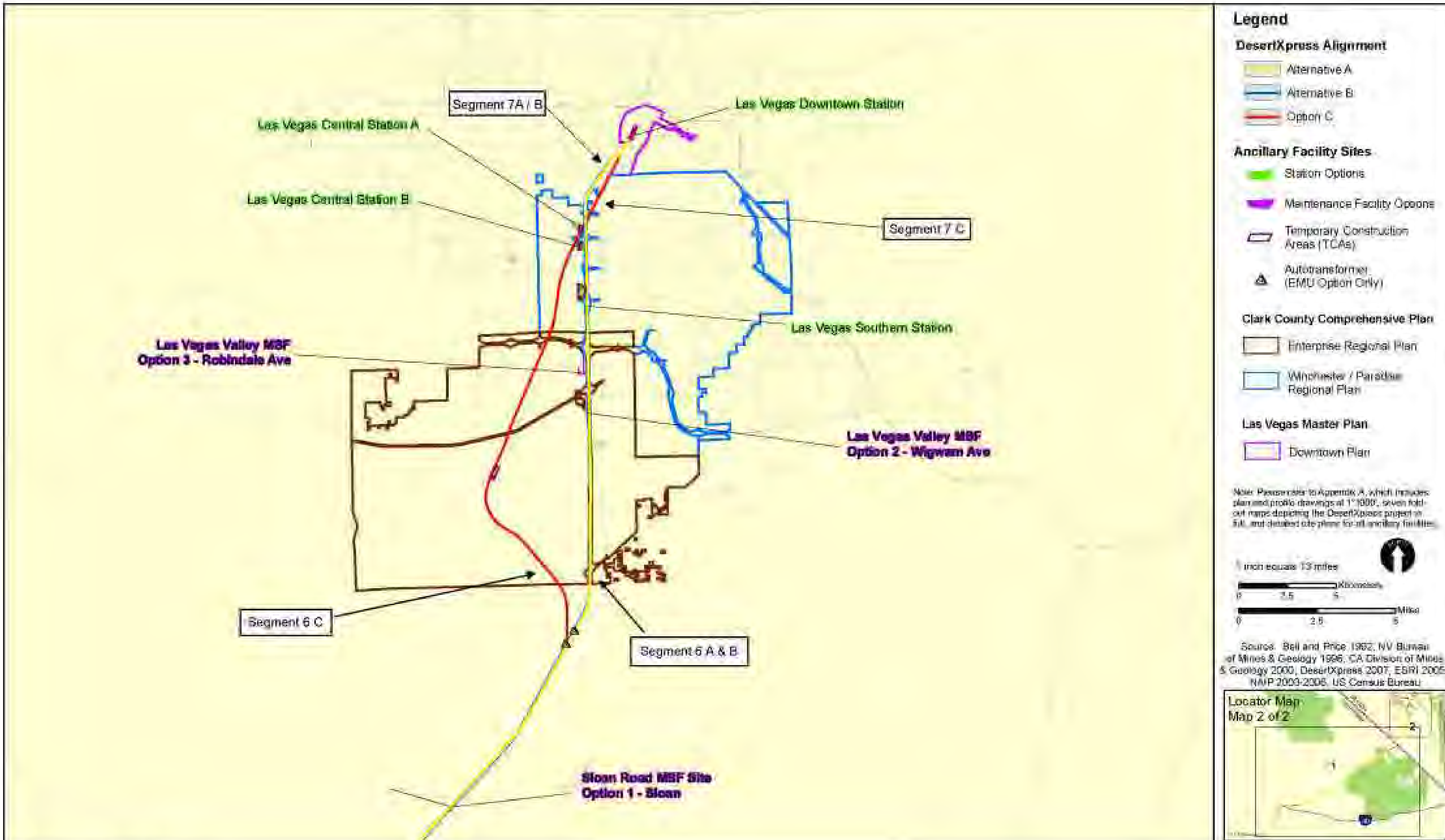
The Enterprise Land Use Plan was adopted as an amendment of the Clark County Comprehensive Plan on December 8, 2004. The Enterprise Plan area covers an area roughly north of Sloan Road to its northern boundary at Sunset Road and McCarran International Airport, as shown in Figure 3-1.4. Substantial portions of Segments 6A/6B and Option C are within the Enterprise Plan area, as are the Wigwam Avenue and Robindale Avenue MSF site options.

Clark County Comprehensive Plan: Winchester/Paradise Land Use Plan

The Winchester/Paradise area of the Comprehensive Plan contains extensive urbanized and urbanizing areas in the Las Vegas Valley, including the Las Vegas Strip and McCarran International Airport.

The Winchester/Paradise planning area is generally bounded on the south by Sunset Road and on the north by Sahara Avenue and the limits of the City of Las Vegas, as shown in Figure 3-1.4.

As shown in Figure 3-1.4, three of the four Las Vegas station site options are within the Winchester/Paradise Plan area: the Southern station at West Russell Road and Central Station A/B station options at Flamingo Road.



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Clark County and City of Las Vegas Planning Areas

FIG 3-1.4

City of Las Vegas, Nevada

The northernmost Las Vegas station site option and portions of Segment 7 would be located in downtown Las Vegas, within the jurisdictional limits of the City of Las Vegas. The Land Use Element of the Las Vegas Master Plan 2020 regulates land use planning in the City of Las Vegas.

Las Vegas Downtown Centennial Plan

The City of Las Vegas adopted the Downtown Centennial Plan to specifically guide growth and development in the downtown area. Figure 3-1.4 shows that the proposed Downtown station would be located within this area. Adopted in 2000, the Centennial Plan provides land use policies, architectural, landscaping, streetscape, and other development standards focused on enhancing the quality of life for residents and visitors. The proposed rail line would terminate within the plan area, traversing several of its sub-districts (Northern Strip, Downtown South, Office Core, and Casino Center).

3.1.2 Regulatory Requirements: Community/Socioeconomic Impacts

The National Environmental Policy Act of 1969 as amended (NEPA) established that the Federal government use all practicable means to ensure all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.[15] FRA, in its Procedures for Considering Environmental Impacts, states that environmental documents should examine the potential for community disruption or cohesion, the possibility of demographic shifts, and impacts on local government services and revenues. In order to determine community impacts, environmental justice is considered.

3.1.2.1 Environmental Justice

Environmental justice analysis is a requirement for all Federal agency actions, imposed by Executive Order No. 12898 (Executive Order) (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations). The order directs individual Federal agencies to develop approaches that address environmental justice concerns in their programs, policies, and procedures. Under the 1997 U.S. Department of Transportation (USDOT) Order on Environmental Justice (USDOT Order), the USDOT is required to comply with Executive Order No. 12898. The USDOT Order describes the processes that the Office of the Secretary and each Operating Administration with USDOT will use to incorporate environmental justice principles, per the Executive Order, into existing programs, policies, and activities. USDOT is thus required to develop specific procedures to incorporate the goals of the USDOT Order and the Executive Order with the programs,

[15] 42 U.S.C. 4331(b)(2)

policies, and activities which they administer or implement.[16] An environmental justice analysis was thus conducted for this project.

Executive Order No. 12898 directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse impacts to minority and low-income populations ("environmental justice populations") with respect to human health and the environment. In summary, the Order directs Federal agencies to conform to existing laws to ensure that their actions:

- Do not discriminate on the basis of race, color, or national origin.
- Identify and address disproportionately high and adverse health or environmental effects of their actions on minority and low-income populations.
- Provide opportunities for community input in the NEPA process, including input on potential effects and mitigation measures.

3.1.3 Affected Environment

The affected environment described here is broken into three sections, one which discusses the regional land use environment, another that discusses the existing land use environment by segment, and lastly a section that describes low income and minority populations near the alignment and station areas. Detailed maps of the action alternatives can be found in Appendix A-2.

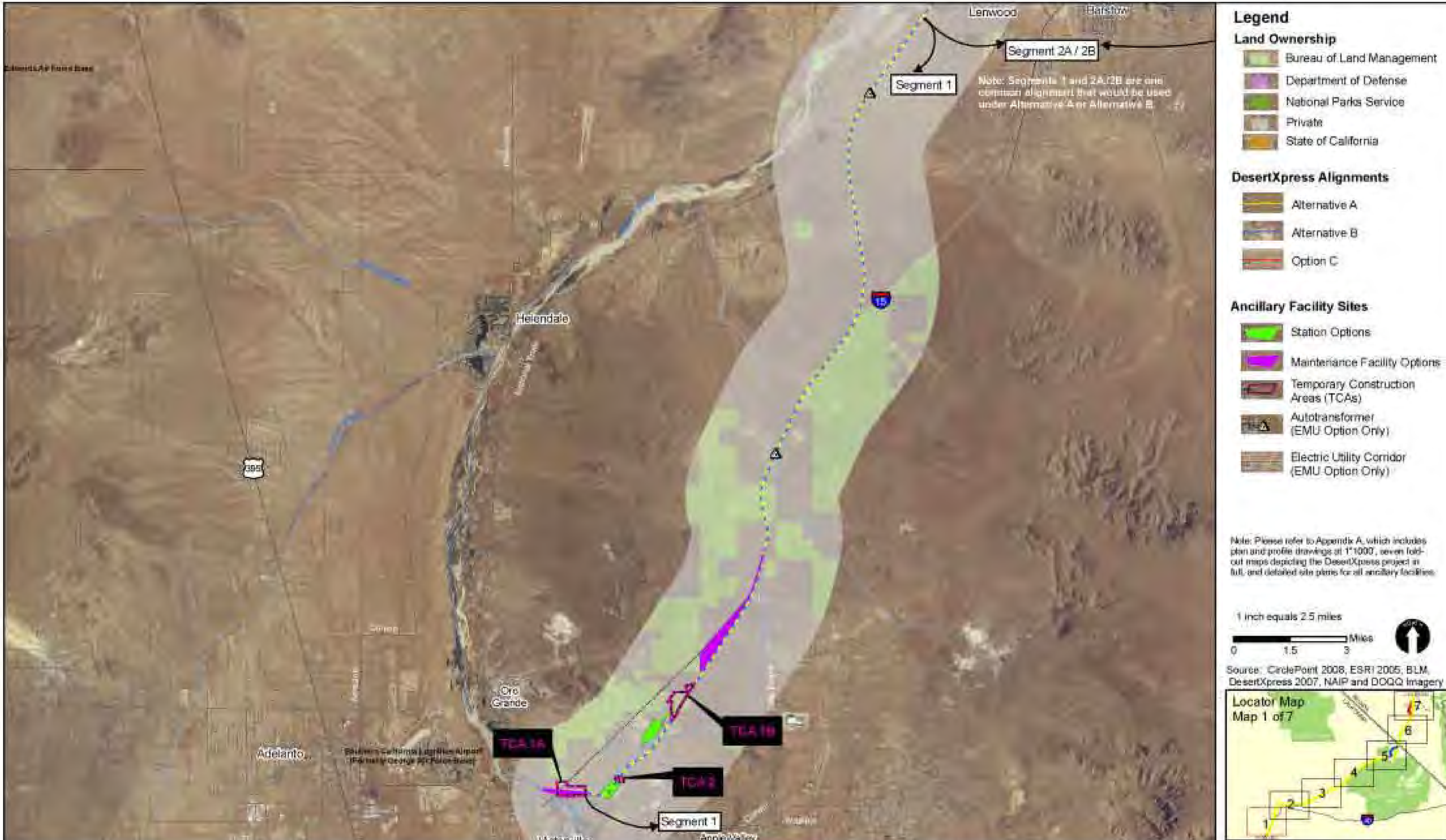
3.1.3.1 Affected Environment: Regional Land Use Environment

To provide the regional context major features such as land ownership, land use designations, mining claims, and public utilities are discussed below.

Land Ownership

Figures 3-1.5 through 3-1.11 depict land ownership patterns across the study area. Outside of populated areas near Victorville, Barstow, and Las Vegas, much of the land in and around the study area is managed by the BLM for the Federal Government. Additional Federal lands in the study area include military lands near Segment 2B, and the Preserve, under the jurisdiction of the National Park Service. The balance of land in the study area is mostly held privately, with some lands (approximately 6.9 acres) owned by the State of California.

[16] Department of Transportation. U.S. Department of Transportation Order on Environmental Justice. Federal Register, April 15, 1997. Volume 62, Number 72.

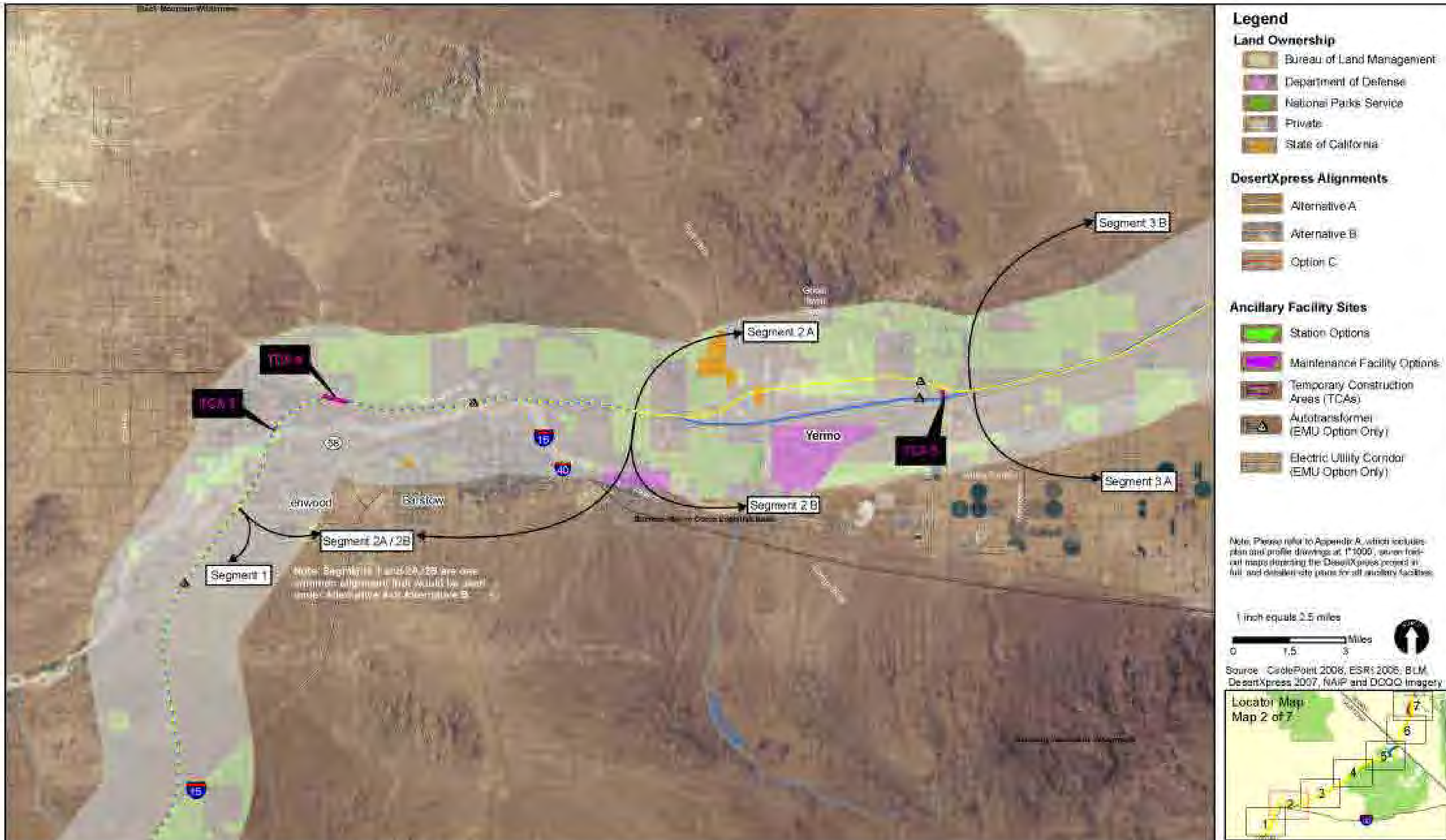


U.S. Department of Transportation
Federal Railroad Administration

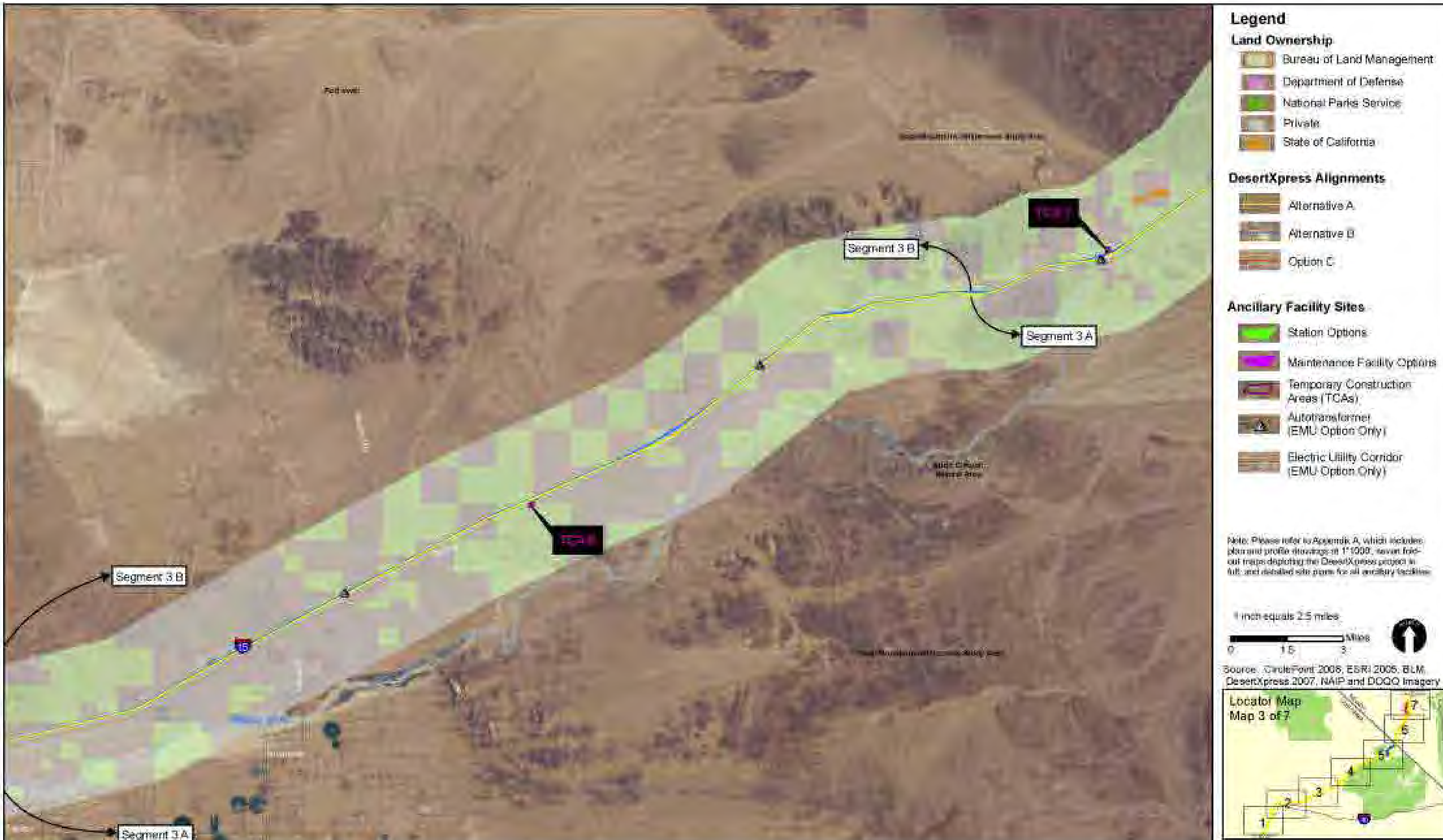
DesertXpress
Project EIS

Land Ownership (1) FIG 3-1.5

Source: Geographics Consulting 02.02.09



Land Ownership (2) FIG 3-1.6



U.S. Department of Transportation Federal Railroad Administration

DesertXpress Project EIS

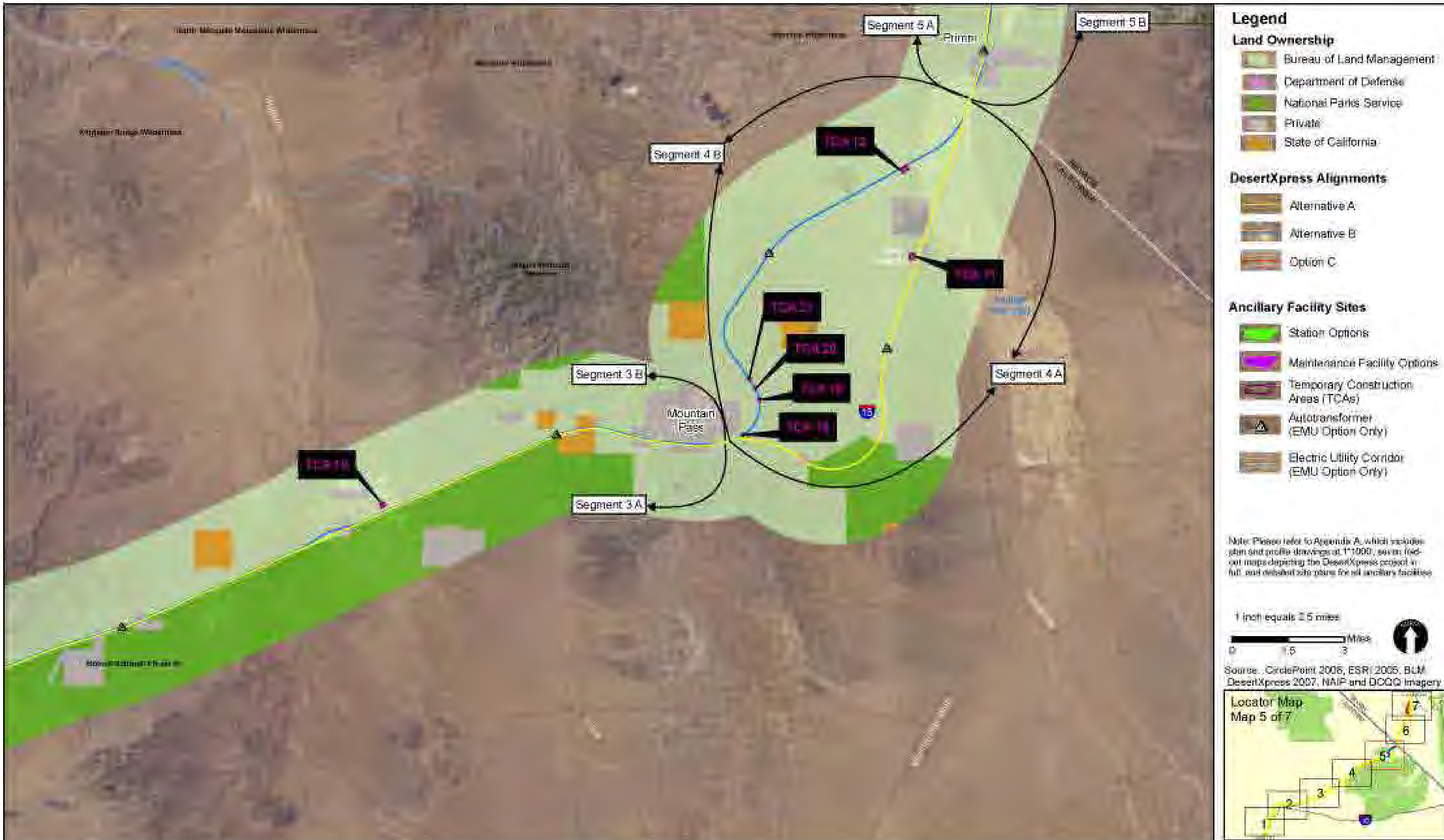
Land Ownership (3) FIG 3-1.7

Source: Geografika Consulting 03.02.08

DesertXpress Project EIS

Land Ownership (4) FIG 3-1.8

Source: Geographic Consulting 02.02.09



DesertXpress Project EIS

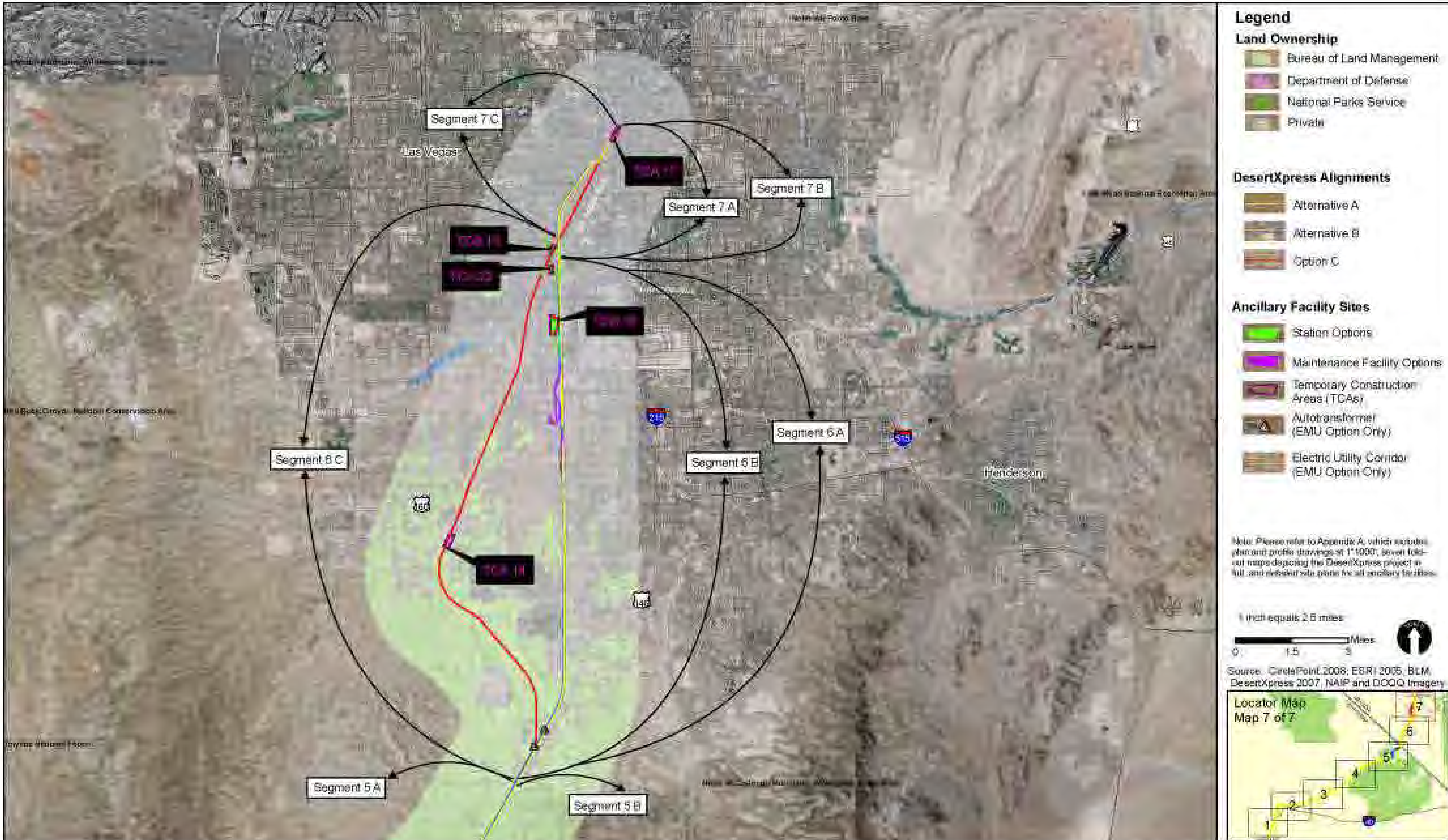
Land Ownership (5) FIG 3-1.9

Source: Geographic Consulting 02.02.08

DesertXpress Project EIS

Land Ownership (6) FIG 3-1.10

Source: Geografika Consulting 02.02.09



DesertXpress Project EIS

Land Ownership (7) FIG 3-1.11

Source: Geografika Consulting 02.03.09

Land Use Designations

Figures 3-1.12 through 3-1.18 depict general city/county land use designations for areas within one mile of the alignments, stations, and maintenance facilities. Excepting areas near Las Vegas, the small communities of Primm and Jean, and portions of the greater Barstow area, most of the land uses immediately adjacent to the rail alignments lack urban development. Closer to the Victorville and Las Vegas ends lands are designated for more intensive urban uses, such as housing, commercial, and industrial development. In Victorville, such lands are largely undeveloped as of 2008. In and near Las Vegas, a more fully developed mosaic of urban uses can be found. A more detailed discussion of land uses by project segment is provided below under the heading "Affected Environment: Land Uses by Segment and Stations/Maintenance Facilities." A detailed discussion of potential agricultural impacts is available in Section 3.3 of this EIS.

The land use designations depicted in Figures 3-1.12 through 3-1.18 apply only to land within city/county jurisdictions. Land outside of such jurisdictions, such as BLM or NPS owned land, would not be subject to city/county land use designations, and would instead be regulated by the relevant Federal agency.

BLM Mining Claims

The BLM administers mining operations on Federal lands, following procedures set forth at 43 CFR 3832. If lands have been designated by the BLM as open for mining, prospective miners may "locate" a lode, placer, tunnel, or mill site, as appropriate.

In the vicinity of the study area, hundreds of mining claims have been located. BLM records mining claim locations within township-range areas. The actual footprint of mining activities is not recorded by BLM and is thus not available for detailed analysis.

Within the study area, mining activities are concentrated primarily in two areas: in the vicinity of Mountain Pass, California, near Segments 4A and 4B, and near the juncture of Segments 5 and 6, between Jean and Sloan, Nevada. Additional mining claims are scattered near the Victorville station and maintenance facility site options, and in the general vicinity of Primm, Nevada.

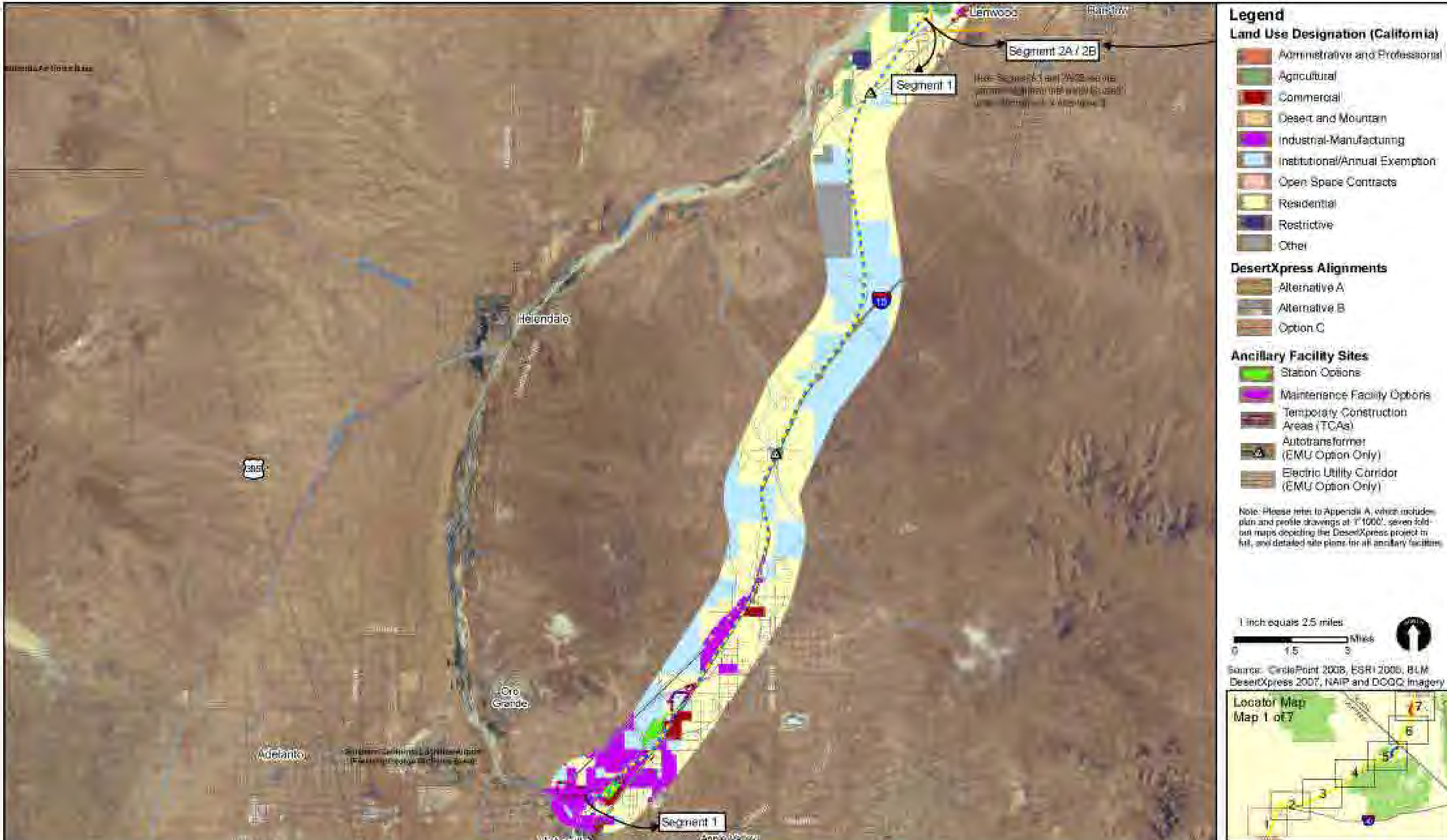
Public Utilities

Public utilities in the study area include facilities for electrical power, oil and gas products, water, and coaxial and fiber-optic cables. These are discussed at length in Section 3.4, Utilities and Emergency Services.

3.1.3.2 Affected Environment: Land Uses by Segment and Stations/Maintenance Facilities

The affected environment includes both existing land uses and land use designations near or in the footprint of the project.

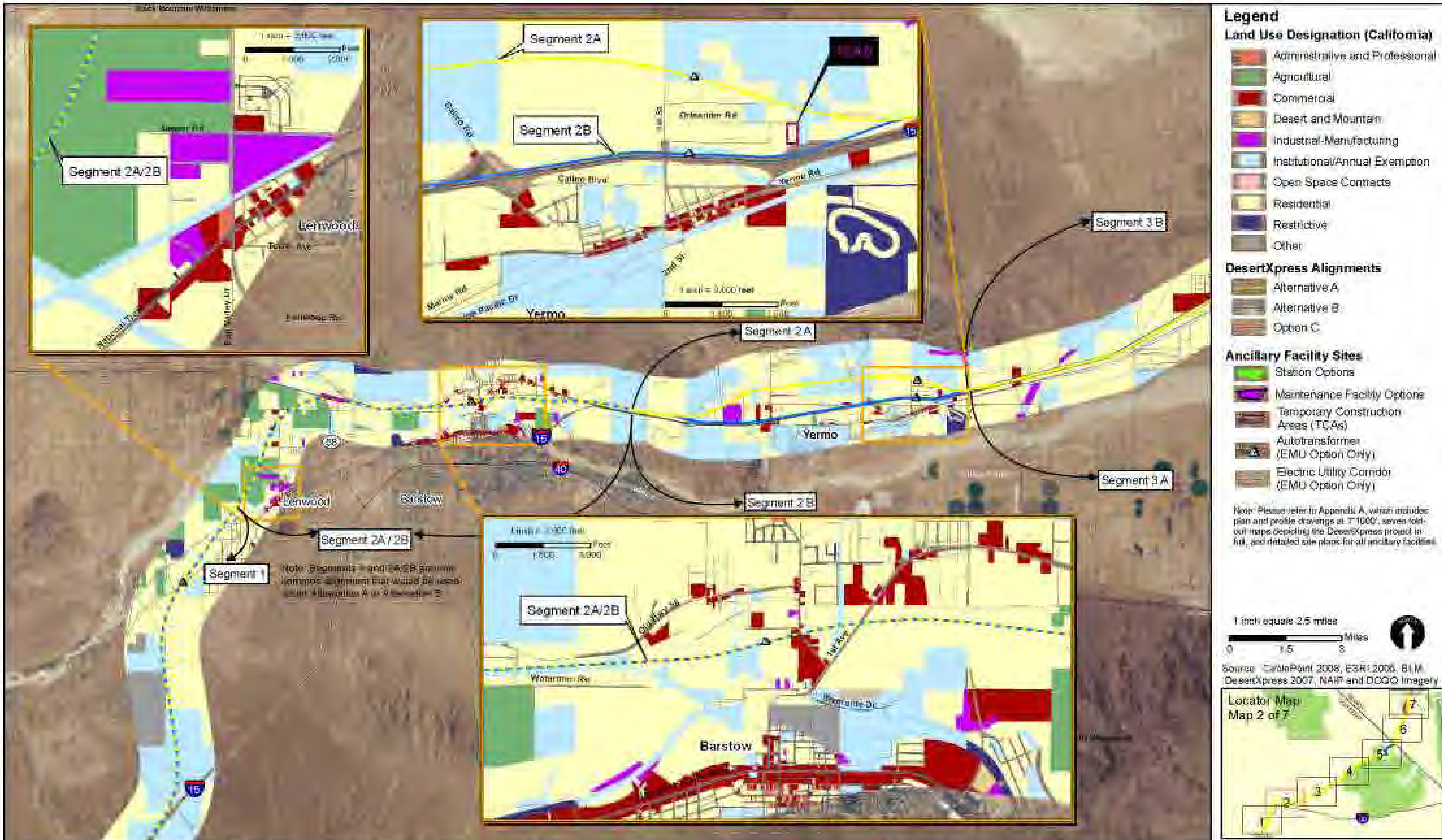
To assess potential land use compatibility effects, land use designations from appropriate county or city agencies were reviewed along with recent aerial maps of the study area. Within California, land use designations refer to the general plan land use designations of



DesertXpress Project EIS

Land Use / Zoning Designations (1)

FIG 3-1.12



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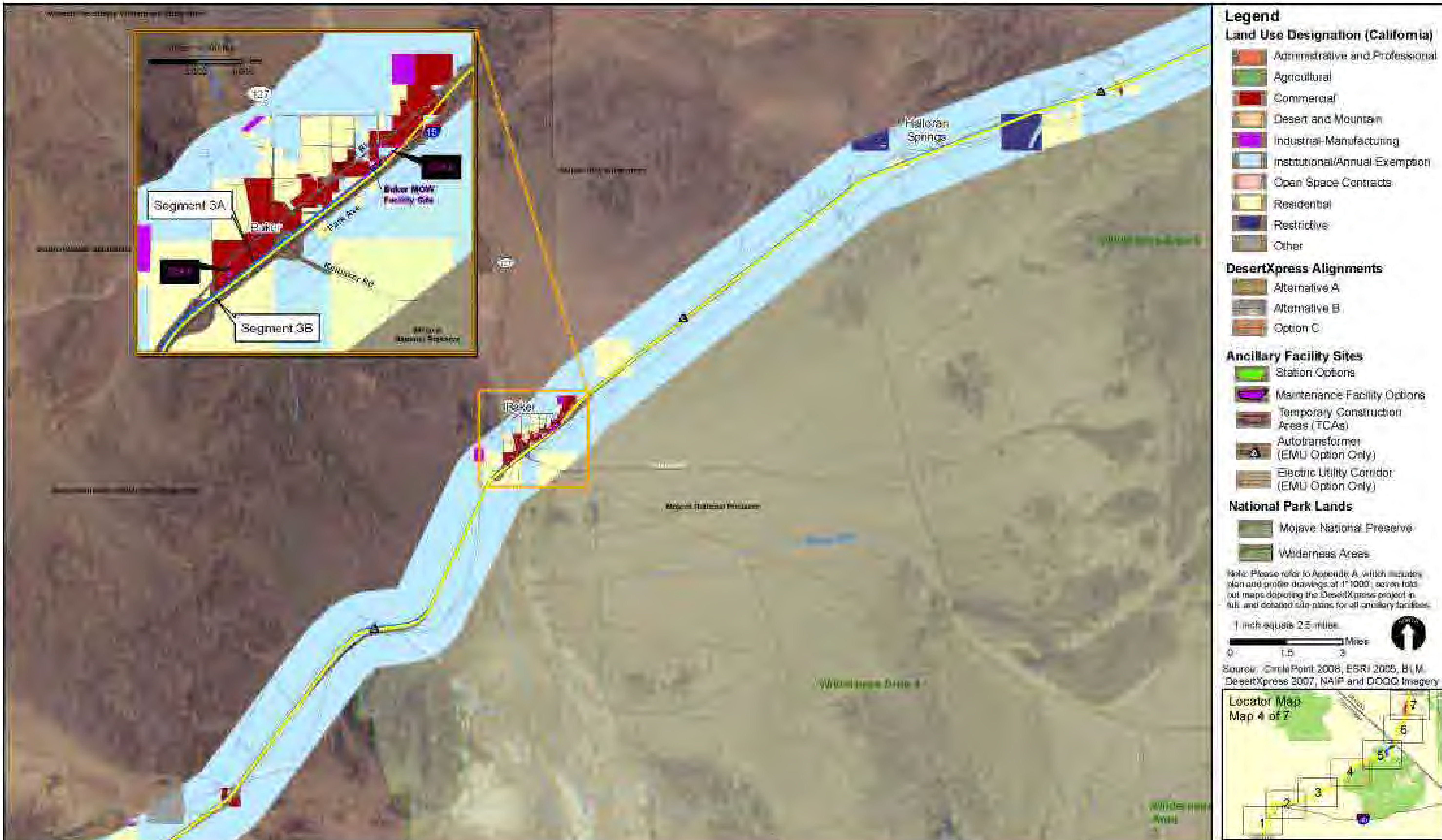
Land Use / Zoning Designations (2) FIG 3-1.13

DesertXpress Project EIS

Land Use / Zoning Designations (3)

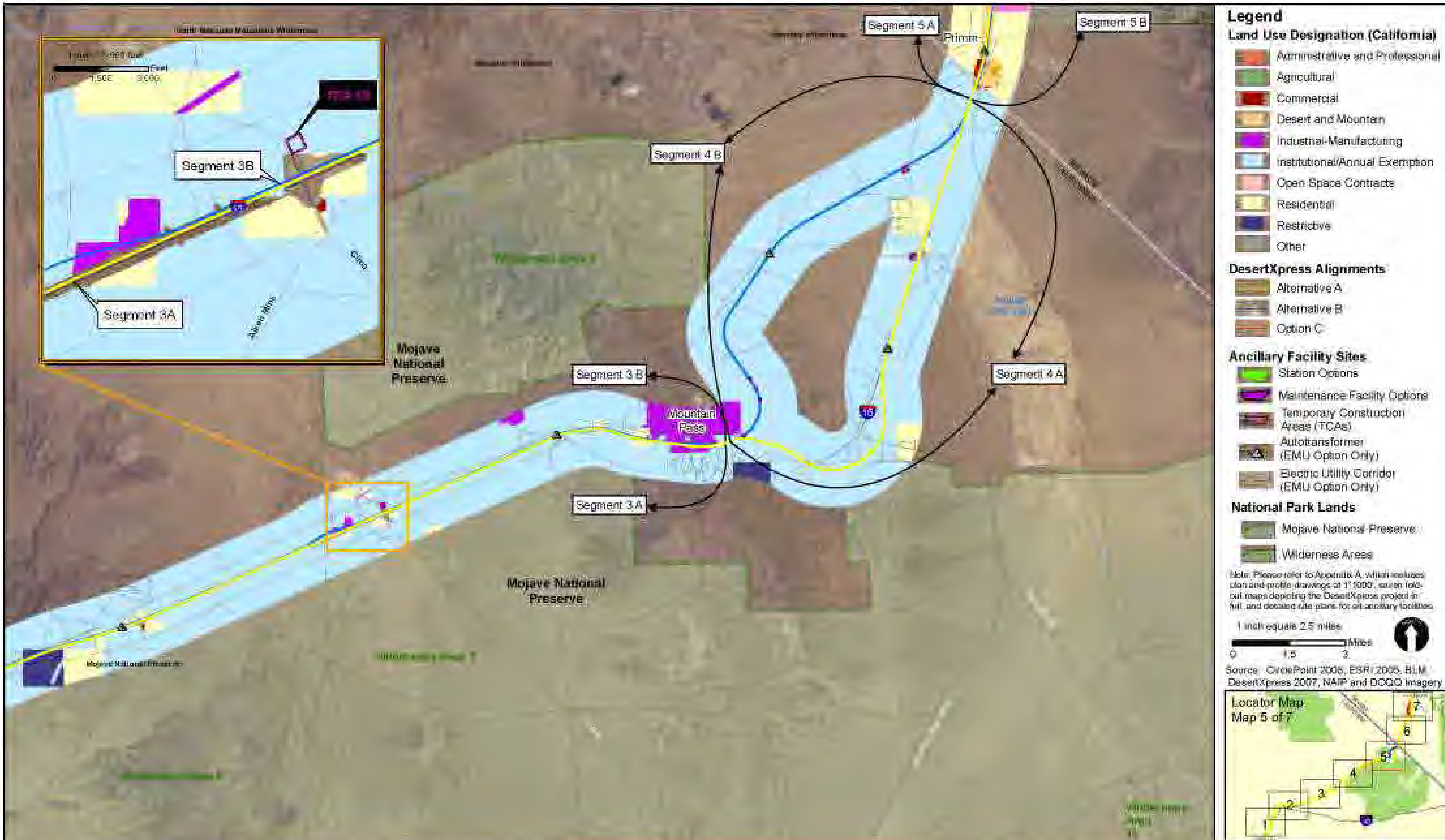
FIG 3-1.14

Source: Geographics Consulting 02.02.09



DesertXpress Project EIS

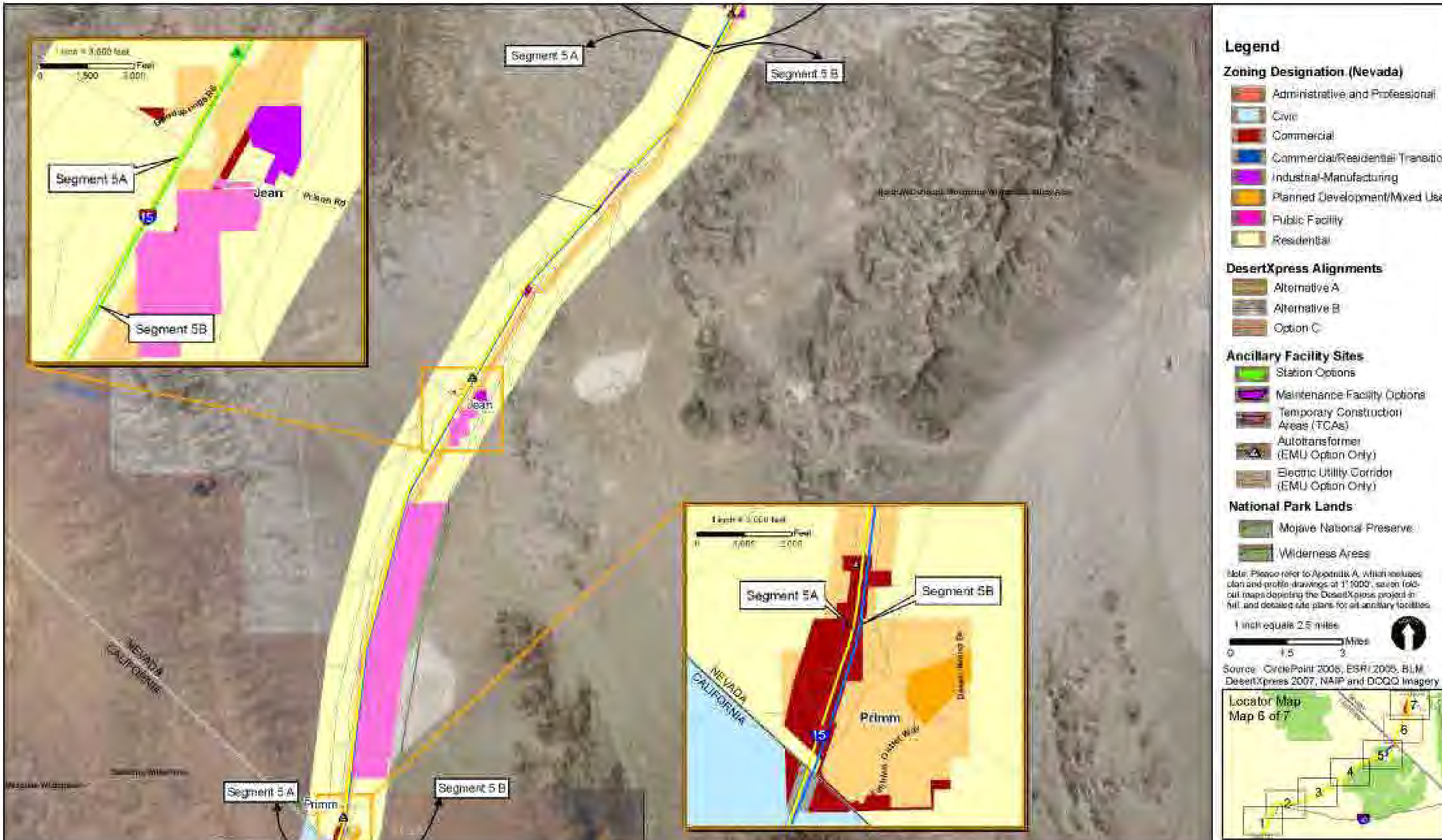
Land Use / Zoning Designations (4) FIG 3-1.15



DesertXpress Project EIS

Land Use / Zoning Designations (5)

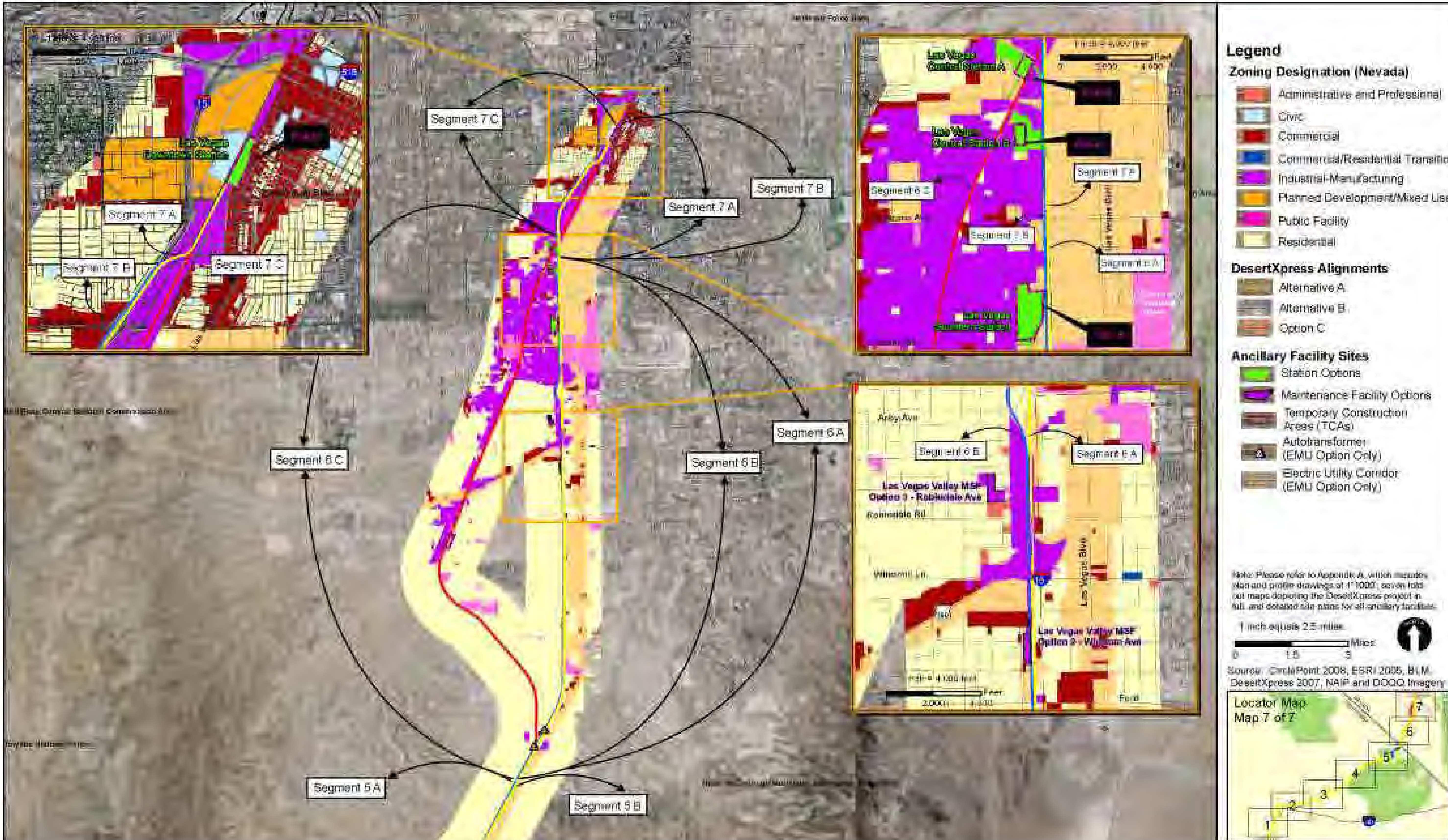
FIG 3-1.16



DesertXpress Project EIS

Land Use / Zoning Designations (6)

FIG 3-1.17



DesertXpress Project EIS

Land Use / Zoning Designations (7)

FIG 3-1.18

San Bernardino County, Victorville, or Barstow, as appropriate. Within Nevada, land use designations were derived from Clark County and City of Las Vegas zoning maps.

The majority of the proposed rail alignments would be located within existing transportation ROWs, primarily the I-15 median or its ROW; secondarily the Union Pacific Rail Road (UPRR) corridor in southern Clark County. In these areas, the only existing land use is a public transportation corridor.

Existing land uses are described below by physical project features: rail alignments, project stations, maintenance facilities, temporary construction areas, and other components.

The two technology options under consideration (DEMU and EMU) would have similar land use environments since they share common ROW and station footprints. The exceptions to this are the electrical utility corridors required for the EMU option and the autotransformer sites, which are discussed separately below and shown on relevant figures herein.

Proposed Rail Alignments

Rail track, ballast and all associated features and equipment (including maintenance roads and catenary structures for the EMU option) would fit within a ROW area approximately 75 feet in width. To this end, the "direct impact" area for the purposes of this EIS is a 75-foot-wide ROW centered on the midpoint of the proposed rail tracks (37.5 feet on either side of the proposed rail centerline). These are areas in which land use impacts would be considered to be permanent and irreversible since structures would be physically located within this area. Table 3.1-1 below identifies the amount of land (in acres) in each land use designation that would be permanently impacted by each segment.

Table 3.1-1: Permanently Impacted land by Generalized Land Use Designation, Rail Alignments (acres)

Land Use Designation	Segment														
	1	2A/2B*	2A	2B	3A	3B	4A	4B	5A	5B	6A**	6B**	6C**	7A	7B	7C
Industrial	15.1	0	1.2	4.5	0	6.6	0	0	0	0	9.7	9.8	58.4	18.5	19.2	18.4
Commercial	4.7	4.4	0	1.3	6.1	7.6	0	0	7.5	7.6	1.2	1.2	0.1	0	0.2	0
Institutional/ Public Facilities	40.2	17.1	35.5	8.4	273.8	317.9	121.1	118.1	68.5	68.5	2.4	2.5	3.4	0	0	0
Residential	66.8	73.3	47.1	44.1	3.6	38.7	0.5	0	123.8	123.8	57.2	54.8	70.4	0	0	0
Agricultural	0	13.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Restrictive	0	0	0	0	7.9	7.34	0	0	0	0	0	0	0	0	0	0
Hotel/Casino	0	0	0	0	0	0	0	0	22.3	22.1	60.1	62.7	13.1	2.2	0.6	0.1
Other/ No Data.	91.2	3.4	0.6	25.3	481.8	389.47	5.8	0	0	0	0	0	0	0	0	0
Total	218.1	111.8	84.4	83.5	773.2	772.5	127.4	118.1	222.1	222.0	130.5	130.9	145.3	20.7	20.0	18.5

Source: CirclePoint and Geografika Consulting, 2008.

*This is the portion of Segments 2A/2B that shares a single alignment.

** Assumes a terminus at the Central A (Rio) Station. Smaller amounts of land would be used if terminating at the Southern or Central B stations, located to the south of Central A.

Note: Land use designations do not correlate with the displacement of existing uses. Much of the footprint of the rail alignment is in areas that are vacant, a freeway ROW, a railway ROW, or unimproved.

As shown in Table 3.1-1, the most common land use designations that would be permanently affected is "institutional/public facilities." This designation is typically used by jurisdictions for transportation rights-of-way controlled at state or local levels.

The total acreages in the tables above were developed from GIS data provided by the affected jurisdictions – the cities of Victorville, Barstow, and Las Vegas, plus San Bernardino and Clark Counties. A cross-check of this land use data against existing, on-the-ground conditions indicates that in many circumstances, the data provided by the county or city show designations for land uses that would not be expected to occur within freeway rights-of-way. In some cases, the GIS data "bleeds" into or sometimes across the freeway corridor. This is the explanation as to why some freeway median areas are identified as designated for residential use. As such, each of the segment–by-segment land use discussions below addresses both existing, on-the-ground land uses as well as land use designations to provide a more complete picture of the affected environment.

In addition to identifying land uses and designations in rail alignment, station, and maintenance facility areas, this section identifies surrounding land uses within 2 miles of the alignment. This analysis included the review of land use publications, aerial photographs, land use maps, conceptual plans of the action alternatives, and geographical information system (GIS) data from public agencies. Profiles of each community near the alignment are summarized.

Segment 1

Segment 1 would travel between Victorville and Lenwood, the southern portion following the I-15 freeway and the northern portion traversing undeveloped land south of Lenwood. Segment 1 would include the Victorville passenger station and OMSF. Communities traversed by Segment 1 would be Victorville and Lenwood.

Passenger Station and OMSF Site Options-Existing Land Uses: The proposed Victorville passenger station and OMSF sites would be on the west side of I-15 north of Victorville. The two sites being considered for the passenger station would occupy about 100- 120 acres of land; OMSF sites would occupy about 100 acres.

Review of recent aerial photography indicates that all station and OMSF site options are vacant.

The center of Victorville is located about 4.5 miles south of the proposed southern station and OMSF site (station and OMSF site 1). The Mojave River is close to the south side of OMSF site 1 (approximately 360 feet away). Rockview Park is located across the Mojave River and an existing train ROW, approximately 550 feet west of this OMSF site. Grady Trammel Park is approximately 1,500 feet from the OMSF site 1 and approximately 2,000 feet from station site 1. In between station site 1 and Grady Trammel Park is a residential neighborhood. This mix of single and multifamily residences is approximately 775 feet from station site 1 and about 1,500 feet from the OMSF site.

A tank and pipe supply store on Stoddard Wells Road is north of station site 1, adjacent to I-15, between the two station sites.

Existing land uses in the vicinity of station site 2 include the adjacent Victorville Refuse Disposal Site (a San Bernardino County landfill). An existing transmission line is located adjacent to Victorville OMSF site 2.

Passenger Station and OMSF Sites-Land Use Designations: All of the sites are within an area designated by the City of Victorville for "Specific Plan" planned development, which would allow a mix of commercial, industrial, and transportation oriented uses. The land for option 1 is designated for "General Commercial" use with a Specific Plan overlay (the draft Northern Triangle Specific Plan, discussed below). South and west of station option 1 would be the related OMSF site option, which has similar City of Victorville land use designations.

Rail Alignment-Existing Land Uses: The southern and northern ends of Segment 1, which stretches between Victorville and Lenwood, are in urban-to-rural transition areas. Outside of greater Victorville, the southern portion of Segment 1 would follow the I-15 corridor through almost entirely undeveloped, uninhabited lands. Segment 1 would diverge from the I-15 corridor near Hodge Road and head northerly through an undeveloped landscape to Barstow. Approaching Barstow, the alignment would travel on undeveloped land near low density residential land uses. The tracks would pass within 200 feet of an existing residence and within half a mile from the private Depue Airport. If Victorville Station site 1 were selected, the rail alignment would be located adjacent to the small Osborne Private Airport.

Rail Alignment-Land Use Designations: Land use designations for the land that Segment 1 would occupy (a total of about 218 acres) include 67 acres of residential and about 20 acres of commercial/industrial. The majority (116 acres) of lands that would be used by Segment 1 have no land use classification or are identified as "institutional," relating to the land's immediate adjacency to the I-15 corridor. Although residential, commercial, and industrially-designated lands would be used by Segment 1, no residential, commercial, or industrial structures are located on these lands as of January 2009. As shown in Figure 3-1.1, the Segment 1 of the alignment would travel through BLM-owned land with Multiple Use Class designations I and M.

Designations in the surrounding area would follow the same profile as those in the Segment 1 footprint. Except for the areas near the segment's end points in Victorville and Lenwood, the segment would traverse an essentially undeveloped environment.

Victorville – Community Profile

The City of Victorville is in southwestern San Bernardino County in the southwestern Mojave Desert known as the Victor Valley. In 1926, U.S. Route 66 was established as one of the main arteries of the National Highway System linking Illinois with California. A portion of U.S. Route 66 provided a major transportation corridor through Victorville. Victorville is the largest city between San Bernardino and the Nevada border and is the primary commerce center of the Victor Valley. The Southern California Logistics Airport (SCLA), a cargo airport, is in Victorville. Victorville was established as a result of the California Southern Railroad station, which was about one mile northwest of the narrows of the Mojave River. Most of the area's employment opportunities are service-related businesses, with nearly 42 percent of businesses in the retail sales category. Local manufacturing companies are primarily related to mining and cement production. Victorville is one of the fastest growing cities in California because of high activity in aeronautics and logistics, and low land costs.[17]

The 2000 Census data lists the population at 64,029 (3.7 percent of county and 0.2 percent of the state population); the population in Victorville over 60 years of age is 14 percent. It has an employment rate of 51 percent, which is lower than both the county employment rate of 55 percent and the state rate of 58 percent. Of these, 26 percent are employed in management, professional and related occupations, which is slightly lower than the county (28 percent) and lower than the state (36 percent) averages. A higher percentage of workers in Victorville are employed in service occupations, construction, extraction and maintenance, and production transportation and material moving, than workers in the entire state.

Segments 2A/2B

Rail Alignments-Existing Land Uses: Through Barstow, Segments 2A and 2B are combined and use a former Atchison Topeka & Santa Fe railroad corridor along the north side of the Mojave River, for approximately three miles before reaching the vicinity of the I-15/Old Highway 58 interchange on the eastside of Barstow. From this point, the alignments would head east along the north side of the I-15 corridor through the town of Yermo where the two alignments diverge, to a point just east of the agricultural inspection station on I-15. Existing land uses within the area near this segment includes single family homes, with some motels and general stores.

At the start of Segments 2A/2B, near Lenwood, the alignment would traverse undeveloped land, cross the Mojave River, and then travel briefly through agricultural land before reaching Barstow. Heading east through Barstow, the combined 2A/2B segment would pass within several hundred feet of existing single family residential and commercial structures. On the eastern side of Barstow, the rail alignment would come within approximately 80 feet of a single family residential development on Balsa Avenue (located just west of the I-15/Old Highway 58 Interchange). Continuing east, Segments 2A/2B would traverse undeveloped land for approximately 3 miles until reaching Yermo.

In Yermo, Segment 2A would split from Segment 2B. Segment 2A would travel north though land that is mostly undeveloped with scattered single family residential development located far from the alignment (approximately 350 feet away). Segment 2B would run adjacent to I-15, coming within approximately 90 feet of scattered commercial and residential properties.

Rail Alignments-Land Use Designations: Prior to splitting, the majority of the combined 2A/2B segment (73.3 acres out of 111.8 acres) would traverse undeveloped land designated for residential use. This alignment would also use 20.5 acres of land identified as "institutional" or containing no land use classification, typical of land in the freeway

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[17] City of Victorville Demographics. Website accessed in 2007. http://www.ci.victorville.ca.us/about/demographics.html

corridor. Approximately 13.7 acres of land classified as agricultural would be traversed by the alignment. This segment also traverses 4.7 acres of land classified as commercial.

After splitting, Segment 2B, would run along the I-15 ROW through Yermo. The majority of this section of the alignment is designated residential (44.1 out of 83.5 total acres). This segment also includes about 33.7 acres of no land use classification or is identified as "institutional," relating to the land's immediate adjacency to the I-15 corridor and other roadways. Small areas of this alignment are also classified as commercial and industrial manufacturing.

More than half of Segment 2A would use land designated for residential use (47.1 acres of the 84.4 section of Segment 2A after separation from Segment 2B). 36.1 acres are classified as institutional, or are unclassified areas. A small portion of Segment 2A is classified as industrial.

Segments 2A/B would traverse BLM-owned land designated with Multiple Use Class M (see Figure 3-1.1).

Lenwood – Community Profile

Segments 2A/2B (running together) would skirt the western edge of the unincorporated community of Lenwood, a census-designated place (CDP) located about five miles west of Barstow in San Bernardino County. According to the 2000 Census, Lenwood has a population of 3,222. The community is comprised primarily of detached single family homes (77 percent of all housing stock). As a community, Lenwood is closely tied to the City of Barstow in terms of commerce and culture.

Barstow– Community Profile

Despite a relatively small population of about 21,000 people as of the 2000 U.S. Census, Barstow is a major crossroads of the southwestern United States. Interstates 15 and 40 converge on Barstow, connecting southern California to Las Vegas, northern Arizona, and points beyond. By virtue of its location, Barstow has been for many decades a major center for rail transportation. The Burlington Northern and Santa Fe Railroad's (BNSF) classification yard is in Barstow, as is the Western American Rail Museum. The UPRR also travels through Barstow en route to Las Vegas via the Preserve. Barstow also includes a U.S. Marine Corps Logistics Base and is the closest city to the Fort Irwin military training center. Notably, most of the incorporated City of Barstow is located south of the Mojave River; the proposed rail alignment would pass through a portion of the City located north of the Mojave River.

Yermo – Community Profile

The unincorporated community of Yermo is five miles east of Barstow. Yermo is known for Calico Ghost Town, a park and tourist attraction featuring the historical Calico mining district, which yielded one of the richest deposits of silver and borax minerals in California in the 1880s.[18] Yermo also contains a major (about 1900 acre) annex for the Barstow

[18] Calico Ghost Town Website accessed in 2007. http://www.calicotown.com

Marine Corps Logistics Base. Yermo has been home for a state of California agricultural inspection station, but this station will be moved to the Ivanpah Valley outside Primm, Nevada by 2009.

The population of Yermo is clustered primarily in a small triangle between Calico Road to the west, I-15 to the north, and Yermo Road to the south. Some homes are scattered outside these boundaries. Segment 2A would be located about a mile north of I-15, largely outside any populated areas. Segment 2B would be located within the I-15 corridor closer to the community.

Segments 3A/3B

Rail Alignments-Existing Land Uses: Segments 3A/3B would travel between Yermo and Mountain Pass, with Segment 3A in the freeway median and Segment 3B along the north (west) side of the freeway corridor. Since these segments would travel along I-15 for their entire length, the existing land uses are that of a transportation corridor.

With the exception of the community of Baker, these segments traverse a largely uninhabited desert region. Some relatively isolated, lightly developed areas, such as Coyote Lake and Harvard, are located just east of Yermo. There is sparse agriculture land use in this corridor, including a pistachio orchard in Newberry Springs and some irrigated farmlands south of I-15 near Harvard. Also located in Newberry Springs north of the I-15 is the abandoned Lake Dolores water park, which last operated in 2004. The Baker Maintenance of Way facility site is undeveloped.

In the approximately 40 mile corridor between Harvard Road and Baker, there is virtually no development near the freeway. East of Baker, the next populated area in proximity to the freeway is Primm, Nevada (see the discussion for Segments 5A/5B). The Mojave National Preserve, a designated national park unit (California Desert Protection Act of 1994; Organic Act of 1916 and Redwoods Act of 1978), is located in this unpopulated area, and abuts the southside of the I-15 freeway. A variety of recreational uses such as horseback riding, backpacking, hunting, and 4-wheel driving occur in the preserve. The Preserve contains wilderness areas, some of which are adjacent to I-15 freeway.

Rail Alignments-Land Use Designations: All of the land within Segments 3A/3B is under jurisdiction of San Bernardino County. The General Plan land use designations for vast majority of land in these segments is either “institutional” or not classified. These designations are typical for freeway corridors, which tend to follow different land use patterns than areas outside freeways. Land for the proposed Baker Maintenance of Way facility is also designated for institutional use.

As shown in Figure 3-1.1, the Segments 3A/3B would travel through BLM-owned land with Multiple Use Class designations L and M.

Baker – Community Profile

The unincorporated community of Baker is located at the junction of I-15 and State Route 127 in San Bernardino County. Baker is roughly equidistant between Victorville and Las Vegas. Its location and relative isolation has made it a popular stop for auto travelers between southern California and Las Vegas. Baker is also a gateway to Death Valley

National Park, located about 100 miles to the north via State Route 127. Baker's economy is thus largely based on serving travelers with hotels, restaurants, and associated businesses. One of the most notable features of the community is a 134 foot tall thermometer, which was erected to showcase the desert area's typically high temperatures.

Baker's population as of 2000 was about 900 people. Nearly all of Baker's population resides in mobile home parks and apartment complexes to the west and north of I-15, as lands south and east of I-15 are within the Preserve.

<u>Segments 4A/4B</u>

Rail Alignments-Existing Land Uses: Segment 4A would leave the freeway corridor at Mountain Pass and would for three miles cross into the Preserve near Nipton Road. Within the Preserve, the Nipton Road area has been designated as desert tortoise habitat, but is not identified for any other land use. About three miles north of its exit from the Preserve, Segment 4A would continue toward Las Vegas within the I-15 median. There are no other land uses in the freeway median here.

Between the Preserve and Primm, there is only one developed area along I-15. Northwest of I-15, is the Primm Valley Golf Club, which includes two 18-hole courses. Although about 50 miles south of Las Vegas, the courses cater to Las Vegas area tourists; the courses are under the management of MGM Mirage, which owns and operates several major Las Vegas resort hotels.

Segment 4B would leave the I-15 corridor near Mountain Pass and travel through the Clark Mountains on undeveloped land managed by the BLM. After exiting the Clark Mountains, Segment 4B would continue northeasterly to Primm, en route crossing the Ivanpah Dry Lake bed about 1.5 miles north of the I-15 corridor. The lake bed is a flat plain about 35 square miles in area whose unimpeded expanses have made it attractive for off-road recreational use. Notably, the BLM has permitted portions of Ivanpah Dry Lake to be used for commercial land sailing.

Rail Alignments-Land Use Designations: Both segments would traverse land identified in the San Bernardino County General Plan as almost entirely institutional use. This designation reflects the routing of the segments through land that is either in the freeway ROW or on major BLM holdings. BLM holdings within Segments 4A/4B are designated as Multiple Use Classes L and M.

<u>Segments 5A/5B</u>

Rail Alignments-Existing Land Uses: The alignment would be constructed either in the freeway ROW or the median; therefore existing land uses at the rail alignment site are that of a transportation corridor.

Either side of the freeway is characterized largely by undeveloped desert terrain. The only exceptions to the undeveloped character are the resort-oriented communities of Primm and Jean, discussed below. A public airport and a casino/hotel are located near the freeway in Jean; similar land uses of casino/hotels and commercial uses are located along the highway in Primm.

Rail Alignments-Land Use Designations: Lands within the I-15 corridor in Nevada have two primary land use designations: residential and public facility. The residential designation extends along the full length of the I-15 corridor between Primm and Sloan, but field reconnaissance and a review of aerial photos indicate that settlements are few and sparse. The area designated for public facilities is coterminous with the boundaries of the planned supplemental commercial airport in the Ivanpah Valley, which is currently proposed by the Clark County Department of Aviation. The communities of Primm and Jean have planned development/mixed use land use designations.

Primm – Community Profile

Primm is a visitor-oriented community in Clark County, located adjacent to the California/Nevada state line, straddling both sides of the I-15 freeway. The major developed features of Primm are three resort casinos and an outlet shopping mall. About 45 miles from Las Vegas, the Primm community originated as a stop en route to Las Vegas. In the last several decades, however, the combination of resort hotels and other tourist attractions has made Primm into a more independent destination. Clark County estimates that the population of Primm as of 2006 is about 436, most of whom work in the community's visitor-oriented businesses. As noted in Section 3.4, Utilities and Emergency Services, the Big Horn Electrical Generation station is located about one mile east of Primm, on the east side of the UPRR Corridor.

Jean – Community Profile

Jean is a primarily visitor-oriented destination in Clark County about 20 miles north of Primm and 20 miles south of Las Vegas. Similar to Primm, Jean straddles both sides of the I-15 freeway. The major features of Jean include a casino, a general aviation airport, and the Jean Conservation Camp, a minimum security prison operated by the Nevada Department of Corrections. Other than inmates at this facility, Jean does not have any residential land uses. The UPRR runs through Jean about one half mile to the east of the I-15 freeway.

Until recently, Jean had two casino hotels. Today, only one (the Gold Strike) remains; it is on the east side of the I-15 freeway. The Nevada Landing Casino, previously located on the west side of the freeway, was demolished in 2007. The site is owned by MGM Mirage, which had publicly announced in 2007 that it intended to build master planned mixed use community on the site.[19] However, by late 2007, a slowing real estate market was seen as a factor in MGM's suspension of planning and development efforts for the site.[20]

Segments 6A/6B

Rail Alignments-Existing Land Uses: Segment 6 would be located in an area used for the I-15 freeway since it would be mainly located in the median or in the ROW. The surrounding land uses vary greatly in intensity over the length of this segment.

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[19] "Nevada Landing About to Sink," *Las Vegas Review-Journal*, February 13, 2007.

[20] "Market Upsets Jean Plan," *Las Vegas Sun*. October 12, 2007.

Between the start of Segment 6 near Sloan Road and the Las Vegas passenger station, the Segment 6 rail alignments would traverse a spectrum of existing land uses. Near Sloan Road, the sparsely developed character of the Ivanpah Valley includes industrial uses near the freeway. North of St. Rose Parkway, the industrial uses give way to the outer fringes of metropolitan Las Vegas. Clusters of new single and multi family residential developments and several hotel/casinos are located near the freeway. Residences in this area are within 70 feet of the proposed alignment.

North of Blue Diamond Road, land uses change; industrial uses are located to the west of the freeway while east of the freeway is undeveloped. After crossing I-215, the land uses fully reflect the intensive urban development of Las Vegas. Hotel/casino and commercial land uses are located on either side of the freeway. McCarran International Airport is located approximately a half mile to the east.

Rail Alignments-Land Use Designations*:* Both rail alignments are located within the I-15 corridor – either in the median or the west side of the freeway. Clark County zoning designations “bleed” from off-freeway parcels into existing freeway corridor areas. Some of these designations, including casino, manufacturing, and residential uses, clearly conflict with the transportation purpose of the I-15 corridor.

Option C

Rail Alignment-Existing Land Uses: Upon leaving the I-15 corridor, Option C travels for approximately 0.8 miles though an area sparsely developed with single-family residences. At its closest, Option C comes within 100-feet of one home. Option C then traverses undeveloped land until just south of Blue Diamond Road. At this point the rail alignment would follow the UPRR corridor past residential and industrial uses which intensify as Option C travels into downtown Las Vegas.

Rail Alignments-Land Use Designations: The southern part of Option C traverses land designated mainly as residential until reaching the more developed area south of Las Vegas where the designation is mostly industrial to the west and residential to the east of the alignment. North of interstate 215, the alignment traverses land mostly designated for industrial development. Other land use designations for the area of Option C include planned development and public facility.

MSF Site Options-Existing Land Uses: Three sites are contemplated for the Las Vegas area Maintenance and Storage Facility (MSF), all of which are located in unincorporated Clark County.

The most southerly, known as the “Sloan Road” site option, is roughly equidistant between Jean and Sloan. The vicinity of this site is undeveloped as of 2009. The only manmade elements here are the freeway, the UPRR, and South Las Vegas Boulevard.

Wigwam Avenue and Robindale Avenue are the two other sites being considered for the Las Vegas MSF. These sites are well within the developed portion of metropolitan Las Vegas.

A Single family home is located in the Robindale Avenue MSF footprint. The site is surrounded by single-family homes to the west and a mix of warehouses and single family homes to the east. Undeveloped land lies immediately north and south of the MSF site. The Wigwam Avenue MSF site contains industrial uses. This site is immediately surrounded by industrial uses and undeveloped land. Residential uses are located nearby across I-15 and Dean Martin Drive.

MSF Site Options-Land Use Designations: Both the Sloan Road and Wigwam Avenue site options appear to be on land designated for planned development. The Robindale Avenue site option is on land designated for residential development.

Passenger Station Site Options-Existing Land Uses: Three of the four "Las Vegas" station site options are actually located within unincorporated Clark County. Only the proposed Downtown station is located within the City of Las Vegas. All four sites are within highly urbanized areas and are surrounded by a mix of commercial, industrial, and institutional land uses.

The proposed Southern station site is presently vacant. The site for Central Station A is in use as the parking area for the Rio Suites Hotel. The site for Central Station B is in industrial use and appears to be used for staging and storage purposes. In addition, the Central Station B site contains a large warehouse with an indoor kart racing facility. The Downtown station site contains various buildings housing industrial uses.

The Southern, Central A, and Central B station sites are adjacent to the I-15 corridor, on the west side of the freeway, across from the numerous casinos and hotels along Las Vegas Boulevard. .Residential uses are within approximately 300 feet of the Central Station B site, while the site for Central Station A is surrounded by industrial uses and motels. The Downtown Station site is surrounded by industrial and hotel uses, the Clark County Government Center. The Southern Station site is surrounded by industrial land uses.

Passenger Station Options-Land Use Designations*:* The Southern, Central A, and Central B station site options are in areas designated for industrial/manufacturing uses. The Downtown stations site option has commercial designations, with an overlay established by the City of Las Vegas Downtown Centennial Plan.

Sloan – Community Profile

Segments 6A and 6B and Option C would travel near the unincorporated community of Sloan. Sloan is a small widely scattered community, consisting of residential, commercial, and recreational uses primarily to the west of I-15 and adjacent to the UPRR. In 2005, Sloan's population was 139.[21]

Las Vegas Metropolitan Area – Community Profile

The Las Vegas area is a metropolitan area in the desert of Nevada, characterized by casinos and resorts which are centered around the Las Vegas Strip.

Much of what is considered to be "Las Vegas" is actually outside the limits of the City of Las Vegas and instead in unincorporated Clark County. As of 2008, the southern boundary of the City of Las Vegas is near Bonneville Avenue. McCarran Airport, the Las

[21] Clark County 2005

Vegas Strip, and all but one of the station site options are located in unincorporated Clark County.

The U.S. Census Bureau has identified a Las Vegas-Paradise Metropolitan Statistical Area (MSA) that comprises all of Clark County, plus small portions of Nye County, Nevada, and Mohave County, Arizona. This area has a total population just fewer than 2 million people, and the population is continuing to grow. The Las Vegas MSA had the 9th largest growth in population among metropolitan regions in the U.S. between 2006 and 2007.[22]

The main component of the economy, and a main attractant for visitors to this region, is the tourism industry. According to Clark County, approximately 39.2 million tourists visit the Las Vegas area each year.

Segments7A/7B

Rail Alignments-Existing Land Uses: If utilized, Segment 7 would travel within the I-15 corridor from Tropicana Avenue until Oakey Boulevard. After diverging from I-15, the rail alignment would follow Oakey Boulevard east for about 2 blocks until turning north on the UPRR ROW to the Downtown Las Vegas passenger station. The existing land uses for the immediate rail alignment area are roadways and railways.

The environment surrounding this corridor is highly urbanized. From Tropicana Avenue to Spring Mountain Road, the areas along Segments7A/7B are characterized by hotel/casinos interspersed with commercial and industrial uses. North of Spring Mountain Road, land uses along the alignment transition to industrial and residential uses. Industrial uses boarder the alignment as it diverges from the I-15 corridor towards the Downtown Las Vegas passenger station.

Rail Alignments-Land Use Designations: Consistent with existing land uses, the area around the Segment 7/I-15 corridor is largely designated for industrial/manufacturing uses. Near the end of the line, within the City of Las Vegas, land use designations change to commercial and planned development (Centennial Downtown Plan). Proposed rail alignments and the potential Downtown passenger station would occupy lands designated by the Master Plan for Light Industrial, Downtown Commercial, and Downtown Mixed Use.

Other Project Features

EMU Option Autotransformers and Substations: If the Electrical Multiple Unit (EMU) technology option is selected, a series of autotransformers and electrical substations would be needed to ensure consistent propulsive power along the rail route.

Three substations would be needed along the entire route, two near either end and one near the midpoint. The substations at the ends of the line would be located on the Victorville OMSF and Las Vegas MSF sites. The midpoint substation would be located on Temporary Construction Area #9, near Baker, California.

[22] "Dallas-Fort Worth Leads Metro Areas in Numerical Growth," *U.S. Census Bureau News*, March 27, 2008.

Preliminary engineering identified the need for a total of 17 autotransformers, spaced at 1o to 12 mile intervals along the alignment. Each autotransformer would require a physical footprint of about one-tenth to one-fifth of an acre. For either median or side-running alignments, these are proposed to be located within the transportation ROW, where no potentially conflicting land uses typically exist. As a result, land use effects of autotransformers are not discussed further in this section.

Utility Corridors: If the EMU technology option is selected, electrical utility corridors will be needed to connect proposed substations in Victorville, Baker, and Sloan to electrical power sources.

In Victorville, the proposed utility corridor as shown on Figure 3-1.4 and 3-1.5, would run somewhat parallel to the I-15 freeway, approximately 1-2 miles to the northwest. The proposed utility corridor here would be immediately adjacent to an existing utility corridor that is expected to be retained even as the City of Victorville moves forward with proposed development within its North Triangle Specific Plan area (also shown on Figure 3-1.4). The utility corridor crosses predominately undeveloped lands. As such, the proposed Victorville utility corridor would have no adverse effects related to land use and is not discussed further in this section.

The proposed Baker utility corridor would be developed along existing public rights-of-way between the proposed Baker substation area and electric transmission lines to the northwest (as shown in Figure 3-1.8). This use of existing public rights-of-way would pose no foreseeable adverse effect related to land use. Therefore, there is no further discussion of the proposed Baker utility corridor in this section.

The proposed Sloan utility corridor would connect the proposed substation at the Sloan Road MSF facility to Nevada Power's existing electric transmission lines running between the Big Horn substation in Primm and the City of Las Vegas. These transmission lines are located approximately 1.5 miles to the northwest of the Sloan Road MSF site. The proposed utility corridor would need to cross I-15 freeway en route to connecting to the existing electrical transmission lines. With the exception of the I-15 freeway, the proposed utility corridor area is undeveloped, albeit designated by Clark County zoning for residential use. The utility corridor would preclude the development of residential uses immediately under or adjacent to the electrical transmission lines. To the east of the freeway are two open-pit mining operations. At present, the closest residential uses appear to be in the unincorporated community of Sloan, several miles to the northeast. The relative remoteness of this area from populated areas, coupled with present mining uses make it unlikely that the area would see any significant residential development; even if such development were to occur in the future, the context of the area would include the proposed utility corridor and could be avoided. Therefore, the proposed Sloan utility corridor would have no adverse effects related to land use and is not discussed further.

Temporary Construction Areas

Construction of the action alternatives is expected to entail the use of up to 22 temporary construction areas (TCAs).

With the exception of OMSF sites in Victorville (which are designated for industrial/manufacturing), all TCAs are designated for institutional (freeway use) or overlap a Las Vegas area station site.

TCA 22, at the Central Station B site, is currently used by Fast Lap, an indoor kart racing facility, and various industrial uses. The land for TCA 17 currently contains industrial uses. All the other TCA sites are undeveloped.

3.1.3.3 Environmental Justice – Affected Environment

This section addresses the requirements of Executive Order 12898 (E.O. 12898), *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, the USDOT Order on Environmental Justice, as well as the USDOT Region 9 Guidance on Addressing Environmental Justice in the Environmental Impact Statement. E.O. 12898 requires that Federal agencies identify and address any disproportionately high and adverse human health or environmental effects resulting from Federal programs, policies, and activities on minority and low-income populations to the greatest extent practicable and permitted by law. The USDOT Order on Environmental Justice requires that the USDOT comply with Executive Order No. 12898. The USDOT is required to develop specific procedures to incorporate the goals of the Executive Order with the programs, policies, and activities which they administer or implement.[23] USDOT guidance defines key terms and provides direction for identifying and addressing disproportionately high and adverse impacts to minority and low-income populations. In addition to complying with E.O. 12898, the USDOT is committed to meeting the requirements of Title VI of the Civil Rights Act, which provides that no person in the United States shall, on the grounds of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity of receiving Federal assistance. E.O. 12898 requires that:

- To the greatest extent practicable and permitted by law...each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse health or environmental effects of its program, policies and activities on minority populations and low-income populations (Subsection 1-101).
- Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under such programs, policies, and activities, because of their race, color, or national origin (Subsection 2-2).

[23] Department of Transportation. U.S. Department of Transportation Order on Environmental Justice. Federal Register, April 15, 1997. Volume 62, Number 72.

- Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public [Subsection 5-5 (c)].

The Presidential Memorandum that accompanied E.O. 12898 emphasized that the Order was “intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.” The memorandum also stated that a NEPA analysis must include a discussion of project “effects on minority communities and low-income communities.” In addition, “each Federal agency shall provide opportunities for community input in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of meetings, crucial documents and notices” (Subsection 5-5c).

Methodology for Identification of Environmental Justice Communities

Existing minority or low- income block groups “environmental justice block groups” near the alignment were identified. Environmental justice block groups are census blocks which meet at least one of the following criteria:

- The low-income population is greater than 25 percent of the total population of the community, or minority population is greater than 50 percent of the total population of the community.
- The low-income or minority population is more than 10 percentage points higher than the City or County average.

In order to identify environmental justice block groups near the alignment, census block groups within a two-mile radius of the alignment were examined to determine if they meet or exceed the above environmental justice thresholds. 2000 U.S. Population Census data was used to perform this analysis.

It should be noted that beginning with the 2000 U.S. Population Census, respondents were asked to answer a series of questions on race and ethnicity instead of the single question used on earlier censuses. First participants were asked to identify if they were Spanish, Hispanic, or Latino. The second question asked respondents their racial identity (African American, Pacific Islander, White, other, etc.). As a result, participants who were considered Spanish, Hispanic, or Latino chose a different racial identity when responding to the second question. This reflects the fact that persons of Spanish/Hispanic/Latino origin are not racially homogenous and do not fit into one inclusive category as presented in the earlier censuses. For this analysis, any person that did not identify themselves as white in the racial identity question of the census is considered part of a minority population.

Minority Populations

According to the Council on Environmental Quality (CEQ) guidelines for environmental justice analysis: “Minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the majority population percentage in the general population or other appropriate unit of geographic analysis. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds."[24]

In this analysis, census blocks are considered to have substantial minority populations if the percent of low-income residents within them is: greater than 50 percent, or 10 percentage points higher than the county average. The more conservative criterion (the criterion resulting in a lower percentage of low-income residents) is used for this analysis.

An average of 41.1 percent of the population in San Bernardino County is a minority race. Any census block groups containing minority groups that are more than 50 percent of the population would be considered environmental justice block groups in San Bernardino. Of the census blocks evaluated, 22 blocks in San Bernardino County meet this criterion and are eligible for environmental justice considerations. As shown in Figure 3-1.19 most of the census blocks in San Bernardino with a high minority population are centered around Victorville.

On average, 28.4 percent of the population in Clark County is a minority race. Therefore, in Clark County an environmental justice community would include any block group with a minority population above 38.4 percent. As shown in Figure 3-1.20, 66 block groups in Clark County meet this criterion. A large percentage of Clark county block groups near the alignment are considered to have a high minority population. These block groups are concentrated around the metropolitan Las Vegas area.

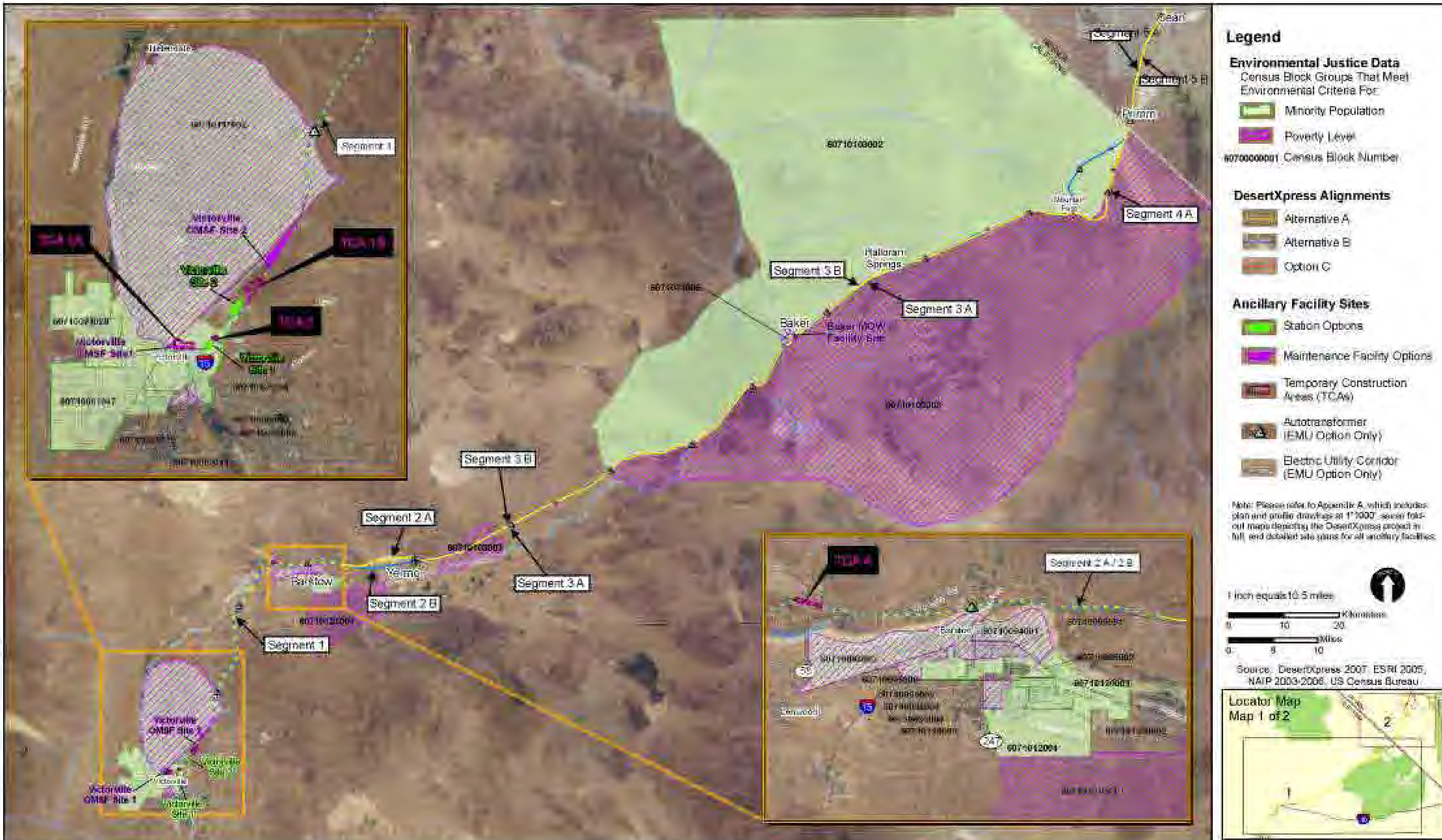
Low-Income Populations

The CEQ's Environmental Justice guidance does not clearly set the demarcations at the Census poverty thresholds but states that "Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty." Poverty level thresholds vary according to a household's size and composition. The Census Bureau's poverty thresholds provide a national measurement that is not adjusted for regional costs of living.

In this analysis, census blocks are considered low-income populations if the percent of low-income residents within them is: greater than 25 percent, or 10 percentage points higher than the county average. The more conservative criterion (the criterion resulting in a lower percentage of low-income residents) is used for this analysis.

On average, 10.8 percent of individuals in Clark County and 15.8 percent of individuals in San Bernardino County fall below the poverty line. Therefore, a census block would be considered a low-income community in Clark County if its low-income population would

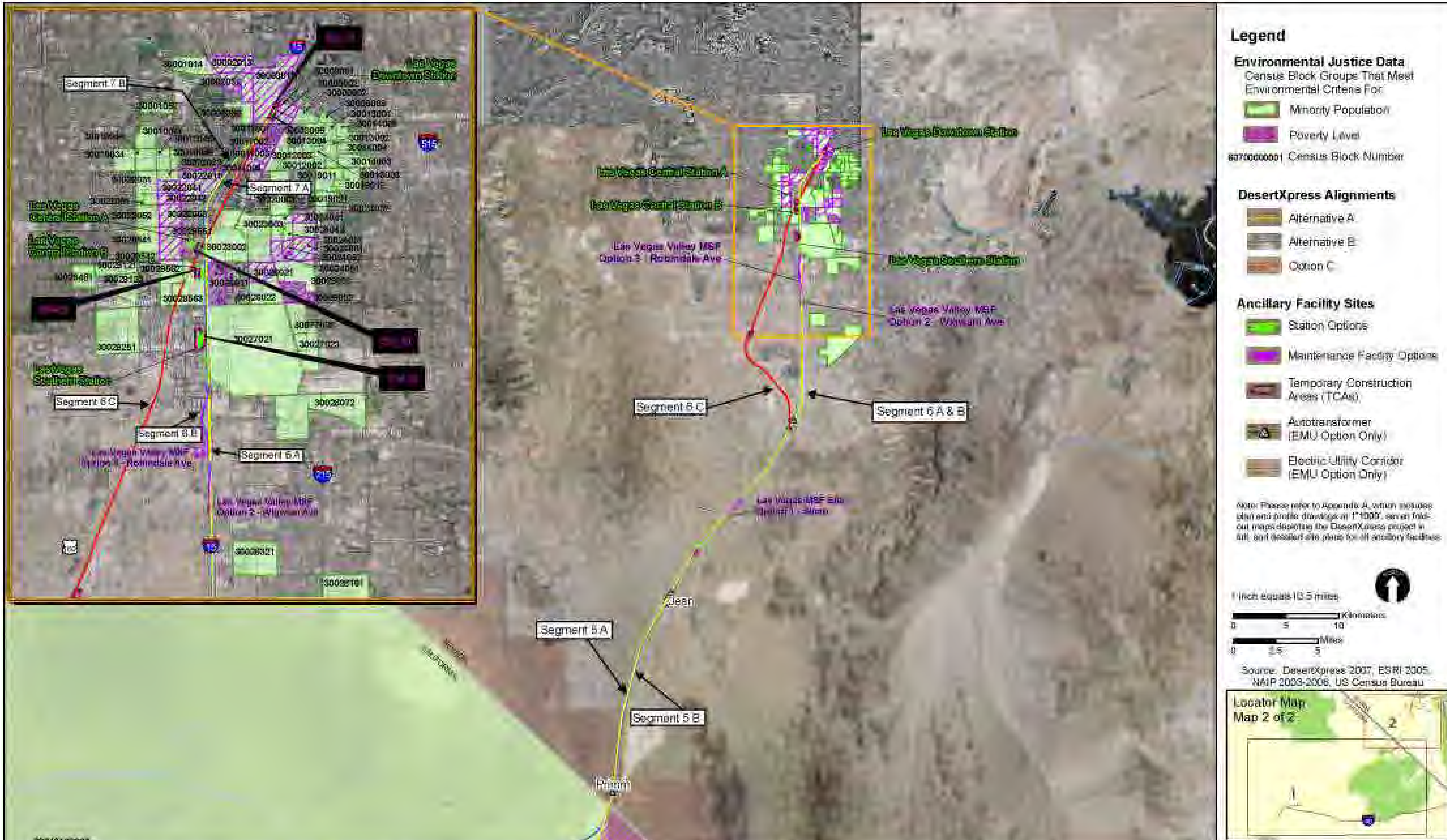
[24] CEQ, 1997



DesertXpress Project EIS

Environmental Justice: California (1) FIG 3-1.19

Source: Geografika Consulting



Environmental Justice: Nevada (1)

FIG 3-1.20

DesertXpress Project EIS

exceed 20.8 percent, and exceed if its low-income population would exceed 25 percent in San Bernardino County.

Thirty-four census blocks that meet low-income criteria would be within 2 miles of the DesertXpress railway. These include 23 census blocks in San Bernardino County and 11 census blocks in Clark County. The low-income block groups near the alignment are shown in Figures 3-1.19 and 3-1.20, respectively.

Distribution of Minority and Low-Income Populations

Environmental justice block groups are clustered around Victorville, Barstow, Baker, and the metropolitan Las Vegas area. As shown in Figure 3-1.19, there are also two large environmental justice block groups on the California side of the California Nevada boarder. Although large in size, these two block groups are small in population, totaling 482 people between them. With the exception of Baker (which lies in a different block group) there are very few residences near this portion of Segments 3A/3B and 4A/4B.

As shown in Figures 3-1.19 and 3-1.20, the majority of environmental justice block groups near the alignment qualify due to their high percentage of minority populations within them. Overall the alignment would be within two miles of 88 block groups with a high minority percentage and 34 block groups with a high poverty level. Of the 95 environmental justice block groups near the alignment, 27 have both a large minority population and a low income level.

3.1.4 Environmental Consequences

An adverse effect related to land use or community character would occur if the action alternatives would:

- Interfere with the normal functioning of adjacent land uses
- Conflict with any applicable land use plan, policy, or regulation
- Cause displacement of a significant number of local residents
- Disrupt or sever community interactions or otherwise divide an established community

An adverse effect related to environmental justice would occur if:

- An adverse environmental effect is predominately borne by a minority population and/or a low-income population; or
- An adverse environmental effect suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

3.1.4.1 No Action Alternative

The No Action Alternative would not involve the construction and operation of the high-speed train and associated facilities described above under the action alternatives. The No

Action Alternative would include existing access to Las Vegas via highway (I-15) and airport (McCarran International [LAS])) access. While the No Action Alternative would not involve the construction of the DesertXpress high-speed rail system, Caltrans and the Nevada Department of Transportation (NDOT) are planning for future highway improvements along I-15 between Victorville and Las Vegas. I-15 is intended to remain in its existing configuration for most of the distance between Victorville and Las Vegas, with the exception of capacity improvements in the urbanized areas. In addition to the highway capacity improvements on I-15, other transportation improvements near Victorville and within Clark County are anticipated.

These roadway capacity improvements would largely take place within the I-15 ROW, using land that is currently in the median and/or existing ROW of I-15 which would create minimal land use conflicts. The precise amount of land affected by the No Action Alternative is unknown at this time. Each project that is a part of the No Action Alternative would be subject to separate environmental review where specific land use impacts would be identified.

Since the improvements considered under the No Action alternative are expected to occur whether or not the action alternatives are implemented, the action alternatives would have a greater land use impact than the No Action Alternative.

3.1.4.2 Action Alternatives

Interference with Normal Functioning of Adjacent Land Uses

Rail Alignment: Since the action alternatives are fully grade separated, they would generally not interfere with access to existing land uses. Existing traffic patterns would not change, because existing roadway connections to and from lands along the rail alignments would not be severed.

To better measure the action alternatives' potential indirect effects on adjacent land uses various land use types were identified and classified as having high, medium, or low compatibility with proposed rail alignments, stations, and maintenance facilities. This classification is shown in Table 3.1-2.

Table 3.1-2: Compatibility of Land Use Types

	High Compatibility	Medium Compatibility	Low Compatibility
Rail Alignments, Utility Corridors	Transportation corridors, utility corridors, industrial areas, institutional, vacant/undeveloped, airport, hotels/casinos, BLM Multiple Use Class I designated land	Agricultural lands, medium to high intensity commercial uses, administrative/professional uses, BLM Multiple Use Class M designated land	Residential land uses, habitat/open space conservation areas, schools, hospitals, parks/recreational use, BLM Multiple Use Class L and C designated land
Stations/Maintenance Facilities, Temporary Construction Areas	Commercial/industrial land uses, business park, transportation/utility corridors, agriculture, vacant/undeveloped, airport, landfill, BLM Multiple Use Class I designated land	Residential land uses, BLM Multiple Use Class M designated land	Habitat/open space conservation areas, schools, parks/recreational use, BLM Multiple Use Class L and C designated land

Source: CirclePoint, 2008.

Table 3.1-3 summarizes the compatibility of the rail alignment, stations, and maintenance facility options with surrounding land uses.

Table 3.1-3: Compatibility of Action Alternative Features with Surrounding Land Uses

Action Alternative Feature	Compatibility with Surrounding Land Uses
Segment 1	High, Medium near BLM Multiple Use Class M designated land, Low near Barstow
Segments 2A/2B	High, Medium near BLM Multiple Use Class M designated land, Low near Barstow
Segment 2A	Low to medium through Yermo
Segment 2B	High near commercial uses, Low near residential uses, Medium near BLM Multiple Use Class M designated land
Segment 3	High, Low near Coyote Lake, Harvard, and BLM Multiple Use Class L designated land
Segments 4A/4B	High, Low through BLM Multiple Use Class L designated land
Segment 4A	High, Low through the Preserve
Segment 4B	High, Low through the Ivanpah Dry Lake bed
Segment 5	High
Segments 6A/6B	High near undeveloped and commercial/industrial uses, Low near residential uses
Option C	High near undeveloped and commercial/industrial uses, Low near residential uses
Segments 7A/7B	High, Low near residential areas if the Downtown

Action Alternative Feature	Compatibility with Surrounding Land Uses
	Station site is selected
Victorville station and OMSF Site 1	Medium
Victorville Station and OMSF Site 2	High
Southern Station Site	High
Central Station Site A	High
Central Station Site B	High
Downtown station Site	High
Sloan Road MSF Site	High
Wigwam Avenue MSF Site	Medium to High
Robindale Avenue MSF Site	Medium

Source: CirclePoint, 2008.

Segment 1

Besides the freeway, there are very few existing land uses adjacent to Segment 1. This area is mostly undeveloped and therefore the alignment would have medium to highly compatibility with adjacent land uses. Near Barstow, land use compatibility would be low since the alignment would be located near residential uses. If Victorville Station site 1 were selected, the rail alignment would pass the Osborne Private Airport, running adjacent and parallel to the runway. Since the proposed rail alignment and associated structures would run parallel to the airport runway, they would not interfere with airplane take-offs or landings, and therefore would be compatible with the airport.

Segments 2A/2B

The combined 2A/2B segment would be highly compatible with existing land uses except in Barstow where the alignment is in close proximity to homes and adjacent to BLM Multiple Use Class M land which allows for moderate human use/change to the landscape.

Segment 2A

Through Yermo Segment 2A would have low compatibility when passing residential areas and a moderately to high compatibility through undeveloped land.

Segment 2B

Through Yermo Segment 2B would have high compatibility with nearby commercial uses and have a low compatibility with adjacent residential uses.

Segment 3

This segment would have moderate to high compatibility with most adjacent land uses.

The most substantial land use conflict would occur just east of Yermo, in the communities of Coyote Lake and Harvard where residential properties and agricultural uses lie near the alignment. In these areas, compatibility with adjacent land uses would be medium to low.

Other land use conflicts would occur where the alignment runs adjacent to land designated as BLM Multiple Use Class L, which allows for a limited human use.

Segments 4A/4B

The majority of the area surrounding Segments 4A and 4B is undeveloped desert, which would have moderate to high compatibility with the alignment. Land use compatibility would be low through BLM land with a Multiple Use Class designation of L. Additional discrete areas with potential land use impacts are discussed below.

Segment 4A

The portions of Segment 4A that traverse through the Preserve would have low land use compatibility. Segment 4A also travels in the median of I-15 by the Primm Valley Golf Club. However, since the alignment near the club is in the median of an existing freeway, it would not be considered incompatible with this land use.

Segment 4B

Segment 4B would pass through the Ivanpah Dry Lake bed. Since the lake bed is used for recreational use, compatibility would be low in this area.

Segment 5

Segment 5 would have high compatibility with surrounding land uses. Furthermore, since the runways of the existing public airport in Jean are parallel to the proposed alignment, DesertXpress structures (such as tall catenary structures) would not interfere with existing flight paths and the action alternatives would be compatible with the airport.

Segments 6A/6B

Segments 6A/6B would have low compatibility with nearby residential areas and high compatibility near undeveloped and commercial/industrial areas. The rail alignment is similar in height with surrounding land uses and would not conflict with flight paths associated with the McCarran International Airport.

Option C

Option C would have low compatibility with surrounding land uses in residential areas and high compatibility through undeveloped and industrial areas.

Segments7A/7B

The majority of Segments 7A/7B would have high compatibility with adjacent land uses. Just before diverging from the I-15 freeway towards the Downtown Las Vegas passenger station, the alignment would pass single family homes and would therefore have low compatibility.

Victorville Station and OMSF Sites: The choice of OMSF site would be dependant on the selected station site. If station site 1 were chosen, OMSF site 1 would be selected and if station site 2 were chosen, OMSF site 2 would be selected. Therefore, effects are discussed according to these two groupings below.

Victorville Station and OMSF Site 1: Due to their proximity to a residential neighborhood, Victorville OMSF and station site 1 would have medium compatibility with adjacent land uses. The OMSF site would not present a compatibility issue with Rockview Park because it is located on the opposite side of the Mojave River and an existing train ROW already passes by this park. The OMSF site would not present a compatibility issue with Grady Trammel Park because this park is located over ¼ miles away and there are intervening commercial and industrial land uses.

Victorville Station and OMSF Site 2: Victorville station site 2 and OMSF site 2 would have high compatibility with surrounding land uses.

Las Vegas Station and MSF Sites: Compatibility with surrounding land uses is discussed for each of the four Las Vegas area station sites and each of the three Las Vegas area MSF sites below.

Southern Station: The Southern would have high compatibility with the surrounding mixture of commercial, industrial, and hotel/casinos land uses.

Central Stations: The Central Station site options would have high compatibility with the surrounding mixture of commercial, industrial, and hotel/casinos land uses.

Downtown Station: As previously discussed, the alignment leading to the Downtown Station site would have low compatibility with nearby residential land uses. However, the Downtown Station would have high compatibility with adjacent hotels and industrial land uses.

Wigwam Avenue OMSF Site Option: The Wigwam Avenue MSF site would have high compatibility with adjacent industrial land uses, but medium compatibility with nearby residential land uses. Of the three OMSF site options, the Wigwam site would be more compatible with existing land uses than the Robindale site option but less compatible than the Sloan site option.

Robindale Avenue OMSF Site Option: The Robindale MSF site would have medium compatibility with nearby residential land uses. Of the three OMSF site options, the Robindale site would be the least compatible with nearby land uses.

Sloan Road OMSF Site Option: The Sloan OMSF site would have high compatibility with the surrounding undeveloped land. Of the three OMSF site options, this site option would be the most compatible with nearby land uses.

Conflicts with Applicable Land Use Plans

STB issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. Therefore, the action alternatives would not be subject to local land use plans. A policy consistency analysis was not performed but a general analysis of the project's consistency with adjacent land use designations is discussed.[25]

To measure the action alternatives' potential direct effects on adjacent land uses, the land use designations for the action alternatives' footprints were classified as having high, medium, or low compatibility with the proposed rail alignments, stations, and maintenance facilities. This classification is shown in Table 3.1-4.

Table 3.1-4: Compatibility of Land Use Designations

	High Compatibility	Medium Compatibility	Low Compatibility
Rail Alignments, Utility Corridors	Institutional/Public Facilities, Industrial, Restrictive, Hotel/Casino, Desert/Mountain	Commercial, Agricultural	Residential
Stations/Maintenance Facilities, Temporary Construction Areas	Institutional/Public Facilities, Commercial, Industrial, Hotel/Casino, Commercial	Residential, Restrictive	Agricultural

Source: CirclePoint, 2008.

Table 3.1-5 shows of the compatibility of the rail alignment, stations, and maintenance facility options with the existing land use designations.

Table 3.1-5: Compatibility of Action Alternative Features with Land Use Designations

Action Alternative Feature	Compatibility with Land Use Designation High	Medium	Low
Segment 1	Institutional/Public Facilities	None	Residential
Segment 2	Institutional/Public Facilities	None	Residential
Segment 3	Institutional/Public Facilities and Desert/Mountain	None	Residential
Segment 4	Institutional/Public Facilities	Commercial	Residential
Segment 5	Institutional/Public Facilities and Hotel/Casino	Commercial	Residential
Segments 6A/6B	Hotel/Casino, Industrial and Institutional/Public Facilities	Commercial	Residential
Option C	Industrial, Hotel Casino, Institutional/Public Facilities	Commercial	Residential

[25] The discussion of land use consistency and compatibility does not imply that the DesertXpress project is subject to local land use and environmental laws. A declaratory order from STB (STB Finance Docket No. 34914, DesertXpress Enterprises, LLC – Petition for Declaratory Order) specifically exempts the DesertXpress project from compliance with such local and state laws, based on the interstate commerce nature of the proposed high-speed passenger rail system. Notwithstanding, information on land use compatibility is presented in order to help readers of this document evaluate potential environmental effects associated with the alternatives.

Action Alternative Feature	Compatibility with Land Use Designation High	Medium	Low
Segments 7A/7B	Industrial, Hotel/Casino	None	None
Victorville Station/OMSF Site 1	Industrial	Commercial	None
Victorville Station/OMSF Site 2	Institutional	None	Residential
Southern Station Site	Planned Development/Mixed Use, Industrial	None	None
Central Station Site A	Planned Development/Mixed Use, Industrial	None	None
Central Station Site B	Planned Development/Mixed Use, Industrial	None	None
Downtown Station Site	Civic, Industrial	Commercial	None
Sloan Road MSF Site	None	None	Residential
Wigwam Avenue MSF Site	Planned Development/Mixed Use	Commercial	None
Robindale Avenue MSF Site	None	None	Residential

Source: CirclePoint, 2008.

It is important to note that land use designations along the rail alignment often do not reflect the land uses that are present in these areas. For example, as shown in Figure 3-1.12, large undeveloped areas of land surrounding the alignment are designated for residential use. For consistency with existing land uses see the effects discussion titled "Interference with Normal Functioning of Adjacent Land Uses" in Section 3.1.4.2.

In California, there are no proposed new goals or policies that would specifically affect or limit implementation of the action alternatives. According to County planning staff, the action would be allowed under any land use designation and zoning because it is a public transportation facilities project.[26]

In Nevada, rail alignment areas would pass through Clark County. The Comprehensive Plan does not provide any land use designation for such areas. According to County planning staff, there are no goals or policies within the Comprehensive Plan that would specifically limit construction or implementation of the action alternatives.[27]

Overall, Action Alternative A (the median alternative) would create less of a conflict with existing land use designations than Action Alternative B, which would run adjacent to the freeway. Since Action Alternative A would develop a high-speed rail through the middle of an existing freeway, an intense transportation use, it would generally not conflict with immediately adjacent land use designations. Action Alternative B would be adjacent to the freeway and one side of the rail alignment would be adjacent to land with another, potentially contrasting, land use designation.

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[26] John Schatz, supervisor, San Bernardino County Planning Department, personal conversation, July 2007.
[27] Bob Klein, senior planner, Clark County Planning Department, personal conversation, July 2007.

Cause displacement of a significant number of local residents

Neither rail alignment A or B would displace any housing and therefore would not displace a significant number of local residents. The project applicant may acquire residential property for the rail alignment ROW; however, this acquisition would not require the demolition of existing homes.

Neither of the Victorville station or OMSF sites or the Las Vegas Southern Station site would result in the displacement of commercial, industrial, or residential uses.

The Las Vegas Central Station A site is currently in use as the parking area for the Rio Suites Hotel. The parking area would be displaced if this station site alternative is selected; no local residents would be displaced.

The Las Vegas Central Station B site currently consists of industrial uses including staging and storage areas and a large warehouse with an indoor kart racing facility. These uses would be displaced if this station site is selected.

The Las Vegas Downtown Station site currently consists of industrial uses which would be displaced if this station site is selected.

The Robindale Avenue MSF site currently contains a single family home which would be displaced if this MSF site is selected.

The Wigwam Avenue MSF site currently contains industrial uses which would be displaced if this MSF site is selected.

Disrupt or sever community interactions or otherwise divide an established community

Rail Alignment: The rail alignment would not sever an established community since the action alternatives in many areas traverses undeveloped lands and is fully grade separated, meaning that in more urbanized areas the rail alignment would cross over or under existing roads and highways allowing existing connections within communities to remain unchanged. Option C, which does not follow the I-15 ROW would follow the UPRR rail alignment, an existing rail corridor. Furthermore, since the proposed rail alignment would generally follow an established freeway or railway ROW, it would not introduce a new divisional element and would therefore not create a new barrier between communities.

The action alternatives would pass through the communities of Lenwood, Yermo, and Sloan. The way in which the proposed rail alignment affects the cohesiveness of each community is discussed below.

Lenwood: After crossing the Mojave River, the combined portion of Segment 2A/2B would cross through developed areas of Lenwood. The new rail line would create a new linear visual element within the community but as stated above, because the rail alignment would be fully grade-separated, the existing connections within the community of Lenwood would remain and community interaction would be unchanged.

Barstow: The proposed rail alignment through Barstow would run just north of the Mojave River, between the river and commercial and residential development along Highway 58 and Poplar Street. There are few community features in this area and the main community connection across the Mojave River in this area, 1st Avenue, would not be affected by the action alternatives.

Yermo: Entering Yermo, Segments 2A splits from Segment 2B heading north between two developed areas. In this area, the Segment 2A would create a divisional element in the community of Yermo. However, Segment 2A would cross over the two main roads in this area that provide community connections, Ghost Town Road and Calico Road Segment 2B would be located next to I-15, in its ROW and therefore would not create a new linear element through the community of Yermo.

Baker, Primm, and Jean: The alignment would follow the I-15 corridor, an existing divisional element though these communities, and therefore would not further divide them.

Sloan: Although action alternatives A and B would be located along the freeway through this community, Option C would run through the community of Sloan, creating a divisional element.

The Las Vegas Metropolitan Area: For action alternatives A and B, the rail alignment would run along the existing freeway corridor in Las Vegas and would therefore not create a divisional element. Near the Las Vegas Downtown Station alternatives A and B would leave the freeway corridor, but would soon follow an existing rail ROW. Therefore Segments 7A/7B would not divide an established community.

After passing through Sloan, Option C would follow an existing rail corridor from the outskirts to the middle of the metropolitan Las Vegas area. Since Option C would follow an existing linear path, it would not create a new divisional element in this area.

No matter which rail alignment option is chosen, the DXE railway would not divide the Las Vegas metropolitan area.

Victorville Station and OMSF Sites: The Victorville Station and OMSF sites would be located north of the developed areas in Victorville. Therefore they would not divide established communities in Victorville.

Las Vegas Area Station and MSF Sites: None of the Las Vegas area station and MSF sites would divide an established community. All of the station and MSF sites, except for the MSF site at Sloan Road, are located in highly developed areas near other large buildings. The proposed station and MSF buildings would not block any existing transportation or fall between a group of homes in an existing neighborhood. The Sloan Road MSF site is an undeveloped area adjacent to the highway and is not near an existing community. While business displacements would occur at Central Station A, Central Station B, and the Downtown Station and the Wigwam Avenue MSF, these uses are primarily industrial in nature. It is not anticipated that the removal of these industrial uses would divide or sever an existing community. These industrial uses would be replaced with similar uses, as the Las Vegas station and MSF site options would provide new industrial and maintenance-related uses.

Result in Environmental Effects Disproportionately Borne by a Low-Income or Minority Population.

Census Block groups within a two-mile radius of the alignment would be considered "environmental justice block groups" if they meet at least one of the following criteria:

- The low-income population is greater than 25 percent of the total population of the community, or minority population is greater than 50 percent of the total population of the community.
- The low-income or minority population is more than 10 percentage points higher than the City or County average.

Block groups meeting the minority and low-income criteria within the study area are shown in Figures 3-1.19 and 3-1.20 and in Section 3.1.3.3. Action alternatives would be located within two miles of 95 census blocks that meet one or both of the criteria for environmental justice, 27 of which meet the criteria for both low-income and minority populations. Of the 95 census blocks 88 qualify as having a high minority population and 34 qualify as low-income areas. As shown in Figures 3.1-19 and 3.1-20, the majority of these census blocks are located in either Victorville or the Las Vegas metropolitan area. Several qualifying block groups are also present around Barstow. As previously discussed, although there are two large environmental justice block groups in eastern California, these two block groups are small in population, with very few residences near the proposed alignments.

As previously mentioned under the heading "Regulatory Requirements: Community/Socioeconomic Impacts," E.O. 12898 requires non-discriminatory opportunities for public input on NEPA documents. The public participation process conducted for this project was open to all interested individuals, including those from environmental justice block groups. A formal scoping process was conducted for this project, which included three public scoping meetings: one in Las Vegas, one in Barstow, and one in Victorville. These locations correspond with concentrations of environmental justice block groups as shown in Figures 3-1.19 and 3-1.20.

Notices to the public, describing the proposed project and listing the dates and locations of the scoping meetings, were printed in the Daily Press, the Las Vegas Sun/Las Vegas Review Journal, and in the Desert Dispatch on several dates. In addition the FRA sent notification mailings to approximately 2,500 individuals, including all property owners within 500 feet of the proposed rail alignments. The notice provided information on the scoping meetings and included details on how and where to submit formal comments on the project. In addition a telephone hotline was established to provide a contact for public scoping meetings.

Environmental effects that could potentially affect populations that meet environmental justice criteria include visual effects (especially from the stations and maintenance facilities), utility impacts related to utility relocation during construction, traffic, noise, and air quality impacts near the proposed station sites. For example, traffic would increase on local roadways near the station sites which could cause traffic delays in minority or low-income communities. Significant increases in noise from passing trains and increases in traffic near station sites, could also affect low-income or minority communities. Air quality impacts include increases in pollutants from car exhaust near stations, which could occur in the minority and low-income communities in Victorville or metropolitan Las Vegas. Adverse physical impacts to the environment such as noise, traffic, and air quality are discussed in detail within the corresponding section of this EIS. The following analysis in this section discusses the environmental justice implications of such physical changes to the environment.

Rail Alignment: The greatest difference between action alternatives A and B related to environmental justice is that Alternative A mostly follows the freeway median while Alternative B runs alongside the freeway. Due to its location in the middle of the freeway, Alternative A would generally have less of an impact on low-income or minority areas near the alignment. In Segments 2 and 4, where the alternatives split from each other, the rail alignments would remain near the same number of environmental justice block groups (See the discussion of existing low-income and minority block groups in Section 3.1.3.3). Option C would avoid running through several of the environmental justice block groups on the outskirts of metropolitan Las Vegas that are bisected by the action alternatives (See Figure 3-1.20). Therefore, of the proposed rail alignments, Option C would least affect census blocks that qualify for environmental justice considerations.

The action alternatives would not directly impact (through displacement) a minority or low income resident. Residents within qualifying census block groups adjacent to the alignments are already exposed to substantial transportation infrastructure (i.e. I-15) and its associated environmental issues (i.e. traffic, noise, air quality, aesthetics). Since the action alternatives generally follow existing transportation infrastructure, they would not introduce substantial new impacts to environmental justice areas. EIS sections 3.4, 3.5, 3.6, 3.11, and 3.12 include mitigation measures to reduce adverse effects on local populations related to utilities, traffic, aesthetics, air quality, and noise. With implementation of these mitigation measures, adverse effects from the action alternatives, to both environmental justice and non-environmental justice populations, would be reduced or avoided.

Victorville Station and OMSF Sites: Environmental effects to environmental justice populations in Victorville would vary depending on which station and OMSF site is selected. Refer to Section 3.1.3.3 for a discussion of the location of environmental justice block groups near the station and OMSF sites.

Victorville Station and OMSF Site 1: In Victorville, OMSF and station site 1 would be directly within a census block with a high minority population. However, this station site is on a bluff, thus separated from the developed areas of Victorville. The closest residence is below the bluff, approximately 775 linear feet away from Victorville Station site 1. In addition, mitigation measures provided in this EIS would reduce or eliminate the adverse environmental effects to this environmental justice area.

Victorville Station and OMSF Site 2: Victorville OMSF and station site 2 would not be located in an environmental justice census block. Although a census block considered both low-income and high-minority is located near Victorville Station and OMSF site 2 (see Figure 3-1.19), the only land uses nearby include a tank supply store and a landfill. Therefore effects from implementation of Victorville Station and OMSF site 2 would be minimal.

Since Victorville OMSF site 1 would be within a census block with a qualifying percentage of minorities, and site 2 would not, OMSF and station site 2 would have the least environmental justice impact of the two site options.

Las Vegas Area Station and MSF Sites: As shown in Figure 3-1.20 and discussed in Section 3.1.3.3, many environmental justice block groups are located near the alignment in the metropolitan Las Vegas area. Environmental effects to environmental justice populations would vary depending on the station site selected.

Southern Station: The Las Vegas Southern Station is not within a census block group that meets environmental justice criteria. The closest environmental justice block group is across I-15. As a result the Southern Station would not result in a direct or indirect impact on an environmental justice community.

Central Station A: Although the Central Station A site is near both minority and low-income census blocks, it is not within one. According to review of aerial photography, the surrounding land uses are commercial/industrial and hotel/casino, not residential. Station A could result in indirect traffic impacts within the environmental justice census block but those impacts would be mitigated to acceptable LOS by mitigation measures described in the Section 3.5, Traffic and Transportation.

Central Station B: This station option is located within a census block with a qualifying minority population. Residential uses are within approximately 300 feet of this station site. Residents could be exposed to air quality, traffic, and noise impacts from the proposed station. However, residents in this area are already exposed to noise and air quality impacts from the I-15 freeway, and as discussed in Section 3.12, Noise and Vibration and Section 3.11, Air Quality and Global Climate Change, the station would not result in a significant permanent noise or air quality impact on surrounding land uses. As discussed in Section 3.5, Transportation and Traffic, traffic impacts would be mitigated to a less than significant level. Noise and air quality construction period impacts would also be reduced to a less than significant level with mitigation.

Downtown Station: The Downtown station site is located within a community that is considered both low-income and minority. Nearby residents could be exposed to air quality, traffic, and noise impacts. However, residents in this area are already exposed to noise and air quality impacts associated with the urbanized setting of Downtown Las Vegas as well as nearby freight railroad operations and as discussed in Section 3.12, Noise and Vibration and Section 3.11, Air Quality and Global Climate Change, the station would not result in a significant permanent noise or air quality impact on surrounding land uses. As discussed in Section 3.5, Transportation and Traffic, traffic impacts would be mitigated to a less than significant level. Noise and air quality construction period impacts would also be reduced to a less than significant level with mitigation.

MSF Site Options: None of the MSF site options are within or adjacent to low-income or minority census block groups.

3.1.5 MITIGATION MEASURES

The action alternatives would not result in significant direct land use impacts because much of the land on which the action alternatives would be located is currently undeveloped or within existing transportation rights of way. Small amounts of industrial or residential displacement would occur with several Las Vegas Station site and MSF options but would not result in significant land use or community impacts. Potential indirect land use effects and adverse effects on environmental justice populations would be mitigated through measures specified in other environmental topics in this EIS including sections 3.4 Utilities/Emergency Services, 3.5 Traffic and Transportation, 3.6 Visual Resources, 3.11 Air Quality and Global Climate Change, and 3.12 Noise and Vibration. Measures indentified in these sections of the EIS generally include:

- **Utilities:** Avoidance or minimization of conflicts with existing utility infrastructure (including coordination with existing utility providers)
- **Traffic:** the addition of signalization and/or lanes to the intersection approaches
- **Visual Resources:** Use of aesthetically pleasing materials for the rail alignment that minimize reflectivity, use of architecture and colors at the Victorville Station that reflect the surrounding desert landscape, design of signage at the Victorville Station to reflect the scale and character of the site and surroundings, use of contour grading, orderly construction site management, minimization of light spillover during construction, and use of visual screening of construction areas as appropriate
- **Air Quality:** use of best management dust control practices to minimize air quality impacts during construction
- **Noise:** installation of noise barriers, use of sound and vibration reducing materials, relocation of crossovers or special track work, property acquisitions, limited construction times, limited locations of construction related activities, and use of sound-reducing construction equipment

3.1.5.1 Residual Impacts Following Mitigation

The incorporation of mitigation measures would mitigate permanent effects related to project construction and operation, but even after mitigation, the action alternatives would result in the permanent conversion of lands to transportation uses. This conversion would include lands from the Mojave National Preserve.

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3.2 GROWTH

This chapter discusses the potential growth-inducing effects that could result from the action alternatives.

The analysis looks at projected statewide, regional, and local population and employment growth trends and to determine if/how the action alternatives may influence these trends, either directly or indirectly. As population and employment growth are closely linked to land use regulations, please also refer to Chapter 3.1, Land Use and Community Impacts.

Because the project involves construction and operation of a high-speed railroad, growth inducing effects would be most prominent around station and maintenance facilities which would create jobs and attract riders. As a result, this analysis is focused on the growth issues in areas immediately surrounding the proposed station and maintenance facilities (described in Chapter 2.0, Alternatives).

This section identifies and describes the following:

- Existing population, housing, and employment conditions in the study area.
- Methodology and data sources used to assess potential growth-induced effects.
- Potential positive or negative regional and local employment and population growth associated with the project alternatives.
- Potential for employment and population concentration in the vicinity of proposed station and maintenance facility locations.
- Potential effects related to growth and development.

3.2.1 REGULATIONS AND STANDARDS

The Council on Environmental Quality (CEQ) regulations, which implement the National Environmental Policy Act of 1969 (as amended), require evaluation of the potential environmental consequences of all proposed federal activities and programs. This provision includes a requirement to examine both direct and indirect consequences, which may occur in areas beyond the immediate influence of an action alternative and at some time in the future. Positive and negative growth (i.e. change) is a potential consequence of the action alternatives.

Direct growth effects are those caused by any action alternative, occurring at the same time and place.[1] Direct growth effects include any permanent jobs directly associated with the action alternatives as well as any displacement of housing related to the construction and operation of the proposed rail facilities.

[1] 40 CFR 1508.8

Indirect growth effects are considered to be reasonably foreseeable effects caused by the action alternatives, typically occurring later in time or further in distance from the project. [2] These include positive or negative growth in population numbers and/or patterns, positive or negative growth in local or regional economic vitality, and associated alterations in land use patterns that could occur with implementation of the DesertXpress project. Removal of existing obstacles to growth would also be considered indirect growth effects. "Removal of obstacles to growth" would include the extension of public services and utilities to a previously undeveloped area, where the provision of such services could have a foreseeable increase in population and/or economic growth.

3.2.1.1 Federal Regulations

Federal Railroad Administration

Under its *Procedures for Considering Environmental Impacts*, the Federal Railroad Administration (FRA) states that an EIS should address the number and kinds of available jobs to be affected by the action alternatives, impacts to local government services and revenue, and impacts on commerce in communities within the immediate project area.[3] In cases where displacement of housing is involved, FRA stipulates an assessment of the availability and adequacy of relocation housing. (Notably, the action alternatives would not displace any housing units). FRA guidance also suggests analysis of the positive and negative consequences of each alternative on growth in the community and its surrounding metropolitan area, specifically near existing business districts and the immediate project area.

3.2.1.2 California Regulations

Southern California Association of Governments

As the designated Metropolitan Planning Organization (MPO), the Southern California Association of Governments (SCAG) is mandated by the Federal government to research and establish plans for growth management within the region. SCAG participates in the development of demographic projections, including population and employment projections, and prepares the Regional Housing Needs Assessment (RHNA), which is used by local agencies as the basis for state-mandated Housing Elements within local general plans. SCAG's 2030 Projections, as published in the *2004 Regional Transportation Plan (RTP)* were used in the analysis of San Bernardino County and the City of Victorville.

[2] 40 CFR 1502.15[b], 40 CFR 1508[b]

[3] FRA Docket No. EP-1. Notice 5, May 26, 1999

San Bernardino County General Plan

The San Bernardino General Plan establishes the basis for land use, transportation, and economic development policies across the entire County. In its introductory sections, the General Plan describes the County as a whole as an "integral part of the Los Angeles/Orange County region" and states that "the extraordinary growth that Orange County experienced from the 1950s through the 1970s is forecasted for both San Bernardino and Riverside counties for the current and future decades."[4] The General Plan seeks to control the timing and location of this anticipated growth through identified goals and policies. The General Plan divides the County into three subregions. All of the physical features of the action alternatives would be located within the "Desert" subregion. Growth-related goals and policies for this region seek to direct growth to already urbanized areas, so as to preserve both existing natural resource areas as well as the integrity of rural developed areas. The General Plan EIR includes a detailed growth projection report. This report examines the overall holding capacity of County lands (without regard to any specific timeframe) relative to the General Plan's potential to increase population, housing, and employment through the year 2030.

City of Victorville General Plan

Policies related to land use, transportation, and housing all influence growth in the City of Victorville. The City has grown considerably in both size and population. At the City's incorporation in 1962, the northern city limits were at Route 66 and the Mojave River, containing an area of 8.2 square miles. The population at the time was 8,111.

By the time of the last update of the General Plan in 1995, the City had expanded its boundaries to encompass more than 67 square miles; its population was 60,577. Currently, the 2007 estimated City population exceeds 100,000.

The Victorville General Plan is arranged by distinct planning areas. As shown in Figure 3-1.3 (in Section 3.1, Land Use and Community Impacts), the Victorville passenger station site option 1 and OMSF site option 1 would be located within the City of Victorville city limits and the North Mojave Community Plan area and the Northern Triangle Specific Plan area. Passenger station site option 2 is partially within the North Mojave Community Plan area and just outside the city limits of Victorville (as of May 2008). Both Victorville station site option 2 and OMSF site option 2 are located within the City's "sphere of influence." A sphere of influence extends over unincorporated County lands adjacent to an incorporated City. This area is formally under the jurisdiction of San Bernardino County. Each parcel has a land use designation set forth by the County, considered operative, but the City of Victorville has also developed land use designations for these areas. In the event the City annexes these lands, these "pre-designations" would likely become governing.

Overall, the City's land use designations for its entire sphere of influence area (which extends to areas beyond the proposed station and maintenance facility sites) are more

[4] San Bernardino County General Plan, April 2007, p. I-11.

aggressive in terms of projected commercial space than County designations. Whereas County land use designations for the entire Victorville sphere of influence area project a "buildout" of approximately 7.5 million square feet of commercial and industrial development, the City's own designations for this same area would allow more than 17 million square feet of commercial and industrial development.

As of early 2008, the City is contemplating a General Plan update that would expand the City limits to include an additional 37,000 acres (57 square miles) within the "Northern Expansion Area" which includes portions of the North Mojave/Northern Triangle areas noted above, including the Victorville station site option 2 and OMSF site option 2.

The General Plan also anticipates significant job and population growth related to the Southern California Logistics Airport (SCLA), the former George Air Force Base. SCLA is located approximately 2 miles to the west of the southernmost site options for the Victorville passenger station and OMSF. At buildout, the immediate SCLA area is expected to host more than 20,000 jobs, many related to goods movement and warehousing.

3.2.1.3 Nevada Regulations

Southern Nevada Strategic Planning Authority (SNSPA): Strategic Plan to Address Growth in Southern Nevada, Final Report 1999

Clark County and the cities of Boulder City, Henderson, Las Vegas, and North Las Vegas comprise the Southern Nevada Regional Planning Coalition (SNRPC). The SNRPC was created to focus on the rapid growth of Clark County and the effects of this growth on education, health care, the natural environment, public safety, recreation and culture, and transportation. In 1999 the SNRPC published the *Strategic Plan to Address Growth in Southern Nevada*, which provides a 20-year outlook identifying and evaluating the needs of Clark County relating to its growth and prioritizes the objectives and strategies relating to the growth of Clark County," per SB 383.[5] The report involves a discussion relating to growth strategies, housing, and community/economic development.

The Center for Business and Economic Research at the University of Nevada, Las Vegas

The Center for Business and Economic Research at the University of Nevada, Las Vegas (CBER) provides regional information on the population and economy of Nevada. Population projections for Clark County used in this EIS are provided by the CBER.

Clark County Comprehensive Plan

In 1990, the population within urban portions of unincorporated Clark County (communities in the Las Vegas Valley) was 364,000. By the year 2000, this population increased by 300,000 to 664,000. By 2007, the population was estimated to have

[5] The Southern Nevada Strategic Planning Authority *Mission, Vision, and Statement of Principles*. http://www.snrpc.org/Snspa_Plan/Strategic_Plan_Elements/SNSPA_Plan_Mission.htm

increased to 837,000.[6] With this increased population, job growth has increased commensurately.

The key growth policy framework is the Clark County Comprehensive Plan. The Plan sets forth goals and policies intended to guide the location and timing of growth. Key goals and policies in the Plan seek to direct new growth to already urbanized areas, particularly towards underdeveloped or vacant parcels within such areas, as a means of reducing urban sprawl, improving air quality, and reducing the need for costly extensions of urban services.[7] Figure 3-1.2 (in Section 3.1, Land Use and Community Impacts) shows that three of the four Las Vegas area station site options and two of the three MSF site options would be located within the Enterprise or Winchester/Paradise sub-areas of the Clark County Comprehensive Plan.

City of Las Vegas Master Plan

The City of Las Vegas Master Plan, adopted in 2000, includes goals and policies intended to guide the timing and location of growth through the plan's horizon year of 2020. The Plan states that the City experienced a 73 percent increase in population between 1990 and 2000, and is projecting by 2020 to double its population again. The Plan attributes much of this population growth to robust job growth, which encourages in-migration of people from other regions.

The Master Plan sets forth goals and policies intended to accommodate growth "while enhancing the City's quality of life and livability." Public outreach leading to the Master Plan found that a strong majority of residents of Las Vegas felt that the pace of growth in the City had detracted from the quality of life; a smaller but still significant majority stated that City policy should accommodate growth through stronger regional planning efforts.[8]

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[6] Comprehensive Planning Division, Clark County, Nevada: http://www.accessclarkcounty.com/depts/comprehensive_planning/demographics/Pages/demographics.aspx accessed April 22, 2008.

[7] Clark County Comprehensive Plan, Volume One, pp. 1-6.

[8] Las Vegas Master Plan, p. 17.

To this end, the Master Plan has a strong focus on "reurbanization" – which is described as the revitalization of existing urbanized areas through targeted infill residential and commercial development. The proposed Downtown Las Vegas passenger station (and portions of the rail alignment) would be located within an area designated by the Master Plan as "Downtown Reurbanization." Specific goals and policies for this area call for a "significant housing component" that would "act as a catalyst" for related urban revitalization efforts. Figure 3-1.2 indicates that the Downtown station and portions of Segments 7A/7B are located within the "Downtown Reurbanization" area of the Master Plan.

3.2.2 METHODS OF EVALUATION OF IMPACTS

This analysis is focused primarily on the areas surrounding station and maintenance facility site options near and/or in Victorville and Las Vegas. The reason for this focus is that potential population and employment growth related to the action alternatives would most likely occur near the station and maintenance facility sites. The station and maintenance facilities are the only "interfaces" of the project where passengers would board or exit trains and where the vast majority of DesertXpress employees would be located. With the exception of the maintenance of way (MOW) facility proposed for the community of Baker, which would house 8 employees, there are no other "entry points" to the DesertXpress project that could foreseeably add to employment and/or induce population growth.

To evaluate the direct and indirect growth effects of the action alternatives, state, regional, and local growth projections of population, housing, and employment were used as the baseline. The anticipated employment from the DesertXpress project was then added to these baseline numbers to determine if the action alternatives would result in substantial growth.

The action alternatives are also evaluated as to whether they could foster employment or population growth through the removal of any existing impediments to growth. Lack of utilities and urban facilities are the most common impediments to growth of undeveloped areas. While the DesertXpress project would traverse significant areas of undeveloped lands which have little to no utilities or urban services, it would not extend utilities to these areas in a way that would remove an impediment to growth. In other words, while the project would construct additional transportation, electrical and communications infrastructure, this infrastructure would not remove an impediment to growth because it would not be readily available to adjacent land uses, with the exception of areas in close proximity to stations and maintenance facilities.

Another factor affecting growth would be the mode shift, or shift from automobile traffic on I-15 to high-speed rail that would occur under the action alternatives. This mode shift could reduce the potential number of "pass-by" visitors to communities along the corridor, including Barstow, Baker, Primm, and Jean. While these communities would have no direct public interface with the DesertXpress project, local economies of each community include substantial areas of "visitor-serving" uses, such as outlet malls, restaurants, and gas stations which rely heavily on automobile traffic on I-15 corridor as their primary source of customers. Since the action alternatives could reduce the number of trips on I-15 assumed with the No Action Alternative and because the action alternatives doe not include any stops or direct interface with these communities, the action alternatives could have a negative effect on the future growth in these communities.

3.2.3 AFFECTED ENVIRONMENT

3.2.3.1 Regional and Local Environment

San Bernardino County

Population: According to the EIR prepared for the San Bernardino County General Plan, the County as a whole is expected to experience significant population growth between 2007 and 2030. During this period, the County population is expected to increase by nearly 35 percent, adding about 700,000 people.[9]

The DesertXpress project would be located in the “Desert Region” of San Bernardino County, which extends roughly from the top of the Cajon Pass, southwest of Victorville, to the Nevada state line. Table 3.2-1 below indicates the County’s anticipated growth projections within the Desert Region. Table 3.2-2 identifies the portion of anticipated Desert Region growth projected for the areas around the six Desert Region cities. Four of these six cities are within 10 miles of the proposed passenger station and OMSF sites: Victorville, Apple Valley, Hesperia, and Adelanto.[10] Barstow is another incorporated city within the Desert Region; it is located approximately 20 miles from the proposed passenger station and OMSF sites. Therefore, nearly all of the projected growth in Table 3.2-2 would occur within 20 miles of the Victorville station and OMSF sites.

[9] County of San Bernardino, Draft Program Environmental Impact Report, p. IV-116.

[10] Needles is the only other incorporated city in the Desert Region. Needles is located 175 miles east of Victorville and as of 2000, had a population of less than 5,000 people. Owing to this distance, the action alternatives are not anticipated to have any growth impacts to the City of Needles.

Table 3.2-1 San Bernardino County Desert Region Growth Projections 2000-2030, Six City Sphere of Influence Areas

Category	2000	2030	% Growth	Annual Growth Rate
Population	108,974	159,893	47%	1.9%
Households	38,158	59,562	56%	2%
Employment	12,324	19,974	62%	4.1%

Source: 2030 Growth Projections, San Bernardino County General Plan EIR, Appendix B.

Table 3.2-2 Aggregated Sphere of Influence Growth Projections within Desert Region, 2000-2030, Unincorporated San Bernardino County

Category	2000	2030	Percentage of All Desert Region Growth within Spheres of Influence
Population	31,671	50,832	37.6%
Households	11,035	18,262	33.8%
Employment	1,557	3,901	30.6%

Source: 2030 Growth Projections, San Bernardino County General Plan EIR, Appendix B.

As shown in Table 3.2-1, the Desert Region is anticipated to see robust population, household, and employment growth through 2030. The Desert Region as a whole is expected to see a population increase of about 51,000 people, along with about 7,500 new jobs. As shown in Table 3.2-2, however, a substantial amount of this growth is expected to occur close to incorporated cities – specifically, within the cities' spheres of influence. About 19,000 new people, or 38% of all Desert Region projected population growth, is expected to occur within the aggregate sphere of influence areas of the Desert Region cities, five of which are within 20 miles of the Victorville passenger station and OMSF site options.

City of Victorville

Population & Housing: According to the City of Victorville General Plan, the City has experienced substantial growth in population and area over several decades. Much of the population and housing growth within the City of Victorville has been externally driven by job growth in the Los Angeles, San Bernardino, and Riverside areas. Increasing land costs in these areas have spurred growth in the Victor Valley area. The City of Victorville has become the primary business and commercial center of the Victor Valley and is expected to have opportunities for continued growth in the future. As anticipated in SCAG Projections, the City of Victorville is expected to see a 36.1 percent increase in population between 2005 and 2020, with an additional increase of 19.6 percent by 2030. This anticipated growth in population is higher than the projected San Bernardino County average increase of 24.9 percent between 2005 and 2020 and 13.2 percent between 2020 and 2030. While both the City of Victorville and San Bernardino County are expected to grow at a steady rate, the City is projected to grow at a slightly higher rate than the County. Table 3.2-3 summarizes the anticipated population growth for the City.

Similar to the anticipated growth in population within the City of Victorville, the number of households is projected to grow substantially from the year 2005 to 2030. The City's General Plan Housing Element indicates that the General Plan area would accommodate an 80 percent build-out through 2015, while maintaining consistency with the land use goals and policies. Thus, the City of Victorville has planned for growth and expansion of population and housing. According to the City of Victorville General Plan Housing Element, the City's growth rate, while slowing since the 1980s, still exceeds the growth rates experienced within San Bernardino County. This rate of growth is thought to be attributed at least in part to the relatively low cost of land and housing in Victorville relative to the more densely populated Valley Region of the County.

The City of Victorville has historically experienced much higher rates of growth than the surrounding areas within the Victor Valley and Barstow regions of the County.[11] As projected by SCAG, the number of households in Victorville is projected to grow from 22,986 units in 2005 to 32,576 units by 2020, representing an approximate 41.7 percent increase. The number of households is projected to grow another 24.1 percent from 2020 to 2030, resulting in an anticipated 40,427 total households. The average household size within the City is approximately 3.26 persons per household. In comparison to the housing projections for San Bernardino County, the City of Victorville is expected to have a greater increase of households than the County. As previously discussed, the County is expected to grow about 33.4 percent from 2005 to 2020, with an additional 18.6 increase from the year 2020 to 2030. Table 3.2-3 summarizes the projected growth of households within the City of Victorville from 2005 to 2030.

Employment: Victorville serves as the primary employment center for residents in the Desert region of San Bernardino County, providing nearly half the jobs in the Victor Valley area.[12] According to SCAG Projections, the number of jobs within the City of Victorville is anticipated to grow significantly. Between the year 2005 and 2020, it is expected that the number of jobs will increase more than 30,000, from 38,108 to 68,611, representing an increase of nearly 80 percent. SCAG projects an additional 10,976 jobs in Victorville between 2020 and 2030. In all, SCAG projects a 57 percent increase in Victorville employment between 2005 and 2030 and 76.2 percent between 2005 to 2030.

In 2005, the total number of jobs in Victorville constituted 5.7 percent of the jobs within San Bernardino County. This will increase to 7 percent in 2020 and 7.7 percent by 2030. Table 3.2-3 shows employment projections for Victorville.

[11] City of Victorville General Plan Housing Element, 2000.

[12] City of Victorville General Plan Housing Element Update, 2000.

Table 3.2-3. City of Victorville Growth Projections

Year	Population / Percent Growth*		Households / Percent Growth*		Employment / Percent Growth*	
2005 (actual)	75,952	NA	22,986	NA	38,108	NA
2010	81,592	+7.4	24,762	+7.7	47,362	+19.5
2015	92,548	+13.4	28,621	+15.6	57,873	+18.2
2020	103,353	+11.7	32,567	+13.8	68,611	+15.7
2025	113,711	+10	36,490	+12	79,439	+13.6
2030	123,641	+8.7	40,427	+10.8	90,415	+12.2

Source: SCAG Projections, 2005.

* Percent Growth from last measured year (5-year increments)

Twenty and thirty-year growth projections dating from the early 2000s anticipate robust growth for both San Bernardino County as a whole and the City of Victorville. Notably, both areas have seen marked slowing in growth related to the nation-wide economic downturn of early 2008. The downtown has slowed regional job growth and depressed prices within the regional housing markets. Construction related employment has been an important constituent in the region's employment spectrum. As of March 2008, the economic downturn has resulted in the loss of approximately 15,000 construction jobs in San Bernardino County.[13] Additionally, the prices of existing homes in the Victor Valley dropped 4 percent between February and March 2008. Nearly 7 out of 10 homes that were sold within the Victor Valley in February 2008 were bank owned (in other words, related to a foreclosure procedure).[14]

At of the date of this EIS, the duration and depth of the economic downturn is unknown. Regional and local planning agencies have not revised their long-range growth projections based on the downturn.

Clark County

Population and Housing: Clark County has seen substantial rates of growth over the past two decades and has experienced the greatest amount of population growth for any metropolitan area in the nation. According to the University of Nevada Center for Business and Economic Research (CBER) , Clark County is anticipated to grow from 1,815,700 in 2005 to 2,946,350 in 2020, reaching a projected population of 3,425,928 in 2030. This represents an approximate 38.4 percent increase in population between the

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[13] Risen, Tom. "Construction Industry Hit Hard." Victor Valley Daily Press. <http://www.vvdailypress.com/news/construction_6468___article.html/jobs_hard.html#slComments>

[14] Orr, Ryan. "High Desert Home prices Continue to Drop." Victor Valley Daily Press. <http://www.vvdailypress.com/news/valley_5352___article.html/victor_february.html>

years 2005 and 2020, and an additional 14 percent from 2020 to 2030. The Las Vegas Valley, which encompasses the Las Vegas metropolitan area, experienced an average annual growth rate of 5.59 percent between 1990 to 2007, accounting for nearly all of the population growth in the County as a whole over the same period.

The projected demand for housing within Clark County correlates with the County's anticipated population growth. A count in 2006 found that there were 740,817 households in the County, with an average of 2.64 people per household.[15] The number of households within Clark County is expected to increase by 71 percent between 2005 and 2030, for an anticipated total of 1,272,142 households.[16] Table 3.2-4 summarizes the estimated housing growth projections within the County for the period of 2005 to 2030.

Employment: According to U.S. Census data, there were 826,065 jobs available within Clark County in 2005. According to CBER projections, the number of jobs within Clark County is expected to increase to 1,229,445 by the year 2015, representing a total growth rate of 33 percent. (As of May 2008, CBER had not released employment projections beyond 2015). Table 3.2-4 summarizes the employment projections within Clark County.

[15] US Census. Clark County, 2006.

[16] 2030 household information obtained by dividing the projected 2030 population by the person per household average of 2.64.

Table 3.2-4. Clark County Growth Projections

Year	Population / Percent Growth*		Households / Percent Growth*		Employment / Percent Growth*	
2005	1,815,700	N/A	740,817	N/A	826,065	N/A
2010	2,198,182	+21	N/A	N/A	N/A	N/A
2015	2,645,236	+20	N/A	N/A	1,229,445	+ 49
2020	2,968,824	+12	N/A	N/A	N/A	N/A
2025	3,216,187	+8	N/A	N/A	N/A	N/A
2030	3,425,928	+6.5	1,272,142	+ 71	N/A	N/A

Source: UNLV Center for Business and Economic Research, April 2006.

* Percent Growth from last measured/projected year

City of Las Vegas

Population and Housing: According to the U.S. Census Bureau, the City of Las Vegas currently has an estimated population of 569,793 (2005), comprising approximately 31 percent of Clark County's population.[17] The Las Vegas Master Plan 2020 states that by 2020, the City is expected to reach a total population of 760,000 to 800,000 people.[18] The Southern Nevada Regional Transportation Commission anticipates a total population of 899,982 by the year 2030, representing nearly a 55 percent increase in population from the year 2005. Growth policies of the City of Las Vegas seek to focus this growth in already urbanized areas, including the Downtown Reurbanization area. The City's Master Plan emphasizes the practice of "reurbanization": infill development within existing but not built-out urbanized areas.

According to the U.S. Census Bureau, the City of Las Vegas has a total of approximately 208,872 households, with an average household size of 2.69. Assuming the average household size remains stable, the anticipated total number of households would rise to approximately 294,972 by 2020 and 334,566 by 2030.

Employment: Similar to housing conditions, employment within the City of Las Vegas has been increasing over the past several decades, particularly within the service industry. The Nevada Department of Employment projects an approximately 10 percent increase in jobs in the City of Las Vegas every five years.[19] However, the Regional Transportation

[17] Clark County Demographics, Clark County Department of Comprehensive Planning, March 2007. http://www.accessclarkcounty.com/depts/comprehensive_planning/demographics/Documents/popbroch2007color.pdf

[18] Las Vegas 2020 Master Plan. Population Element. December 26, 2002.

[19] Nevada Department of Employment, 2007.

Commission anticipates a slight decrease in the growth rate in 2025 and 2030,[20] as shown in Table 3.2-5 below.

Table 3.2-5. City of Las Vegas Growth Projections

Year	Population / Percent Growth		Households / Percent Growth*		Employment / Percent Growth**	
2005	569,793	N/A	208,872	N/A	265,916	+10
2010	667,065	+17	247,980	+18	292,507	+10
2015	729,271	+9.3	271,104	+9.3	321,757	+10
2020	793,208	+8.7	294,872	+8.7	344,032	+10
2025	847,228	+6.8	314,954	+6.8	358,036	+4
2030	899,982	+6.2	334,566	+6.2	381,558	+7

Source: U.S. Census Bureau, 2005; Las Vegas Master Plan 2020; Nevada Department of Employment, May 2007; Regional Transportation Commission, Southern Nevada, 2008.

* Total number of households calculated by dividing the average household size of 2.69 by the projected population.

** Percent Growth calculated based on 2005 U.S. Census data and the projected 10 percent growth rate.

The Las Vegas area has also been affected by the economic downturn of early 2008. A slowing in the regional housing market has had a substantial detrimental effect on the Las Vegas economy as a whole. Sales of new homes have decreased approximately 28 percent between 2007 and 2008.[21] As of spring 2008, economists have found that the Las Vegas housing market has an excess of supply, which has driven down regional home prices.[22] During the same period, unemployment in the Las Vegas region has increased by over 33 percent. Nearly 4,900 construction workers were laid off in Las Vegas in December 2007 alone.[23] Regional economists have not comprehensively updated long-term growth forecasts for Las Vegas, but have produced reports acknowledging the shorter-term impacts of the economic downturn.

[20] Southern Nevada Regional Transportation Commission, 2008.

[21] Wargo, Brian. "Housing market downturn hits new low." Las Vegas Sun. 19 February 2008. <http://www.lasvegassun.com/news/2008/feb/19/housing-market-downturn-hits-new-low/>

[22] UNLV Center for Business and Economic Research.

[23] Benston, Liz and Alexandra Berzon. "How Vegas could weather a recession." Las Vegas Sun. 27 January 2008. <http://www.lasvegassun.com/news/2008/jan/27/how-vegas-could-weather-recession/>

3.2.4 Environmental Consequences

This section describes the potential growth effects associated with the action alternatives on population, housing, and employment. An adverse, direct growth effect would occur if the anticipated growth associated with the action alternatives would exceed growth projections at local and/or regional levels. As previously stated, none of the action alternatives would remove existing housing. As a result, such potential effects are not considered further with regard to the action alternatives.

An adverse indirect growth effect would occur if the action alternatives would involve the removal of obstacles to growth, result in negative growth (i.e. changes) associated with local and/or regional economic vitality, and or positive or negative growth in population numbers or patterns. None of the action alternatives would directly remove existing housing units with the exception of one residence that would be displaced for the Robindale Avenue MSF site if selected. Therefore, the potential for residential displacement is not discussed further in this analysis with regard to the action alternatives.

3.2.4.1 Potential Direct Effects

No Action Alternative

The No Action Alternative would not involve the construction of the proposed high-speed passenger train between Victorville and Las Vegas. There would be no associated diversion of automobile or airplane trips between Southern California and Las Vegas.

While the No Action Alternative consists of planned and programmed transportation improvement projects that would be in place by the year 2030, these improvements primarily consist of the expansion of existing highways and roadways in and around the I-15 corridor between Victorville and Las Vegas. These improvements would generate direct construction period jobs. These projects would also incrementally increase the number of permanent jobs at Caltrans, NDOT, and local agencies to maintain new and/or expanded facilities. In sum, the No Action Alternative would have the potential to contribute to growth within the region. This employment growth under the No Action Alternative would be comparatively small to the overall anticipated growth in Victorville, San Bernardino County, Las Vegas, and Clark County, as described above.

No new housing or substantial permanent employment would be directly created as part of the No Action Alternative, but it is reasonably foreseeable that local and regional transportation improvements could have the ability to indirectly influence growth through the extension or expansion of transportation infrastructure that could facilitate growth in presently undeveloped or inaccessible areas. Regional growth forecasts are developed in part based on regional transportation improvement plans. The No Action Alternative is expected to entail the construction of projects as identified in these regional transportation plans. Therefore, the No Action Alternative would be expected to result in population and economic growth commensurate with regional growth forecasts.

The No Action Alternative would have a direct effect related to population if one of the projects under this alternative would remove housing located in its building footprint. It is unknown at this time if these projects would displace housing. Any improvement under the No Action Alternative would require project-specific environmental review to determine effects from housing displacement. Since the majority of the improvements under the No Action Alternative would require expansions and improvements to existing roadway infrastructure, direct displacement of housing is expected to be limited.

Action Alternatives

Direct growth effects as a result of the action alternatives would occur during both the construction and operational phases of the DesertXpress project.

Direct Regional Effects: Construction Employment: Construction of the action alternatives would be temporary, occurring over an anticipated four-year time frame. According to the applicant, the anticipated number of workers to be employed directly by DesertXpress to design and construct all proposed facilities, including design, supply, manufacturing, testing, and training for the trains and system elements and heavy civil construction, would vary from about 1,730 to 3,000 per year, depending on the construction phase. At any given time up to 260 of the design, supply, manufacturing, testing, and training positions would be filled by Bombardier employees from other locations worldwide, some of whom might be temporarily relocated to the local Victorville and/or Las Vegas area (some design, supply and manufacturing work would be done at the project site and some would be done remotely). The remainder of design and construction jobs, approximately 3,900 in all at the highest employment peak, would come from the local construction labor force in San Bernardino County and Clark County. Construction would thus result in a short-term increase in construction related job opportunities.

As of 2006, the construction industry comprised approximately 7.1% of the labor force, or about 62,000 jobs, in San Bernardino County.[24] Construction jobs in Clark County during this same year comprised approximately 13 percent of the labor force, totaling 112,300 jobs.[25] New construction jobs created by the action alternatives could help ameliorate local employment impacts in San Bernardino County and Clark County associated with the 2008 economic downturn. This downturn has resulted in increased unemployment, particularly in the construction sector within Las Vegas. Thus, the action alternatives could have a beneficial effect to the region by providing job opportunity for local residents. This would minimize the need to draw on labor resources from outside the project area during the anticipated four-year construction period. As such, construction of the action alternatives is anticipated to have a beneficial effect on local employment and growth and would not be anticipated to result in significant permanent relocation of construction workers from outside the project area to inside the project area.

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[24] San Bernardino Snapshot. State of California Employment Development Department. 2008. <http://www.calmis.ca.gov/file/COsnaps/sanbrsnap.pdf>

[25] U.S. Census Bureau, American Community Survey.

It is also reasonably foreseeable that salaries to construction workers and related spending on construction activities from local/regional suppliers could contribute to additional economic growth in the communities along the action alternatives. These indirect effects would however, be temporary, lasting for the duration of the construction period, and would therefore not be anticipated to have permanent effects on growth.

Direct Regional Effects: Permanent Employment: Table 3.2-6 below shows the estimated total permanent jobs expected to be created by the action alternatives in the Victorville, Baker, and Las Vegas areas respectively.

Table 3.2-6: Estimated Operational Employment by Location

Location	Opening Year Number of Employees	Buildout Year Number of Employees
Victorville Area Jobs (Passenger Station, OMSF)	361	463
Baker Area Jobs (Maintenance of Way Facility)	8	8
Greater Las Vegas Jobs (MSF, Passenger Station)	154	251
Grand Total	*523*	*722*

Source: DesertXpress, 2007, CirclePoint 2008

Direct Local Effects: San Bernardino County/City of Victorville: As shown in Table 3.2-5, the Victorville OMSF and passenger station would employ approximately 361 people at the opening year of rail operations and about 460 people in the buildout year (2030). As indicated in Table 3.2-1, 3.2-2 and 3.2-3 above, robust population and employment growth is anticipated in Victorville and the surrounding unincorporated areas. More than 50,000 new jobs are expected in these areas by the year 2030. The increase in jobs associated with DesertXpress would constitute less than 1 percent of all anticipated job growth in the area by 2030 and, therefore, would not exceed the projected growth in employment for the area.

Direct Local Effects: Baker: The action alternatives include construction and operation of a maintenance-of-way facility near unincorporated Baker, California. DesertXpress anticipates that this facility would employ a staff of 8 employees. Due to the small size of the MOW facility, the project is not anticipated to have an adverse effect on the anticipated growth of Baker.

Direct Local Effects: Clark County/City of Las Vegas: There are four proposed station site options located in the Las Vegas metropolitan area. The Southern Station, Central Station A, and Central Station B are located in unincorporated Clark County, whereas the Downtown Station is within the City of Las Vegas. All of the proposed station site options areas are heavily urbanized and in close proximity to the “Las Vegas Strip,” a stretch of Las Vegas Boulevard along which most of the region’s major casino and hotels are located.

Two of the three MSF site options (Wigwam Avenue and Robindale Avenue) are located near the current southern edge of the greater Las Vegas metropolitan area. The Sloan Road MSF site option is about 10 miles outside the current edge of the metropolitan area.

As shown in Table 3.2-6 above, all of the Las Vegas area project facilities combined would have the potential to create about 138 jobs at the opening year and 251 jobs in the buildout year (2030). These direct jobs created by the project would constitute less than 1 percent of the anticipated growth in Clark County and Las Vegas and therefore would not adversely effect growth projections. These are relatively miniscule numbers relative to the growth projections for the area as shown in Tables 3.2-4 and 3.2-5. The minimal population and housing growth as a result of the Las Vegas Station and MSF operation would not be anticipated to exceed the rapidly growing projections for the City and County.

3.2.4.2 Potential Indirect Effects

No Action Alternative

Indirect growth effects most often occur when a project removes an existing obstacle to growth, positive or negative growth in local/regional economic vitality, and/or positive or negative growth in population numbers or patterns.

As previously discussed, the No Action Alternative consists of planned and funded transportation improvement projects that would be in place by the year 2030. As these improvements primarily consist of improvements to existing roadways and interchanges, there would be very limited effects in terms of opening new lands to development and as a result the No Action Alternative would not indirectly induce growth beyond that which is already envisioned in regional growth forecasts. These roadway improvements would serve to reduce congestion and improve traffic flows between Victorville and Las Vegas.

A potential roadway improvement would involve the expanding the width of I-15 between Primm and Las Vegas. Refer to Section 2.1.3.1 of Chapter 2.0, Alternatives, of this EIS for further discussion of the programmed transportation improvements. Although the Primm to Las Vegas corridor is already served by a freeway, any such expansion of roadway capacity would have the potential to influence growth patterns. Such an expansion could make areas along the I-15 corridor more attractive for new development. Any improvement under the No Action Alternative would require project-specific environmental review by the project proponent to determine specific environmental effects.

Action Alternatives

As previously discussed, the action alternatives over much of the 200-mile corridor would not indirectly foster growth by extending potentially growth-inducing infrastructure to areas currently lacking infrastructure with the exception of the station and maintenance facilities which could affect local and regional growth and economic vitality.

Indirect Regional Effects: Transit-Oriented Development Potential: Rail transit projects often foster a mixture of residential and commercial development in a synergistic, clustered arrangement (sometimes referred to "transit-oriented development"). Such developments will typically occur around areas where people commute multiple times per week from a residential area to an employment center. A transit-oriented development (or TOD) in a primarily residential area would include a mix of commercial and service oriented businesses typically geared to the daily needs of commuters (coffee shops, dry cleaners, grocery stores, etc.). By locating such business in close proximity to both transit and housing, TOD is encouraged in many jurisdictions as a means of reducing automobile trips.

The action alternatives could foster some TOD, but the amount is anticipated to be small. Unlike other TODs, the action alternatives would primarily serve non-work trips between two stations only – Victorville and Las Vegas. Given the travel time (at least 100 minutes between stations), anticipated $50 or greater one-way fare, and focus on serving resort-bound traveler from Los Angeles to Las Vegas destinations, it is anticipated that the use of the rail line for frequent commute trips would be limited. Not withstanding this, the action alternatives could potentially attract people to live in the nearby vicinity of one of the stations in order to take advantage of high-speed rail transit between the two ends.

Indirect Regional Effects: Economic Vitality: The economies of several communities along the I-15 corridor are heavily dependent on visitor-serving retail and commercial uses. In particular, the communities of Barstow, Baker, Primm, and Jean each feature a variety of businesses geared to attract people driving through the I-15 corridor.

The ridership study prepared by DesertXpress (Appendix B) estimates that by 2035, as many as 5 million annual automobile trips between southern California and Las Vegas would be diverted to high-speed rail. This diversion would reduce the potential pool of customers from visitor-serving businesses located in these communities. This could in turn have a potentially negative effect on the economic vitality of these communities. The extent of this negative effect cannot be quantified precisely. These potentially affected communities along the I-15 corridor are considered environmental justice communities and effects to such communities are further discussed in Section 3.1, Land Use and Community Impacts. The traffic analysis shows that although the project would accommodate a large number of trips between Victorville and Nevada state line, automobile traffic on I-15 would remain high. The number of automobiles travelling on the I-15 freeway between Victorville and the Nevada state line would be reduced at project inception, however the number of cars travelling on the I-15 between Victorville and Nevada state line by the year 2030 would increase back to near or in some cases higher volumes that under existing conditions. Under the EMU option traffic volumes in 2030 on the I-15 would be between -5% to -12% (am and pm peak hours) compared to existing traffic levels while under the DMU option traffic levels would be 0% to +5% (am and pm peak hours). The reason the traffic volumes on the I-15 rebound and in the future exceed existing levels even with the action alternatives is because the projected increase in travel demand between Los Angeles and Las Vegas by the year 2030. As a result communities oriented toward visitor-serving businesses in the I-15 corridor could see a drop off in customers in the early years of the project initiation, but traffic levels would rebound overtime so that businesses would continue to have substantial pools of potential customers on I-15 to draw from. Potential adverse effects to the economic vitality of these communities is acknowledged, but anticipated to be relatively minor in nature.

Indirect Local Effects: San Bernardino County/ City of Victorville: Operations of the action alternatives have the potential for indirect growth effects relative to local economic vitality and local population patterns.

The addition of new permanent jobs with the operation of the Victorville Station and OMSF would have the potential to indirectly affect the economic vitality of the local economy in the Victorville area. With new employment opportunities, spending in the area could increase, thus contributing to the growth in the local economy. Growth in the local economy could be beneficial to the Victorville region, as a great deal of growth is already anticipated within the area. However, as the job growth associated with the action alternatives constitute such a smaller percentage of the anticipated employment growth in the region, the action alternatives would not have an adverse indirect effect on the economic vitality of San Bernardino County and the City of Victorville.

While the employment growth as a result of the action alternatives is small in scale in comparison to the anticipated growth rates for the City and County, the DesertXpress project could have the potential to induce population and housing growth as a result of the new employment opportunities. However, such growth would occur in an area where tremendous population growth is anticipated by 2030. Specifically, incorporated Victorville is anticipating a population increase of more than 40,000 people between 2000 and 2030.[26] Much of this growth would be accommodated in currently undeveloped areas to be annexed to the City by 2030. As of May 2008, Victorville is contemplating a General Plan update that would expand the City limits to include an additional 37,000 acres (57 square miles). With these potential expansions, all of the potential station and OMSF sites could be located within Victorville's city limits. In sum, the proposed project would create new jobs and housing in the Victorville area, but in relatively miniscule numbers when compared to anticipated growth projections.

The proposed Victorville station and OMSF is likely to generate complementary, synergistic development. The OMSF may foster businesses supporting train operations, ranging from manufacturing to security and maintenance. Moreover, the passenger station is likely to attract to the area a number of visitor-serving businesses, catering to the potential thousands of weekly riders. As noted in the ridership study (Appendix B), by 2035, up to 7 million annual passengers would travel from southern California to Victorville in order to board Las Vegas-bound trains. It is reasonable to expect that businesses catering to the needs of rail travelers would seek to locate in the vicinity of the passenger station. Such uses could include restaurants, gas stations, auto washing and service, retail, and related visitor-serving businesses. In addition, the OMSF site would employ about 430 people at buildout. The presence of employees could create demand for businesses and services catering to a working population, such as restaurants, day care centers, and personal services.

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[26] http://www.proland.com/victorville.asp; accessed April 22, 2008.

The precise amounts of such indirect growth are not quantified here. As documented by the Victor Valley Area Transportation Study and the Regional Transportation Commission travel demand forecasting model, growth over time is anticipated around the station areas (see Section 3.5, Traffic). However, this indirect growth would be channeled by the City and County land use plans and would occur within the anticipated growth “envelope.” The general areas surrounding the proposed station and OMSF site options in Victorville are anticipated to see significant growth. According to the City of Victorville General Plan, the City has assigned land use designations for the areas within the City’s sphere of influence. The designations allow for more than 17 million square feet of commercial and industrial development.

Future development, if any, in the vicinity of the proposed station and OMSF site would be subject to the land use regulations of Victorville and/or San Bernardino County. These jurisdictions would evaluate development proposals according to relevant general plan and zoning regulations, all of which take growth projections into account. The level of indirect growth associated with the Victorville passenger station and OMSF would be comfortably within regional growth projections. Moreover, the land use regulatory authority of the City and County would ensure that indirect growth of jobs and housing as a result of the project would conform to regional growth projections.

Indirect Local Effects: Baker: The action alternatives would not stop along the rail corridor at this location nor would the action alternatives remove a barrier to growth, minimal indirect growth is anticipated in Baker. Additionally, the small size of the MOW facility, staffing 8 employees, would not induce the indirect growth of businesses to support the new employment in the area.

Indirect Local Effects: Clark County / City of Las Vegas: With the exception of the Sloan Road MSF site, all of the potential station and MSF site options would be infill developments, surrounded by commercial, industrial, and/or institutional uses. There are some currently vacant and/or underutilized sites within close proximity to these station site options, which could potentially become more intensively developed as a result of construction and operation of the passenger station. This would have the potential to indirectly affect the economic vitality of the local economy through the addition of new permanent employees. Indirect growth could result from the new salaries of these permanent jobs, as the employees would potentially spend in the local economy. While there would be potential for indirect growth of business to support riders and stations, the urbanized areas surrounding the proposed station and MSF sites are anticipated to see significant positive growth in economic vitality with local and regional growth projections. Potential indirect growth effects of the project would therefore be minimal in comparison to the local and regional growth projections .

The only minor exception to this conclusion is if the Sloan Road site is selected for the Las Vegas area MSF. The vicinity of the proposed MSF site is largely undeveloped at present. Future development in this area is anticipated, including the proposed Clark County Heliport. Therefore, if the Sloan Road MSF site is selected, its potential indirect growth effects would be more significant than any such growth effects in the urbanizing Wigwam Avenue or Robindale Avenue vicinity.

While the employment growth as a result of the action alternatives is small in scale in comparison to the anticipated growth rates for the City and County, the DesertXpress project could have the potential to induce population and housing growth as a result of the new employment opportunities. However, such growth would occur in an area where tremendous population growth is anticipated by 2030. City and County projections to 2030 indicate a continuation of the exponential growth patterns each has followed over the past several decades. Therefore, even if the all of the proposed Las Vegas area jobs by buildout (about 250) were to be filled by people who would have to migrate to Las Vegas, this migration would be miniscule relative to overall anticipated in-migration to the Las Vegas metropolitan area.

The Downtown Station would be located within the Downtown Reurbanization Area within the City of Las Vegas, as designated by the Las Vegas Master Plan. As previously discussed, the Las Vegas Reurbanization Plan for the Downtown area is intended to be used as a means for promoting the development of the Downtown as a regional center for finance, business, and governmental services, and entertainment and recreation. The Downtown Station would provide a transportation hub and would support the purpose of the Reurbanization Plan, thus indirectly inducing growth within the area. The Plan proposes to introduce a mix of housing, retail, parks, and education amenities to the area. The intent of the Downtown Reurbanization Area is to provide an urban environment that could serve as the cultural and economic center for the community. This indirect growth would maintain consistency with the policies set for the in the growth plans for the area.

3.2.4.3 Residual Impacts

Overall, the implementation of the action alternatives would result in a beneficial economic effect. The project would result in a temporary increase in the construction industry employment, relieving unemployment levels. It would also lead to indirect economic benefits to the local economies of Cities where stations would be located.

3.3 FARMLANDS AND GRAZING LANDS

This section describes the federal, state, and local policies related to the preservation of farmland and grazing lands followed by an analysis of the existing farmlands and grazing lands within the study area and the potential effects of the action alternatives on these lands. Mitigation measures are presented to lessen potential adverse effects of the action alternatives.

3.3.1 REGULATIONS AND STANDARDS

3.3.1.1 Farmland Regulations

Farmland Protection Policy Act

The National Environmental Policy Act (NEPA) and the Farmland Protection Policy Act (FPPA, 7 U.S.C. § 4201 et seq.; and its regulations, 7 C.F.R. Part 658) require federal agencies to coordinate with the Natural Resource Conservation Service (NRCS) of the United States Department of Agriculture (USDA) if their activities may irreversibly convert farmland to nonagricultural use, either directly or indirectly.

In accordance with the NRCS and the Farmland Protection Policy Act (FPPA), and as described in 7 CFR Section 658.1:

> *As required by section 1541(b) of the Act, 7 U.S.C. 4202(b), Federal agencies are (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (b) to consider alternative actions, as appropriate, that could lessen adverse effects, and (c) to ensure that their programs, to the extent practicable, are compatible with State and units of local government and private programs and policies to protect farmland.*

The FPPA is intended to minimize the extent to which federal activities contribute to the conversion of farmland to non-agricultural use. The FPPA requires federal agencies to examine potential direct and indirect effects to farmland of a proposed action and its alternatives before approving any activity that would convert farmland to non-agricultural use.

Farmland is usually divided into three classifications: prime farmland, unique farmland, and farmland of statewide or local importance. Classification standards differ from state to state; each state may set its own criteria for classification in each category.

The following types of land are exempted from the FPPA:

- Soil types not suitable for crops, such as rocky terrain or sand dunes (although such lands may be under a grazing agreement from the Bureau of Land Management (BLM));

- Sites where the right-of-way for a project is entirely within a delineated urban area and the project requires no prime or unique farmland, nor any farmland of statewide or local importance; and
- Farmland that has already been converted to industrial, residential, commercial or is used for recreational activity.

Farmland Mapping and Monitoring Program (California)

The California Department of Conservation administers the Farmland Mapping and Monitoring Program (FMMP), a statewide agricultural land inventory. Updated every two years, the FMMP utilizes an automated map and database system to record changes in the use and designation of agricultural lands.

The FMMP classifies farmland using categories established by the United States Department of Agriculture (USDA), but based on California criteria: prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance.[1]

Prime farmland is land with the best combination of physical and chemical features to sustain long-term production of agricultural crops. These lands have the soil quality, growing season, and moisture supply necessary to produce sustained high yields. Soil must meet the physical and chemical criteria determined by the USDA's Natural Resource Conservation Service (NRCS). Prime farmland must have been used for production of irrigated crops at some time during the four years prior to the mapping date by the FMMP.

Farmland of statewide importance is similar to prime farmland but exhibits minor differences, such as greater slopes or a lesser ability of the soil to store moisture. Farmland of statewide importance must have been used for production of irrigated crops at some time during the four years prior to the mapping date.

Unique farmland has lesser quality soil than prime farmland or farmland of statewide importance. Unique farmland is used for the production of the state's leading agricultural crops. These lands are usually irrigated but may include non-irrigated orchards or vineyards found in some climatic zones in California. Unique farmland must have been used for crops at some time during the four years prior to the mapping date.

Farmland of local importance is defined by each county government. In San Bernardino County, locally important farmland can be either irrigated pastureland or areas used in dryland crop farming, regardless of soil conditions.[2]

[1] Cities and counties within the study area may identify additional categories of farmland, but these are not indexed within the FMMP.

[2] Patrick Hennessy, California Division of Land Resources. Personal communication, March 26, 2007.

In addition to identifying farmlands, the FMMP also identifies lands in urban uses (and thus unsuitable for agricultural activity) as well as land suitable for grazing.

California Government Code §65570(b)(3) defines grazing land as "...land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock." Whereas the designations of prime, unique, and locally/statewide important farmland are contingent upon the active or recent use of lands in agricultural activities, lands identified by FMMP as suitable for grazing need not be actively grazed.

Williamson Act (California)

The California Land Conservation Act (Government Code §51200 et seq.) of 1965, commonly known as the Williamson Act, provides a tax incentive for the voluntary enrollment of agricultural and open space lands in contracts between local government and landowners. The contract restricts the land to agricultural and open space uses and other compatible uses defined in state law and local ordinances. Local governments calculate the property tax assessment based on the actual use of the land instead of the potential land value assuming full development. In areas where agricultural lands interface with growing suburban or urban development, Williamson Act contracts are often encouraged as a means of ensuring the long term financial viability of agricultural uses. Without a Williamson Act contract, the taxable basis of agricultural lands on the urban fringe can increase to such an extent that agricultural operations are financially infeasible for the landowner.

Williamson Act contracts run for a period of 10 years. The contract is automatically renewed each year, maintaining a constant, 10-year contract, unless the landowner or local government files to initiate nonrenewal. The contract terminates 10 years after the filing of a notice of nonrenewal. Williamson Act contracts may also be terminated under limited circumstances and conditions set forth in Government Code (GC) §51280 et seq. upon petition of the landowner. Termination proceedings require the approval of the local government legislative body, such as the City Council or County Board of Supervisors.

The State of California has policies regarding the public acquisition of and/or location of public improvements on lands under Williamson Act contracts (GC § 51290-51295). These policies discourage the use of such lands for public improvements and require due consideration before any such lands can be used for any public purpose.

Williamson Act information is provided notwithstanding the fact that cancellation or non-renewal of a Williamson Act contract (or portion thereof) is not considered a physical environmental impact. The use of land under Williamson Act contracts for implementation of Alternative A would pose a potential conflict with State of California policy (Alternative B would involve any land under a Williamson Act contract). California GC § 51290-51295 discourages the conversion of land under an agricultural preserve to non-agricultural public use. While the project has been determined by STB Declaratory

Order 349143 to be exempt from state and local land use and environmental laws, information about potential impacts to land under Williamson Act contracts is provided for informational purposes. The potential cancellation of Williamson Act contracts is not considered an adverse effect under NEPA; no mitigation would be required.

Nevada Department of Agriculture

Established in 1915, the Nevada Department of Agriculture's (NDA) mission is to "benefit the welfare of all persons residing in the state by encouraging the advancement and protection of Nevada's agriculture and related industries."[4] The NDA has regulatory authority over the animal industry, livestock ID, measurement standards, the plant industry, and resource protection.

Clark County Comprehensive Plan Conservation Element

The conservation element outlines the land resources within the County and includes policies to protect, maintain, and enhance such resources. No Clark County lands within the project area are designated as prime, unique, or of statewide or local importance under NRCS standards. The conservation element describes the lands in the vicinity of the project area as being "arid with high winds and [high] temperature" with "very erodable and alkaline soils" and thus not suitable for large-scale agricultural use.[5]

3.3.1.2 Grazing Regulations

Taylor Grazing Act

The Taylor Grazing Act of 1934 (43 USC 315), signed by President Roosevelt, was intended to "stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; [and] to stabilize the livestock industry dependent upon the public range" (USDI 1988). This act laid the foundation for grazing policy in the United States and resulted in the formation of what is today known as the Bureau of Land Management (BLM). This Act was pre-empted by the Federal Land Policy and Management Act of 1976 (FLPMA).

Federal Land Policy Management Act

In 1976 Congress passed The Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 et seq.), as amended by the Public Rangelands Improvement Act (PRIA) (43 U.S.C. 1901 et seq.), which governs the manner in which the BLM manages public

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[3] Issued June 25, 2007.

[4] Nevada Department of Agriculture: http://agri.state.nv.us/

[5] Clark County Comprehensive Plan, Conservation Element: http://www.co.clark.nv.us/comprehensive_planning/CompPlanElements/Conservation_Element/Conservation_Element_CH1_Agriculture.htm

lands under their jurisdiction. The BLM has set forth guidelines for public land use planning and management designed to:

- Protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values;
- Where appropriate, preserve and protect certain lands in their natural condition;
- Provide food and habitat for fish and wildlife and domestic animals;
- Provide for outdoor recreation and human occupancy and use.

Section 202 of FLPMA requires the development and maintenance of land use plans for public lands. BLM land use plans are designed to provide guidance for future management actions and the development of subsequent, more detailed and limited-scope plans for resources and uses. Land use plans identify lands that are available for livestock grazing and the parameters under which grazing is to occur.

FLPMA also directs grazing advisory boards to guide the BLM in developing allotment management plans (which allow resource management over a discreet management unit). Under its West Mojave and Northern and Eastern Mojave plans, the BLM administers grazing allotments in the study area and surrounding lands.

California Desert Conservation Area Plan Resource Management Plan

The California Desert Conservation Area Plan (CDCA Plan) manages 25 million acres of land in southern California as designated by Congress in 1976 through the FLPMA. About 10 million acres are administered by the U.S. Bureau of Land Management (BLM). All proposed features within the State of California (rail alignments, stations, maintenance facilities, etc.) would be located within the CDCA Plan area.

CDCA Plan areas are managed under the California Desert Protection Act of 1994, the 1964 Wilderness Act, and BLM's national wilderness management policy, all of which mandate a high degree of protection and restrict access and use. The CDCA Plan establishes goals for the protection and use of the desert (including grazing) and designates land with multiple use classes. The plan sets forth goals, specific actions, and management needs for each resource in the desert.

3.3.2 METHODS OF EVALUATION OF IMPACTS

For the purposes of this analysis, an adverse impact to farmland resources would occur if an action alternative would directly or indirectly:

- Convert to nonagricultural use any prime farmland, farmland of statewide importance, or unique farmland, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency.
- Sever farmland by the placement of barriers that impede farmland access which could result in the creation of non-economic remnant parcels and/or conversion of farmland to a nonagricultural use.

Reviews of available data indicate that no agricultural lands are present from a point immediately east of Newberry Springs, California (along Segment 3A/3B), easterly through Segments 4A/4B, 5A/5B, 6A/6B, 7A/7B, and Option C[6]

Analysis of farmland impacts is therefore limited to Segments 1, 2A/2B, and 3A/3B.

3.3.2.1 Methodology for Determining Permanent and Operational Impacts to Farmlands and Grazing Lands

Direct impacts would occur on any farmland or grazing land that would be traversed by the approximately 75-foot-wide rail alignment. Direct impacts would also occur on any farmland or grazing land that lies within a site proposed for stations, maintenance facilities, or other permanent features. Within these areas, the analysis assumes that implementation of the alternatives would directly and permanently convert any identified farmland or grazing land.

Indirect impacts to farmland and grazing lands were assumed to occur under three distinct scenarios:

1. A 37.5 foot buffer area on either side of the 75 foot rail alignment: In this area, adverse impacts could include dust, pollution, noise, or other factors related to the operation and/or construction of the alternatives.

2. Severance: The linear nature of the alternatives could divide a parcel of farmland or grazing land such that the acreage on either side is too small to sustain economically viable operations. According to the San Bernardino County General Plan, the minimum parcel size for agricultural purposes in this area (the Desert Region) of the County is 40 acres (i.e., the minimum farmable

[6] Additional resources consulted were the National Atlas, the USDA Data Gateway, the NRCS Soil Data Mart, the GIS Data Depot, Geography Network, and geodata.gov. None of these resources identified any agricultural lands within the vicinity of the project from Baker, California to Clark County, Nevada.

unit).[7] Indirect impacts would thus occur on any farmland parcel whose undivided area would be reduced to less than 40 acres.

3. Access impacts: The alternatives have the potential to cut off access to a farmed or grazing parcel from any public or private road. Without direct access to a parcel, farming and grazing capabilities on the parcel could be adversely affected.

3.3.2.2 Methodology for Determining Construction Period Impacts

Construction would involve the use of temporary construction areas (TCAs). If the TCAs are located on farmland or grazing land, the use of these lands for construction staging would temporarily alter the land use to a nonagricultural use.

[7] San Bernardino County General Plan, Policy CO.6.4.2

3.3.3 AFFECTED ENVIRONMENT

3.3.3.1 Regional Environment

The project area includes San Bernardino County, California, and Clark County, Nevada. As there are no farmland resources identified in any portion of the project area east of Newberry Springs, CA (within Segment 3), this analysis is limited to Segments 1 through 3 within San Bernardino County, California.

San Bernardino is consistently ranked as one of the top agricultural producing counties in California. However, the vast majority of county agricultural production occurs in the valley region, south and west of the Cajon Pass, and approximately 40 miles to the south of Victorville and Segment 1. The dairy industry in the Chino vicinity is the biggest agricultural producer in the County, totaling 76 percent of the County's agricultural output in 2002.[8] Citrus production, although less significant than in the County's early history, remains another important agricultural crop; most citrus orchards are likewise located in the valley region of the County, outside of the project area.

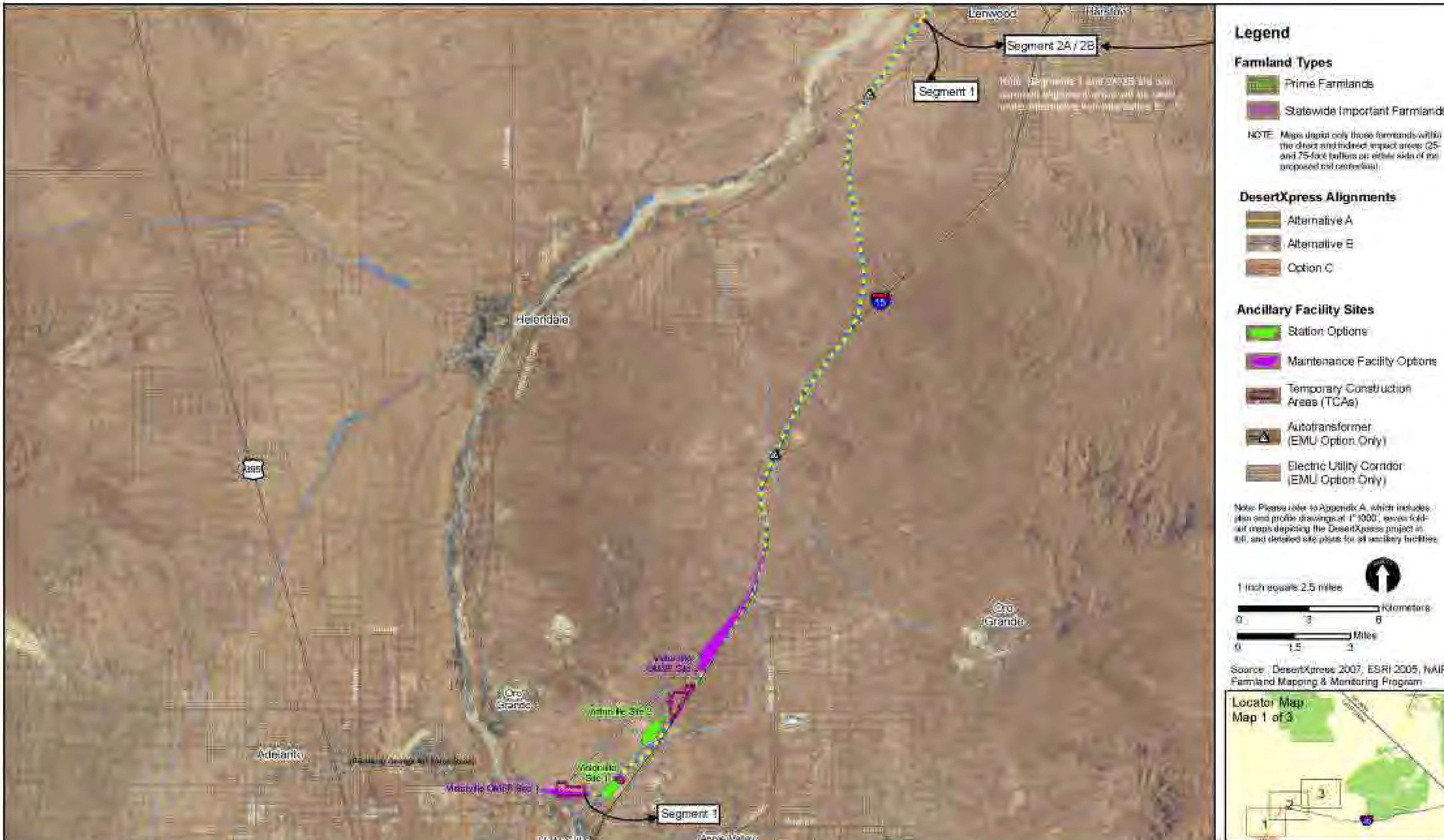
The project area is within the County's "Desert Region," which sees relatively little agricultural activity. Field crops are grown primarily in irrigated areas near the Mojave River, including a number of pistachio nut orchards.[9] More intensive agriculture uses in the Mojave Desert area are limited by the region's generally inhospitable soils, limited rainfall and water sources, high altitude, and great temperature extremes.

Figures 3.3-1 through 3.3-3 depict farmlands within the project area.

While FMMP data indicate the suitability for grazing of some land in the project area, the precise extent of lands in active grazing use is unknown. However, grazing is known to occur on BLM designated grazing allotments in the vicinity of the proposed alignments. These grazing allotments are shown in Figure 3.3-4.

[8] San Bernardino County 2006 General Plan Program Draft Program Environmental Impact Report (IV-19).

[9] San Bernardino County 2006 General Plan Program Draft Program Environmental Impact Report (IV-22).



DesertXpress Project EIS

Farmlands within Direct / Indirect Impact Areas, Segment 1 FIG 3-3.1

DesertXpress Project EIS

Farmlands within Direct / Indirect Impact Areas, Segment 2

FIG 3-3.2

DesertXpress Project EIS

Farmlands within Direct / Indirect Impact Areas, Segment 3

FIG 3-3.3

DesertXpress Project EIS

BLM Grazing Allotments

FIG 3.3-4

3.3.3.2 Resources by Segment

Segment 1

There is no prime farmland, farmland of statewide importance, farmland of local importance, unique farmland, nor any lands under Williamson Act contracts in the project area for Segment 1 (see Figure 3.3-1). Some lands traversed by Segment 1 are classified by the FMMP as grazing land and this segment would traverse and lie adjacent to BLM grazing allotments which cover much of the land between Victorville and Barstow (see Figure 3.3-4).

Segment 2 A/2B

An approximately five mile portion of the shared Segment 2A/2B alignment would cross land designated for possible grazing use before reaching the former Atchison, Topeka and Santa Fe Railway (AT&SF) right of way along the north side of the Mojave River. This same portion of the Segment 2A/2B alignment would pass by prime farmland located north of the Mojave River near Barstow (see call out boxes on Figure 3-3.2).

Segment 3A/3B

The vast majority of the land within Segment 3 is open desert. However agricultural land does exist in this segment near Newberry Springs where a pistachio nut orchard is located (see call out box on Figure 3-3.3). BLM grazing allotments lie adjacent to and north of Segment 3A/3B in the Halloran Springs area (see Figure 3.3-4). The BLM is currently proposing to take a portion of this area out of grazing use.[10]

Segments 4-7 and Option C

As noted previously, no farmlands were identified in California east of Newberry Springs. In Nevada, no farmlands were identified anywhere within or near the project area. However, Segments 4A and 4B would pass through BLM grazing allotment areas located in the Mountain Pass area (see Figure 3.3-4).

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[10] BLM, Valley Wells Allotment Grazing Relinquishment for Habitat Conservation, Environmental Assessment [CA-690-EA08-28], July 18, 2008.

3.3.3.3 Summary

The project area contains very little farmland located at isolated spots along Segments 2A/2B and 3. The Action Alternatives would result in some direct and indirect effects on these farmland resources, but the amount of farmland impacted would be small. None of the action alternative stations, maintenance facilities, or ancillary facilities would result in direct or indirect impacts to farmlands.

The vast majority of lands along Segments 1 and 2 are identified by the FMMP as "grazing land." Although FMMP uses soil, vegetative, and climatic factors in assigning "grazing land" status, an FMMP designation of grazing does not indicate actual grazing use of the subject lands. As such, grazing land is not considered a protected category of agricultural land.

However, some lands in the vicinity of the action alternatives are under a grazing agreement from the Bureau of Land Management (BLM). The action alternatives would pass through three BLM grazing allotments located in the areas between Victorville and Barstow, along Segment 3 and in the Segment 4 in the Mountain Pass area as shown in Figure 3.3-4.

3.3.4 Environmental Consequences

3.3.4.1 No Action Alternative

Under the No Action Alternative, no privately-financed high speed passenger rail system would be constructed or operated in the study area. Adverse effects to farmland associated with the action alternatives would not occur.

This alternative would include roadway widening/expansion projects such as the widening of the bridge over the Mojave River in Victorville, widening approximately one mile of the freeway to six lanes and reconstruction of an interchange in Barstow, adding several truck lanes in California along the highway sections with steep grades, and several roadway projects in Nevada. These projects would not directly affect farmland, as there is no farmland identified along I-15 in these areas. However, roadway widening and interchange construction in Barstow as well as the addition of truck lanes in steeply graded sections of I-15 in California could result in direct and indirect impacts to farmland. Since development would in the ROW of existing roadways, resulting effects to farmland would likely be minimal. Subsequent environmental review by the project proponent would be conducted to identify the impacts to farmland from each of these roadway projects.

Since the action alternatives include all of the actions proposed under the No Action Alternative plus construction of the DesertXpress project, the No Action Alternative would result in the least amount of development. Overall, farmland would be affected the least by the No Action Alternative.

3.3.4.2 Action Alternatives

Effects on Farmlands within the Project Area

As shown in Appendix D, FRA completed and submitted a series of USDA NRCS Forms CPA-106. The NRCS uses these forms to evaluate whether potential farmlands identified for direct or indirect conversion merit any special protection or mitigation. The forms utilize two scoring systems, which evaluate both the quality of the soils and the surrounding land use context. Scores from the two systems are combined for a possible total of 260 points. According to NRCS, evaluated sites whose total scores fall below 160 points need not be given further consideration for protection and no alternative sites need to be considered as part of an environmental evaluation. Protection and/or mitigation should be contemplated for sites that receive total scores over 160.[11]

Appendix D provides one CPA-106 form each for segments 1, 2, and 3; no other segments have any farmlands in proximity to the proposed action alternatives. As shown in Appendix D, NRCS has concluded that none of the segments evaluated have total scores exceeding 160 and that no mitigation is recommended.[12]

Table 3.3-1 below shows the acreage of affected farmland for the action alternatives. Notably, all direct and indirect impacts are related to the proposed rail alignment segments. None of the proposed sites for stations, maintenance facilities, nor temporary construction areas (TCAs) would be located on farmland.

[11] Rick Aguayo, Victorville office of NRCS, personal communication, September 2008.

[12] The CPA 106 form for Segment 1 included both Segment 1A (Mojave River alignment) and the proposed action alternative (alongside I-15). Segment 1A had a score of 162 points. However, Segment 1A has since been dropped from further consideration in this EIS. The proposed action alternative showed a total score of 25 points. See Chapter 2.0, Alternatives Considered But Rejected, for further discussion of the removal of Segment 1A from further consideration in this EIS.

Table 3.3-1: Acreage of Affected Farmland by Alternative

		Alternative A		Alternative B	
		Direct	***Indirect***	***Direct***	***Indirect***
Farmland Types	**Prime Farmland**	3.37	6.75	3.37	6.9
	Unique Farmland	0	0	0	0
	Farmland of Statewide Importance	0	0	0	0.16
	Farmland of Local Importance	0	0	0	0
Total Farmland Affected		3.37	6.75	3.37	7.06
Lands Under Williamson Act Contracts		0	N/A	0	NA

Source: California Department of Conservation, Farmland Mitigation and Monitoring Program.

As shown in Table 3.3-1, Alternative A and Alternative B are equivalent in potential direct impact to farmland. The action alternatives in Segment 1 and the shared portion of Segment 2A/2B would pass through prime farmland near Barstow (see Figure 3-3.2) resulting in 3.37 acres of direct conversion of prime farmland. Indirect effects, calculated to be an additional 6.75 acres, would also occur to these same farmlands resulting from increase dust, noise, and activity as a result of the action alternatives. In Segment 3 there is a small amount of farmland located near Newberry Springs. The farmland in Segment 3 would not be directly impacted by either action alternative but Alternative B would result in indirect impacts, calculated to be 0.31 acres, because of the alignment's close proximity to the a pistachio nut orchard located on this property. Alternative A would be located in the median of the I-15 freeway in the vicinity of the pistachio nut orchard and would not result in any indirect effect.

Effects on Grazing Land with the Project Area

Segment 1 would traverse and lie adjacent to land allotted for grazing by the BLM. Segment 1 could affect grazing activities by cutting off livestock access to available water sources. Similarly, range improvements such as fences and gates may be found on grazing lands. Sections of fences may need to be removed and gates may need to be opened to accommodate the rail alignment or construction traffic. Open fences and gates may allow livestock to leave allotments and trespass on other lands, become lost, or potentially be struck by vehicles.

Although Segment 3A/3B is adjacent to BLM grazing allotments, it would not cross though grazing land and would therefore not divide BLM grazing areas. However, construction of this segment may require the removal of fences or the opening of gates, thereby resulting in potential loss of livestock.

BLM grazing allotments are located in the vicinity of Segment 4 as indicated in Figure 3.3-4. Segment 4B would be traveling though BLM grazing allotments and could affect grazing activities by cutting off livestock access to available water sources. Range improvements such as fences and gates may need to be removed or opened to accommodate the rail alignment or construction traffic. Open fences and gates may allow livestock to leave allotments and trespass on other lands, become lost, or potentially be struck by vehicles.

Since Segment 4A follows the I-15 freeway, except in a small area which is not designated by the BLM for grazing, no operational period effects to BLM grazing land would result. Construction period impacts from the removal of fence sections or the opening of gates could occur.

3.3.5 Mitigation Measures

Mitigation Measure FAR-1: Direct and Indirect Conversion of Protected Farmland: Prior to construction, the project sponsor shall acquire conservation easement(s) over agricultural lands of equal quality to mitigate for direct and indirect impacts related to the permanent conversion of protected agricultural lands (prime farmlands, unique farmlands, and farmlands of statewide and/or local importance). This conservation easement(s) shall provide for the conservation of agricultural uses in perpetuity, and be held in trust by a public agency or other appropriate entity. These easements shall be located within the limits of San Bernardino County. Lands to be placed under conservation easement shall be procured on a ratio of 1 acre for each 1 acre of protected farmland converted to non-agricultural use.

Mitigation Measure FAR-2: Division of Protected Farmland: Where the proposed rail line would sever parcels identified as one of the four protected farmland categories (prime farmland, unique farmland, or farmland of statewide or local importance), the project sponsor shall construct underpasses and overpasses where practicable to provide adequate property access. Where such access cannot be feasibly created, the project sponsor shall provide severance payments to property owners in the vicinity who would otherwise choose to continue agricultural operations. Where severance, including the creation of non-economic remnant parcels, results in the permanent conversion of farmland to non-agricultural use, the project sponsor shall adhere to the requirements of Mitigation Measure FAR-1 above to purchase conservation easements in equal size to the amount of farmland permanently converted to non-agricultural use.

Mitigation Measure FAR-3: Livestock Access to Water: Prior to issuance of the permit to construct, the project sponsor shall consult with BLM range resource managers to determine if the action alternatives will affect livestock access to water. If BLM range resource managers determine that construction would block livestock access to critical water sources, the applicant shall provide alternative water sources as approved by the

BLM.

Mitigation Measure FAR-4: Fencing and Gate Modifications: Prior to issuance of the permit to construct, the project sponsor shall coordinate with BLM range resource managers and permittees to locate range improvements that might require special attention when fencing or gates are modified. Gates that do not require removal shall be closed directly after construction traffic has passed though them. The applicant shall replace all range improvements damaged or removed during construction activities as determined necessary by the BLM.

3.3.5.1 Residual Impacts Following Mitigation

The incorporation of the above mitigation measures would mitigate effects related to the project construction and operation, but even with mitigation, the project would result in the permanent conversion of farmland to rail corridor uses.

3.4 UTILITIES/EMERGENCY SERVICES

This section evaluates the potential effects of the action alternatives on utilities and emergency service systems and associated service providers operating in the study area (the footprint of the DesertXpress project). The utilities evaluated in this section include electricity and gas, water, wastewater facilities, and solid waste providers. Emergency services evaluated in this section include police, fire, and emergency response. The analysis also covers potential physical impacts to existing pipelines and electrical transmission infrastructure.

3.4.1 REGULATIONS AND STANDARDS

3.4.1.1 Federal Regulations

Bureau of Land Management (BLM)

Pursuant to 43 CFR 2800 and 43 CFR 2881 et seq., the BLM authorizes and maintains authority over linear utilities that cross BLM-managed public lands and other utility facilities authorized on BLM-managed lands. BLM has the authority to grant rights-of-way (ROW) across BLM-managed lands for pipeline purposes for the transportation of oil, natural gas, synthetic liquids or gaseous fuels, pipelines or aqueducts for water and sewer services, electric transmission lines and facilities, fiberoptic, phone, and other communications pipelines and facilities, and power generation facilities.

National Park Service (NPS)

A three mile portion of Segment 4A would traverse the northeastern area of the Mojave National Preserve (MNP), a unit of the National Park Service (NPS) within the United States Department of the Interior.

Fire prevention and management within the MNP is cooperatively overseen by the NPS and the BLM. From the MNP's incorporation in 1994 until 2004, a full fire suppression policy was in place: any fires started by natural or non-natural caused were suppressed. This policy was modified in 2004 to "implement a more complete range of fire response commensurate with the perpetuation of natural processes and values at risk."[1]

The 2004 Fire Management Plan divides the MNP into five fire management units, each with specific policies regarding fire suppression relative to the unit's natural resources. This portion of the project area is located in the Cima Fire Management Unit. Tortoise habitat present in the Cima unit is considered a valuable biological resource and as such, a full fire suppression policy is in place for the entire unit. The FMP also stipulates that the

[1] Fire Management Plan, Mojave National Preserve, December 2004.

Cima unit's proximity to I-15 requires active fire suppression policies in an effort to reduce smoke on the freeway.

Pipeline and Hazardous Materials Safety Administration (PHMSA)

A number of pipelines transmitting petroleum products cross the study area. The Office of Pipeline Safety of the Pipeline and Hazardous Materials Safety Administration (PHMSA), an agency within the U.S. Department of Transportation, is charged with regulating pipeline safety under 49 C.F.R. § 190.1. Pipeline owners and operators are required to meet particular standards of qualification to operate pipelines, uphold established safety standards, and participate in public safety programs that "notify an operator of proposed demolition, excavation, tunneling, or construction near or affecting a pipeline," identify pipelines that may be affected by such activities, and identify any hazard that may affect a pipeline.

In California, pipeline safety is administered by the Office of the State Fire Marshal. In Nevada, pipeline safety is implemented by the Public Utilities Commission of Nevada (PUCN). Other utilities regulated by the PUCN include railroads, telephone, broadcasting, sewage and wastewater treatment, heat, gas, electricity, and water.

3.4.1.2 State Regulations

California Public Utilities Commission

Numerous utilities ROW cross the California portion of the study area. The California Public Utilities Commission (CPUC) is charged by Article 12 of the California State Constitution with the authority to regulate privately owned utilities within the State of California. Utilities under the jurisdiction of the CPUC that would cross the study area include the distribution facilities of privately owned electric, gas, pipeline, sewer, telecommunications, and water companies.[2]

The CPUC's authority over interstate passenger carriers, such as the proposed DesertXpress project, is limited to registration of operations and filing evidence of liability insurance.

All of the proposed DesertXpress rail alignments would be fully grade separated. If any at-grade crossings of public streets, roads, or highways were proposed, California law would require CPUC authorization prior to the construction of any such at-grade rail crossings.[3]

Public Utilities Commission of Nevada

Numerous utilities ROW cross the Nevada portion of the study area. The Public Utilities

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[2] California Pub. Util. Code § 216.

[3] California Pub. Util. Code § 1201 et seq.

Commission of Nevada (PUCN) is vested with the authority to regulate the operation and maintenance of public utilities within the state of Nevada.[4] Utilities in the study area under the PUCN's authority include electric and gas utilities, telecommunications, and railroads. PUCN is also the state agent of the Office of Pipeline Safety.

California Department of Transportation (Caltrans), Nevada Department of Transportation (NDOT)

A variety of storm drainage facilities and conveyances (catch basins and drain inlets, curbs, gutters, ditches, channels, and storm drains, etc.) exist along the I-15 corridor portions of the study area. Within California, such facilities are maintained by Caltrans; in Nevada, by NDOT. These facilities discharge storm water from study area freeways and other state highways into surface water bodies, which, in the project area, primarily include rivers, washes, and lake beds.

3.4.2 Methods of Evaluation of Impacts

In order to understand the potential of the action alternatives to affect utilities and emergency services, the Federal Railroad Administration (FRA) contacted utility and service providers in the study area, seeking information on any adverse effects associated with providing utilities and/or services to the proposed action and alternatives. Utilities and service providers were also asked if such provision would adversely affect their current or future continuing ability to provide services within the study area.

FRA also contacted the owners/operators of potentially sensitive physical utility delivery systems (such as pipelines and electric transmission towers/lines) located in close proximity to proposed project features, such as rail alignments, stations, and maintenance facilities. The purpose of this inquiry was to determine if the proposed action and/or alternatives could safely cross or come in close proximity to existing and/or proposed pipelines and electric transmission lines, and if necessary, develop appropriate mitigation for potential conflicts.

[4] Nevada Revised Statutes, 703.150 et seq.

3.4.3 AFFECTED ENVIRONMENT

3.4.3.1 Regional Environment

The study area for public services and utilities includes the areas in which physical alignments and associated project stations, maintenance facilities, and other features would be constructed and operated. These areas are under a variety of jurisdictions, including the Bureau of Land Management, the National Park Service, San Bernardino County, California, Clark County, Nevada, the cities of Victorville and Barstow, California; and the City of Las Vegas, Nevada. These areas are served by a variety of public and private utilities, which provide electricity, natural gas, potable water, wastewater conveyance, and solid waste disposal services. The areas are also served by numerous entities providing law enforcement, fire protection, and emergency medical services. The utilities and service providers and a discussion of the services they provide are in the following sections. Table 3.4-1 provides a summary of existing utilities and service providers, arranged project segment.

Table 3.4-1: Utilities and Public Services in Study Area

Project Area/Location	***Service Providers***					
	Electric/Gas	***Water***	***Sewage/Storm Water***	***Solid Waste***	***Police***	***Fire/Emergency Response***
Segment 1 Victorville Station and Maintenance Facility Site Options	Southern California Edison Southwest Gas Corporation	Victorville Water District	Victor Valley Wastewater Reclamation Authority	San Bernardino County Solid Waste Management Division	San Bernardino County Sheriff (includes contract "Victorville Police Department")	San Bernardino County Fire Department
Segment 1 Alignment (including TCAs 1A, 1B, and 2)	LA Department of Water and Power	NA	NA	NA	San Bernardino County Sheriff Barstow Police Department California Highway Patrol	Barstow Fire Protection District San Bernardino County Fire Department
Segment 2A and 2B Alignments (including TCAs 3-5)	NA	N/A	N/A	N/A	Barstow Police Department San Bernardino County Sheriff California Highway Patrol	Barstow Fire Protection District San Bernardino County Fire Department

Project Area/Location	Service Providers					
	Electric/Gas	***Water***	***Sewage/Storm Water***	***Solid Waste***	***Police***	***Fire/Emergency Response***
Segment 3A and 3B Alignments (including TCAs 6-10)	NA	N/A	N/A	N/A	San Bernardino County Sheriff California Highway Patrol	San Bernardino County Fire Department
Segment 3 Maintenance of Way Office (on TCA 9 near Baker)	Southern California Edison	Baker Community Services District	Baker Community Services District	Baker Community Services District	San Bernardino County Sheriff California Highway Patrol	Baker Community Services District, in cooperation with the San Bernardino County Fire Department
Segment 4A and 4B Alignments (TCAs 11, 12, 18-21)	NA	NA	NA	NA	San Bernardino County Sheriff California Highway Patrol	Portion of Segment 4a only: Mojave National Preserve: Interagency Fire Center San Bernardino County Fire Department
Segment 5A and 5B Alignments (including TCA 13)	Nevada Power Electric Service	NA	NA	NA	Las Vegas Metropolitan Police Department Nevada Highway Patrol	Clark County Fire Department
Segment 6A and 6B and Option C Alignments (including TCAs 14-16)	Nevada Power Electric Service	N/A	N/A	N/A	Las Vegas Metropolitan Police Department Nevada Highway Patrol	Clark County Fire Department Las Vegas Fire and Rescue

Project Area/Location	***Service Providers***					
	Electric/Gas	***Water***	***Sewage/Storm Water***	***Solid Waste***	***Police***	***Fire/Emergency Response***
Segment 7A and 7B; Option C Alignments (including TCA 17)	Nevada Power Company	NA	NA	NA	Las Vegas Metropolitan Police Department Nevada Highway Patrol	Las Vegas Fire and Rescue
Segments 6 & 7 **Southern, Central, or Downtown Las Vegas Station site options**	Nevada Power Company	Las Vegas Valley Water District	Southern and Central station site options only: Clark County Water Reclamation District Downtown station site option only: City of Las Vegas Public Works Department	Republic Services of Southern Nevada	Las Vegas Metropolitan Police Department	Las Vegas Fire and Rescue
Segment 6 Las Vegas Area Maintenance Facility site options	Nevada Power Company	Las Vegas Valley Water District	Clark County Water Reclamation District	Republic Services of Southern Nevada	Las Vegas Metropolitan Police Department	Las Vegas Fire and Rescue

Source: CirclePoint, 2007.

Electricity and Gas Service Providers

Southern California Edison: Southern California Edison's (SCE) service area encompasses large portions of Central and Southern California. The portion of the study area in the state of California is within the SCE service area, including the Victorville station and maintenance facility site options and the Baker maintenance of way facility.

SCE has the capacity to supply nearly 20,000 megawatts (MW) of power to its customer base and has contracted power where necessary to meet projected needs. SCE is required by its operating charter to supply enough power to meet projected power needs of its service area and have additional reserve capacity.

As of 2007, there are no transmission bottle neck problems in the Victorville and Baker areas.[5] SCE does not have plans for additional power plants to serve the Victorville or Baker areas. However, in February 2007, the City of Victorville applied to the California Energy Commission for approval of the private construction and operation of a hybrid natural gas/solar power generation plant on property adjacent to the Southern California Logistics Airport near Victorville.[6]

Southwest Gas Corporation: The entire study area is located within the Southwest Gas Corporation (SGC) service area, which includes much of inland southern/southeastern California and significant portions of the states of Nevada and Arizona. Demand for gas within the SGC service area is evaluated on an ongoing basis, and SGC adjusts gas purchases and infrastructure according to community and customer needs[7]. Upgrades to the system are continuously being planned.

Nevada Power: The proposed Las Vegas area station and maintenance facility site options are located within the service area of Nevada Power, an affiliate of Sierra Pacific Resources Company. The Nevada Power service area covers over 4,500 square miles within central Clark County and southeastern Nye County. Nevada Power serves more than 800,000 residential and commercial customers in metropolitan Las Vegas and surrounding communities.

Water Supply and Service

Victorville Water District: The Victorville station and maintenance facility site options would all be located within the Victorville Water District (VWD) service area.[8]

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[5] Nancy Jackson, Region Manager, Southern California Edison. Personal Contact 7/26/2007.

[6] http://www.energy.ca.gov/sitingcases/victorville2/index.html

[7] Letter of Inquiry, Southwest Gas Corporation, January 15, 2007.

[8] VWD was created in August 2007, as a result of the consolidation of the Baldy Mesa Water District, Victor Valley Water District and the City of Victorville Water Department.

VWD maintains two independently operating water systems. The water system relevant to the study area, Zone 2906, is located north of the Mojave River and has a capacity of 1,300 gallons per minute (gpm). VWD states that in order to accommodate anticipated water needs for planned residential and commercial development in the vicinity of the station and maintenance facility site options, substantial expansion of water delivery infrastructure will be necessary.[9] The extent of necessary expansions would be determined through individual water supply assessments and periodic urban water management plans.

Anticipated upgrades to the Victorville Water Department systems include adding one 0.5 MG reservoir to be located on the existing reservoir site in addition to expansions to meet demand from proposed developments within its service area.

Baker Community Services District: The proposed maintenance of way facility would be located within the jurisdiction of the Baker Community Services District (CSD). The CSD provides water, trash collection, and sanitary sewer services.

Las Vegas Valley Water District: All proposed Las Vegas area station and maintenance facility site options would be located within the jurisdiction of the Las Vegas Valley Water District (LVVWD). LVVWD provides retail water service to metropolitan Las Vegas, the communities of Blue Diamond, Jean, Kyle Canyon, Searchlight, and portions of unincorporated Clark County. LVVWD's delivery system includes 35 reservoirs and tanks with more than 725 million gallon storage capacity, 32 pump stations, 76 production wells capable of producing 175 million gallons per day, and nearly 4,000 miles of water transmission pipelines. Fireflow availability at the proposed station site options is estimated at 1,500 gpm.[10]

Wastewater

Victor Valley Wastewater Reclamation Authority: The southernmost proposed Victorville station and OMSF site options would be located within the jurisdiction of the Victor Valley Wastewater Reclamation Authority (VVWRA), which also serves much of the cities of Victorville, Hesperia, and Apple Valley. A portion of passenger station site 2 would be located in VVWRA's jurisdictional area. OMSF site option 2 is located outside the VVWRA's present boundaries.

VVWRA operates one regional treatment facility at 2011 Shay Road in the City of Victorville. Currently, the regional treatment facility is being expanded to accommodate 18 million gallons per day (MGD) of wastewater. The expansion is anticipated to be completed in 2008. Another expansion, allowing for capacity of 25 MGD, is also planned.

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[9] Laine Ruzicka, Associate Engineer, Victor Valley Water District. Personal communication, 8/9/07.

[10] Roger Jordan, Senior Civil Engineer, LVVWD. Personal communication, 8/27/07.

In addition to the regional treatment facility, the VVWRA maintains two lift stations and several monitoring stations.

Baker Community Services District: The proposed maintenance of way (MOW) facility site would be located within the jurisdiction of the Baker Community Services District (CSD). In addition to wasterwater services, the CSD provides water service and solid waste collection.

Clark County Water Reclamation District: The Southern and Central (A and B) Las Vegas station site options, as well as the Wigwam Avenue and Robindale Avenue maintenance facility site options, would be located within the jurisdiction of the Clark County Water Reclamation District (CCWRD). The CCWRD serves the communities of Blue Diamond, Indian Springs, Laughlin, Overton, and Searchlight, and portions of the Las Vegas Valley within unincorporated Clark County. Although CCWRD's potential service boundary encompasses all of Clark County, the actual area in which wastewater services is provided is much smaller.

As of May 2008, the Sloan Road MSF site option would be located outside CCWRD's service area. Unless this area is annexed to the CCWRD service area, any wastewater generated at this site would need to be treated in a septic system or carried to a wastewater treatment facility.

As of 2007, CCWRD owns and operates seven wastewater treatment facilities within Clark County. The central wastewater treatment facility (Central Plant) is located within the vicinity of the proposed alignment at the far east end of Flamingo Road. The Central Plant has a 110 MGD capacity with a planned expansion to 150 MGD capacity.

In addition to the wastewater treatment facilities, the CCWRD maintains a total of 2,700 miles of pipeline and operates 26 lift stations that pump the wastewater to the treatment facilities. CCWRD's other services include processing more than 350 tons of biosolids daily for disposal at landfill sites and providing up to 15 million gallons of cleaned reuse water for irrigation of golf courses, parks, and industrial uses. The water treatment and reclamation for reuse in the vicinity of the station and maintenance facility site options is performed at the Desert Breeze Water Resource Center.

City of Las Vegas Public Works Department: The City of Las Vegas Public Works Department (LVPWD) handles wastewater treatment for the cities of Las Vegas and North Las Vegas. The proposed Downtown Station would be within the jurisdiction of the LVPWD. The LVPWD currently runs three wastewater treatment plants. These include the Water Pollution Control Facility (WPCF), which processes 91 MGD; the Durango Hills Water Resource Center (DHWRC), which processes 10 MGD; and the Bonanza Mojave Water Resource Center (BMWRC), which processes 1 MGD. A 10 MGD expansion for the WPCF is planned as of 2007. Average influent flow for June 2007 was 65.2 MGD, or 72% of capacity.

The WPCF would process the wastewater from the Downtown Station area, utilizing a 21-inch main below Main Street. This line has a capacity of 5.1 MGD and is currently operating at less than 10% of capacity. [11]

Stormwater

Victorville/San Bernardino County: The San Bernardino County Department of Public Works has established flood control districts across the County. The proposed action and alternatives would be located in flood control district zone 4, which encompasses most of the high desert portion of the County, from the Cajon Pass to the Nevada state line. There are no physical flood control facilities within zone 4.

Caltrans and NDOT: Along Interstate 15, the respective state transportation agencies maintain storm drain facilities. These facilities serve the immediate roadway areas and are intended to keep such roadways free of flooded conditions. These facilities discharge stormwater into a variety of culverts and washes alongside roadway areas.

Clark County and Las Vegas: In Clark County, public stormwater conveyance systems and facilities have been established by the Clark County Regional Flood Control District. Conveyances cross the I-15 corridor in several locations, generally following the lines of natural washes (including the Las Vegas, Flamingo, and Tropicana Washes).

Stormwater management in Clark County, Las Vegas, and other communities within the Las Vegas Valley is also overseen by the Stormwater Quality Management Committee (SQMC) a community partnership of the Clark County Regional Flood Control District. The stormwater quality management activities of this entity are discussed further in Section 3.8, Hydrology.

The Las Vegas Public Works Department, in addition to managing wastewater also manages stormwater through their Water Pollution Control Facility, Bonanza Mojave Water Resource Center, and the Durango Hills Water Resource Center. Segment 7, north of Sahara Road is located within the department's jurisdiction.

Solid Waste Services

City of Victorville Solid Waste Division: As of May 2008, the southernmost OMSF and Victorville passenger station site options (passenger and OMSF option 1) would be located within the service area of the City of Victorville solid waste division. The City's Solid Waste Division provides for refuse and recycling collection services to all residents and businesses within the City.

[11] Daniel Fischer, Laboratory Superintendent/Pretreatment Coordinator. City of Las Vegas Valley Water Pollution Control Facility. E-mail communication. 8/13/07.

San Bernardino County Solid Waste Management Division: As of May 2008, the northernmost OMSF and Victorville passenger station site options (passenger and OMSF option 2) would receive solid waste service from San Bernardino County's Solid Waste Management Division (SWMD). The SWMD operates six regional landfills, eight transfer stations, and five community collection centers.

Both the City of Victorville and SWMD carry waste to a number of regional landfills. The closest landfill to the proposed Victorville station and OMSF site options is the Victorville Sanitary Landfill. The landfill is located on Stoddard Wells Road outside the present corporate limits of Victorville and within 2 miles of all proposed Victorville station and OMSF site options. The station and OMSF sites would generate waste that would be serviced by either the City's Solid Waste Division and/or the SWMD.

The total design capacity of the Victorville Landfill is 83.2 million cubic yards. As of June 2007, 13.64 million cubic yards have been filled with a remaining capacity of 69.6 million cubic yards.[12]

Baker Community Services District: Trash collection is provided by the district and transported to the Barstow Landfill for solid waste disposal services. The Barstow Landfill is the closest county waste facility to the proposed Baker maintenance of way facility. As of 2007, the Barstow landfill was at 74% capacity and is scheduled to remain open under current permitting through 2012.[13] In 2012, the Barstow Landfill will have to be recertified to remain open, else waste from the Baker maintenance of way facility would have to be disposed of in other regional landfills.

Republic Services of Southern Nevada: Republic Services of Southern Nevada provides solid waste collection services for the majority of Clark County and would serve all proposed station and maintenance facility sites in Nevada.

The company provides waste disposal services for approximately 420,000 single-family homes and 21,000 commercial and multi-family units, handling approximately 10,700 tons of solid waste per day. Republic Services maintains three transfer stations, a recycling center, two convenience drop-off centers, and two landfills.

The larger of the two landfills, Apex Regional, would serve the Las Vegas area stations and maintenance facilities. Apex Regional receives approximately 17,000 tons of waste per day and is permitted to remain operational through at least 2042.

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[12] Eagle, Patrick. San Bernardino County Solid Waste Management Division. Personal communication. 8/9/07.

[13] California Integrated Waste Management Board, 2007.

Police Services

National Park Service: A three-mile portion of Segment 4A would traverse the Mojave National Preserve (MNP) near the intersection of I-15 and Nipton Road. Police services within the MNP would be provided by park service rangers operating from Hole-in-the-Wall station near the center of the Preserve. Park Rangers carry out various tasks associated with forest and structural fire control; protection of property; gathering and dissemination of natural, historical, or scientific information; enforcement of laws and regulations; investigation of violations, complaints, trespass/encroachment, and accidents; search and rescue; and management of historical, cultural, and natural resources.[14] Response times to emergency calls in the I-15 corridor would average about 45 minutes. The NPS has mutual-aid agreements with surrounding police and fire departments.[15]

California Highway Patrol: The California Highway Patrol (CHP) is an agency of the state charged with enforcing traffic laws on all county and state highways, assisting local agencies during emergencies, and providing disaster and lifesaving assistance. In 1995, the California State Police agency was merged into CHP, increasing the scope of CHP to include protection of state property and employees, among other functions. Calls for police and/or emergency services within portions of the project area in or adjacent to the I-15 corridor in California would be responded to by CHP's Inland Division, headquartered in San Bernardino, as well as the Victorville station.

San Bernardino County Sheriff's Department: The following portions of the action alternatives would be in the jurisdictional area of the San Bernardino County Sheriff's Department (SBCSD):

- Rail Segments: 1, 2A/2B, 3A/3B, 4A/4B, limited portions of 5A/5B
- Built facilities: Victorville station and OMSF site options; Baker Maintenance of Way facility

The SBCSD consists of 1o patrol stations, including one station in Victorville and one in Barstow. The SBCSD is contracted to provide full service law enforcement, traffic services, investigation, and a variety of safety services to 14 incorporated cities, including the City of Victorville.[16] The "Victorville Police Department" is thus an agency of the SBCSD. SBCSD patrol and contract stations that would serve the project area are located in Victorville, Barstow, and Needles.

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[14] http://www.nps.gov/personnel/rangers.htm accessed August 8, 2007

[15]Kirk Gebicke, Public Information Officer for National Park Service, Hole-in-the-Wall Station. Personal communication. September 18, 2007

[16] http://www.co.san-bernardino.ca.us/sheriff/About_Us.asp. Accessed May 15, 2007.

The Victorville station services an area of approximately 71 square miles, including the City of Victorville and its environs. As of 2007, the station was staffed by 80 sworn deputies, 22 general employees, and 30 citizen volunteers and reserve deputies. The station has an average response time of five minutes for emergency calls and approximately eight minutes for priority one calls.[17] Although the station does not have a standard officer-to-resident ratio, the station and Victorville City Council conduct yearly reviews of staffing levels and projected needs.[18]

The Barstow Sheriff's Station (BSS) is located in Barstow, and oversees substations in the communities of Yermo and Baker. BSS serves an area of approximately 10,000 square miles and provides resident deputies to the communities of Trona and Baker. The BSS is staffed by 49 sworn officers, 17 general employees, and 61 volunteers that include citizen volunteers, reserve deputies, explorer scouts, mounted posse, and search and rescue team members. The BSS has an average response time of 3 to 8 minutes for priority calls. Although the station does not have a standard officer-to-resident ratio, the BSS conducts an annual review to assess staffing levels and projected needs.[19] Current staffing levels at the department are sufficient to meet present service needs[20].

The Colorado River Station is located in Needles, California. The station serves the vast eastern portion of San Bernardino County, from the state of Nevada south to the Riverside County line, and from the Colorado River west to Kelbaker Road. The station includes a search and rescue unit. As of December 2007, the Colorado River Station is staffed by 40 sworn officers (31 deputies, four sergeants, three corporals, one lieutenant, and one captain) and nine general employees. Staffing levels are anticipated to be stable through 2017. For service calls for San Bernardino County outside the immediate Needles area, the station reports an average response time of approximately five to six minutes.[21]

Barstow Police Department: A total of about 2.75 miles of rail alignment would traverse the jurisdictional area of the Barstow Police Department (BPD). BPD jurisdiction extends to approximately 40 square miles. The BPD is staffed by 34 sworn and 16 non-sworn officers, with management consisting of a police chief, two lieutenants, six sergeants, one non-sworn supervisor, four reserve officers, 12 non-sworn Citizens on Patrol (COP) volunteers, and 20 non-sworn Explorer Youth volunteers. BPD currently meets the Barstow General Plan level of service of 1.7 officers per 1,000 residents. In 2006, BPD handled 37,000 calls for service and responded with an average response time of 20 to 30 minutes for routine calls and about five minutes or less for emergency calls.[22]

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[17] "Priority one" calls involve an incident with an imminent threat to human life.

[18] Sergeant Kurt Lackman, Victorville Police Department. Personal Communication, April 27, 2007.

[19] Sergeant Doug Hubbard, Barstow Sheriff's Station. Personal Communication, January 16, 2007.

[20] Ibid.

[21] Bill Maddox, Colorado River Sheriff Station. Personal Communication. November 15, 2007.

[22] Chief of Police Lee Gibson. Personal Communication, January 18, 2007.

Baker Community Services District: Segment 3 runs along the Town of Baker. While the district provides police protection services to the town, it does not serve the project area.[23]

Nevada Highway Patrol: The Nevada Highway Patrol (NHP), a division of the Nevada Department of Public Safety, provides police and emergency services to state and county routes. Along Segment 5 and southern portions of Segment 6, NHP's Primm Station would respond to emergency calls. In Segment 6 and 7, responses would originate from NHP's Las Vegas center.

As of 2007, the Primm station is patrolled by one sergeant and six troopers, with one trooper position vacant. The Primm station provides 20 hours of coverage per day with the remaining four hours being handled by on-call units or units from the Las Vegas urban area. Between 2007 and 2010, staffing is anticipated to increase to two sergeant positions and twelve trooper positions.

NHP's Southern Command Urban Operations station in Las Vegas is staffed by 190 sworn personnel as of October 2007.

Response time goals for emergency calls differ for rural and urban areas. In rural areas, the response time goal is 20 minutes; in urban portions of the service area, the response time goal is 10 minutes or less.[24]

Las Vegas Metropolitan Police Department: Segments 5, 6, and 7, Option C, the Las Vegas station site options, and the Las Vegas area maintenance facility site options would be within the jurisdiction of the Las Vegas Metropolitan Police Department (METRO). METRO provides both police and emergency response services.

METRO facilities include seven substations within its service area of approximately 7,560 square miles, which extend south to the California border, west to Nye County, north to the city of Mesquite, and east to the Arizona border. The service area includes the City of Las Vegas and all of unincorporated Clark County.

METRO's current staffing level includes 20 captains, 73 lieutenants, 250 sergeants, 1,859 police officers, and 1,305 civilian personnel. METRO maintains a level-of-service goal of two officers per 1,000 residents and is currently operating at 1.7 officers per 1,000 residents. A quarter cent increase in sales tax went into effect in 2005 for the purpose of

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[23] Personal communications with Le Hayes, May 2008 and http://www.bakercsd.com. Accessed May 5 and June 12, 2008.

[24] Dan Solow, Public Information Officer for Nevada Highway Patrol. Personal Communication October 10, 2007

hiring additional officers to meet the METRO's level of service goal, including the addition of substations. [25]

Average response times vary depending upon the location within Clark County. The southern portion of Segment 5 would receive police services through METRO's Resident Section Officer Program, staffed by one sergeant and eight officers. This patrol area is covers approximately 2,200 square miles and has an average response time of 39.4 minutes.

The northwest portions of Segment 5 and all of Segments 6 and 7 would be served by several substations. Response time within this area is approximately 13 minutes or less.

Fire and Emergency Response Services

Interagency Fire Center: A three-mile portion of Segment 4A would traverse the Mojave National Preserve (MNP), near the intersection of I-15 and Nipton Road.

Fire and emergency response services within the MNP are provided by the Interagency Fire Center, located at Hole-in-the-Wall. The Center includes facilities for an interagency fire crew of 15, two large fire trucks, and related vehicles and equipment. In addition to performing fire prevention services within the MNP, the Interagency Fire Center also responds to vehicle fires along Interstates 15 and 40 during the summer months, when vehicle fires are at particular risk of threatening resources within the MNP. These responses do not entail extinguishing vehicle fires, but instead ensure that fires do not spread to wildland areas, which are adjacent to the two interstates.

Average response times to a fire or other emergency calls along the I-15 corridor from the Hole-in-the-Wall Fire Center are about 1 hour. As of 2007, there are no planned improvements to the staffing levels or equipment at Hole-in-the-Wall Fire center, as all fire suppression needs have been deemed as being met.[26]

San Bernardino County Fire Department: In portions of the study area within California but outside of the City of Barstow and outside the Mojave National Preserve, fire and emergency response services would be provided by the San Bernardino County Fire Department (SBCFD). As of July 5, 2008, SBCFD assumed fire and emergency service jurisdiction over the City of Victorville. The City had maintained an independent fire department until 2008, but the City opted to contract with the County for fire and emergency response services.

[25] http://www.reviewjournal.com/lvrj_home/2005/Oct-01-Sat-2005/news/3633116.html accessed August 8, 2007

[26] Chuck Heard, Fire Management Officer with the Interagency Fire Center at Mojave National Preserve. Personal Communication, September 17, 2007.

SBCFD stations that would provide service to the proposed action include:

- *Station 311 (16200 Desert Knoll Drive, Victorville):* This station is staffed by six full-time firefighters and one battalion chief. Equipment available at the station includes two Type 2 Fire Engines with 100-foot area ladders. This is the most northeasterly of VFD's stations and thus closest to proposed rail alignments and station and maintenance facility site options.
- *Station 312 (15182 El Evado Road, Victorville):* This station is staffed by three full-time firefighters and is equipped with one structure engine and one reserve engine.
- *Station 313 (13086 Amethyst Road, Victorville):* This station is staffed by three full-time firefighters and is equipped with one structure engine and one reserve engine.
- *Station 314 (17008 Silica Drive, Victorville):* This station is staffed by three full-time fire fighters and is equipped with a 75-foot Ladder-pumper and a reserve Type 1 Fire Engine. The VFD also maintains a hazardous materials unit at this station location.
- *Station 319 (18550 Readiness Street, Southern California Logistics Airport):* This station is integrated into the campus of the SCLA and is intended to serve airport related fire and emergency response needs.
- *Hinkley Station 125*- This station serves the I-15 corridor both immediately north and south of the City of Barstow and is located near Segments 2A/2B. Equipment available at Hinkley Station 125 includes one Type 1 Structure Engine, one Type 4 Brush Patrol, and one water tender. Station 125 is not staffed, but is instead served by paid on-call firefighters (PCFs).
- *Harvard Station 46*- This station serves the community of Yermo and the I-15 corridor between the City of Barstow and the community of Baker (Segments 2A/2B, and western portions of Segment 3). Equipment available at Harvard Station 46 includes one Type 1 Structure Engine, one Type 4 Brush Patrol, and one water tender. Harvard Station is staffed by one full-time captain and two PCFs.
- *Baker Station 53*- This station is staffed by of one full-time captain and two PCFs. The station serves the I-15 corridor from Basin Road to the Nevada state line (Segments 3 and 4). Equipment available at Baker Station 53 includes one Type 1 Structure Engine and one Type 4 Brush Patrol.

Response times for these stations range from seven to 11 minutes for incidents in close proximity to any station; longer response times are anticipated for response to incidents in less populated areas in the eastern portion of the county.[27]

Barstow Fire Protection District: Much of Segment 2 is within the jurisdiction of the Barstow Fire Protection District (BFPD). The BFPD's service area encompasses the entire incorporated City area, and stretches from near Outlet Center Drive near Lenwood, and east to the Marine Corps Logistics Base.

BFPD services include fire suppression, paramedic, and hazardous materials response. The Segment 2 alignment area is serviced by the following facilities:

- *Station 361*: Staffed by nine full-time firefighters as well as on-call staff, and includes a Hazardous Materials Unit. Equipment available at Station 361 includes three Type 1 fire engines, one 75-foot Quint (a truck that serves as both an engine and a ladder truck), and one Type 3 Water Tender.
- *Station 363:* Staffed by three full-time firefighters as well as on-call staff. Equipment available at Station 363 includes one Type 1 Engine. Response time for the Department is approximately eight minutes.

Barstow Fire Protection District currently has an average response time of six to ten minutes, but has no established response-time goal or service ratio.

Baker Community Services District: Segment 3 runs along the Town of Baker. While the district provides fire protection services to the town, it does not serve the project area.[28]

Clark County Fire Department: Segments 5 and Segment 6, as well as the proposed Las Vegas area maintenance facility site options as well as the Southern and Central A/Central B station site options, would be within the jurisdiction of the Clark County Fire Department (CCFD).

CCFD serves unincorporated areas of Clark County. CCFD provides both urban and rural fire services, aircraft rescue fire fighting, emergency medical services, a hazardous material response team, fire prevention, fire investigation, disaster and emergency preparedness, and public education.

CCFD employs 614 fire fighters, 58 prevention and investigation officers, and 50 administration, training, and support employees. In addition, CCFD maintains a voluntary force of 350 people. Average response time is approximately 6.5 minutes.

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[27] Mike Huddleston, Fire Prevention Supervisor San Bernardino County Fire Department. Personal Communication, August 28, 2007

[28] Personal communications with Le Hayes, May 2008 and http://www.bakercsd.com. Accessed May 5 and June 12, 2008.

CCFD maintains a total of 38 fire stations, 13 of which are volunteer fire stations. The stations that would serve project facilities include:

- *Station 11* (5150 South Las Vegas Boulevard) is staffed by 10 firefighters a day and provides fire and emergency services. Equipment available at Station 11 includes one 500-gallon fire engine and one 200-gallon truck.
- *Station 12* (3050 Industrial Road) is staffed by six firefighters a day and provides fire and emergency services. Equipment available at Station 12 includes one 500-gallon fire engine and one rescue apparatus.
- *Station 15 (*3480 South Valley View Boulevard) is staffed by six firefighters a day and provides fire and emergency services. Equipment available at Station 15 includes one 500-gallon fire engine and one rescue apparatus.
- S*tation 21* (5015 West Oquendo Road) is staffed by 10 firefighters a day and provides fire and emergency services. Equipment available at Station 21 includes one 500-gallon fire engine, one heavy rescue, one trench trailer, and one confined space truck.
- *Station 24* (7525 Dean Martin Drive) is staffed by 10 firefighters a day and provides fire and emergency services. Equipment available at Station 24 includes one 500-gallon fire engine, one hazardous materials apparatus, and one rescue apparatus.
- *Station 65* (3825 West Starr Avenue) is staffed by six firefighters a day and provides fire and emergency services. Equipment available at Station 65 includes two 500-gallon fire engines and one rescue apparatus,
- *Station 87* (20400 South Las Vegas Boulevard) is staffed by two firefighters a day and provides fire and emergency services. This is the only station located within the Segment 5 area. Equipment available at Station 87 includes one rescue apparatus.

CCFD has a response time goal of seven minutes, and meets this goal 90% of the time. In addition to the response time goal, CCFD has a staffing ratio goal of 1.225 firefighters per 1,000 residents served. With 1.8 million residents served, a firefighting staff of 2,205 members would be needed to meet the goal. As of 2005, however, CCDF had 614 paid professional firefighters plus 350 volunteers, a total of 964 firefighters, well short of the staffing goal.

Las Vegas Fire and Rescue: The northern portion of Segment 7 and the Downtown Las Vegas Station site option would be within the jurisdiction of the Las Vegas Fire and Rescue's (LVFR). LVFR provides fire prevention and emergency response services in its service area.

LVFR receives about 20,000 service calls per year. LVFR has a staffing goal of 0.8 firefighters per 1000 residents, as well as a response time goal of six minutes. As of 2005, LVFR employed 622 staff, serving a population of 559,000, achieving the staffing goal.[29] Actual response time varies based on location of an emergency and the time of day during which the emergency occurs. In the downtown Las Vegas area, where the Downtown passenger station would be located, response times average six minutes, achieving the goal. A total of seven LVFR stations are located within two miles of the proposed Downtown station. The two closest LVFR stations are discussed in detail below:

- *Station 1* (500 N Casino Center Boulevard) is served by 18 firefighters providing fire, emergency medical, hazardous materials, bomb-squad activities, fire prevention and life safety inspection and education. Equipment includes two fire engines with four firefighters assigned to each engine, one truck, staffed by four firefighters, and three rescue ambulances staffed by two firefighters each.
- *Station 4* (421 South 15th Street) is served by 10 firefighters providing fire, emergency medical, hazardous materials, bomb-squad activities, fire prevention and life safety inspection and education. Equipment includes one fire engine with four firefighters assigned to it, one truck served by four firefighters, and one rescue ambulance staffed by two firefighters.

3.4.3.2 Physical Utility Delivery Systems within the Study Area

A number of utilities transmission and/or distribution facilities are located within or in close proximity to the study area. The facilities include petroleum pipelines and associated facilities, communications lines, electrical transmission lines and towers, water pipelines, and sewage/storm drainage facilities. Many of these facilities, particularly petroleum pipelines and electric transmission lines, serve areas well outside of the study area. Table 3.4-2 below identifies these facilities within each segment of the proposed action and alternatives.

[29] City of Las Vegas Planning & Development Department; http://www.lasvegasnevada.gov/files/4thQtrFinal.pdf, accessed May 2008.

Table 3.4-2: Potential Utility Infrastructure Conflicts in the Study Area

Segment/ Station	***Pipelines***	***Communications/Fiber Optic***	***Electrical Transmission***	***Regional Water***	***Sewage/Storm Water***
1	Southern California Gas Pipeline Mojave-Kern Pipeline Oro Grande Southwest Gas Corporation High Pressure System (Alternative A only) Kern River Gas Pipeline Southwest Gas Corporation Pipeline Kinder Morgan Calnev Pipeline	No information available from Caltrans; presumed to be similar to Nevada segments.	Southern California Edison PG &E LA Department of Water and Power	Mojave River Pipeline	Victor Valley Wastewater Reclamation Authority North Apple Valley Interceptor (Sewage Only)
2A/2B	*Natural Gas* Mojave-Kern Pipeline Southwest Gas Corporation Pipelines Kinder Morgan Calnev Pipeline	No information available from Caltrans; presumed to be similar to Nevada segments.	Southern California Edison PG &E	Mojave River Pipeline	None

Segment/ Station	*Pipelines*	*Communications/Fiber Optic*	*Electrical Transmission*	*Regional Water*	*Sewage/Storm Water*
3A/3B	*Natural Gas* Kern River Gas Pipeline Kinder Morgan Cal Nev	No information available from Caltrans; presumed to be similar to Nevada segments.	SCE LA Department of Water and Power	None known	None known
4A/4B	Kern River Gas and Kinder Morgan within I-15 corridor portions of segment.	None known outside I-15 corridor	None known.	None known	None known
5A/5B	*Natural Gas* Kern River Gas Pipeline Southwest Gas Corporation Pipelines *Oil* Kinder Morgan Calnev Pipeline	AT&T Communications California Sprint Central Telephone 2 Level 3 Communications MCI WorldCom Sprint Nevada	Sierra Pacific/Nevada Power	Las Vegas Valley Water District	None known
6A/6B	*Natural Gas* Southwest Gas Corporation Pipelines Kinder Morgan Calnev Pipeline	AT&T Communications Nevada Sprint Central Telephone 2 Electric Lightwave COX Communication, Las Vegas IDA Communications Level 3 Communications Nextlink Nevada Sprint Nevada	Sierra Pacific/Nevada Power	Las Vegas Valley Water District	Clark County Water Reclamation District; Clark County Flood Control District

Segment/ Station	*Pipelines*	*Communications/Fiber Optic*	*Electrical Transmission*	*Regional Water*	*Sewage/Storm Water*
7A/7B	*Natural Gas* Southwest Gas	AT&T Communications Nevada Sprint Central Telephone 2 COX Communication, Las Vegas IDA Communications Level 3 Communications Electric Lightwave Nextlink Nevada	Sierra Pacific/Nevada Power	Las Vegas Valley Water District	City of Las Vegas Clark County Water Reclamation District

Sources: USA North, Southwest Gas Corporation, NDOT, 2007, memorandum on meetings with utility companies, July 24, 2008.

Petroleum Pipelines

Three pipeline systems transporting natural gas, oil, gasoline, and kerosene (jet fuel) from various locations in the southwest would cross the proposed action and alternatives.

Southwest Gas Corporation: SGC operates numerous underground high pressure gas pipelines in the Victorville, Barstow and Las Vegas areas. However, following meetings with SGC to review project plans, SGC observed that most of its lines in California are local transmission lines, as opposed to major interstate pipelines. In Nevada, SGC observed that its lines cross under I-15 at Primm and in three other locations near Las Vegas. All lines running under I-15 are already encased. SGC had expressed concern about stray electrical currents from train operations potentially affecting pipelines. However, the proposed EMU option would utilize alternating current (AC) power, which has little effect on buried utilities relative to direct current (DC) power.[30]

Kern River/Mojave Pipeline/El Paso Natural Gas Pipeline: Kern River Gas operates the Kern River Pipeline system. The system is approximately 1,680 miles long and traverses the states of Wyoming, Utah, Nevada, and California. The pipeline has the capacity to move 1.7 billion cubic feet of natural gas each day and is a major source of natural gas for end users in Southern California. [31]

The Mojave Pipeline Company is a subsidiary of the El Paso Natural Gas Company. The company's Mojave Pipeline connects natural gas fields in West Texas to markets in Arizona and Southern California.

The study area includes a pipeline system jointly owned by Kern River and Mojave. This portion of the pipeline system is known informally as the Mojave-Kern Pipeline, although it is also referred to as part of the El Paso Natural Gas Pipeline. This system has capacity to provide gas to serve up to 9.5 million residential consumers in Southern California.

Where the pipeline is parallel to I-15, it is outside the Area of Potential Effect (APE) utilized in this EIS. However, in meetings with the Mojave Pipeline Company, it was observed that the pipeline would cross Segments 2A/2B west of Lenwood, and Segments 3A and 3B east of Yermo. In addition, a lateral pipeline within this system would cross Segments 5A and 5B north of Primm. The lateral serves the Big Horn Electrical Generation Station, just outside of Primm, which generates power for the Nevada Power Company.

Kinder Morgan – Calnev Pipeline: The Calnev Pipeline, operated by Kinder Morgan Energy Partners, transports gasoline, oil, jet fuel (kerosene) and gasoline from refineries in southern California to Las Vegas within two pipes (8 inch and 14 inches in diameter).

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[30] DesertXpress, memorandum on meetings with utility companies, July 24, 2008.

[31] Kern River Gas Transmission Company. <http://www.kernrivergas.com/InternetPortal/Desktop.aspx>

An additional 6 inch pipe runs from near Hesperia to a fuel terminal along State Highway 58 east of Mojave. The main branch of Calnev Pipeline travels within or near the I-15 corridor for much of its distance between Las Vegas and Colton, California, crossing from the west to east side of the freeway – and thereby the study area --several times. In 2007, Kinder Morgan proposed adding a third pipeline, 16 inches in diameter, alongside the existing two pipelines that currently comprise the Calnev pipeline.

The project applicant met with Kinder Morgan to review existing and proposed pipelines relative to the proposed action and alternatives. Where the pipelines currently cross under I-15, they are buried deeply enough such that the overlay of the proposed rail trackbed would not pose a significant conflict. Stray electrical current from rail operations was identified by Kinder Morgan as a potential concern, However the EMU locomotive option would use alternating current (AC), which, unlike direct current (DC), does not pose a risk to nearby pipelines.

Electrical Transmission Lines

Pacific Gas & Electric: PG&E electrical transmission lines traverse the study area in several locations, carrying power from sources in the southwest to customers in Northern California. According to PG&E, line L-314 would cross Segment 1. Lines L300A and L300B would cross over Segments 2A/2B west of Barstow. PG&E also indicated that Line L300B is in close proximity to Segments 2A/2B north of Barstow.[32]

Southern California Edison/Los Angeles Department of Water & Power: SCE transmission lines traverse the study area in several locations. Line L-235 would cross Segment 1B and the southernmost of the Victorville OMSF site options. These facilities are believed to be shared with the Los Angeles Department of Water and Power. Other SCE facilities are located near I-15 in Segment 3.

Sierra Pacific/Nevada Power: SP/NP has several elevated electrical transmission lines within close proximity to the proposed action and alternatives. These include a crossing of I-15 near Primm, where transmission lines emanate from the Big Horn Generation Station. In addition, other elevated transmission lines are parallel to I-15 in the Las Vegas valley.

Regional Water Supply and Service

Mojave River Pipeline: The MRP is a State Water Project pipeline that delivers water from the California Aqueduct to three groundwater recharge basins in the communities of Hodge, Lynwood, and Dagget/Yermo. The pipeline begins at the White Road Siphon at the eastern branch of the California Aqueduct (south of Victorville) and then roughly parallels the Mojave River between Oro Grande and Lenwood. The pipeline would cross 2A/2B in several locations between Lenwood and Barstow.

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[32] Doug Snyder, PG&E, personal communication, August 25, 2007.

Sewage and Wastewater

Victor Valley Wastewater Reclamation Authority: The North Apple Valley Interceptor would cross Segment 1. Preliminary review of plans of the proposed action showed that the southern passenger station site option (site 1) would be within 500 feet of this underground interceptor line.

Baker Community Services District: Sewers services for the Town of Baker are provided via a central pumping station located near Baker Boulevard and Highway 127 across from I-15.[33] Pipelines cross under I-15 to deliver wastewater to lagoons for treatment.[34]

Clark County Water Reclamation District: CCWRD wastewater lines would cross in multiple locations and/or be in close proximity to Segments 6, 7, and Option C. A proposed force main and lift station would be in close proximity to Segments 5A/5B near East Cactus Avenue. New collection lines are proposed in the immediate vicinity of I-215, intersecting with Option C.

City of Las Vegas Public Works Department: City wastewater lines are located throughout incorporated Las Vegas; Option C and Segment 7 would cross such lines in multiple locations.

Communication Lines

The I-15 corridor includes many existing communication lines, as noted in Table 3.4-2. An underground service alert (USA) performed by NDOT in 2007 identified a variety of lines running within the freeway right-of-way. It is assumed that some or all of the lines identified in the NDOT USA also run in the California portion of I-15.

3.4.4 Environmental Consequences

An action alternative would result in adverse effects if:

1) Utility or service demands of the action alternative exceeded the existing or planned capacity of existing or planned utility and service systems, or

2) The action alternative would physically interrupt or otherwise constrain or impede existing utilities distribution systems.

[33] http://www.bakercsd.com. Accessed May 5 and June 12, 2008.

[34] Ibid.

3.4.4.1 No Action Alternative

No high-speed passenger rail system would be constructed or operated under the No Action Alternative. There would be no change in demand for utility or service systems related to the construction or operation of a high-speed passenger rail system. Future changes in demand for utilities and service systems in the study area may still occur but would be related to projected population and economic growth in Victorville, Las Vegas, and other locations, even if the high-speed rail project is not constructed. See Chapter 3.2, Growth, for information on area growth projections. Transportation improvements associated with the No Action Alternative would most likely be located adjacent to existing highway facilities, posing the potential for a similar degree of conflict with utility infrastructure located nearby.

3.4.4.2 Action Alternatives

Electricity and Gas Service

Locomotive Power: The DEMU locomotive power option would not generate a demand for electrical or natural gas service. The EMU locomotive power option would require a substantial supply of electricity (approximately 17762 kwh per round trip per train) that would be delivered to project substations along new utility corridors. The project applicant has been in close coordination with local utility providers in developing its utility corridor and electric power plan.

Victorville passenger station and OMSF site options, Baker Maintenance of Way Facility: All of these proposed facilities would utilize natural gas and electricity. Southern California Edison (SCE) provides electrical services to the project area. SCE reports sufficient equipment and facility conditions to serve the existing and future needs of the project's passenger station, OMSF, and Maintenance of Way facility. [35]

Southwest Gas Corporation (SGC) provides retail natural gas service in the project area. Based on its review of preliminary project information, SGC has provided a "will-serve" letter for the project. SGC states that current operating conditions are sufficient to serve existing needs and those of the project.[36]

Las Vegas Area MSF and Passenger Station Site Options: These proposed facilities would utilize natural gas and electricity services. Natural gas would be provided by SGC; electricity by Nevada Power.

SGC has indicated that natural gas service would be available in the Las Vegas area to

[35] Nancy Jackson, Southern California Edison. Personal communication, January 16, 2007.

[36] Letter from Southwest Gas Corporation, June 12, 2008.

serve the stations/maintenance facilities of the proposed project.[37] SGC has also indicated that connection to the local natural gas system could incur fees that would be borne by the project proponent.

Water Supply and Service

Railroad Segments 1-7: The proposed rail segments would not generate demand for water. There would not be any landscaping nor any other water related use associated with the rail segments that would create an ongoing demand for water. Water usage would be limited to built facilities, discussed below.

Victorville Passenger Station and OMSF Site Options: The passenger station and the OMSF would generate a demand for water. Passenger station water demand would be associated with restrooms, restaurant/food service uses, and landscaping. At the OMSF, water demand would be associated with train washing and associated maintenance, providing an on-board drinking water supply, landscaping, and routine employee usage for consumption and restrooms.

The project applicant provided estimates of water needs relative to train washing. The applicant proposes implementation of a water recovery system that would enable up to 85% of all fresh water usage to be recycled and reutilized. The applicant's estimates indicated that at buildout, train washing activities would require 3.3 acre-feet per year (AFY).

The Victorville Water District (VWD) utilizes an acreage-based rate in computing the potential water usage of proposed developments. At the direction of VWD, a commercial water usage rate was applied to measure the total water demand of the proposed action's facilities in Victorville, namely the proposed passenger station and the OMSF. Together, either pair of station and OMSF site options would have a gross acreage of 200 acres. VWD assumes commercial development use 1,800 gallons per day (gpd) per gross acre. Applying this usage rate to the gross acreage of the station and OMSF would yield a daily usage of 360,000 gallons, equivalent to 1.1 acre-feet (AF) per day. On an annual basis, the water usage rate would be about 400 acre-feet per year (AFY). Considering that the applicant anticipates that 3.3 AFY would be utilized for train washing, a significant remainder – approximately 397 AFY --would be available to provide water for all other anticipated uses (restrooms, food service, train maintenance, landscaping, etc).

According to VWD, this estimated water demand of the station and maintenance facility (either site option) is well within the service capabilities of VWD, but that a Water Supply Assessment is recommended prior to project construction to better determine the size of water facilities needed to adequately serve the project at buildout. VWD further

[37] Barbara Demaree, Southwest Gas Corporation. Personal communication, June 18, 2008.

encourages that the project incorporate low water use desert landscaping, install low flow toilets, and otherwise implement water-saving fixtures and devices. [38]

Baker Maintenance of Way Facility: The eight employees anticipated to be headquartered at the Baker MOW would use water for drinking, restrooms, and limited landscaping. The MOW would not generate water demand related to any actual train maintenance or service activities. Consultation with the Baker Community Services District, which provides water, wastewater, and solid waste services, indicated that the proposed action's water demands could be met with existing infrastructure and anticipated supply and that the Baker CSD could provide water service to the MOW. [39]

Las Vegas Area MSF and Passenger Station Options: The passenger station and the MSF would generate a demand for water. Passenger station water demand would be associated with restrooms, restaurant/food service uses, and landscaping. At the MSF, water demand would be associated with train maintenance, providing on-board drinking water supply, landscaping, and routine employee usage for consumption and restrooms.

Water for these facilities would be provided by the Las Vegas Valley Water District (LVVWD). At the direction of LVVWD, a water consumption rate based on an assumed commercial land use was utilized to determine water demands of the proposed action. LVVWD requested that water demand flow rates be estimated based on maximum day gallons per minute (gpm).

> ***MSF Site Options:*** Three sites are under consideration for the Las Vegas area MSF, the largest of which is 10 acres in size. Using LVVWD commercial water demand flow rates, estimated demand on an annual basis would be 48.4 acre feet per annum (AFA).
>
> ***Passenger Station Options:*** Four sites are under consideration for the Las Vegas passenger station. These sites range in size from a low of 23 acres (Downtown Station) to a high of 62 acres (Southern Station). For the most conservative water demand estimation, the largest station site size (62 acres) was utilized in this analysis. Using LVVWD commercial water demand flow rates, a 62 acre commercial site would utilize 300 AFA.

LVVWD reviewed the above projections, comparing them to regional water availability estimates established by SNWA. LVVWD's review indicated that estimated water demand associated with the MSF and passenger station would be within projections for the LVVWD/SNWA's service area. LVVWD also indicated that the amount of water demanded by the project would not require the construction of additional infrastructure

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[38] Laine Ruzicka, Victorville Water District. Personal communication, July 10, 2008.

[39] Baker Community Services District. Personal communication. September 26, 2007 and June 27, 2008.

specific to the project.[40] LVVWD has established a "water commitment" application process, which is included as a mitigation measure.

[40] Akash Sehdev, LVVWD Engineering. Personal communication, August 8, 2008.

Sewage and Wastewater

Railroad Segments 1-7: As the proposed rail segments would not generate demand for water, nor would they produce wastewater or trigger the need for wastewater services. Wastewater would be generated only at built facilities, as discussed below.

Victorville Passenger Station and OMSF Site Options: These facilities would generate wastewater associated with anticipated water usage (restrooms, restaurant/food service use, etc.). According to VVWRA, the proposed facilities would not create a substantial need for additional waste water equipment, facilities, or personnel. In its 2005 Sewerage Facilities Plan Update, as well as a policy adopted in August 2005 regarding anticipated community growth, VVWRA acknowledges the robust growth projections forecast for the Victor Valley area. Specifically, the sewerage plan anticipates the City of Victorville's population will double between 2005 and 2025 and that wastewater flows from the City would more than double over the same period.[41] In the event that OMSF and station site 2 (the more northerly site options) are selected as part of the preferred alternative, the lands underlying these sites may need to be annexed to the VVWRA, as they are currently outside district boundaries.

Baker Maintenance of Way Facility: The eight employees anticipated to be headquartered at the Baker MOW would generate wastewater related to consumption and sanitary uses. Consultation with the Baker CSD indicated that wastewater from the MOW could be serviced appropriately within existing infrastructure and facilities.[42]

Las Vegas Area MSF and Passenger Station Options: These facilities would generate wastewater associated with anticipated water usage (restrooms, restaurant/food service use, etc.). With the exception of the Downtown Las Vegas passenger station site, wastewater services for these facilities are provided by the Clark County Water Reclamation District (CCWRD). Wastewater services at the Downtown Las Vegas passenger station site are provided by the City of Las Vegas Public Works Department (LVPWD).

> ***CCWRD:*** In its review of preliminary project plans, CCWRD indicated that it has adequate capacity to serve the proposed action, without any need to add personnel, equipment, or other facilities.[43]
>
> ***LVPWD***: LVPWD reviewed the projected wastewater levels associated with the proposed Downtown Station, utilizing a wastewater generation rate equal to 90% of the water demand projected by LVVWD. According to LVPWD, existing wastewater treatment facilities are adequate to treat the incremental increase in wastewater

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[41] VVWRA 2005 Sewerage Facilities Plan, p. 1-3.

[42] Baker Community Services District. Personal communication. 9/26/07, 6/27/08.

[43] Julie Chadbourn, CCWRD, written correspondence, March 17, 2007.

associated with the project. Site-specific plans would need to be reviewed to determine whether local wastewater infrastructure is sufficient to serve the demand associated with the proposed action.[44]

Stormwater

Railroad Segments 1-7: Stormwater will fall on proposed rail alignments. Although rail track beds will have a degree of porosity related to the spacing of railroad ties, the proposed alignment areas nevertheless have the potential to generate stormwater, particularly during the short in duration, but high intensity rainfall events typical in the Mojave Desert.

Where the rail alignment is within or adjacent to the I-15 right-of-way, there is an opportunity to tie into existing stormwater discharge systems associated with the roadway facilities.

In locations where the proposed rail alignment is at a distance from the I-15 where connection to existing storm drainage facilities is not feasible, there is the potential that new railroad alignments could create new stormwater conveyances.

Victorville Passenger Station and OMSF Site Options*:* The areas proposed for the Victorville passenger station and OMSF site options are largely unimproved at present. The construction and operation of these facilities will convert unimproved lands to paved and/or built facilities, decreasing permeability and potentially creating stormwater.

Clark County and City of Las Vegas Station and MSF Site Options: With the exception of the Southern Station option, the areas proposed for the Las Vegas passenger station are largely developed. The MSF site options are partially developed land, with the exception of Sloan Road. Additional volumes of stormwater would result in areas where the proposed facilities would convert pervious undeveloped surfaces to impervious surface.

However, the proposed station sites and maintenance facilities in Clark County would not conflict with the County's existing flood control facilities or with installation of their proposed Master Plan drainage facilities.[45] Furthermore, Clark County typically designs all of their facilities assuming that the upstream watershed is completely developed.

Solid Waste

Railroad Segments 1-7*:* The proposed rail alignments would not generate solid waste. Daily maintenance-of-way activities may be required to dispose of waste items that may have strayed onto the tracks. However, this amount of waste is expected to be

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[44] Dan Fischer, LVPWD. Personal communication, July 30, 2008.

[45] Steve Parrish, CCRFCD. Personal Communication September 2, 2008.

incidental/negligible. Maintenance of the rail trackway over time would generate waste railroad ties and scrap and hardware that would typically be recycled.

Victorville Passenger Station and OMSF: These facilities would generate solid waste related to ongoing operations, including passenger and employee usage, food service, and related uses.

A waste generation rate for these facilities was estimated based on commercial waste disposal rates in the City of Victorville, as estimated by the California Integrated Waste Management Board (CIWMB). CIWMB assumes a gross waste generation rate of 14 pounds per employee per day. The rate is measurement which encompasses waste generated from all commercial activities, including from commercial enterprise customers.

At project buildout, the two Victorville facilities would have about 460 employees. Applying this disposal rate to the projected number of employees yields an estimated disposal rate of about 1,850 pounds/per day for the two facilities combined. On an annual basis, this would be equal to about 340 tons of solid waste. According to the CIWMB, the nearest landfill (the Victorville Landfill at 18600 Stoddard Wells Road) was at less than 2% of its 83 million cubic yard capacity as of the year 2000. The landfill is permitted to remain open through October 2047.[46] As a result, there appears to be sufficient existing capacity to accommodate the solid waste generated by the Victorville facilities.

Baker Maintenance of Way Facility: The eight employees that would be located at the MOW would generate waste associated with daily operational activities. According to the CIWMB, within unincorporated San Bernardino County, the average office-commercial disposal rate is 6.3 pounds of solid waste per employee per day.[47] On an annualized basis, this would be about 9 tons of solid waste, which is well within the capacity of the nearest landfill (in Barstow); other area landfills utilized by San Bernardino County could accommodate this additional waste without the need to expand facilities.

Las Vegas Area MSF and Passenger Station Options: These facilities would generate solid waste related to ongoing operations, including passenger and employee usage, food service, and related uses. A waste generation rate for commercial uses was not available from the Nevada Division of Environmental Protection (NDEP). To estimate anticipated solid waste production at the proposed MSF and passenger station facilities, the commercial waste generation rate for the City of Victorville (which assumes gross waste generation of 14 pounds per day per employee) was utilized. The Las Vegas area MSF and passenger station are anticipated to host about 250 employees. Using the above generation rate, the two Las Vegas area facilities would be estimated to produce up to 1.75

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[46] CIWMB Waste Stream Profiles, accessed at www.ciwmb.ca.gov, August 2008.

[47] http://www.ciwmb.ca.gov/Profiles/Juris/JurProfile1.asp?RG=U&JURID=428&JUR=San+Bernardino%2D Unincorporated. Accessed June 2, 2008.

tons of waste per day, or about 640 tons of waste annually. The Apex Regional Landfill, operated by Republic Services of Nevada, has the capacity to receive up to 17,000 tons of waste each day. As of 2006, the Apex Landfill was receiving 11,000 tons of waste each day.[48] The additional 1.75 daily tons associated with the proposed Las Vegas Station and MSF would be well within the landfill's capacity to receive solid waste.

Police Services

Victorville Passenger Station OMSF Site Options; Portions of Segment 1, 2A/2B, and 5A/5B; all of Segments 3A/3B, 4A/4B; Baker Maintenance of Way Facility: All of the above project features and facilities would be located in the service area of the San Bernardino County Sheriff's Department (SBCSD), which includes the contract "Victorville Police Department." Project alignments immediately adjacent to or within freeway corridors would also receive police response services from the California Highway Patrol (CHP).

The SBCSD anticipates that current and projected staffing would be sufficient to serve the proposed action, but express concern that future high levels of human activity at the passenger station could lead to increased needs for police response/services there.[49]

SBCSD has also expressed concern that a catastrophic event, such as a train derailment, could result in a blockage of one or both sides of the I-15 freeway. Such a blockage would be especially problematic if it were to occur in remote desert portions of the I-15 corridor, where no secondary access or alternate parallel routes exist. Although unlikely, such a situation could occur. The project's incorporation of crash barriers at all supporting columns of bridges at freeway interchanges and overpasses along with the implementation of Mitigation Measure 7, development of an emergency operations plan, would reduce effects to I-15 during a train derailment.

Portions of Segments 2A/2B: Approximately 4 miles of Segments 2A/2B traverse the jurisdictional area of the Barstow Police Department (BPD). BPD anticipates being able to serve the proposed action without interfering with service to the community.[50] BPD has plans to expand its services and facilities to serve anticipated population growth. However, BPD expressed concern that an emergency or catastrophe related to a train derailment or other event could inhibit safe travel and/or evacuation of local roadways and highways.[51]

[48] 2007 Solid Waste Management Plan, Nevada Division of Environmental Protection, Bureau of Waste Management. http://ndep.nv.gov/BWM/swmp/swp04.htm. Accessed June 13, 2008.

[49] Letter of inquiry with San Bernardino County Sheriff's Department, January 2007.

[50] Letter of inquiry with Barstow Police Department, January 2007..

[51] Ibid.

Portions of Segments 5A/5B, all of Segments 6A/6B and 7A/7B, Option C; all Las Vegas area MSF site options and passenger station options: All of these alignments, station site options, and maintenance facility site options are in the jurisdiction of the Las Vegas Metropolitan Police Department (LVMPD). In addition, the portions of Segments 5A/5B, 6A/6B, and 7A/7B within the I-15 corridor would also be within the jurisdictional area of the Nevada Highway Patrol (NHP).

Although the LVMPD is not considered understaffed, it is seeking to hire more personnel to meet local initiatives.[52] It is not anticipated that the proposed action will impact services to the community as the current level of staffing is sufficient to serve the community and the proposed action.[53]

NHP reports that its current staffing levels are sufficient to handle present needs and that the proposed action would not adversely affect NHP's ability to provide service.[54] However, NHP anticipates that most police service needs associated with the project would be provided by LVMPD.[55]

Fire and Emergency Response Services

Victorville Passenger Station and OMSF Site Options, Segment 1, portions of Segments 2A/2B, Segments 3A/3B, 4A/4B, and portions of Segments 5A/5B; Baker Maintenance of Way Facility: All of the foregoing would receive fire and emergency services from the San Bernardino County Fire Department. As of July 2008, the City of Victorville dissolved its own fire department, opting to contract with the County for fire and emergency response services. Many attempts were made to consult with the SBCFD regarding potential impacts to fire and emergency services that might result form the action alternatives. However SBCFD did not return numerous telephone and e-mail inquires. The action alternatives are not anticipated to result in significant impacts to fire and emergency response services because the SBCFD maintains several fire stations in the Victorville area that could respond to incidents at the Victorville station and/or maintenance facility. As indicated previously fire and emergency service needs for rail segments would primarily be related to potential train derailments. As discussed under Police Services the project's incorporation of crash barriers at all supporting columns of bridges at freeway interchanges and overpasses along with the implementation of Mitigation Measure 7, development of an emergency operations plan, would reduce effects of train derailments.

Portions of Segments 2A/2B: About 2.75 miles of rail alignment would be served by

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[52] Letter of inquiry with Las Vegas Police Department, January 2007.

[53] Ibid.

[54] Ibid.

[55] Personal communication with Trooper Kevin Hones, May 6, 2008.

the Barstow Fire Protection District (BFPD). The BFPD has indicated that present staffing levels are insufficient to meet the District's present demands. BFPD noted that the rail alignment would be within an area in which the BFPD could potentially maintain an 8 to 15 minute response time if proposed new facilities north of the Mojave River were to be constructed and staffed, which is currently outside BFPD's capability to fund. BFPD also notes that its staff has not received specific training with regard to fires or other emergencies that might be associated with high-speed passenger rail. [56]

Portion of Segment 4A: A three mile portion of Segment 4A would traverse the Mojave National Preserve and receive fire services from the Interagency Fire Center (IFC) located within the Preserve at Hole-in-the-Wall. According to the IFC, it is not anticipated that the Segment 4A would affect the fire or emergency services of the Preserve and that the Preserve would be able to respond to project needs.[57]

Portions of Segments 5A/5B and 6A/6B: These areas would receive fire and emergency response services from the Clark County Fire Department (CCFD). Current staffing levels of the department are at 0.89 responders per 1,000 residents, which is below CCFD's desired staffing level. CCFD states that implementation of the project would further strain staffing levels and require new staff, equipment and most likely, a new station located nearby the I-15 corridor outside of the right of way in the unincorporated portions of Clark County.[58]

Portions of Segments 5A/5B, 7A/7B, Option C; all Las Vegas area MSF and passenger station site options: These facilities would be served by Las Vegas Fire and Rescue (LVFR). LVFR reports that its staffing levels are sufficient to serve the proposed action. A long-standing concern of the LVFR is existing at-grade crossings of the Union Pacific Railroad (near Option C). LVFR reports that these passing trains, which are not grade-separated in many locations, currently impose delays in the ability to reach certain sites in the UPRR's vicinity, which could in turn adversely affect response times to portions of the proposed rail alignment. [59] Notably, the proposed rail alignments would be fully grade-separated, and would thus not impose any new sources of delay for fire/emergency response.

Utility Infrastructure Crossings

The proposed rail alignment would overlap and/or intersect with numerous utility conveyance systems, such as gas pipelines, electric transmission lines, and water/wastewater infrastructure. Although utilities infrastructure is a common feature

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[56] Letter of inquiry with Barstow Fire Department, April 2008.

[57] Personal communications with Chuck Heard, Mojave National Preserve, June 12, 2008.

[58] Ibid.

[59] Letter of inquiry with Las Vegas Fire and Rescue, January 2007.

within both rail and roadway corridors, some of the facilities within the I-15 corridor are major interstate facilities for the transport of petroleum products, electricity, and telecommunications. There is the concern that proposed rail alignments would conflict with such utility conveyance in a manner that would limit the effectiveness of the conveyance and/or threaten human health or safety.

Petroleum Pipelines: Three major interstate pipeline systems (owned and/or maintained by Southwest Gas Corporation (SGC), Kern River, and Kinder Morgan) would be crossed by rail alignments in several locations. Representatives of the project applicant coordinated extensively with each of these operating companies to more precisely identify opportunities to avoid conflicts and mitigation measures where conflicts could not be avoided. Mitigations are included below to address potential conflicts.

Electric Transmission Lines: The proposed rail alignments and portions of Victorville OMSF site 1 would be located beneath elevated electric transmission lines owned/operated by several companies. The project applicant consulted with each of these companies (Sierra Pacific/Nevada Power, Pacific Gas & Electric, and Southern California Edison). In these consultations, each company indicated that they did not anticipate any major conflicts associated with the proposed rail alignment running beneath electrical transmission lines. PG&E indicated that the lines are elevated throughout the project area and as such, would not pose a significant conflict to implementation of the proposed action.[60]

Major Water and Wastewater Conveyances: Proposed rail alignments would cross these conveyances, as detailed in the Affected Environment discussion. Mitigations are included below to address potential crossings.

Communications Lines: Proposed rail alignments would cross underground telecommunications lines, which run in the freeway corridor. Mitigations are included below to address any potential adverse effects of these crossings.

3.4.5 Mitigation Measures

The following avoidance, minimization, and mitigation measures will be incorporated to reduce adverse effects related to utilities and emergency services.

Mitigation Measure 1: Payment of connection and or user/service/tipping fees. The costs of any needed connections to utilities and service systems, as well as any usage fees, shall be borne by the project applicant, according to fee schedules as may be established by each utility/service system. Where such fees have not been established, the proposed applicant shall enter in development agreements with the controlling utility/service system. This shall also include fees associated with any required

[60] DesertXpress, memorandum on meetings with utility companies, July 24, 2008.

annexations to utilities or service districts.

Mitigation Measure 2*:* Minimize water usage through the incorporation water saving devices wherever required or feasible; require drought-tolerant landscaping at all facilities. Stations and maintenance facilities will utilize water for consumption, operations, and landscaping purposes. Wherever feasible, low water usage practices should be implemented, including in restrooms and landscaping. As the stations and maintenance facilities are located in regions with very low annual rainfall, any landscaping of such facilities shall feature drought-tolerant and/or xeriscape plantings that will minimize and/or avoid the need for any landscape watering.

Mitigation Measure 3: Obtain a water commitment from the Las Vegas Valley Water District during the design phase. The LVVWD has indicated that anticipated water demand associated with the proposed action would not exceed regional projections. However, LVVWD will not provide any project applicant with an assurance of water availability until the applicant obtains a "water commitment" from LVVWD to ensure that the proposed action would be served by enough water for usage and to meet fireflow requirements.

Mitigation Measure 4: Rail segments within freeway rights-of-way shall tie into existing freeway stormwater conveyance devices. Along the I-15 corridor, stormwater is discharged from roadways and median areas primarily through culverts or natural and/or manmade channels. New rail segments within the freeway corridor will have the potential to generate additional stormwater requiring discharge. The project applicant shall coordinate with the state transportation agencies in California and Nevada to ensure that the proposed rail alignments connect to existing stormwater discharge facilities. Wherever the addition of project-generated stormwater would exceed the capacity of existing discharge facilities, the project applicant shall either fund the upsizing of existing facilities or create new facilities that comply with local stormwater regulations.

Mitigation Measure 5: Develop appropriate stormwater conveyance structures/systems at station and maintenance facility sites, as well as points along railroad segments where it is not possible to connect to existing systems.

Mitigation Measure 6: Payment of impact fees for police, fire, and emergency services. The proposed action will create incremental demand for additional police, fire, and emergency services at proposed stations and maintenance facilities, as well as along rail alignments in times of emergencies. For each affected agency, the project applicant shall pay any development impact fees that may have been established by affected agencies at the time the applicant seeks a permit to construct.

Mitigation Measure 7: Develop a comprehensive emergency operations plan. To protect life safety for passengers and people traveling in the vicinity of the proposed rail alignments, the project applicant shall develop and periodically update and test a comprehensive emergency operations plan. This plan shall set forth protocols in the event of train derailments and other catastrophic events. The applicant shall be responsible for conducting briefings and/or trainings on the plan with all appropriate employees, as well as with representatives of local first responders and transportation agencies. This may include a training of local first responders regarding proposed rail facilities, including train sets, any catenary structures, and other unique features. The plan shall set forth appropriate lines of communication in the event of emergency events. The plan shall specifically identify protocols in the event an emergency involving a train derailment and blockage of any freeway lanes, an emergency in the proposed tunnels within Segment 4B, and emergencies involving loss of locomotive power in the event the EMU option is selected.

Mitigation Measure 8: Avoid or minimize conflicts with existing utility infrastructure. For water, wastewater, communications, local gas pipelines, and other physical facilities that the proposed rail alignments and/or stations would cross, the following mitigations would avoid or minimize any adverse effects.

Utility Type Intersected/Crossed	Mitigation Strategy
Water utilities	Protect pipelines/canals in place; span any crossings of open canals.
Local natural gas distribution systems	Protect/encase pipelines in place. Utilize alternating current if EMU locomotive option is selected.
Fiber optic/communications lines	Protect line, as appropriate

Additional mitigation for electrical transmission lines and major petroleum pipelines is provided below.

Electrical transmission lines: Continue to coordinate closely with all electric utilities as design moves forward to ensure that final design meets any design requirements that may be set forth for development beneath electrical transmission lines.

Petroleum pipelines: Continue to coordinate with pipeline companies into next phase of design and construction. Encase/protect all pipelines as needed to minimize any possible conflict, including any possible concerns about stray electrical current.

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3.5 TRAFFIC AND TRANSPORTATION

This section is based on a technical report prepared by the project applicant (Appendix E). The technical report was reviewed and verified by FRA and project cooperating agencies. This section summarizes the methodology and results of the traffic report, and identifies adverse effects and related mitigation measures.

Implementation of the proposed action or alternatives would result in a reduction in traffic on Interstate 15 between Victorville and Las Vegas. This reduction ranges from 400 to 500 vehicles per peak hour in the peak direction in 2013 to 1,100 to 1,400 vehicles in 2030, depending on whether the diesel-electric multiple unit (DEMU) or electric multiple unit (EMU) technology option is selected.

In the areas around the proposed rail stations, the DesertXpress project would result in higher traffic volumes through some nearby intersections. In general, these higher volumes can be mitigated by adding signalization and/or adding lanes to the intersection approaches.

With implementation of the recommended mitigation measures, all intersections, except for the existing intersections at Victorville Station Site 1, would operate at an acceptable Level of Service (LOS). Due to cumulative growth in the region, the two Stoddard Wells Road interchanges would operate at unacceptable levels by 2030. The addition of project traffic would increase this unavoidable cumulative impact.

3.5.1 REGULATIONS AND STANDARDS

3.5.1.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347), requires the consideration of potential environmental effects, including potential impacts to transportation and traffic systems, in the evaluation of any proposed Federal agency action. NEPA also obligates federal agencies to consider the environmental consequences and costs of their projects and programs as part of the planning process.

3.5.1.2 Federal Railroad Administration

FRA's *Procedures for Considering Environmental Impacts*[1] states that environmental assessments and environmental impact statements should consider possible impacts to all modes of transportation, including passenger and freight rail, as well as potential impacts to roadway traffic congestion.

[1] FRA Docket No. EP–1, Notice 5.

3.5.2 METHODS OF EVALUATION OF IMPACTS

3.5.2.1 Rail Ridership Study

The proposed action and action alternatives would introduce a new mode of travel in the Southern California to Las Vegas corridor and are anticipated to shift travelers from one mode (primarily automobile travel) to another (high speed rail). The magnitude of these potential shifts has been forecast in a rail ridership report prepared for the project applicant. FRA had the ridership study independently evaluated; the FRA evaluation and the original study are included as Appendix B.

The first step of the rail ridership study was to forecast the annual number of trips by each existing mode between Southern California and Las Vegas through 2035. Existing modes included air, auto, and bus. The ridership study then applied rail diversion factors to each mode to develop rail ridership. These rail ridership forecasts are the basis for the traffic analysis. Notably, the rail ridership study only included trips that originate in southern California; no trips to southern California originating in Las Vegas were contemplated.

Ridership projections for the project were developed through a comprehensive travel demand modeling process commissioned by DesertXpress Enterprises. Two technology options were considered for this project (EMU and DEMU, described in greater detail in Chapter 2.0, Alternatives). The EMU option would utilize trains with a larger passenger capacity than the DEMU. As a result, traffic reduction on I-15 between Victorville and Las Vegas would vary depending on the technology option chosen. Trip reduction is estimated in Table 3.5-1 below.

Table 3.5-1 Expected Vehicle Reduction on I-15

Alternative	Year	Average Annual Daily Rail One-way Trips	Daily Trips Diverted from Auto	Daily Trips Diverted from Bus	Daily Diverted Auto Volume	Daily Diverted Bus Volume	Total Daily Diverted Volume	Total Volume Reduction in Peak Hour of Peak Direction
DEMU	2013	11,098	9,988	1,110	4,060	18	4,097	410
DEMU	2030	29,732	26,759	2,973	10,878	50	10,977	1,098
EMU	2013	14,089	12,680	1,409	5,154	23	5,201	520
EMU	2030	37,745	33,970	3,774	13,809	63	13,935	1,393

Source: FRA's Ridership Review (Appendix B)

Assumptions Include:

a) Average daily trips were calculated from annual trips by dividing by 365.
b) Trips diverted from the auto and bus modes to rail will reduce traffic on the section of I-15 between Victorville and Las Vegas.
c) Rail trips diverted from auto were converted to vehicle trips using an average vehicle occupancy rate of 2.46 persons per vehicle.

d) Rail trips diverted from bus were converted to vehicle trips using an average vehicle occupancy rate of 60 persons per bus.
e) Peak hour diverted vehicle volumes were derived from average daily diverted vehicle volumes by applying the highway peak hour factor of 10%.
f) It is assumed that 90% of the reduced trips would be auto trips and 10% would be bus trips. The occupancy for one car is 2.46 passengers and that for bus is 60 passengers. The peak hour volume in the peak direction is assumed to be 10% of the daily trips.

3.5.2.2 Scenarios Evaluated

The traffic analysis focused on three separate areas, which were selected based on likely changes in traffic patterns. One focus area is the I-15 freeway mainline, which would experience a reduction in traffic due to introduction of the DesertXpress high speed rail.

As discussed under the heading "Rail Ridership Study" trips that would have been made by automobiles would be diverted to the train, thereby reducing the number of vehicles on I-15 between Victorville and Las Vegas. The other two focus areas are around the proposed station sites in Victorville and Las Vegas; specifically the local roadway intersections in these areas. Stations would be expected to increase the number of vehicles on local roadways around proposed station sites.

Two horizon years were selected for the traffic analysis: 2013 and 2030. The DesertXpress high speed rail is expected to begin operations in 2013. The out-year of 2030 was selected because it is about 20 years after the start of construction, and because it was the farthest year in the future for which regional travel forecasts were available for the metropolitan Las Vegas area. In the Victorville area, intersections were also analyzed for existing conditions. This was done due to uncertainty regarding the completion date of the South Stoddard Wells Road interchange relative to the opening date of the DesertXpress rail project.

In the future, Interstate 15 is anticipated to remain in its existing configuration for most the distance between Victorville and Las Vegas, except for capacity improvements in the urban areas. The following capacity expansion projects are assumed to be reasonably foreseeable and thus included in the No Action Alternative, consistent with Section 2.0 of the Traffic Impact Study (Appendix E).

California Improvements

- Widen bridge over Mojave River in Victorville; reconstruct D Street, E Street, and South Stoddard Wells Road interchange.
- Widen approximately 1 mile of freeway to 6 lanes and reconstruct an interchange in Barstow.
- Add several truck lanes in sections with steep grades.

Nevada Improvements

- “NEON” project in the City of Las Vegas, includes reconstruction of Charleston interchange, local access improvements, and a HOV direct connector from US 95 to I-15.

- “I-15 South” project from Sloan Road to Tropicana Avenue includes new interchanges at Bermuda Road, Starr Ave. and Cactus Road, plus reconstruction of Sloan Road interchange.

For the purposes of this EIS, these planned transportation improvements are assumed to occur under both the No Action Alternative and the Action Alternatives by 2030.

In addition to the highway capacity improvements on I-15, other transportation improvements near Victorville and within Clark County are anticipated but were not found to be reasonably foreseeable and were thus not taken into account in the traffic impact study for the DesertXpress project. In the Victorville area, planning is underway for the High Desert Corridor (HDC) roadway project, which would intersect with I-15 between the Stoddard Wells Road interchanges at a freeway-to-freeway interchange. This section of the HDC is part of a longer roadway facility envisioned to extend from I-15 near Lancaster and Palmdale to the east of Victorville. However, the HDC segment between I-15 and US 395 would be constructed during the earlier phases of construction. Furthermore, the City of Victorville is preparing a specific plan for the North Mojave area. The North Mojave area extends along I-15 from the Mojave River to the north of the Dale Evans Parkway interchange. However, planning work is not yet complete and the assumed roadway configuration within the North Mojave area is preliminary at this time.

Clark County is considering a new airport in the Ivanpah Valley, just south of Las Vegas. The new airport would supplement the existing McCarran airport in Las Vegas. While specific site plans for the proposed Ivanpah airport are not yet complete, the new airport project has furthered the consideration of adding roadway capacity on the I-15 corridor, either through freeway widening and/or the construction of a new arterial roadway. Additionally, Clark County Department of Aviation is proposing the construction of the Southern Nevada Regional Heliport, which would be located near Sloan Road and I-15.

Since ridership forecasts differ between the EMU and DEMU technology options (the shorter travel time associated with the EMU is expected to attract a higher level of ridership than the DEMU), traffic effects from both technology options are analyzed.

3.5.2.3 Level of Service

Level of Service (LOS) is a measure used to determine the quality of transportation flow. How it is calculated varies between highways and intersections, as explained below.

I-15 Mainline: For freeway mainlines, the HCM methodology determines LOS based on the density of the freeway section, which is the number of vehicles within a given section of roadway for a period of time (presented in passenger cars per mile per lane, or pc/mi/ln).[2]

I-15 Ramp Junctions: For the freeway-ramp junctions, the HCM methodology determines the LOS based on density of vehicles in the area of the freeway directly downstream or upstream of the analysis ramp (presented in passenger cars per mile per lane, or pc/mi.ln).

Table 3.5-2 presents the definitions LOS threshold values for freeway sections and ramp junctions.

Table 3.5-2 Freeway Mainline and Ramp Junction Level of Service Description

Level of Service	Freeway Density Range (passenger cars/mile/lane)	Ramp (Merge and Diverge area) Density Range (pc/mi/ln)
A	0 to 11	≤ 10
B	> 11 to 18	> 10 to 20
C	> 18 to 26	> 20 to 28
D	> 26 to 35	> 28 to 35
E	> 35 to 45	> 35
F	> 50	Demand exceeds capacity

Source: *Highway Capacity Manual*, Transportation Research Board, 2000.

In California and Nevada, LOS E and F are considered unacceptable service conditions. Intersection LOS is based on anticipated delays at the intersection. Intersection LOS levels and corresponding delays are provided in Table 3.5-3.

Table 3.5-3 Intersection Level of Service Description

Level of Service	Signalized Intersections Delay Thresholds, seconds per vehicle	Unsignalized Intersections Delay Thresholds, seconds per vehicle
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50

[2] Density is not computed when free-flow speed is less than 55 mph. Under LOS F conditions, free-flow speed drops to below 55 mph.

F	> 80	> 50

Source: *Highway Capacity Manual*, 2000.

Victorville Area: According to the City of Victorville and the San Bernardino County Congestion Management Plan (CMP), the LOS at an intersection would be considered unacceptable if it falls below LOS D.

Las Vegas Area: As determined by the Regional Transportation Commission in Nevada LOS at an intersection would be considered unacceptable if it falls below LOS D. A description of Level of Service intersection standards are discussed in Table 3.5-3 above.

3.5.2.4 Forecasting Methodology

In order to determine traffic effects from the DesertXpress high speed rail (to be discussed in subsequent sections) in the two horizon years, future background traffic volumes needed to be obtained. Project volumes are then added to these future volumes before comparison of level of service can be made between the 'with' and 'without' project scenarios. The comparison results would be the project impact.

A full description of the methodology used and assumptions made is presented in detail within the traffic report (see Appendix E).

3.5.3 Affected Environment

3.5.3.1 Study Area Roadways

This section discusses the existing transportation networks relevant to the proposed action and alternatives.

I-15 Mainline

Currently I-15 is the only significant surface transportation route between Victorville and Las Vegas. The general number of traffic lanes on I-15 is described below:

- Victorville to Barstow - Three lanes each way with a fourth southbound truck lane coming out of Barstow up to the summit
- SR-58 to I-40 - Three lanes each way plus some auxiliary lanes
- I-40 to Baker - Two lanes each way
- Baker to State Line - Two lanes each way with a truck lane approaching Halloran Summit (about 17 miles north of Baker) and at Mountain Pass (about 15 miles south of the State Line)
- State Line to I-215 - Three southbound lanes and two northbound lanes, with an additional northbound lane currently being constructed
- I-215 to Flamingo Road in Las Vegas - Three lanes each way plus auxiliary lanes
- North of Flamingo Road in Las Vegas - Four lanes each way

Victorville Station Area

The two Stoddard Wells Road interchanges with I-15 would provide the most direct regional access to the proposed station site options. Affected intersections are:

2. Stoddard Wells Road and I-15 NB Ramps
3. Stoddard Wells Road and Quarry Road
4. I-15 SB Ramps and Quarry Road

Currently, the local roadway system in this area has a single travel lane in each direction. Owing to the relatively low traffic volumes, these intersections are stop-sign controlled.

The Victor Valley Transit Authority (VVTA) provides local transit service throughout the Victor Valley, including Victorville and San Bernardino County communities. The following bus line operates in the vicinity of the proposed station location.

The Route 22-Helendale is a local service running from Silver Lakes Market to Lorene Transfer Station, with approximately 120 minute headways from 6:00 AM to 8:00 PM, Monday to Saturday.

Las Vegas Southern Station Existing Roadway Network

Tropicana Avenue is a two-way east-west principal arterial. This roadway extends from south of Town Center Drive to the north of Broadbent Boulevard. In the vicinity of the proposed Southern Station location, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Hacienda Avenue is a two-way east-west minor collector. This roadway extends from Wynn Road to Dean Martin Drive where it merges Mandalay Bay Road. In the vicinity of the proposed Southern Station location, this street generally has two lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Mandalay Bay Road is a two-way east-west minor collector. This roadway extends from Dean Martin Drive to Las Vegas Blvd where it merges Hacienda Ave. In the vicinity of the proposed Southern Station location, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Russell Road is a two-way east-west minor arterial. This roadway extends from John Boulevard to west of Las Vegas Boulevard. In the vicinity of the proposed Southern Station location, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Las Vegas Central Station A and B Area *Existing Roadway Network*

Industrial Boulevard is a two-way north-south minor arterial. This roadway extends from north of Sahara Avenue to Twain Avenue where it merges into Dean Martin Drive. In the vicinity of the proposed Central Station site options, this street generally has two lanes in each direction with sidewalk on the east side of the street. On-street parking is generally not permitted on both sides of the street.

Valley View Boulevard is a two-way north-south minor arterial. This roadway extends from Washington Avenue at the north to Flamingo Road at the south. In the vicinity of the proposed Central Station site options, this street generally has two lanes in each direction and a center turning lane, with sidewalks on both sides of the street. On-street parking is generally not permitted on both sides of the street.

Spring Mountain Road is a two-way east-west minor collector. This roadway extends from east of Decatur Blvd to Las Vegas Boulevard Avenue where it merges into Sands Avenue. In the vicinity of the proposed Central Station site options, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Twain Avenue is a two-way east-west minor collector. This roadway extends from Town Center Drive to the east of Frank Sinatra Drive. In the vicinity of the proposed Central Station A location, this street generally has three lanes in the westbound direction and two lanes in the eastbound direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Flamingo Road is a two-way east-west minor arterial. This roadway extends from south of Desert Inn Road/ Red Rock Ranch Road to Stephanie St. In the vicinity of the proposed Central Station site options, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Las Vegas Downtown Station Area Existing Roadway Network

Las Vegas Boulevard is a two-way north-south minor arterial. The roadway generally has three lanes in each direction with sidewalks on both sides of the street in the study area. In the vicinity of the proposed Downtown station, this street provides access to I-515 via the ramps located north of the station.

Main Street is a two-way north-south minor arterial. This roadway extends between Las Vegas Boulevard/5th Street at the north and Las Vegas Boulevard/East St. Louis Avenue at the south. In the vicinity of the proposed Downtown station, this street generally has one lane in each direction with sidewalks on both sides of the street. On-street parking is permitted on the east side of the street.

Grand Central Parkway is a two-way north-south minor collector. This roadway extends between Main Street at the north and Charleston Boulevard at the south. In the vicinity of the proposed Downtown station, this street generally has two lanes in each direction with a sidewalk on the west side of the street. On-street parking is generally not permitted on both sides of the street.

Martin Luther King Boulevard is a two-way north-south minor arterial. This roadway extends between Craig Road at the north and Oakey Boulevard at the south. In the vicinity of the proposed Downtown station, this street generally has two lanes in each direction with a sidewalk on the west side of the street. On-street parking is generally not permitted on both sides of the street. Southbound I-15 from the Downtown station can be accessed via the ramps on Martin Luther King Boulevard south of Charleston Avenue.

Rancho Drive is a two-way north-south roadway that extends between highway 95 at the north and I-15 at the south. In the vicinity of the proposed Downtown station location, this street generally has two lanes in each direction and a center turning lane, with sidewalks on both sides of the street. On-street parking is generally not permitted on both sides of the street.

Bonneville Avenue/Alta Drive is a two-way east-west minor arterial. Bonneville Avenue extends from east of I-15 to Charleston Boulevard. On the west of I-15, Bonneville Avenue continues as Alta Drive and extends west outside the project limits.

Charleston Boulevard is a two-way east-west principal arterial. This roadway extends from west of Decatur Boulevard to east of Las Vegas Boulevard. In the vicinity of the proposed Downtown station, this street generally has three lanes in each direction with sidewalks on the both sides of the street. On-street parking is generally not permitted on both sides of the street.

Existing Transit Conditions Near Las Vegas Station Site Options

The proposed station locations in Las Vegas, Nevada are well served by public transit. Following section describes the various transit facilities operating near the proposed station locations:

The **103-Decatur** is a 24-hour bus service running along Decatur Boulevard. This service runs from Decatur/Rome to Decatur/Tropicana with approximately 20 minute headways from 5:00AM to 8:00PM and 40-60 minute headways for the rest during weekdays.

The **104-Valley View/ Torrey Pines** runs from Alexander/ Rancho to South Strip Transfer Terminal with approximately 30 minute headways from 4:30 AM to 7:00 PM and 40-60 minute headways for the rest during weekdays.

The **105-Martin L. King** is a 24-hour bus service running along Martin Luther King Blvd. This service runs from Camino Al Norte/ Ann to Downtown Transportation Center with approximately 30 minute headways from 5:00AM to 8:00 PM and 60 minute headways for the rest during weekdays.

The **113-Las Vegas Blvd** is a 24-hour service running along Las Vegas Blvd. This service connects from Las Vegas Blvd (Wal-mart Supercenter) to the Downtown Transportation Center. This service runs with approximately 30 minute headways.

The **201-Tropicana** is a 24-hour bus service running along Tropicana Avenue. This service connects Andover on the east (east of I-515) to Durango Avenue intersection on the west (west of I-15). This service runs with approximately 15 minute headways from 5:00 AM to 8:00 PM and approximately 20-60 minute headways for the rest during weekdays.

The **204-Sahara** is a 24-hour bus service running along Sahara Avenue. This service runs from Sahara/ Fort Apache to Sahara/ Sloan intersection with approximately 20 minute headways from 5:00 AM to 8:00 PM and approximately 30-60 minute headways for the rest of the weekdays.

The **206-Charleston** is a 24- hour bus service running along Charleston Blvd. This service runs from the Red Rock Station to the Charleston and Sloan intersection with approximately 45 minute headways for the weekdays and 20-35 minute headways for the weekends and holidays.

The **207-Alta/Stewart** runs from Rainbow/ Westcliff to Bonanza/ Nellis with approximately 60 minute headways for Eastbound. For the Westbound, it runs approximately 30 minute headways from 5:30 AM to 6:30 PM and 40-60 minute headways for the rest during weekdays.

The **202-Flamingo** is a 24-hour bus service running along Flamingo Road from Grand Canyon Parkway Shopping Center to Harmon/ Boulder Hwy with approximately 10-15 minute headways from 5:00 AM to 7:00 PM and 20-30 minute headways for the rest during weekdays.

The **203-Spring Mountain/Twain** runs from Durango/ Tropicana to Flamingo/ Pecos with approximately 30-minute headways from 5:30 AM to 6:30 PM and 40-60 minute headways for the rest during weekdays.

The **Deuce-Las Vegas Blvd** is a 24-hour bus service running along Las Vegas Blvd. This service runs from Las Vegas/ Stewart to South Strip Transfer Terminal Center (SSTT) with 7 minute headways from 3:00 PM to 11:00 PM and 8-17 minute headways at all other times. This service stops at virtually every hotel, casino and every quarter mile in each direction along the Las Vegas Strip.

3.5.3.2 Baseline Conditions

I-15 Mainline

The operating conditions for the freeway mainline were evaluated using the *Highway Capacity Manual (HCM)* methodology.

Interstate 15 (I-15) mainline conditions were evaluated for the following sections for weekday AM and PM peak hours:

1. North Stoddard Wells to Junction I-40 (California)
2. Junction I-40 to Nevada State Line (California)
3. Primm to Sloan (Nevada)
4. Sloan to I-215 (Nevada)

These sections are also indicated on Figure 3.5-1. These sections do not correspond exactly to the proposed railway segments and should be considered separately.

For the I-15 mainline analysis sections in California, volumes for existing (year 2007) and year 2013 baseline conditions were obtained by interpolating between year 2006 and year 2030 volumes provided by the San Bernardino Association of Government's (SANBAG) travel demand model. Similarly for the I-15 mainline analysis sections in Nevada, volumes for existing (year 2007) and year 2013 baseline conditions were obtained by interpolating between year 2005 and year 2030 volumes provided by Regional Transportation Commission (RTC) travel demand model.

For the future year 2030, cumulative conditions, traffic volumes were obtained from the SANBAG travel demand model. Similarly for the mainline analysis sections in Nevada, cumulative conditions volumes for the future year 2030 were obtained from the RTC travel demand model.

It was assumed that the following improvements would be made between the year 2013 and 2030:

- Between Primm and Sloan, the I-15 mainline would be expanded from 2 northbound lanes and 3 southbound lanes to 4 lanes in each direction.
- Between Sloan and I-215, the I-15 mainline would be expanded from 3 lanes in each direction to 5 lanes in each direction.

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FREEWAY SECTIONS EVALUATED

FIG 3-5.1

Source: DMJM Harris, 2008.

EMU and DEMU Conditions I-15 Mainline

Future conditions were modeled by subtracting the anticipated reduction in the number of trips (Table 3.5-1), from modeled baseline I-15 mainline traffic volumes.

Ramp Junctions

The operating conditions for the ramp junctions were evaluated using the *Highway Capacity Manual (HCM)* methodology.

The ramp junction conditions were evaluated for the following locations for PM peak hour. Ramp junctions 1 through 4 indicate merge and diverge areas at the station location alternative 1 and ramp junctions 5 through 8 are near the station location alternative 2.

1. I-15 NB Off-ramp to Stoddard Wells (Diverge analysis)
2. I-15 SB Off-ramp to Stoddard Wells (Diverge analysis)
3. I-15 NB On-ramp from Stoddard Wells (Merge analysis)
4. I-15 SB On-ramp from Stoddard Wells (Merge analysis)
5. I-15 NB Off-ramp to North Stoddard Wells (Diverge analysis)
6. I-15 SB Off-ramp to North Stoddard Wells (Diverge analysis)
7. I-15 NB On-ramp from North Stoddard Wells (Merge analysis)
8. I-15 SB On-ramp from North Stoddard Wells (Merge analysis)

The ramp junction volumes for the existing (year 2007) conditions were obtained by interpolating between year 2006 and year 2035 volumes provided by the San Bernardino Association of Government's (SANBAG) travel demand model.

The future years 2013 and 2030 baseline volumes were obtained by interpolating between the existing year and future year 2035 travel demand volumes.

EMU and DEMU Conditions – Ramp Junctions

Future projects conditions were modeled by adding the project volumes to the baseline volumes from the SANBAG travel demand model for each of the station location alternatives.

Baseline Conditions Victorville Area

Intersection analysis was performed according to requirements the San Bernardino County CMP, which follows Highway Capacity Manual (HCM) methodologies, implemented using SYNCHRO Version 7 software.

Intersection LOS conditions were analyzed for weekday PM peak period (4:00 PM to 6:00 PM) at the study intersections. PM peak hour traffic counts were obtained at the study intersections. The study intersections varied depending on the station site option chosen. A total of 13 intersections were analyzed (including future project intersections) for the two proposed station location alternatives.

Victorville Station site 1: Victorville Station site 1 would be located along the west side of I-15 between the two existing Stoddard Wells Road interchanges. Access to this station would be via the two existing Stoddard Wells Road interchanges. The following intersections were identified for analysis purposes as shown on Figure 3.5-2:

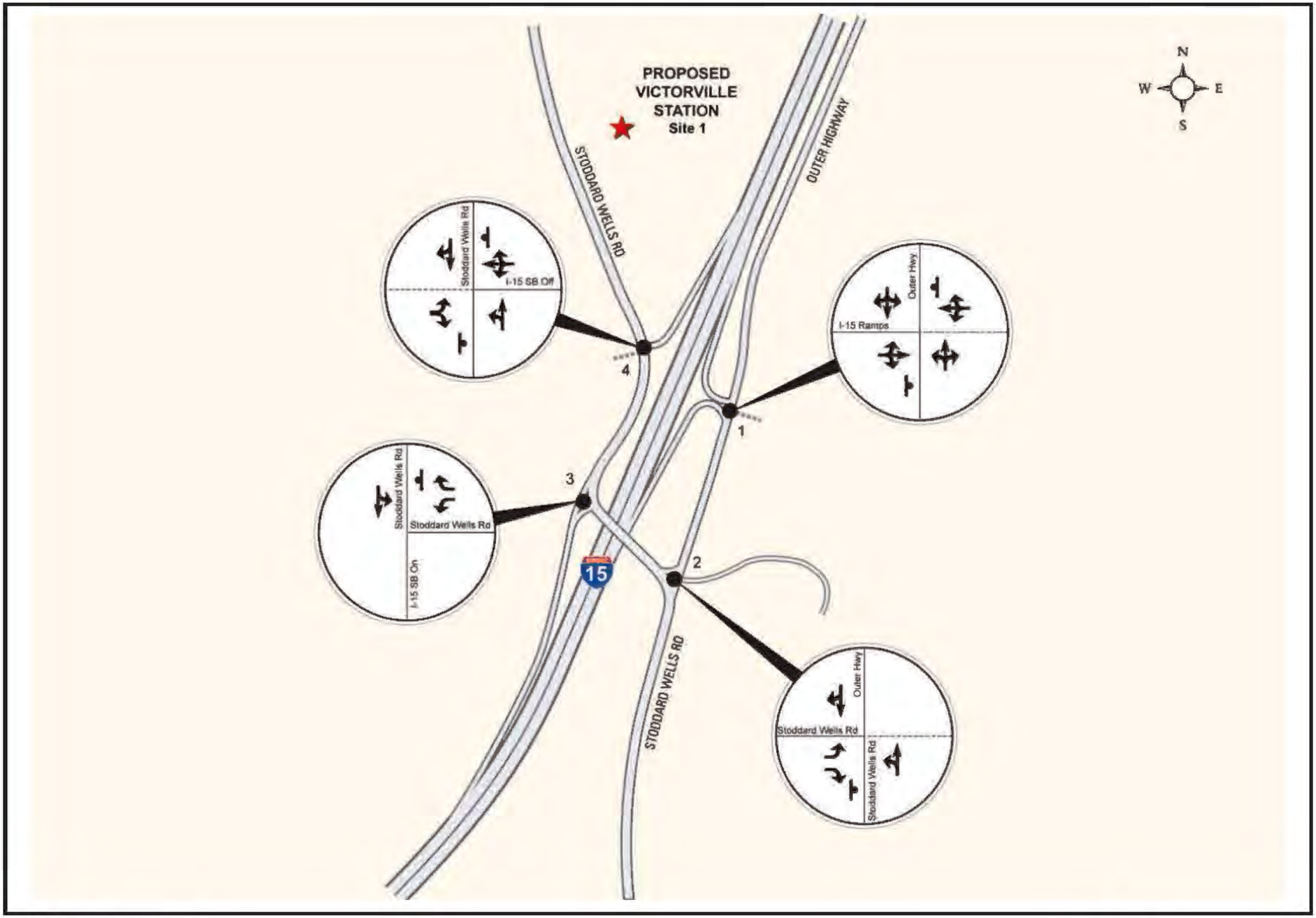
1. Outer Highway & I-15 NB Ramps
2. Outer Highway & Stoddard Wells Rd
3. Stoddard Wells Rd & I-15 SB Off-Ramp
4. Stoddard Wells Rd & I-15 SB On-Ramp

Victorville Station Site Option 2: Victorville Station site 2 would be located along the west side of I-15 between the two existing Stoddard Wells Road interchanges. Access to this station would be via the existing northerly Stoddard Wells Road interchange. The following intersections in the vicinity of the station location were identified for analysis purposes:

1. Stoddard Wells Road and I-15 NB Ramps
2. Stoddard Wells Road and Quarry Road
3. I-15 SB Ramps and Quarry Road

These intersections are shown in Figure 3.5-3.

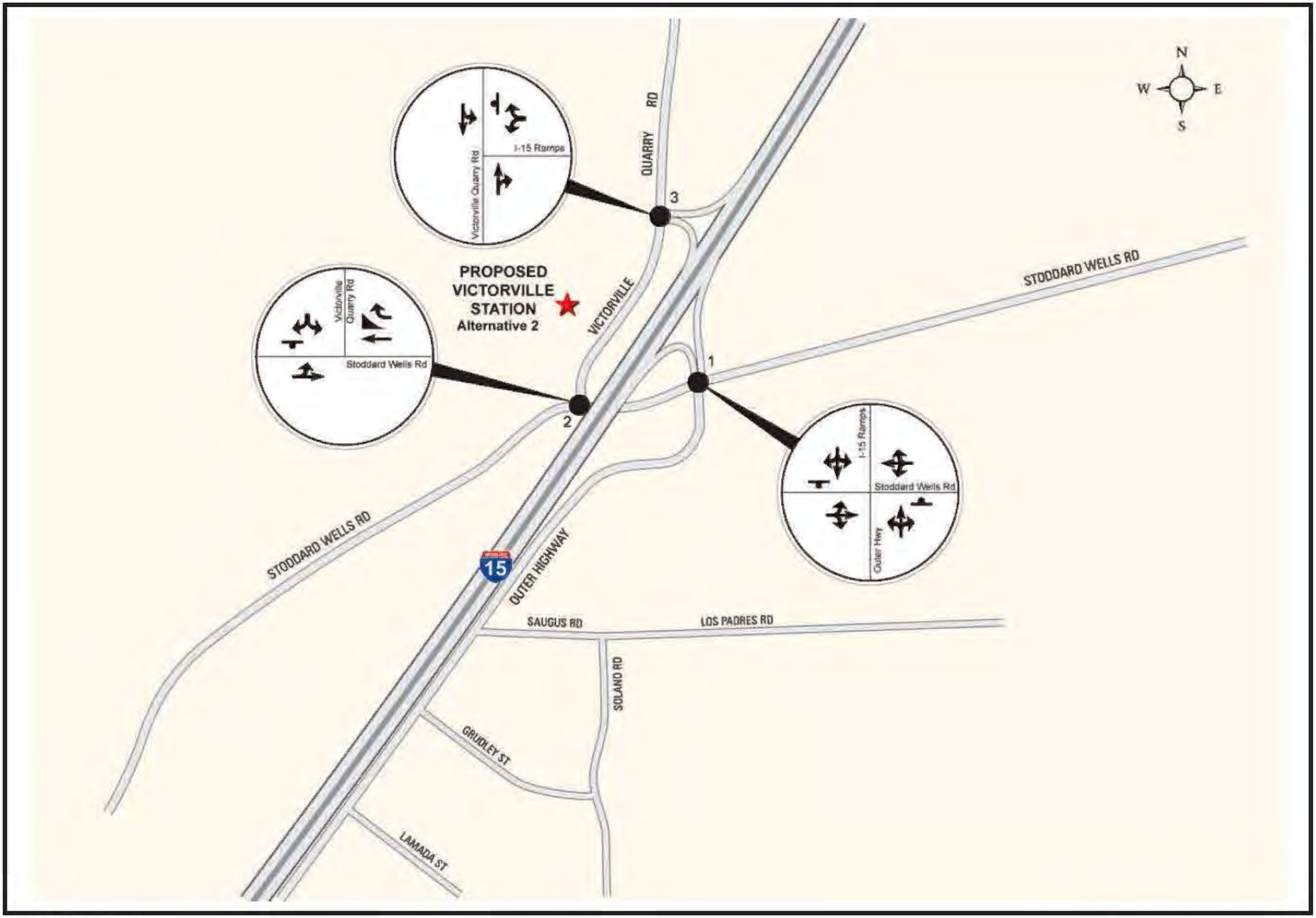
For analysis purposes, existing intersection geometry was assumed for future year 2013 conditions. By 2030, intersection geometry would change as shown in Figures 3.5-4 and 3.5-5.



EXISTING INTERSECTION LANE GEOMETRY
Victorville Station Site 1

FIG 3-5.2

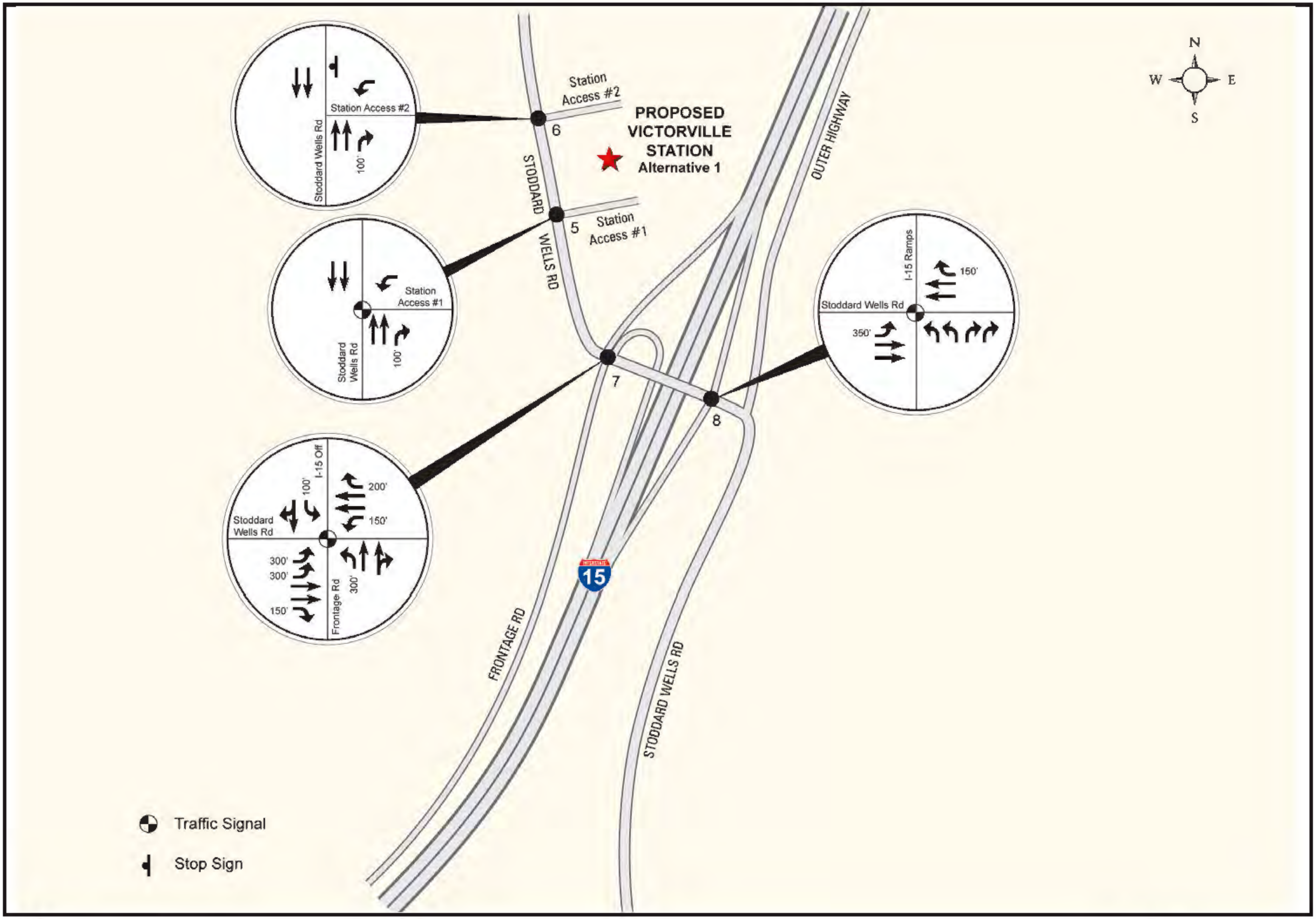
Source: DMJM Harris, 2008.



EXISTING INTERSECTION LANE GEOMETRY
Victorville Station Site 2

FIG 3-5.3

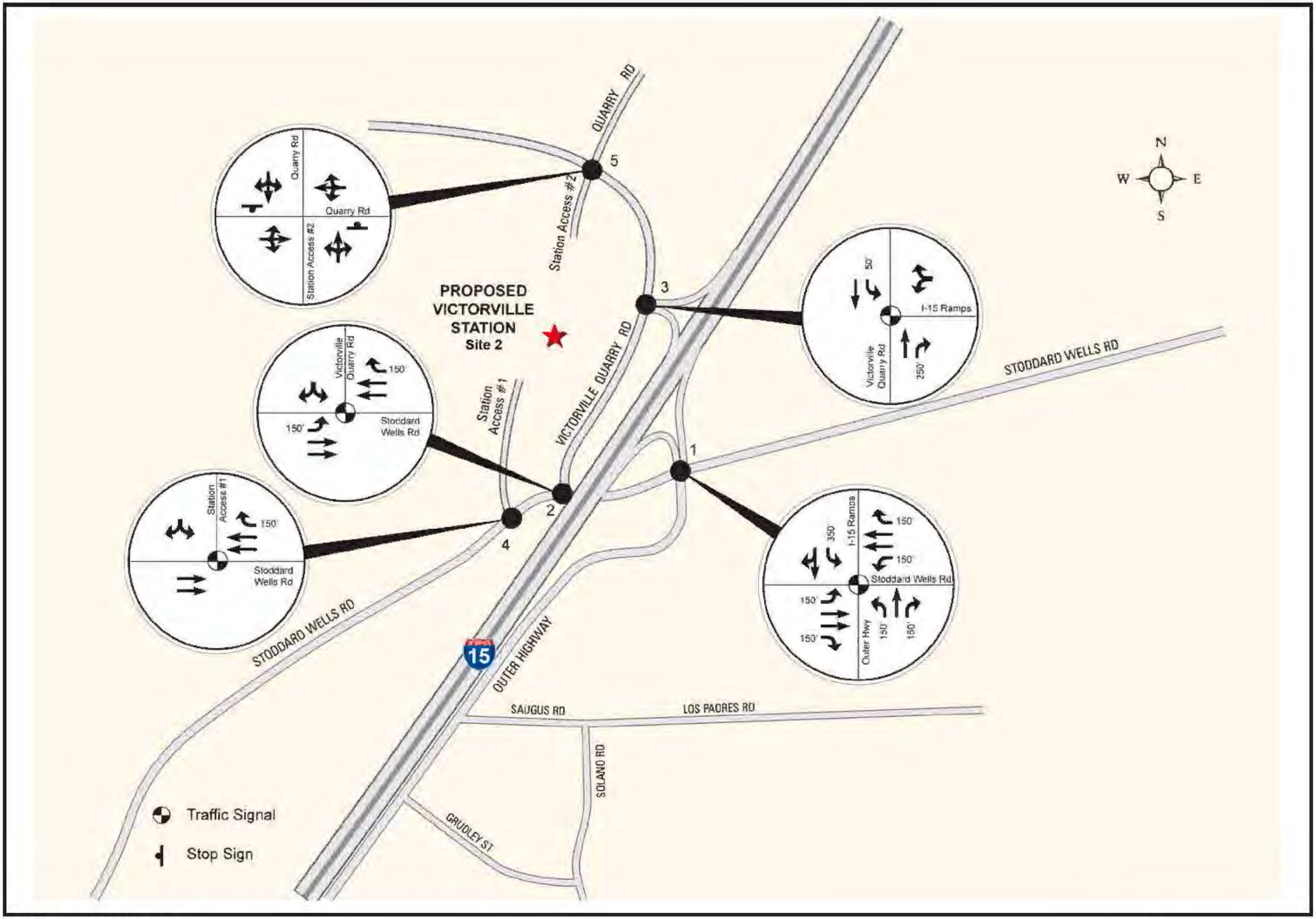
Source: DMJM Harris, 2008.



FUTURE YEAR 2030 INTERSECTION LANE GEOMETRY
Victorville Station Site 1

FIG 3-5.4

Source: DMJM Harris, 2008.



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FUTURE YEAR 2030 INTERSECTION LANE GEOMETRY
Victorville Station Site 2

FIG 3-5.5

Source: DMJM Harris, 2008.

Project Conditions, Victorville Area

Railway Related Travel Demand: The Victor Valley Area Transportation Study (VVATS) travel demand forecasting model was used to develop the baseline "no-project" travel forecasts for future year 2013 and 2030 traffic analysis. The City of Victorville provided future year 2035 travel forecasts from the model. A straight line method was used to interpolate the intermediate year growth factors for each network link in the model. The calculated growth factors were applied to the existing volumes to generate analysis year volumes. The additional EMU- or DEMU-related trips were then added to the future year base volumes to determine with-project conditions.

Trip generation estimates take into account that passengers will arrive or leave stations via one of 5 modes: self drive, "kiss and ride," charter bus, shuttle bus, and taxi. The analysis also considered the number of trips generated by workers and the OMSF sites.

Trip Distribution, Victorville Station Site Options: The overall trip distribution for the stations is shown in Figures 3.5-6 and 3.5-7. Due to the proximity of Victorville Station site 1 to the southern I-15 /Stoddard Wells Road interchange, it is assumed that all vehicle trips generated by the proposed station would use this interchange. Hence, no project traffic is assigned to the northern I-15 / Stoddard Wells Road interchange. On the other hand, due to the proximity of Victorville Station site 2 to the northern I-15/Stoddard Wells Road interchange, it is assumed that all vehicles generated by the proposed station would use this interchange.

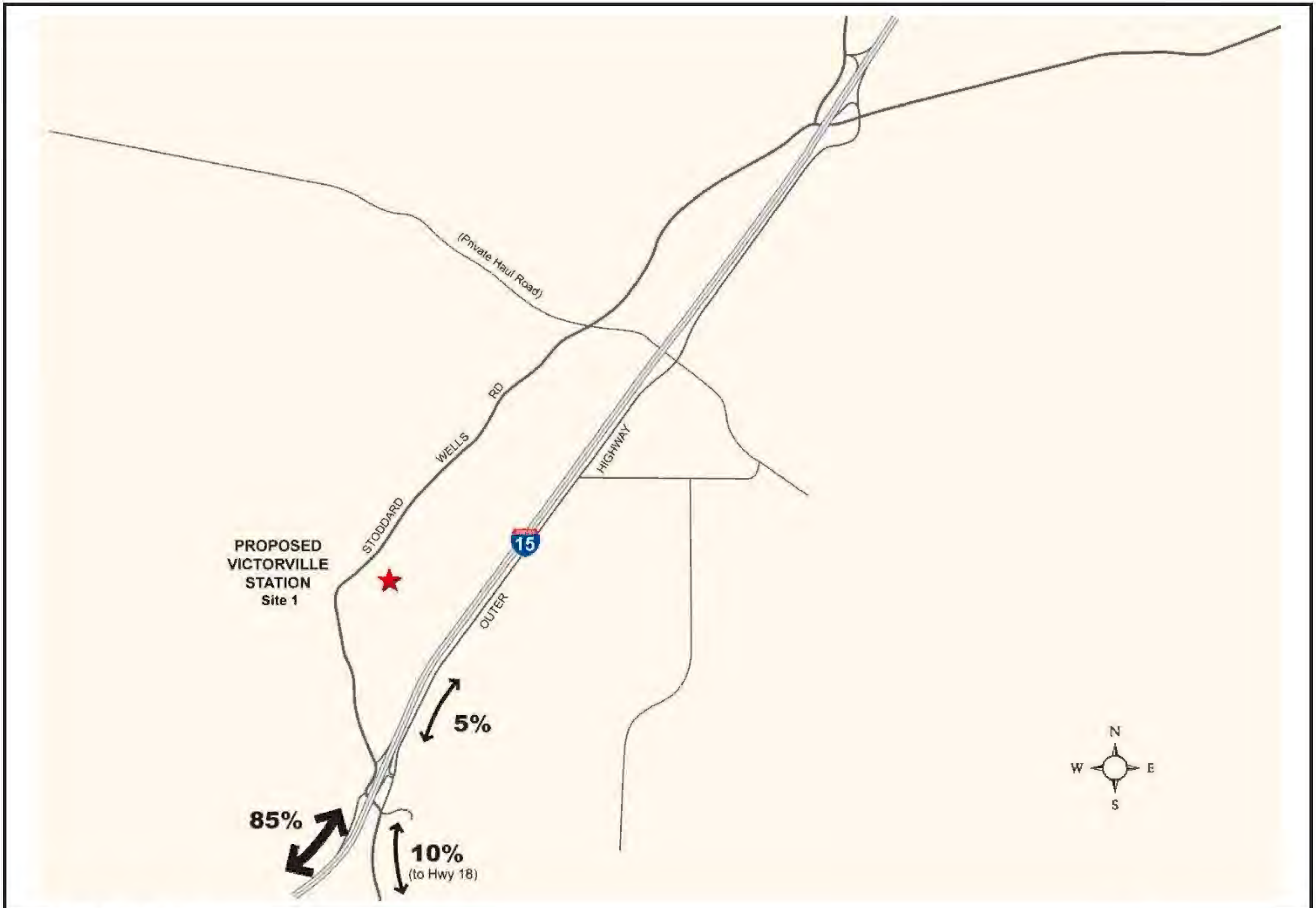
Baseline Conditions Las Vegas Area

The intersection analysis was performed using the Highway Capacity Manual (HCM) methodologies, a requirement of the Regional Transportation Commission of Southern Nevada (RTC), which was implemented using SYNCHRO Version 7 software.

Intersection LOS conditions were analyzed for the weekday PM peak period (4:00 PM to 6:00 PM) at the study intersections. Turning movement counts at intersections in Clark County's jurisdiction were collected for this project in 2008. The City of Las Vegas provided turn volumes for all intersections in its jurisdiction. The study intersections varied depending on the station site option chosen. Four station site options were examined for the Las Vegas area; these generated a total of 48 intersections that were analyzed for potential effects.

Southern Station: Figure 3-5.8 shows the location and existing lane geometry for the 11 study intersections around the Southern Station site. The Southern Station site can be accessed from I-15 via ramps located at West Russell Road.

Central Station A: Figure 3-5.9 shows the location and existing lane geometry for the 13 intersections evaluated for the Central Station A site option. The Central Station A site can be accessed from I-15 via ramps located at Flamingo Road.



VICTORVILLE STATION TRIP DISTRIBUTION
Site 1

FIG 3-5.6

Source: DMJM Harris, 2008.

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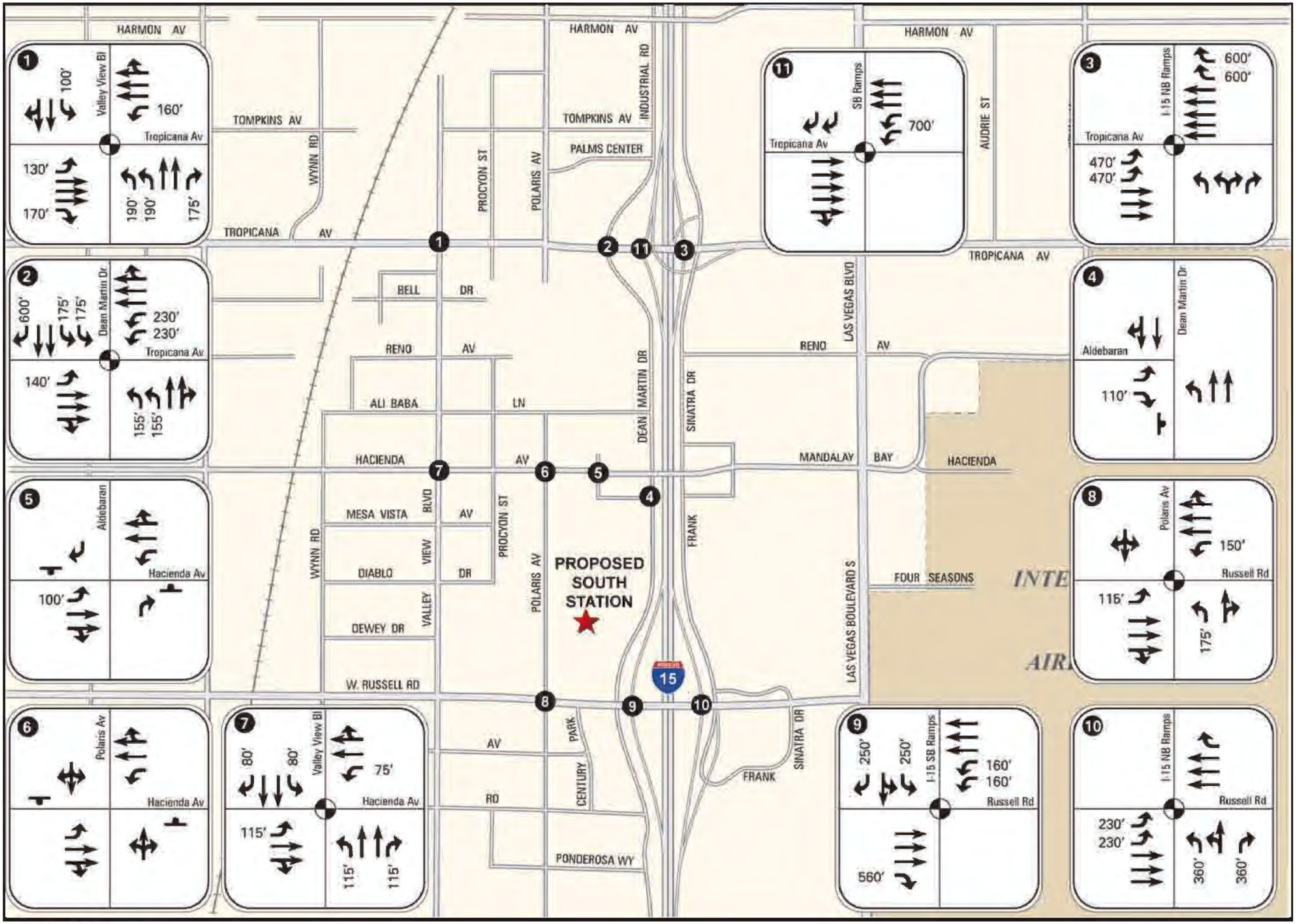
VICTORVILLE STATION TRIP DISTRIBUTION
Site 2

FIG 3-5.7

Source: DMJM Harris, 2008.



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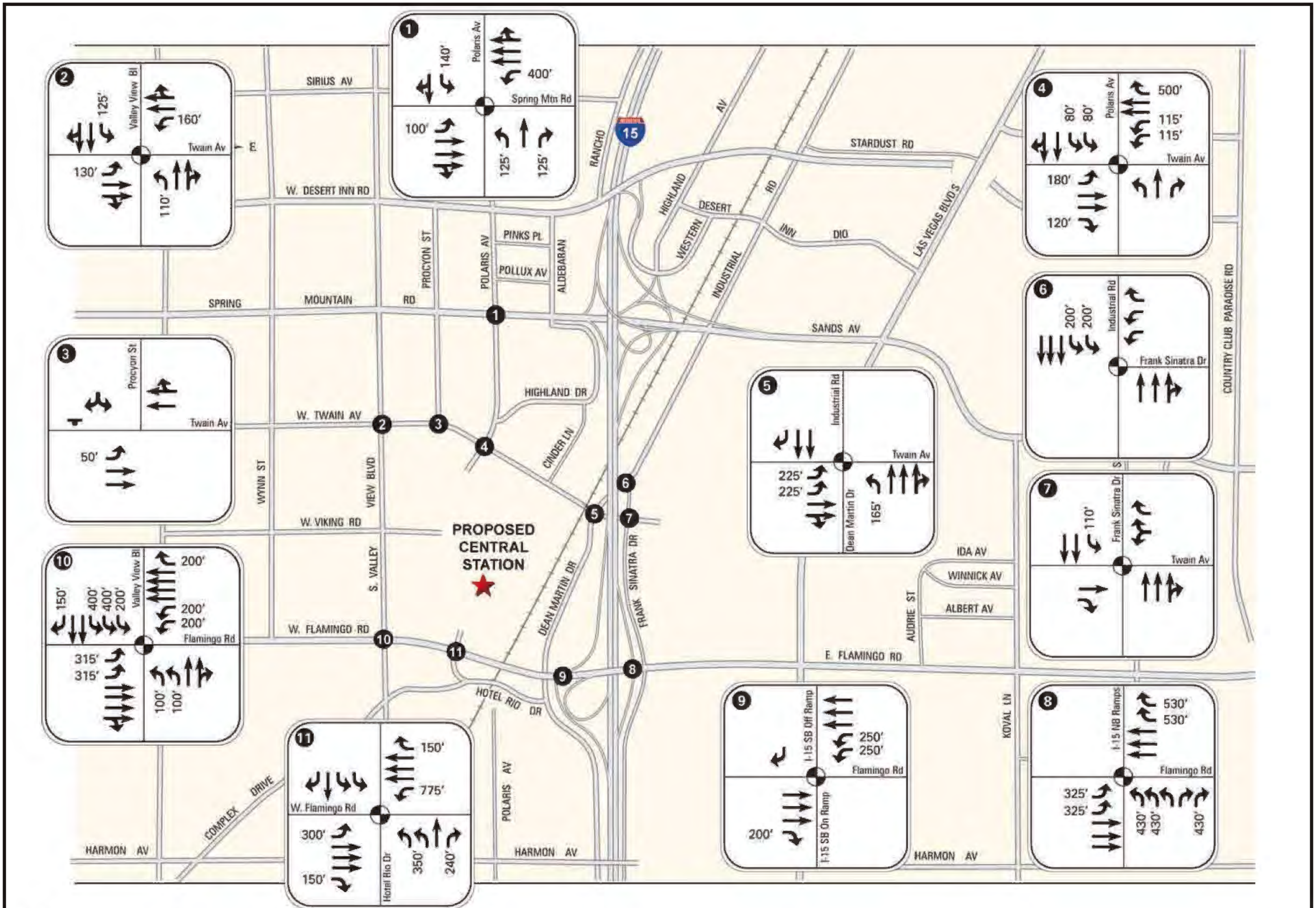
EXISTING INTERSECTION GEOMETRY
Southern Station

FIG 3-5.8

Source: DMJM Harris, 2008.



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EXISTING INTERSECTION GEOMETRY
Central Station A

FIG 3-5.9

Source: DMJM Harris, 2008.

Central Station B: Figure 3-5.10 shows the location and existing lane geometry for the 10 study intersections around the Central Station B site. Auto access to Central Station B would be via I-15 ramps located at Flamingo Road and Tropicana Avenue.

Downtown Station: The Downtown Station site option and lane geometry around the 14 evaluated intersections are shown in Figure 3-5.11. Access to the Downtown Station site from I-15 would be via ramps located at South Grand Central Parkway and West Charleston Boulevard and from I-515 via ramps located at North Las Vegas Boulevard.

Project Conditions Las Vegas Area

Railway Related Travel Demand: RTC travel demand forecasting model was used to develop the baseline "no-project" travel forecasts for the future years 2013 and 2030 traffic analyses. RTC provided future year 2030 travel forecasts from the model. The traffic analysis (Appendix E) applies a straight-line method to interpolate the intermediate year growth factors. The calculated growth factors were then applied to the existing volumes to generate analysis year volumes. The additional EMU- and DEMU-related trips were then added to the future year base volumes to determine "with project conditions."

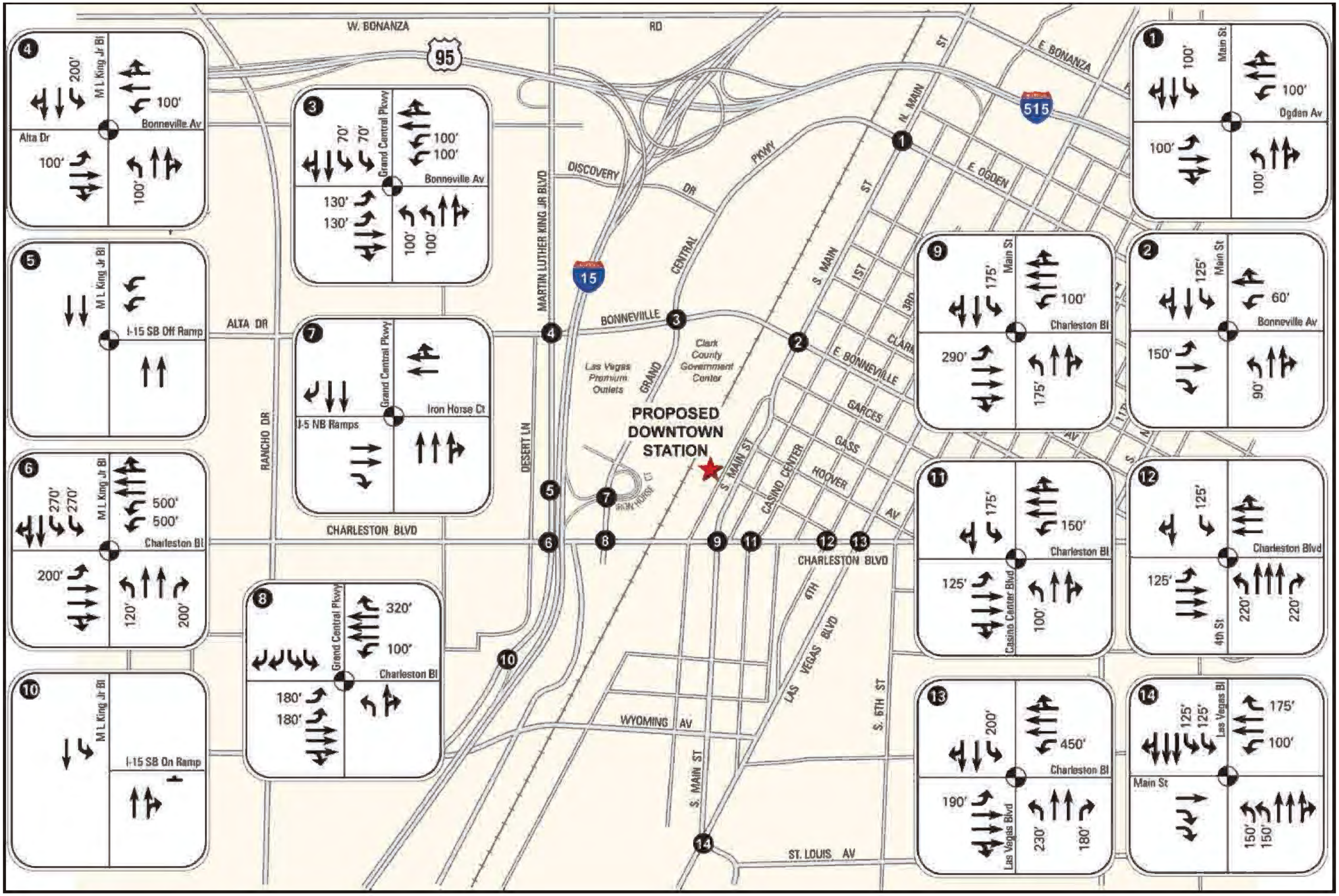
Trip generation took into account that the expected number of passengers using the project's stations will arrive or leave the station via 5 modes: rental car, "kiss and ride," charter bus, shuttle bus, and taxi. The analysis also considered the number of trips generated by station workers and employees accessing the potential MSF sites.

Trip Distribution: Trip distribution varies with station sites as discussed below. Overall, it is envisioned that most train passengers would have destinations at resort hotels/casinos on the Las Vegas Strip (South Las Vegas Boulevard between McCarran Airport and Downtown Las Vegas. Therefore, most traffic exiting the station sites would use local streets instead of the I-15 freeway. Anticipated trip distribution for station sites is shown in Figures 3.5-12 through 3.5-15.

EXISTING INTERSECTION GEOMETRY
Central Station B

FIG 3-5.10

Source: DMJM Harris, 2008.



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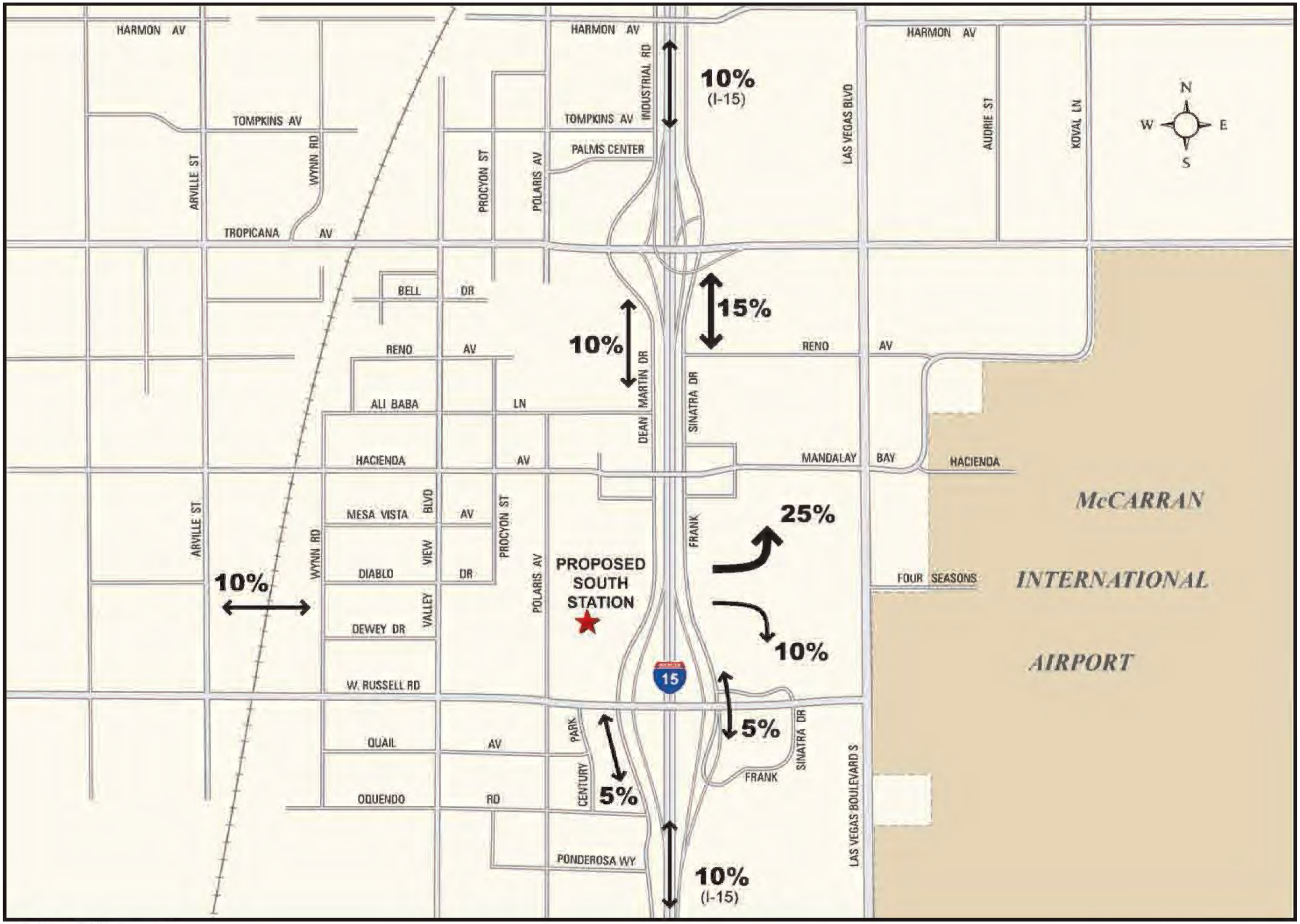
EXISTING INTERSECTION GEOMETRY
Downtown Station

FIG 3-5.11

Source: DMJM Harris, 2008.



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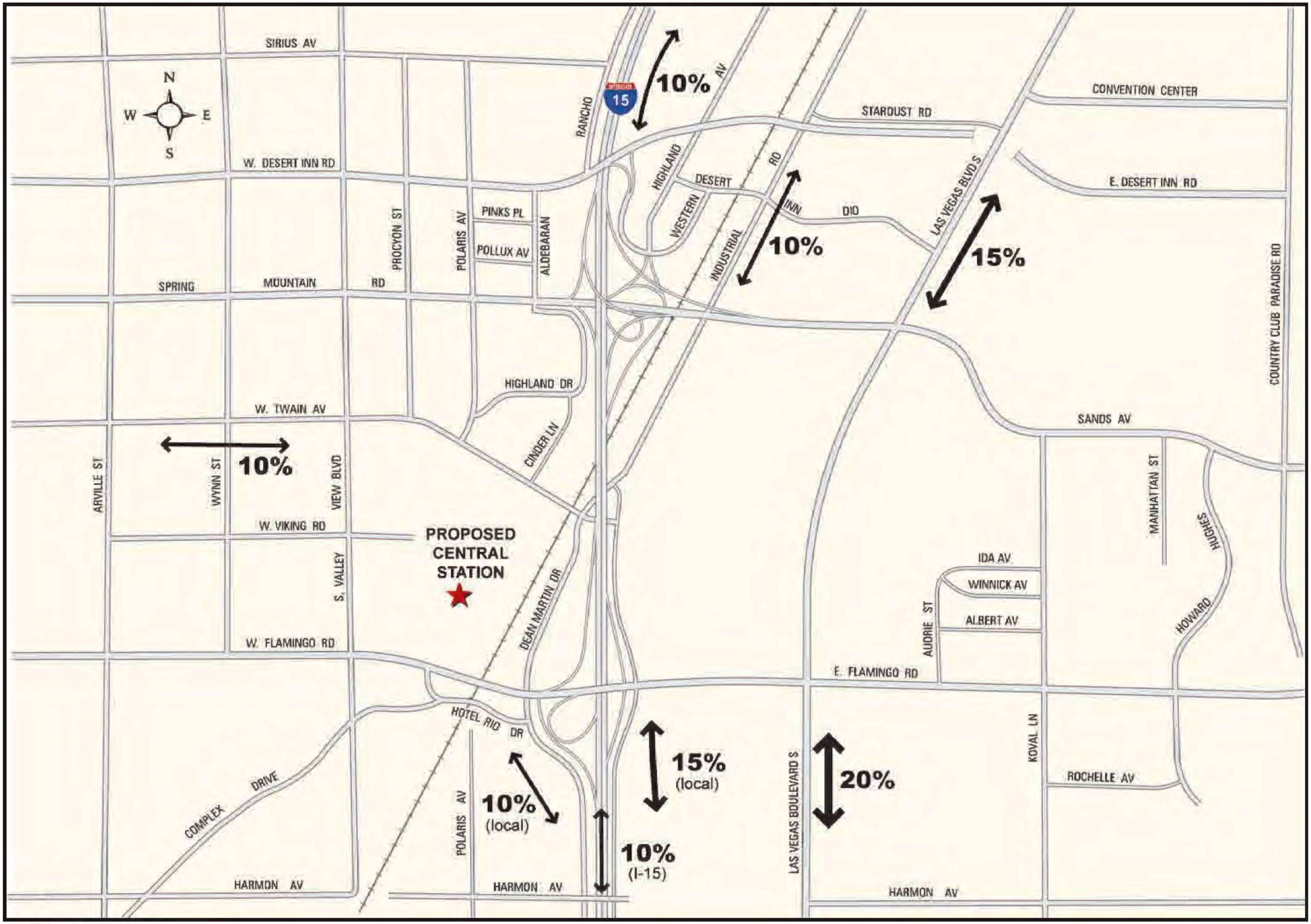
SOUTHERN STATION TRIP DISTRIBUTION

FIG 3-5.12

Source: DMJM Harris, 2008.



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CENTRAL STATION A TRIP DISTRIBUTION

FIG 3-5.13

Source: DMJM Harris, 2008.

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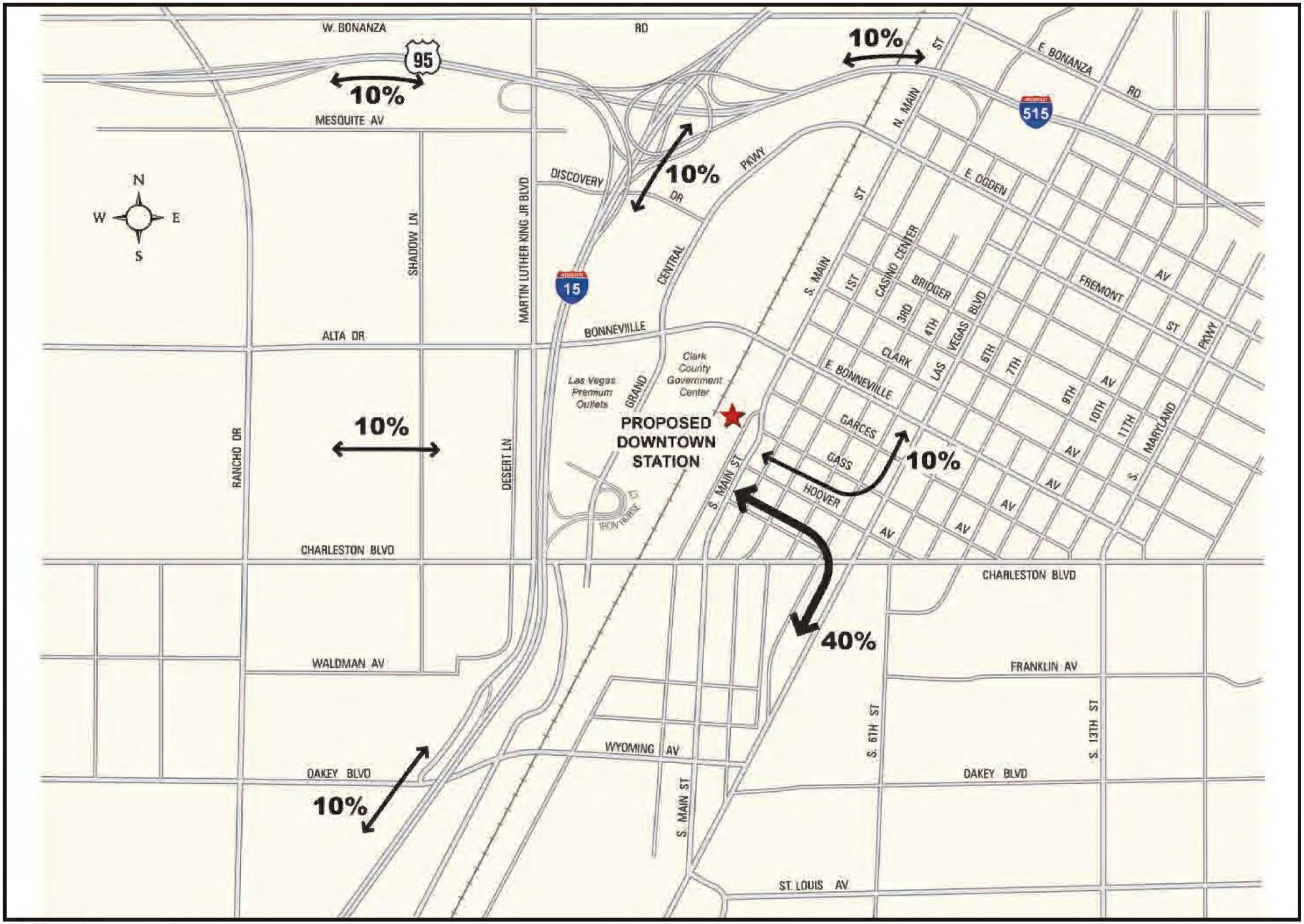
CENTRAL STATION B TRIP DISTRIBUTION

FIG 3-5.14

Source: DMJM Harris, 2008.



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DOWNTOWN STATION TRIP DISTRIBUTION

FIG 3-5.15

Source: DMJM Harris, 2008.

3.5.3.3 Existing and Baseline Conditions (2013 and 2030)

This section presents the assessment of transportation impacts related to the proposed action. Impacts are separately considered for the freeway mainline, the Victorville station site options, and the Las Vegas area station site options for the years 2013 and 2030, assuming no project conditions. Freeway mainline conditions are shown for morning and afternoon peak periods; intersections near station site options are shown for the worst approach.

I-15 Mainline

Table 3.5-4 shows existing conditions, plus 2013 and 2030 baseline (no project) conditions for the four sections of I-15 between Victorville and Las Vegas. Results shown in bold text represent unacceptable conditions.

Table 3.5-4 Freeway Mainline Level of Service – Existing Conditions; 2013 and 2030 Baseline Conditions

Freeway Section		Peak Hour	Existing				2013 Baseline				2030 Baseline			
			Northbound		Southbound		Northbound		Southbound		Northbound		Southbound	
			LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density
1	N. Stoddard Wells to Junction I-40	AM	C	19.8	B	16.6	C	21.9	C	18.3	D	27.4	C	22.2
		PM	B	13.3	D	28.4	B	14.7	D	33.3	B	17.8	**F**	**>45.0**
2	Junction I-40 to Nevada State line	AM	C	22.1	C	18.4	C	25.4	C	20.8	**E**	**35.8**	D	27.0
		PM	B	14.8	D	33.5	B	16.7	**E**	**43.6**	C	21.0	**F**	**>45.0**
3	Primm to Sloan	AM	C	18.8	C	19.4	D	26.9	D	30.5	**E**	**40.6**	**F**	**>45.0**
		PM	C	25.1	C	24.2	**F**	**>45.0**	**E**	**39.1**	**F**	**>45.0**	**F**	**>45.0**
4	Sloan to I-215	AM	D	27.1	C	21.4	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**
		PM	D	26.8	**E**	**38.7**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**

Source: DMJM Harris, 2008.
Notes:
a) NB = Northbound; SB = Southbound
b) LOS = Level of Service
c) Density reported in passenger cars/minute/lane
d) **BOLD** font indicates unacceptable conditions

Ramp Junctions

Table 3.5-5 presents the results of ramp junction analysis for the existing and future years 2013 and 2030 baseline conditions. Results shown in bold text represent unacceptable conditions.

As indicated in Table 3.5-5, all the ramp junctions operate at acceptable conditions under the existing conditions and at unacceptable conditions under future conditions. This indicates that the ramp configuration would not be able to handle the future volume growth in the area.

Table 3.5-5 Ramp Junction Level of Service – Existing Conditions; 2013 and 2030 Baseline Conditions

Location		Existing		2013 Baseline		2030 Baseline	
		LOS	Density	LOS	Density	LOS	Density
1	I-15 NB Off-ramp to Stoddard Wells	B	18.4	**F**	**41.5**	**F**	**96.8**
2	I-15 SB Off-ramp to Stoddard Wells	D	28.2	**F**	**47.5**	**F**	**115.5**
3	I-15 NB On-ramp from Stoddard Wells	B	18.5	**F**	**48.3**	**F**	**118.4**
4	I-15 SB On-ramp from Stoddard Wells	D	31.0	**F**	**69.7**	**F**	**163.1**
5	I-15 NB Off-ramp to North Stoddard Wells	B	17.5	**F**	**38.8**	**F**	**84.3**
6	I-15 SB Off-ramp to North Stoddard Wells	C	27.9	**F**	**47.0**	**F**	**116.7**
7	I-15 NB On-ramp from North Stoddard Wells	B	17.5	**F**	**44.1**	**F**	**106.1**
8	I-15 SB On-ramp from North Stoddard Wells	D	29.7	**F**	**65.3**	**F**	**156.7**

Source: DMJM Harris, 2008.
Notes:
a) NB = Northbound; SB = Southbound
b) LOS = Level of Service
c) Density reported in passenger cars/minute/lane
d) **BOLD** font indicates unacceptable conditions

Victorville Station Site Option 1

Table 3.5-6 presents the results of intersection operating conditions for future year 2013 baseline conditions at Victorville Station Site Option 1. Results shown in bold text represent unacceptable conditions.

Table 3.5-6 Victorville Station Site Option 1 – Existing Conditions; 2013 and 2030 Baseline Conditions

	Intersection	Traffic Control	Existing LOS	Existing Delay[b]	2013 Baseline LOS	2013 Baseline Delay[b]	2030 Baseline LOS	2030 Baseline Delay
1	Outer Highway & I-15 NB Ramps	Unsignalized[c]	C (WB)	16.3	**F (WB)[d]**	**324.0**	NA	NA
2	Outer Highway & Stoddard Wells Road	Unsignalized[c]	B (EB)	12.7	**F (EB)[d]**	**154.9**	NA	NA
3	Stoddard Wells Rd. & I-15 SB On-Ramp	Unsignalized[c]	B (WB)	10.4	**F (WB)[d]**	**113.4**	NA	NA
4	Stoddard Wells Rd. & I-15 SB Off-Ramp	Unsignalized[2]	B (WB)	11.9	C (WB)[3]	20.5	NA	NA
5	*Stoddard Wells Rd & Station Access #14* [C]	Signalized	NA	NA	NA	NA	NA	NA
6	Stoddard Wells Rd & Station Access #24	Unsignalized	NA	NA	NA	NA	NA	NA
7	Stoddard Wells Road & I-15 SB Ramps	Signalized	NA	NA	NA	NA	**F**	**102.9**
8	Stoddard Wells Road & I-15 NB Ramps	Signalized	NA	NA	NA	NA	**F**	**216.4**

Source: DMJM Harris, 2008.
Notes:
a) Intersections 5 & 6 would be created on in with-project conditions but are included in this table for ease of comparability with other tables.
b) Delay reported in seconds per vehicle
c) LOS and Delay reported for worst approach
d) EB=Eastbound, WB=Westbound
e) **BOLD** font indicates unacceptable conditions

To improve existing unacceptable conditions at these intersections, the following measures would be needed by 2013:

- #1: Signalize intersection of Outer Highway at I-15 northbound ramps and add eastbound right turn lane.
- #2: Signalize intersection of Outer Highway at Stoddard Wells Road and add northbound left turn lane and southbound right turn lane.
- # 3: Signalize intersection of Stoddard Wells Road at I-15 southbound on-ramp and add southbound left turn lane.

To improve operating conditions at these intersections and accommodate the future volume growth, the following measures would be needed by 2030:

5. #7: Add eastbound left turn lane and eastbound through lane at the intersection of Stoddard Wells Road at I-15 southbound ramps.
6. #8: Add eastbound left turn lane and northbound right turn late at the intersection of Stoddard Wells Road at I-15 northbound ramps.

However, even with these measures, the study intersections continue to operate at unacceptable conditions.

Victorville Station Site Option 2

Table 3.5-7 shows existing conditions, plus 2013 and 2030 baseline conditions for the intersections around proposed Victorville Station Site Option 2. Existing conditions were found to be acceptable and are projected to remain acceptable under the 2013 and 2030 baselines.

Table 3.5-7: Victorville Station Site Option 2 – Existing Conditions; 2013 and 2030 Baseline Conditions

Intersection		Existing		2013 Baseline		2030 Baseline	
		LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
1	Stoddard Wells Road & I-15 NB Ramps	A (SB)[b,c]	10.0	C (SB)[b,c]	17.3	C	28.3
2	Stoddard Wells Road & Quarry Road	A (SB)[b,c]	8.6	A (SB)[b,c]	9.4	B	19.2
3	I-15 SB Ramps & Quarry Road	A (WB)[b,c]	8.8	A (WB)[b,c]	9.6	C	31.2
4	Quarry Road & Station Access #1	NA	NA	NA	NA	NA	NA
5	Stoddard Wells Road & Station Access #2	NA	NA	NA	NA	NA	NA

Source: DMJM Harris, 2008.
Notes:
a) Delay reported in seconds per vehicle
b) LOS and Delay reported for worst approach
c) SB=Southbound, WB=Westbound

Southern Station Area

Table 3.5-8 shows existing conditions, plus 2013 and 2030 baseline (no project) conditions for intersections near the proposed Southern Station option. Results shown in bold text represent unacceptable conditions.

Table 3.5-8 Southern Station Site Option – Existing Conditions; 2013 and 2030 Baseline Conditions

Intersection		Existing		2013 Baseline		2030 Baseline	
		LOS	Delay [a]	LOS	Delay [a]	LOS	Delay [a]
1	W. Tropicana & S. Valley View	**E**	**55.2**	**E**	**70.3**	**F**	**425.2**
2	W. Tropicana & Dean Martin Dr	D	52.6	**E**	**59.8**	**F**	**80.0**
3	W. Tropicana & I-15 NB Ramps	C	26.4	C	31.3	**E**	**78.3**
4	Dean Martin Dr & Circulation	C(EB) [b,c]	16.9	C (EB) [b,c]	18.2	C (EB) [b,c]	24.9
5	Circulation/Aldebaran & W. Hacienda	B (SB) [b,c]	12.9	B (SB)[b,c]	13.8	C (SB) [b,c]	17.3
6	W. Hacienda & Polaris Ave	**F(NB)** [b,c]	**128.8**	**F (NB)** [b,c]	**336.9**	**F (NB)** [b,c]	**-**
7	W. Hacienda & S. Valley View	C	24.1	D	35.2	**F**	**618.8**
8	W. Russell & Polaris	D	46.2	D	52.9	**F**	**81.3**
9	W. Russell & I-15 SB Ramps	**E**	**68.1**	**F**	**83.1**	**F**	**144.1**
10	W. Russell & I-15 NB Ramps	C	33.5	D	36.4	**E**	**67.7**
11	W. Tropicana & I-15 SB Ramps	B	15.4	B	16.2	C	20.7

Source: DMJM Harris, 2008.
Notes:
a) Delay reported in seconds per vehicle
b) LOS and Delay reported for worst approach
c) SB=Southbound, WB=Westbound
d) **BOLD** font indicates unacceptable conditions

2013 baseline conditions would require the following improvements to improve operating conditions to acceptable levels:

- #1. Tropicana/Valley View- Add exclusive southbound free right turn lane.
- #2. Tropicana & Dean Martin Drive/Industrial- Optimize signal offset along Tropicana.
- #6. Hacienda/Polaris - Signalize this intersection.
- #9. Russell/I-15 SB Ramps

2030 baseline conditions would require the following measures to improve conditions to acceptable levels.

- #1. Tropicana & Valley View
  - Add exclusive westbound right turn lane.
  - Add exclusive southbound free right turn lane.
  - Add second southbound left turn lane.

- #2. Tropicana & Dean Martin Drive/Industrial
  - Add fourth eastbound through lane.
  - Add fourth westbound through lane.
- #3. Tropicana & I-15 NB Ramps
  - Add second northbound right turn lane.
- #6. Hacienda & Polaris
  - Signalize this intersection.
- #7. Hacienda & Valley View
  - Add second eastbound left turn lane.
  - Add exclusive eastbound right turn lane.
  - Add third eastbound through lane.
  - Add exclusive westbound right turn lane.
  - Add third westbound through lane.
  - Add second northbound left turn lane.
  - Add third northbound through lane.
- #8. Russell & Polaris
  - Add exclusive northbound right turn lane.
  - Add exclusive southbound left turn lane.
- #9. Russell & I-15 SB Ramps
  - Add second southbound right turn lane.
- #10. Russell/I-15 NB Ramps
  - Optimize signal offset along Russell Road.

Central Station Site Option A

Table 3.5-9 shows existing conditions, plus 2013 and 2030 baseline (no project) conditions for Central Station Site Option A. Results shown in bold text represent unacceptable conditions.

Table 3.5-9 Central Station Site Option A – Existing Conditions; 2013 and 2030 Baseline Conditions

Intersection		Existing		2013 Baseline		2030 Baseline	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	*Spring Mountain & Polaris*	C	24.6	C	24.9	C	26.1
2	*W. Twain & S. Valley View*	D	53.0	**E**	**59.3**	**E**	**70.8**
3	W. Twain & Procyon	B (SB)[B,C]	11.8	B (SB) [B,C]	12.0	B (SB) [B,C]	12.5
4	*W. Twain & Polaris*	C	25.7	C	26.5	C	28.2
5	*W. Twain & Dean Martin Dr/Industrial*	C	30.9	C	30.4	D	38.1
6	*Industrial & Frank Sinatra*	C	31.0	D	36.2	**E**	**61.2**
7	*W. Twain & Frank Sinatra*	C	20.4	C	20.2	B	17.0
8	*W. Flamingo & I-15 NB Ramps*	C	27.7	C	29.5	D	37.9
9	*W. Flamingo & I-15 SB Ramps*	A	7.2	A	7.5	A	8.6
10	*W. Flamingo & S. Valley View*	D	38.2	D	41.6	**F**	**95.8**
11	*W. Flamingo & Hotel Rio Dr*	D	41.1	D	39.1	D	39.1
12	*W. Twain & Station Access*	NA	NA	-	-	-	-

Source: DMJM Harris, 2008
Notes:
[A] Delay reported in seconds per vehicle
[B] LOS and Delay reported for worst approach
[C] SB=Southbound
BOLD font indicates unacceptable conditions

To improve 2013 baseline conditions to acceptable levels, the following measure would be needed:

- #2. Twain Avenue & Valley View
  - Optimize network offset.

To improve 2030 baseline conditions to acceptable levels, the following measures would be needed:

- #2. Twain Avenue & Valley View
  - Add exclusive westbound right turn lane.
- #6. Industrial & Frank Sinatra
  - Add second westbound right turn lane
- #10. Flamingo & Valley View
  - Add exclusive northbound right turn lane.

Central Station Site Option B

Table 3.5-10 shows existing conditions, plus 2013 and 2030 baseline (no project) conditions for Central Station Site Option B. Results shown in bold text represent unacceptable conditions.

Table 3.5-10 Central Station Site Option B – Existing Conditions; 2013 and 2030 Baselines

Intersection		Existing		2013 Baseline		2030 Baseline	
		LOS	Delay [a]	LOS	Delay [a]	LOS	Delay [a]
1	*W Flamingo Rd/Hotel Rio Dr*	D	40.9	D	39.0	D	39.1
2	*Flamingo/I-15 SB*	A	7.2	A	7.5	A	8.6
3	*Flamingo/I-15 NB*	C	27.1	C	29.0	D	37.9
4	*Hotel Rio Dr/Dean Martin Dr*	C	24.1	C	24.5	C	26.6
5	*W Harmon Ave/Polaris Ave*	C	20.2	C	20.6	B	18.7
6	*W Tropicana Ave/Polaris Ave*	B	11.4	B	12.7	B	17.6
7	*W Tropicana Ave/Dean Martin Dr*	D	53.6	**E**	**60.2**	**F**	**80.2**
8	*Tropicana/I-15 SB Ramp*	B	15.3	B	16.2	C	20.7
9	*Tropicana/I-15 NB Ramp*	C	26.5	C	31.2	**E**	**77.0**
10	*W Harmon Ave/Aldebaran Ave*	B	11.7	B	11.6	B	11.8

Source: DMJM Harris, 2008.
Notes:
a) Delay reported in seconds per vehicle
b) **BOLD** font indicates unacceptable conditions

To improve 2013 baseline conditions to acceptable levels, the following measure would be needed:

- #7. Tropicana Avenue & Dean Martin Drive
  - Optimize signal offset along Tropicana Avenue.

To improve 2030 baseline conditions to acceptable levels, the following measures would be needed:

- #7. Tropicana Avenue & Dean Martin Drive
  - Add exclusive northbound right turn lane.
- #9. Tropicana Avenue & I-15 NB Ramps
  - Optimize signal offsets along Tropicana Avenue.

Downtown Las Vegas Station Site Option

Table 3.5-11 below shows existing conditions, plus 2013 and 2030 baseline (no project) conditions for intersections near the proposed Downtown Las Vegas Station site option.

By 2030, the proposed roadway improvements are anticipated to be complete[3]:

- Interchange reconfiguration at Charleston Boulevard and I-15 northbound and southbound ramps. This interchange will be configured as a Single Point Urban Interchange (SPUI) at Charleston Boulevard.
- Intersection of Martin Luther King Boulevard at Charleston Boulevard would be grade separated in the future.
- Bonneville Avenue would be one-way in the eastbound direction west of Main Street.

Table 3.5-11 Downtown Las Vegas Station Site Option, Existing Conditions, 2013 and 2030 Baseline Conditions

Intersection		Existing		2013 Baseline		2030 Baseline	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	N. Main St & S. Grand Central Pkwy	B	14.1	B	13.2	B	13.4
2	E. Bonneville & N. Main St	D	52.1	**F**	**82.2**	**E**	**66.7**
3	E. Bonneville & S. Grand Cntrl Pkwy	C	30.7	C	34.2	D	48.1
4	W. Bonneville & S. MLK	D	54.6	**E**	**56.3**	**E**	**65.8**
5	S. MLK & I-15 SB Off-Ramp	A	9.5	B	10.8	-	-
6	S. MLK & W. Charleston	**F**	**117.3**	E	60.0	-	-
7	S. Grand Cntrl Pkwy & Iron Horse Ct / I-15 NB ramps	B	16.9	B	18.1	-	-
8	S. Grand Cntrl Pkwy & W. Charleston	**E**	**71.2**	**E**	**79.2**	**F**	**97.6**
9	S. Main St & W. Charleston	D	53.2	D	54.9	**E**	**66.5**
10	S. MLK & I-15 SB On-Ramp	**F(NB)[B,C]**	**85.1**	**F (NB)[B,C]**	**154.3**	-	-
11	Casino Center & Charleston	A	9.7	A	9.9	B	10.6
12	4th Street & Charleston	B	10.5	B	10.9	B	12.0
13	Las Vegas Blvd & Charleston	D	46.0	D	46.8	D	50.2
14	S. Las Vegas Blvd & S. Main St	D	39.8	D	40.3	D	41.8
15	I-15 ramps & Charleston	-	-	-	-	**E**	**56.9**

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle
[B] LOS and Delay reported for worst approach
[C] NB=Northbound
BOLD font indicates unacceptable conditions

[3] DMJM Harris, 2008.

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To improve operating conditions at these intersections to acceptable levels, the following measures would be needed by 2013:

- #2. Bonneville/Main Street
  - Add exclusive westbound right turn lane.
- #4. Bonneville/S. Martin Luther King Boulevard
  - Add second eastbound left turn lane.
- #6. Charleston/S. Martin Luther King Boulevard
  - Optimize network offset and signal timing.
- #8. Grand Central Parkway/W. Charleston Boulevard
  - Optimize network offset and signal timing.
- #10. S. Martin Luther King Boulevard/ I-15 southbound on-ramp
  - Signalize the intersection.

To improve operating conditions at these intersections to acceptable levels and accommodate the future volume growth, following measures would be needed by 2030:

- #2. Bonneville/Main Street
  - Optimize network offset and signal timing.
- #4. Bonneville/S. Martin Luther King Boulevard
  - Add exclusive southbound right turn lane.
- #8. Grand Central Parkway/W. Charleston Boulevard
  - Add second eastbound left turn lane.
  - Add third southbound right turn lane.
- #9. Main Street/Charleston Boulevard
  - Optimize network offset and signal timing.
- #15. I-15 Ramps/Charleston Boulevard (SPUI Interchange)
  - Optimize network offset and signal timing.

3.5.4 ENVIRONMENTAL CONSEQUENCES

3.5.4.1 Thresholds

The National Environmental Policy Act (NEPA) requires the analysis of the potential impacts of a proposed project on the traffic, transit, and circulation of the affected area. Effects on traffic and circulation would be considered adverse if any of the following impacts were to occur:

- An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in the number of vehicle trips, the volume-to-capacity ration on roads, or congestion at intersections).
- Either individually or cumulatively exceeding a LOS standard established by the county congestion management agency for designated roads or highways. In both California and Nevada, LOS E and F are considered unacceptable service conditions. Thus, an exceedance of LOS D would result in an adverse effect. In addition, an impact would occur at an intersection in the City of Victorville and San Bernardino County if the project would add 5% or more to the peak hour traffic.
- A substantial increase in hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment).
- Inadequate parking capacity.
- Inadequate emergency access.
- Conflict with adopted policies, plan, or programs supporting alternative transportation (e.g., but turnouts, bicycle racks).
- Rail, waterborne, or air traffic impact.

For the purposes of this analysis, this section focuses on the criteria relating to traffic and LOS, specifically on the I-15 mainline and roadways within Victorville and Las Vegas. Thresholds relating to hazards, parking, emergency access, alternative transportation, and rail, waterborne, and air traffic impacts are not discussed in detail within this section.

As discussed in Chapter 2.0, Alternatives, safety features, such as fencing and barriers around the rail alignment, would be provided to reduce potential hazards related to the design of the proposed action and alternatives. As no effects relating to design feature hazards are anticipated, this section does not provide an analysis of this criterion. Additionally, the parking components of the proposed action and alternatives at station and maintenance facility locations were designed using the estimated parking demands identified within the Ridership Study (Appendix B). No further discussion of this criterion is provided, as the DesertXpress project would provide adequate parking capacity to meet demand. A discussion of effects relating to emergency access is provided in Section 3.4, Utilities/Emergency Services. As stated in Chapter 1.0, Purpose and Need, the Surface Transportation Board

(STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. However, a policy consistency analysis relating to adopted policies and plans is provided in Section 3.1, Land Use and Community Impacts. As the proposed action and alternatives would introduce new rail travel from Southern California to Las Vegas, the DesertXpress project would have the effect of shifting travelers from one mode of travel to another. These potential mode shifts through the year 2035 were forecasted in the DesertXpress project's Ridership Study (Appendix B). As such, the future 2030 traffic analysis in this section incorporates the anticipated mode shifts into the baseline for analysis, thereby addressing impacts to rail and air traffic effects.

3.5.4.2 No Action Alternative

The 2013 and 2030 baseline conditions presented in the tables above and below are intended to demonstrate conditions along the freeway sections and selected intersections in the event that no high speed passenger rail system with stations is constructed and operated.

3.5.4.3 I-15 Mainline

Under future conditions, operation of DesertXpress would improve traffic conditions on I-15. Future I-15 traffic volumes would be reduced since after construction of the DesertXpress railway, some people who would otherwise drive to Las Vegas would instead opt to ride the train.

Operation of the proposed action or action alternatives would result in adverse effects to I-15 in any of the future scenarios modeled. Beneficial effects[4] for both technology options in the years 2013 and 2030 are discussed below.

EMU Technology Option

Table 3.5-12 shows future plus DesertXpress EMU option conditions on the I-15 Freeway Mainline.

***2013 Plus DesertXpress EMU Option – Beneficial Effects*:** Given that it would improve an unacceptable LOS on several freeway segments to acceptable conditions, the DesertXpress EMU option would have a significant beneficial effect on I-15 traffic. Segments that would experience beneficial effects are:

- Section 2, from Junction I-40 to Nevada State Line, in southbound direction during the PM peak hour
- Section 3, from Primm to Sloan, in southbound direction during the PM peak hour

[4] For this analysis an effect is considered beneficial only if the LOS would change from an unacceptable to acceptable level with implementation of the DesertXpress railway.

2030 Plus DesertXpress EMU Option – Beneficial Effects: Beneficial effects would occur in 2030 at the following freeway sections since at these locations, LOS would improve from unacceptable to acceptable with implementation of the EMU option:

- Section 1, from North Stoddard Wells to Junction I-40, in the southbound direction during the PM peak hour
- Section 2, from Junction I-40 to Nevada State Line, the northbound direction during the AM peak hour
- Section 3, from Primm to Sloan, in the northbound direction during the AM peak hour

DEMU Technology Option

Table 3.5-13 shows baseline plus DEMU project conditions on the I-15 freeway mainline sections.

2013 Plus DesertXpress DEMU Option – Beneficial Effects: Given that it would improve an unacceptable LOS on to acceptable, the DesertXpress DEMU option would have significant beneficial effects on I-15 traffic. The segments that would experience beneficial effects are:

- Section 2, from Junction I-40 to Nevada State Line, in the southbound direction during the PM peak hour.
- Section 3, from Primm to Sloan, in the southbound direction during the PM peak hour.

2030 Plus DesertXpress DEMU Option - Beneficial Effects: Beneficial effects would occur in 2030 at the following freeway sections since at these locations, LOS would improve from unacceptable to acceptable with implementation of the DEMU option:

- Section 1, from North Stoddard Wells to Junction I-40, in the southbound direction during the PM peak hour
- Section 2, from Junction I-40 to Nevada State Line, in the northbound direction during the AM peak hour
- Section 3, from Primm to Sloan, in the northbound direction during the AM peak hour

Table 3.5-12: Freeway Mainline Level of Service: 2013 and 2030 Baseline plus EMU Conditions

Section		Peak Hour	2013 Baseline Conditions				2013 Baseline plus EMU Conditions				2030 Baseline Conditions				2030 Baseline plus EMU Conditions			
			NB [A]		SB		NB		SB		NB		SB		NB		SB	
			LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]
1	North Stoddard Wells to Junction I-40	AM	C	21.9	C	18.3	C	18.8	B	15.3	D	27.4	C	22.2	C	18.7	B	14.4
		PM	B	14.7	D	33.3	B	11.7	D	28.1	B	17.8	**F**	**>45.0**	A	10.1	D	30.4
2	Junction I-40 to Nevada State line	AM	C	25.4	C	20.8	C	20.3	B	16.3	**E**	**35.8**	D	27.0	C	19.6	B	14.5
		PM	B	16.7	**E**	**43.6**	B	12.2	D	32.2	C	21.0	**F**	**>45.0**	A	9.5	**E**	**35.6**
3	Primm to Sloan	AM	D	26.9	D	30.5	C	23.3	D	26.2	**E**	**40.6**	**F**	**>45.0**	D	29.0	**E**	**40.3**
		PM	**F**	**>45.0**	**E**	**39.1**	**E**	**39.3**	D	32.6	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**
4	Sloan to I-215	AM	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**
		PM	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**

Source: DMJM Harris, 2008.
Notes:
[A] SB = Southbound; NB = Northbound
[B] D= Density, reported in pc/mi/ln
Bold text indicates unacceptable conditions

Table 3.5-13: Freeway Mainline Level of Service: 2013 and 2030 Baseline plus DEMU Conditions

	Section	Peak Hour	2013 Baseline Conditions				2013 Baseline plus DEMU Conditions				2030 Baseline Conditions				2030 Baseline plus DEMU Conditions			
			NB [A]		SB [A]		NB [A]		SB [A]		NB [A]		SB [A]		NB [A]		SB [A]	
			LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]	LOS	D [B]
1	North Stoddard Wells to Junction I-40	AM	C	21.9	C	18.3	C	19.5	B	15.9	D	27.4	C	22.2	C	20.3	B	16.0
		PM	B	14.7	D	33.3	B	12.4	D	29.1	B	17.8	**F**	**>45.0**	B	11.7	D	33.4
2	Junction I-40 to Nevada State line	AM	C	25.4	C	20.8	C	21.3	B	17.2	**E**	**35.8**	D	27.0	C	22.1	B	17.0
		PM	B	16.7	**E**	**43.6**	B	13.1	D	34.1	C	21.0	**F**	**>45.0**	B	11.9	**E**	**42.2**
3	Primm to Sloan	AM	D	26.9	D	30.5	C	24.0	D	27.1	**E**	**40.6**	**F**	**>45.0**	D	30.9	**E**	**44.0**
		PM	**F**	**>45.0**	**E**	**39.1**	**E**	**41.0**	D	33.7	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**
4	Sloan to I-215	AM	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**
		PM	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**	**F**	**>45.0**

Source: DMJM Harris, 2008.
Notes:
[A] SB = Southbound; NB = Northbound
[B] D = Density; Density reported in pc/mi/ln
Bold text indicates unacceptable conditions

3.5.4.4 Ramp Junctions

Both the EMU and DEMU technology options would result in adverse effects and significantly contribute to future adverse cumulative effects at the ramp junctions. Adverse effects to ramp junctions are discussed below for both technology options.

EMU Technology Option

Table 3.5-14 shows intersection analysis for the EMU option at Victorville Station location alternatives 1 and 2. The already failing LOS at all studied ramp junctions would be further degraded by DesertXpress-related traffic.

DEMU Technology Option

Table 3.5-15 shows intersection analysis for the DEMU option at Victorville Station location alternatives 1 and 2. The already failing LOS at all studied ramp junctions would be further degraded by DesertXpress-related traffic.

Table 3.5-14: Ramp Junction Level of Service: 2013 and 2030 Baseline plus EMU Conditions

Location		2013 Baseline Conditions		2013 EMU Conditions		2030 Baseline Conditions		2030 EMU Conditions	
		LOS	D_R	LOS	D_R	LOS	D_R	LOS	D_R
1	I-15 NB Off-ramp to Stoddard Wells	**F**	**41.5**	**F**	**42.7**	**F**	**96.8**	**F**	**101.2**
2	I-15 SB Off-ramp to Stoddard Wells	**F**	**47.5**	**F**	**47.5**	**F**	**115.5**	**F**	**115.8**
3	I-15 NB On-ramp from Stoddard Wells	**F**	**48.3**	**F**	**48.6**	**F**	**118.4**	**F**	**118.7**
4	I-15 SB On-ramp from Stoddard Wells	**F**	**69.7**	**F**	**74.9**	**F**	**163.1**	**F**	**168.3**
5	I-15 NB Off-ramp to North Stoddard Wells	**F**	**38.8**	**F**	**40.3**	**F**	**84.3**	**F**	**89.3**
6	I-15 SB Off-ramp to North Stoddard Wells	**F**	**47.0**	**F**	**47.0**	**F**	**116.7**	**F**	**117.0**
7	I-15 NB On-ramp from North Stoddard Wells	**F**	**44.1**	**F**	**44.3**	**F**	**106.1**	**F**	**106.3**
8	I-15 SB On-ramp from North Stoddard Wells	**F**	**65.3**	**F**	**69.7**	**F**	**156.7**	**F**	**161.0**

Source: DMJM Harris, 2008.
Notes:
A) NB = Northbound; SB = Southbound
B) LOS = Level of Service
C) Density of ramp (D_R) reported in pc/mi/ln
Bold text indicates unacceptable conditions.

Table 3.5-15: Ramp Junction Level of Service: 2013 and 2030 Baseline plus DEMU Conditions

Location		2013 Baseline Conditions		2013 DEMU Conditions		2030 Baseline Conditions		2030 DEMU Conditions	
		LOS	D_R	LOS	D_R	LOS	D_R	LOS	D_R
1	I-15 NB Off-ramp to Stoddard Wells	**F**	**41.5**	**F**	**42.3**	**F**	**96.8**	**F**	**99.9**
2	I-15 SB Off-ramp to Stoddard Wells	**F**	**47.5**	**F**	**47.5**	**F**	**115.5**	**F**	**115.7**
3	I-15 NB On-ramp from Stoddard Wells	**F**	**48.3**	**F**	**48.5**	**F**	**118.4**	**F**	**118.6**
4	I-15 SB On-ramp from Stoddard Wells	**F**	**69.7**	**F**	**73.4**	**F**	**163.1**	**F**	**166.8**
5	I-15 NB Off-ramp to North Stoddard Wells	**F**	**38.8**	**F**	**39.8**	**F**	**84.3**	**F**	**87.9**
6	I-15 SB Off-ramp to North Stoddard Wells	**F**	**47.0**	**F**	**47.0**	**F**	**116.7**	**F**	**116.9**
7	I-15 NB On-ramp from North Stoddard Wells	**F**	**44.1**	**F**	**44.2**	**F**	**106.1**	**F**	**106.3**
8	I-15 SB On-ramp from North Stoddard Wells	**F**	**65.3**	**F**	**68.4**	**F**	**156.7**	**F**	**159.8**

Source: DMJM Harris, 2008.
Notes:
a) NB = Northbound; SB = Southbound
b) LOS = Level of Service
c) Density of ramp (D_R) reported in pc/mi/ln
Bold text indicates unacceptable conditions.

3.5.4.5Victorville Station Site 1

Both the EMU and DEMU technology options would result in adverse effects and significantly contribute to future adverse cumulative effects at study intersections. Adverse effects to intersections are discussed below for both technology options.

EMU Technology Option

Table 3.5-16 shows intersection analysis for the EMU option at Victorville Station site option 1.

Existing Plus EMU - Adverse Effects: When compared to existing conditions, the EMU option would result in an adverse effect at all existing study intersections. These intersections would experience a change in LOS from acceptable to unacceptable levels:

- Intersection 1, Outer Highway/I-15 northbound ramps
- Intersection 2, Outer Highway/Stoddard Wells Road
- Intersection 3, Stoddard Wells Road/I-15 southbound on-ramp
- Intersection 4, Stoddard Wells Road/I-15 southbound 0ff-ramp

2013 Plus EMU – Adverse Effects: EMU option traffic would result in an adverse effect at 1 intersection since this intersection would experience a change in LOS from an acceptable to an unacceptable level. The adversely affected intersection is:

- Intersection 4, Stoddard Wells Road/I-15 southbound Off-Ramp

With the addition traffic generated by the EMU option, the delay at several already failing intersections would worsen. Since traffic generated from the EMU option would account for more than 5% of the total volume at these intersections, the EMU option would significantly contribute to this adverse cumulative traffic effect. In 2013, the EMU would significantly contribute to cumulative traffic effects at the following intersections:

- Intersection 1, Outer Highway/I-15 northbound ramps
- Intersection 2, Outer Highway/ Stoddard Wells Road
- Intersection 3, Stoddard Wells Road/I-15 southbound on-ramp

***2030 Plus EMU – Adverse Effects**:* The EMU option would adversely effect one intersection because this intersection, which would exist only if Victorville Station option 1 is chosen, would operate at an unacceptable LOS in 2030. This intersection is:

- Intersection 5, Stoddard Wells Road/Station Access #14

By the 2030, with inclusion of the EMU option, both future highway on- and off-ramp intersections would operate at unacceptable conditions. The EMU option would increase traffic at these intersections, thereby contributing to this cumulative effect. Given this, the EMU option would contribute to adverse cumulative traffic effects at the following intersections:

- Intersection 7, Stoddard Wells Road/I-15 southbound ramps
- Intersection 8, Stoddard Wells Road/I-15 northbound ramps

Table 3.5-16: Victorville Option 1: Existing, 2013, & 2030 Baseline plus EMU Conditions LOS

Intersection		Existing Conditions		Existing Conditions plus EMU Conditions		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline EMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	Outer Highway & I-15 NB Ramps	C (WB) [B]	16.3	**F (WB) [B]**	**-**	**F (WB) [B]**	**324.0**	**F (WB) [B]**	**-**	N/A	N/A	N/A	N/A
2	Outer Highway & Stoddard Wells Rd	B (EB) [B]	12.7	**F (EB) [B]**	**335.8**	**F (EB) [B]**	**154.9**	**F (EB) [B]**	**-**	N/A	N/A	N/A	N/A
3	Stoddard Wells Rd & I-15 SB On-Ramp	B (WB) [B]	10.4	**F (WB) [B]**	**204.6**	**F (WB) [B]**	**113.4**	**F (WB) [B]**	**-**	N/A	N/A	N/A	N/A
4	Stoddard Wells Rd & I-15 SB Off-Ramp	B (WB) [B]	11.9	**F (WB) [B]**	**839.2**	**C (WB) [B]**	**20.5**	**F (WB) [B]**	**-**	N/A	N/A	N/A	N/A
5	*Stoddard Wells Rd & Station Access #14* [CD]	N/A	N/A	C	22.5	N/A	N/A	D	38.6	N/A	N/A	**F**	**95.6**
6	Stoddard Wells Rd & Station Access #24[D]	N/A	N/A	A	0	N/A	N/A	A	0.2	N/A	N/A	A	0.0
7	Stoddard Wells Road & I-15 SB Ramps[BE]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**F**	**102.9**	**F**	**261.4**
8	Stoddard Wells Road & I-15 NB Ramps[BE]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**F**	**216.4**	**F**	**214.3**

Source: DMJM Harris, 2008.
Notes: [A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
[C] Intersections shown in *italics* are signalized. Intersections shown in normal text are unsignalized.
[D] These intersections are station access intersections and would only exist with implementation of Victorville Station site 1
[E] These intersections would be constructed by 2030 and would replace intersections 1-4.
Bold text indicates unacceptable conditions.

DEMU Technology Option

Table 3.5-17 shows intersection analysis results for the DEMU option at Victorville Station site option 1. In summary, the DEMU option would have adverse effects at all of the same intersections as the EMU technology option, save for Intersection 2 and 3 under existing traffic plus project conditions.

Existing Plus DEMU - Adverse Effects: The DEMU option would result in adverse effects at 2 intersections since it would cause these intersections to deteriorate from acceptable to unacceptable LOS conditions. These intersections are:

- Intersection 1, Outer Highway/I-15 northbound ramps
- Intersection 4, Stoddard Wells Road/I-15 southbound 0ff-ramp

2013 Plus DEMU - Adverse Effects: DEMU option traffic would result in an adverse effect at 1 intersection since this intersection would experience a change in LOS from an acceptable to an unacceptable level. The adversely affected intersection is:

- Intersection 4, Stoddard Wells Road/I-15 southbound Off-Ramp

Additionally, the traffic generated by the DEMU option would increase the delay at several already failing intersections. Since traffic generated from the DEMU option would account for more than 5% of the total volume at these intersections, the DEMU option would significantly contribute to this adverse cumulative traffic effect. In 2030 the DEMU option would significantly contribute to cumulative traffic effects at the following intersections:

- Intersection 1, Outer Highway/I-15 northbound ramps
- Intersection 2, Outer Highway/ Stoddard Wells Road
- Intersection 3, Stoddard Wells Road/I-15 southbound on-ramp

2030 Plus DEMU - Adverse Effects: The EMU option would adversely effect one intersection because this intersection, which would exist only if Victorville Station option 1 is chosen, would operate at an unacceptable LOS in 2030. This intersection is:

- Intersection 5, Stoddard Wells Road/Station Access #14

By the year 2030, without the DEMU option project, both future highway on- and off-ramp intersections would operate at unacceptable conditions. The DesertXpress DEMU option would increase traffic at these intersections, thereby contributing to this cumulative effect. Given this, the EMU option would contribute to adverse cumulative traffic effects at the following intersections:

- Intersection 7, Stoddard Wells Road/I-15 southbound ramps
- Intersection 8, Stoddard Wells Road/I-15 northbound ramps

Table 3.5-17: Victorville Station Site Option 1: Existing, 2013, & 2030 Baseline plus DEMU Conditions LOS

Intersection		Existing Conditions		Existing Conditions plus DEMU Conditions		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline DEMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	Outer Highway & I-15 NB Ramps	C (WB) [B]	16.3	**F (WB) [B]**	-	**F (WB) [B]**	**324.0**	**F (WB) [B]**	-	N/A	N/A	N/A	N/A
2	Outer Highway & Stoddard Wells Rd	B (EB) [B]	12.7	D (EB) [B]	32.5	**F (EB) [B]**	**154.9**	**F (EB) [B]**	-	N/A	N/A	N/A	N/A
3	Stoddard Wells Rd & I-15 SB On-Ramp	B (WB) [B]	10.4	D (WB) [B]	25.1	**F (WB) [B]**	**113.4**	**F (WB) [B]**	-	N/A	N/A	N/A	N/A
4	Stoddard Wells Rd & I-15 SB Off-Ramp	B (WB) [B]	11.9	**F (WB) [B]**	**179.5**	C (WB) [B]	20.5	**F (WB) [B]**	-	N/A	N/A	N/A	N/A
5	*Stoddard Wells Rd & Station Access #14* [CD]	N/A	N/A	B	15.7	N/A	N/A	B	14.9	N/A	N/A	**E**	**58.6**
6	Stoddard Wells Rd & Station Access #24[D]	N/A	N/A	A	0	N/A	N/A	A	0.0	N/A	N/A	A	0.0
7	Stoddard Wells Road & I-15 SB Ramps[BE]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**F**	**102.9**	**F**	**192.8**
8	Stoddard Wells Road & I-15 NB Ramps[BE]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**F**	**216.4**	**F**	**162.1**

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
[C] Intersections shown in *italics* are signalized. Intersections shown in normal text are unsignalized.
[D] These intersections are station access intersections and would only exist with implementation of Victorville Station site 1
[E] These intersections would be constructed by 2030 and would replace intersections 1-4.
Bold text indicates unacceptable conditions.

3.5.4.6 Victorville Station Site 2

Both the EMU and DEMU technology options would result in adverse effects at study intersections. Adverse effects to intersections are discussed below for both technology options.

EMU Technology Option

Table 3.5-18 shows intersection analysis results for the EMU option at Victorville Station site option 2.

Existing Plus EMU - Adverse Effects: The EMU option would have an adverse effect on the following intersections since it would result in the LOS changing from an acceptable to unacceptable level:

- Intersection 1, Stoddard Wells Road/I-15 northbound ramps
- Intersection 2, Stoddard Wells Road / Quarry Road

2013 Plus EMU - Adverse Effects: The EMU option would have an adverse effect on the following intersections since it would result in the LOS changing from an acceptable to unacceptable level:

- Intersection 1, Stoddard Wells Road/I-15 northbound ramps
- Intersection 2, Stoddard Wells Road / Quarry Road

2030 Plus EMU - Adverse Effects: The EMU option result in the LOS changing from an acceptable to unacceptable level at one intersection. The adversely affected intersection is:

- Intersection 1, Stoddard Wells Road/I-15 northbound ramps

Table 3.5-18: Victorville Station Site Option 2: Existing, 2013, & 2030 Baseline plus EMU Conditions LOS

Intersection		Existing Conditions		Existing Conditions plus EMU Conditions		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline EMU Conditions	
		LOS	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**
1	Stoddard Wells Road & I-15 NB Ramps[B]	A (SB) [B]	10.0	**F (NB) [B]**	**-**	C (SB) [B]	17.3	**F (NB) [B]**	**-**	C	28.3	**F**	**99.2**
2	Stoddard Wells Road & Quarry Road	A (SB) [B]	8.6	**F (SB) [B]**	**63.2**	A (SB) [B]	9.4	**F (SB) [B]**	**141.8**	B	19.2	B	19.6
3	I-15 SB Ramps & Quarry Road[B]	A (WB) [B]	8.8	B (WB) [B]	12.0	A (WB) [B]	9.6	C (WB) [B]	22.3	C	31.2	C	23.9
4	Quarry Road & Station Access #1[BC]			A (NB) [B]	9.9	-	-	D (NB) [B]	26.5	-	-	A (NB) [B]	2.8
5	Stoddard Wells Road & Station Access #2 [BC]			C (SB) [B]	19.9	-	-	A (NB) [B]	9.9	-	-	B	11.0

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
[C] These intersections are station access intersections and would only exist if Victorville Station site 2 is implemented
Bold text indicates unacceptable conditions.

DEMU Technology Option

Table 3.5-19 shows intersection analysis results for the DEMU option at Victorville Station site option 2.

Existing Plus DEMU - Adverse Effects: All study intersections would operate at acceptable conditions. Therefore the DEMU option would not result in significant adverse effects in this scenario.

2013 Plus DEMU Conditions: The EMU option would result in the LOS changing from an acceptable to unacceptable level at one intersection:

- Intersection 1, Stoddard Wells Road/I-15 northbound ramps

***2030 Plus DEMU Conditions*:** As indicated in Table 3.5-23, all study intersections would operate at acceptable conditions. The DEMU option would not result in significant adverse effects in 2030 at the study intersections.

Table 3.5-19: Victorville Station Site Option 2: Existing Conditions, Existing Conditions Plus DEMU Conditions, and 2013 & 2030 Baseline plus DEMU Conditions LOS

Intersection		Existing Conditions		Existing Conditions plus DEMU Conditions		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline DEMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	Stoddard Wells Road & I-15 NB Ramps [B]	A (SB) [B]	10.0	D (SB) [B]	28.8	C (SB) [B]	17.3	**F (NB) [B]**	-	C	28.3	D	49.4
2	Stoddard Wells Road & Quarry Road	A (SB) [B]	8.6	C (SB) [B]	25.0	A (SB) [B]	9.4	D (SB) [B]	34.2	B	19.2	B	15.4
3	I-15 SB Ramps & Quarry Road [B]	A (WB) [B]	8.8	B (WB) [B]	10.8	A (WB) [B]	9.6	C (WB) [B]	16.0	C	31.2	C	22.9
4	Quarry Road & Station Access #1 [BC]	N/A	N/A	A (NB) [B]	9.3	N/A	N/A	A (NB) [B]	9.3	N/A	N/A	A (NB) [B]	2.6
5	Stoddard Wells Road & Station Access #2 [BC]	N/A	N/A	B (SB) [B]	13.4	N/A	N/A	C (SB) [B]	15.9	N/A	N/A	A	7.3

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
[C] These intersections are station access intersections and would only exist if Victorville Station site 2 is implemented

3.5.4.7 Las Vegas Area - Southern Station

Both technology options would result in adverse effects and similar contributions to cumulative adverse effects. Adverse traffic effects are discussed for each technology option below.

EMU Technology Option

Table 3.5-20 shows intersection analysis results for the EMU option at the proposed Southern Station site option.

2013 Plus EMU – Adverse Effects: Implementation of the EMU option would change the LOS from acceptable to unacceptable conditions at 2 intersections. The two intersections which would experience adverse effects are:

- Intersection 5, Circulation-Aldebaran Avenue/West Hacienda Avenue
- Intersection 8, West Russell Road/Polaris Avenue

Since the EMU option would further degrade already failing intersections, it would contribute to adverse cumulative effects at the following locations:

- Intersection 1, West Tropicana Avenue/South Valley View Boulevard
- Intersection 2, West Tropicana Avenue/Dean Martin Drive
- Intersection 6, West Hacienda Avenue/Polaris Avenue
- Intersection 9, West Russell Road/I-15 southbound ramps

2030 Plus DesertXpress EMU – Adverse Effects: Because its LOS would change from an acceptable to an unacceptable level, the following intersection would be adversely affected by implementation of the EMU option:

- Intersection 5, Circulation-Aldebaran Avenue/West Hacienda Avenue

Since the EMU option would further degrade already failing intersections, it would contribute to adverse cumulative effects at the following locations:

- Intersection 1, West Tropicana Avenue/South Valley View Boulevard
- Intersection 2, West Tropicana Avenue/Dean Martin Drive
- Intersection 3, West Tropicana/ I-15 northbound ramps
- Intersection 6, West Hacienda Avenue/Polaris Avenue
- Intersection 7, West Hacienda Avenue/South Valley View Boulevard
- Intersection 8, West Russell Road/Polaris Avenue
- Intersection 9, West Russell Road/I-15 southbound ramps
- Intersection 10, West Russell Road/I-15 northbound ramps

DEMU Technology Option

Table 3.5-21 shows intersection analysis results for the DEMU option at the Southern Station site option.

2013 Plus DEMU – Adverse Effects: The LOS at several intersections would change from an acceptable to an unacceptable level with implementation of the DEMU option. These adversely affected intersections are:

- Intersection 5, Circulation-Aldebaran Avenue/West Hacienda Avenue
- Intersection 8, West Russell Road/Polaris Avenue

In 2013, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU technology option.

2030 Plus DEMU – Adverse Effects: Because its LOS would change from an acceptable to an unacceptable level, the following intersection would be adversely affected by implementation of the DEMU option:

- Intersection 5, Circulation-Aldebaran Avenue/West Hacienda Avenue

In 2030, the DEMU technology option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU technology option.

Table 3.5-20: Southern Station Site Option, 2013 and 2030 Baseline plus DEMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline plus DEMU Conditions	
		LOS	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**
1	*W. Tropicana & S. Valley View*	**E**	**70.3**	**E**	**74.7**	**F**	**425.2**	**F**	**423.4**
2	*W. Tropicana & Dean Martin Dr*	**E**	**59.8**	**E**	**70.5**	**F**	**80.0**	**F**	**95.4**
3	*W. Tropicana & I-15 NB Ramps*	C	31.3	C	31.5	**E**	**78.3**	**E**	**78.4**
4	Dean Martin Dr & Circulation	C (EB) [B]	18.2	C (EB) [B]	18.8	C (EB) [B]	24.9	D (EB) [B]	26.0
5	Circulation-Aldebaran & W. Hacienda [D]	B (SB) [B]	13.8	**F (NB) [B]**	**232.1**	C (SB) [B]	17.3	**F (SB) [B]**	-
6	W. Hacienda & Polaris Ave	**F (NB) [B]**	**336.9**	**F (NB) [B]**	**-**	**F (NB) [B]**	**-**	**F (NB) [B]**	-
7	*W. Hacienda & S. Valley View*	D	35.2	D	40.1	**F**	**618.8**	**F**	**617.4**
8	*W. Russell & Polaris*	D	52.9	**F**	**327.7**	**F**	**81.3**	**F**	**472.6**
9	*W. Russell & I-15 SB Ramps*	**F**	**83.1**	**F**	**89.1**	**F**	**144.1**	**F**	**158.0**
10	*W. Russell & I-15 NB Ramps*	D	36.4	D	37.5	**E**	**67.7**	**F**	**90.8**
11	*W. Tropicana & I-15 SB Ramps*	B	16.2	B	18.0	C	20.7	C	23.9

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
Intersections shown in *italics* are signalized. Intersections shown in normal text are unsignalized.
Under existing conditions, there is no left turn lane at the Circulation –Aldebaran/W. Hacienda intersection. DesertXpress would add a left turn lane at this intersection. Accordingly, future conditions at this intersection were analyzed with the inclusion of such a lane.

Table 3.5-21: Southern Station Site Option 2013 and 2030 Baseline plus EMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline plus EMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	*W. Tropicana & S. Valley View*	**E**	**70.3**	**E**	**76.4**	**F**	**425.2**	**F**	**422.4**
2	*W. Tropicana & Dean Martin Dr*	**E**	**59.8**	**E**	**76.7**	**F**	**80.0**	**F**	**103.2**
3	*W. Tropicana & I-15 NB Ramps*	C	31.3	C	31.6	**E**	**78.3**	**E**	**78.4**
4	Dean Martin Dr & Circulation	C (EB) [B]	18.2	C (EB) [B]	19.0	C (EB) [B]	24.9	D (EB) [B]	26.5
5	Circulation/Aldebaran & W. Hacienda	B (SB) [B]	13.8	**F (NB) [B]**	**-**	C (SB) [B]	17.3	**F (SB) [B]**	**-**
6	W. Hacienda & Polaris Ave	**F (NB) [B]**	**336.9**	**F (NB) [B]**	**-**	**F (NB) [B]**	**-**	**F (NB) [B]**	**-**
7	*W. Hacienda & S. Valley View*	D	35.2	D	42.4	**F**	**618.8**	**F**	**617.2**
8	*W. Russell & Polaris*	D	52.9	**F**	**550.8**	**F**	**81.3**	**F**	**818.7**
9	*W. Russell & I-15 SB Ramps*	**F**	**83.1**	**F**	**94.9**	**F**	**144.1**	**F**	**164.8**
10	*W. Russell & I-15 NB Ramps*	D	36.4	D	38.9	**E**	**67.7**	**F**	**103.6**
11	*W. Tropicana & I-15 SB Ramps*	B	16.2	B	19.0	C	20.7	C	25.3

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
Intersections shown in italics are signalized. Intersections shown in plain text are unsignalized.
Under existing conditions, there is no left turn lane at the Circulation –Aldebaran/W. Hacienda intersection. DesertXpress would add a left turn lane at this intersection. Accordingly, future conditions at this intersection were analyzed with the inclusion of such a lane.

3.5.4.8 Las Vegas Area - Central Station A

Implementation of both the EMU and DEMU technology options would result in adverse project-specific and cumulative traffic effects at study intersections. These effects are discussed below for each technology option.

EMU Technology Option

Table 3.5-22 shows intersection analysis results for the EMU option at the Central Station A site option.

2013 Plus EMU – Adverse Effects: Implementation of the EMU option would cause several intersections to deteriorate from acceptable to unacceptable conditions. The adversely affected intersections are:

- Intersection 5, West Twain Avenue/Dean Martin Drive-Industrial Road
- Intersection 6, Industrial Road/Frank Sinatra Drive
- Intersection 8, West Flamingo Road/I-15 northbound ramps
- Intersection 11, W. Flamingo Road/Hotel Rio Drive

In 2013, the EMU option would further degrade failing baseline conditions, thereby contributing to cumulative adverse effects at the following intersection:

- Intersection 2, West Twain Avenue/South Valley View Boulevard

2030 Plus EMU – Adverse Effects: When compared against baseline conditions, EMU option traffic would result in adverse effects at several intersections since these intersections would experience a change in LOS from an acceptable to an unacceptable level. The adversely affected interchanges are:

- Intersection 5, West Twain Avenue/Dean Martin Drive-Industrial Road
- Intersection 8, West Flamingo Road/I-15 northbound ramps
- Intersection 11, West Flamingo Road/Hotel Rio Drive

In 2030, the EMU option would contribute to traffic at three already failing intersections, thereby contributing to cumulative adverse effects. These intersections are:

- Intersection 2, West Twain Avenue/South Valley View Boulevard
- Intersection 6, Industrial Road/Frank Sinatra Drive
- Intersection 10, West Flamingo Road/South Valley View Boulevard

DEMU Technology Option

Table 3.5-23 shows intersection analysis results for the DEMU option at the Central Station A site option.

2013 Plus DEMU – Adverse Effects: Because its LOS would change from an acceptable to an unacceptable level, the following intersections would be adversely affected by implementation of the DEMU option:

- Intersection 5, West Twain Avenue/ Dean Martin Drive-Industrial Road
- Intersection 8, West Flamingo Road/I-15 northbound ramps
- Intersection 11, W. Flamingo Road & Hotel Rio Drive

In 2013, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU option.

2030 Plus DEMU – Adverse Effects: Since it would change LOS from an acceptable to an unacceptable level in 2030 the DEMU option would adversely effect the following intersections:

- Intersection 5, West Twain Avenue/ Dean Martin Drive-Industrial Road
- Intersection 8, West Flamingo Road/I-15 northbound ramps
- Intersection 11, W. Flamingo Road & Hotel Rio Drive

In 2030, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU option.

Table 3.5-22 Central Station A Site Option – 2013 and 2030 Baseline plus EMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline plus EMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	Spring Mountain & Polaris	C	24.9	C	24.9	C	26.1	C	26.1
2	W. Twain & S. Valley View	**E**	**59.3**	**E**	**64.8**	**E**	**70.8**	**E**	**79.1**
3	W. Twain & Procyon	B (SB) [B]	12.0	B (SB) [B]	12.5	B (SB) [B]	12.5	B (SB) [B]	13.0
4	W. Twain & Polaris	C	26.5	C	30.4	C	28.2	C	31.3
5	W. Twain & Dean Martin Dr/Industrial	C	30.4	**F**	**94.6**	D	38.1	**F**	**142.2**
6	Industrial & Frank Sinatra	D	36.2	**E**	**55.9**	**E**	**61.2**	**F**	**90.4**
7	W. Twain & Frank Sinatra	C	20.2	C	24.8	B	17.0	C	25.4
8	W. Flamingo & I-15 NB Ramps	C	29.5	**E**	**76.4**	D	37.9	**F**	**92.1**
9	W. Flamingo & I-15 SB Ramps	A	7.5	B	10.1	A	8.6	B	11.9
10	W. Flamingo & S. Valley View	D	41.6	D	42.9	**F**	**95.8**	**F**	**95.8**
11	W. Flamingo & Hotel Rio Dr	D	39.1	**F**	**105.7**	D	39.1	**F**	**107.2**
12	W. Twain & Station Access[C]	-	-	C	31.7	-	-	D	35.8

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] SB = Southbound
[C] If Central Station A is selected, station access from Twain Avenue would be located at this intersection.
All intersections are signalized except W. Twain and Procyon.

Table 3.5-23 Central Station A Site Option 2013 and 2030 Baseline plus DEMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline plus DEMU Conditions	
		LOS	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**
1	Spring Mountain & Polaris	C	24.9	C	24.9	C	26.1	C	26.1
2	W. Twain & S. Valley View	**E**	**59.3**	**E**	**62.9**	**E**	**70.8**	**E**	**76.1**
3	W. Twain & Procyon	B (SB) [B]	12.0	B (SB) [B]	12.4	B (SB) [B]	12.5	B (SB) [B]	12.8
4	W. Twain & Polaris	C	26.5	C	29.5	C	28.2	C	30.5
5	W. Twain & Dean Martin Dr/Industrial	C	30.4	**E**	**62.1**	D	38.1	**F**	**105.4**
6	Industrial & Frank Sinatra	D	36.2	D	45.9	**E**	**61.2**	**E**	**79.5**
7	W. Twain & Frank Sinatra	C	20.2	C	23.4	B	17.0	C	22.4
8	W. Flamingo & I-15 NB Ramps	C	29.5	**E**	**57.3**	D	37.9	**E**	**71.8**
9	W. Flamingo & I-15 SB Ramps	A	7.5	A	9.0	A	8.6	B	10.9
10	W. Flamingo & S. Valley View	D	41.6	D	42.6	**F**	**95.8**	**F**	**95.9**
11	W. Flamingo & Hotel Rio Dr	D	39.1	**E**	**76.5**	D	39.1	**E**	**77.2**
12	W. Twain & Station Access[C]	-	-	B	13.1	-	-	B	13.1

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] SB = Southbound
[C] If Central Station A is selected, station access from Twain Avenue would be located at this intersection.
All intersections are signalized except W. Twain and Procyon.

3.5.4.9 Las Vegas Area - Central Station B

Both technology options would result in adverse effects and similar contributions to cumulative adverse effects. Adverse traffic effects are discussed for each technology option below.

EMU Technology Option

Table 3.5-24 shows intersection analysis results for the EMU option at the Central Station B site option.

2013 Plus EMU – Adverse Effects: The addition of traffic generated by the EMU option to 2013 baseline conditions would result in failing LOS operations at 2 study intersections. The intersections adversely affected in 2013 by the EMU option are:

- Intersection 1, Flamingo Road/Hotel Rio Drive
- Intersection 5, Hotel Rio Drive/Dean Martin Drive

In 2013, the EMU option would contribute to traffic at the following already failing intersection, thereby contributing to cumulative adverse effects:

- Intersection 7, West Tropicana Avenue/Dean Martin Drive

2030 Plus EMU – Adverse Effects: Since it would change LOS from an acceptable to an unacceptable level in 2030 the EMU option would adversely affect the following intersections:

- Intersection 1, Flamingo Road/Hotel Rio Drive
- Intersection 3, Flamingo Road at I-15 northbound ramps
- Intersection 5, Hotel Rio Drive/Dean Martin Drive

In 2013, the EMU option would further degrade failing baseline conditions, thereby contributing to cumulative adverse effects at the following intersections:

- Intersection 7, West Tropicana Avenue/Dean Martin Drive
- Intersection 9, Tropicana Avenue/I-15 northbound ramps

DEMU Technology Option

Table 3.5-25 shows intersection analysis results for the DEMU option at the Central Station B site option.

2013 Plus DEMU – Adverse Effects: Because its LOS would change from an acceptable to an unacceptable level, the following intersection would be adversely affected by implementation of the DEMU option:

- Intersection 1, Flamingo Road/Hotel Rio Drive

In 2013, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU option.

2030 Plus DEMU – Adverse Effects: Because its LOS would change from an acceptable to an unacceptable level, the following two intersections would be adversely affected by implementation of the DEMU option:

- Intersection 1, Flamingo/Hotel Rio Drive
- Intersection 3, Flamingo Road/I-15 northbound ramps

In 2030, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU option.

Table 3.5-24 Central Station B Site Option 2013 and 2030 Baseline plus EMU Conditions LOS

Intersection [B]		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline plus EMU Conditions	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	W Flamingo Rd/Hotel Rio Dr	D	39.0	**F**	**293.4**	D	39.1	**F**	**301.2**
2	Flamingo/I-15 SB	A	7.5	A	7.7	A	8.6	A	9.0
3	Flamingo/I-15 NB	C	29.0	D	45.5	D	37.9	**E**	**64.4**
4	Hotel Rio Dr/Dean Martin Dr	C	24.5	**F**	**87.6**	C	26.6	**F**	**87.0**
5	W Harmon Ave/Polaris Ave	C	20.6	C	25.7	B	18.7	C	27.5
6	W Tropicana Ave/Polaris Ave	B	12.7	C	26.5	B	17.6	D	35.0
7	W Tropicana Ave/Dean Martin Dr	**E**	**60.2**	**F**	**149.7**	**F**	**80.2**	**F**	**181.2**
8	Tropicana/I-15 SB Ramp	B	16.2	B	15.4	C	20.7	C	20.1
9	Tropicana/I-15 NB Ramp	C	31.2	D	35.7	**E**	**77.0**	**F**	**87.6**
10	W Harmon Ave/Aldebaran Ave	B	11.6	C	23.7	B	11.8	C	23.8

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
Bold indicates unacceptable conditions.
All intersections are signalized

Table 3.5-25 Central Station B Site Option 2013 and 2030 Baseline plus DEMU Conditions LOS

Intersection [B]		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline plus DEMU Conditions	
		LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]	LOS	Delay [A]
1	W Flamingo Rd/Hotel Rio Dr	D	39.0	**F**	**180.0**	D	39.1	**F**	**185.7**
2	Flamingo/I-15 SB	A	7.5	A	7.4	A	8.6	A	8.7
3	Flamingo/I-15 NB	C	29.0	D	38.5	D	37.9	**E**	**55.4**
4	Hotel Rio Dr/Dean Martin Dr	C	24.5	D	46.9	C	26.6	D	49.2
5	W Harmon Ave/Polaris Ave	C	20.6	C	22.8	B	18.7	C	24.3
6	W Tropicana Ave/Polaris Ave	B	12.7	C	20.7	B	17.6	C	27.8
7	W Tropicana Ave/Dean Martin Dr	**E**	**60.2**	**F**	**115.3**	**F**	**80.2**	**F**	**146.1**
8	Tropicana/I-15 SB Ramp	B	16.2	B	15.5	C	20.7	C	20.1
9	Tropicana/I-15 NB Ramp	C	31.2	C	34.0	**E**	**77.0**	**F**	**85.3**
10	W Harmon Ave/Aldebaran Ave	B	11.6	C	22.0	B	11.8	C	22.9

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
Bold indicates unacceptable conditions.
All intersections are signalized

3.5.4.10 Las Vegas Area - Downtown Station

Implementation of both the EMU and DEMU options would result in adverse project-specific and cumulative traffic effects at study intersections. These effects are discussed below for each technology option

EMU Technology Option

Table 3.5-26 shows intersection analysis results for the EMU option at the proposed Downtown Station site option.

2013 Plus EMU – Adverse Effects: The addition of traffic generated by the EMU option to 2013 baseline conditions would change LOS from acceptable to unacceptable at one study intersection. The intersection adversely affected in 2013 by the EMU option is:

- Intersection 9, Main Street/West Charleston Boulevard.

Since the EMU option would further degrade already failing intersections, it would contribute to adverse cumulative effects at the five following intersections:

- Intersection 2, East Bonneville Avenue/North Main Street
- Intersection4, West Bonneville Avenue/South Martin Luther King Junior Boulevard
- Intersection6, South Martin Luther King Junior Boulevard/West Charleston Boulevard
- Intersection 8, South Grand Central Parkway/West Charleston Boulevard
- Intersection 10, South Martin Luther King Junior Boulevard/I-15 southbound on-ramp

2030 Plus EMU – Adverse Effects: Implementation of the EMU option would not result in significant adverse traffic effects in 2030.

In 2030, the EMU option would further degrade already failing intersections, thereby contributing to adverse cumulative effects at the following intersections:

- Intersection 2, East Bonneville Avenue/North Main Street
- Intersection4, West Bonneville Avenue/South Martin Luther King Junior Boulevard
- Intersection 8, South Grand Central Parkway/West Charleston Boulevard
- Intersection9, South Main Street/West Charleston Boulevard
- Intersection 15, I-15 ramps/ Charleston Boulevard

DEMU Technology Option

Table 3.5-27 shows intersection analysis results for the DEMU option at the Downtown Station site option.

2013 Plus EMU – Adverse Effects: The addition of traffic generated by the DEMU option to 2013 baseline conditions would change LOS from acceptable to unacceptable at one study intersection. The intersection adversely affected in 2013 by the DEMU technology option is:

- Intersection 9, Main Street/West Charleston Boulevard.

In 2013, the DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU technology option.

2030 Plus EMU – Adverse Effects: Implementation of the DEMU option would not result in significant adverse project-specific traffic effects in 2030.

The DEMU option would contribute to adverse cumulative effects at the same intersections as previously discussed for the EMU option.

Table 3.5-26 Downtown Station Site Option 2013 and 2030 Baseline plus EMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus EMU Conditions		2030 Baseline Conditions		2030 Baseline plus EMU Conditions	
		LOS	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**
1	N. Main St & S. Grand Central Pkwy	B	13.2	B	17.9	B	13.4	B	16.1
2	E. Bonneville & N. Main St	**F**	**82.2**	**F**	**103.6**	**E**	**66.7**	**F**	**95.2**
3	E. Bonneville & S. Grand Central Pkwy	C	34.2	C	33.8	D	48.1	D	47.8
4	W. Bonneville & S. MLK	**E**	**56.3**	**E**	**56.1**	**E**	**65.8**	**E**	**74.1**
5	S. MLK & I-15 SB Off-Ramp	B	10.8	B	15.5	-	-	-	-
6	S. MLK & W. Charleston	**E**	**60.0**	**F**	**125.7**	-	-	-	-
7	S. Grand Central Pkwy & Iron Horse Ct / I-15 NB ramps	B	18.1	C	20.9	-	-	-	-
8	S. Grand Central Pkwy & W. Charleston	**E**	**79.2**	**F**	**105.7**	**F**	**97.6**	**F**	**177.2**
9	S. Main St & W. Charleston	D	54.9	**F**	**240.8**	**E**	**66.5**	**F**	**327.5**
10	S. MLK & I-15 SB On-Ramp	**F (NB) [B]**	**154.3**	**F (NB) [B]**	**280.2**	-	-	-	-
11	Casino Center & Charleston	A	9.9	A	9.7	B	10.6	B	10.7
12	4th Street & Charleston	B	10.9	B	11.2	B	12.0	B	11.8
13	Las Vegas Blvd & Charleston	D	46.8	D	51.2	D	50.2	D	51.3
14	S. Las Vegas Blvd & S. Main St	D	40.3	D	49.2	D	41.8	D	52.6
15	I-15 ramps & Charleston	-	-	-	-	**E**	**56.9**	**F**	**93.9**

Source: DMJM Harris, 2008.
Notes: [A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
Bold indicates unacceptable conditions.

Table 3.5-27 Downtown Station Site Option, 2013 and 2030 Baseline plus DEMU Conditions LOS

Intersection		2013 Baseline Conditions		2013 Baseline plus DEMU Conditions		2030 Baseline Conditions		2030 Baseline plus DEMU Conditions	
		LOS	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**	**LOS**	**Delay [A]**
1	N. Main St & S. Grand Central Pkwy	B	13.2	B	16.4	B	13.4	B	15.2
2	E. Bonneville & N. Main St	**F**	**82.2**	**F**	**96.2**	**E**	**66.7**	**F**	**86.3**
3	E. Bonneville & S. Grand Central Pkwy	C	34.2	C	33.9	D	48.1	D	47.9
4	W. Bonneville & S. MLK	**E**	**56.3**	**E**	**56.2**	**E**	**65.8**	**E**	**71.3**
5	S. MLK & I-15 SB Off-Ramp	B	10.8	B	13.3	-	-	-	-
6	S. MLK & W. Charleston	**E**	**60.0**	**F**	**101.4**	-	-	-	-
7	S. Grand Central Pkwy & Iron Horse Ct / I-15 NB ramps	B	18.1	B	19.7	-	-	-	-
8	S. Grand Central Pkwy & W. Charleston	**E**	**79.2**	**F**	**96.0**	**F**	**97.6**	**F**	**152.1**
9	S. Main St & W. Charleston	D	54.9	F	163.8	**E**	**66.5**	**F**	**237.5**
10	S. MLK & I-15 SB On-Ramp	**F (NB) [B]**	**154.3**	**F (NB) [B]**	**236.7**	**-**	-	-	-
11	Casino Center & Charleston	A	9.9	A	9.7	B	10.6	B	10.7
12	4th Street & Charleston	B	10.9	B	11.1	B	12.0	B	11.8
13	Las Vegas Blvd & Charleston	D	46.8	D	49.3	D	50.2	D	50.9
14	S. Las Vegas Blvd & S. Main St	D	40.3	D	46.4	D	41.8	D	47.3
15	I-15 ramps & Charleston	-	-	-	-	**E**	**56.9**	**F**	**80.8**

Source: DMJM Harris, 2008.
Notes:
[A] Delay reported in seconds per vehicle. LOS and Delay reported for worst approach.
[B] EB = Eastbound; WB = Westbound; SB = Southbound; NB = Northbound
Intersections shown in *italics* are signalized. Intersections shown in normal text are unsignalized.
Bold indicates unacceptable conditions.

3.5.5 Mitigation Measures

The traffic analysis indicates that implementation of the DesertXpress project would result in a reduction in traffic on Interstate 15 between Victorville and Las Vegas, when compared to the no action conditions (ie, 2013 and 2030 baseline data). This reduction ranges from 400 to 500 vehicles per peak hour in the peak direction in 2013, and 1,100 to 1,400 vehicles in 2030, depending on whether the DEMU or EMU alternative is selected. As a result, both technology options would result in a beneficial effect on mainline traffic volumes on I-15 between Victorville and Las Vegas.

In the areas around the proposed stations, the DesertXpress project would result in higher traffic volumes at local intersections. In general, these higher volumes can be mitigated by adding signalization and/or adding lanes to the intersection approaches. Tables 3.5-28 and 3.5-29 summarize the mitigation measures recommended for the EMU and DEMU alternatives respectively. Mitigation for cumulative impacts at ramp junctions near the Victorville station areas are the same as the mitigation listed for the Victorville site option intersections. The Traffic Impact Study (Appendix E) includes a signal warrant analysis as an appendix.

With implementation of the following mitigation measures, all intersections, except for the existing intersections at Victorville Station Site 1, would operate at acceptable LOS. Due to cumulative growth in the region, the two Stoddard Wells Road Intersections would be at unacceptable levels of service by 2030. The addition of project traffic would increase this cumulative effect.

Table 3.5-28 Action Alternative Mitigations – EMU Alternatives

Station Site Option	Existing	2013	2030
Mitigation TRAF- 1: Victorville Site Option 1 – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e.		1. Outer Highway/ I-15 NB Ramps ▪ Add second eastbound right turn lane 2. Outer Highway/ Stoddard Wells Road ▪ Add second northbound left turn lane ▪ Add second southbound right turn lane 3. Stoddard Wells Road/ I-15 SB on-ramp ▪ Signalize ▪ Add second southbound left turn lane	7. Stoddard Wells Road/ I-15 SB ramps ▪ Add eastbound left turn lane ▪ Add eastbound through lane 8. Stoddard Wells Road/ I-15 NB ramps ▪ Add eastbound left turn lane ▪ Add northbound right turn lane *Even with implementation of cumulative mitigation measures, future LOS at intersections 7 and 8 would remain at an unacceptable*

Station Site Option	Existing	2013	2030
Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)			*level. Adverse cumulative effects to intersections cannot be feasibly mitigated.*
Mitigation TRAF-2: Victorville Site Option 1 – Project Mitigation	1. Outer Highway/I-15 NB ramps ▪ Signalize 2. Outer Highway/ Stoddard Wells Road ▪ Signalize ▪ Add northbound left turn lane ▪ Add southbound right turn lane 3. Stoddard Wells Road/ I-15 SB on-ramp ▪ Signalize 4. Stoddard Wells Road/ I-15 SB off-ramp ▪ Signalize		5: Stoddard Wells Road/Station Access #1 ▪ Add third southbound through lane *Even with implementation of the cumulative mitigation measures, future LOS at intersections 7 and 8 would remain at an unacceptable level. Adverse effects to intersections cannot be feasibly mitigated.*
Mitigation TRAF-3: Victorville Site Option 2 – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	N/A	N/A
Mitigation TRAF-4: Victorville Site Option 2 –	1. Stoddard Wells Road/ I-15 NB ramps ▪ Signalize	1. Stoddard Wells Road/ I-15 NB ramps ▪ Add northbound left turn lane	1. Stoddard Wells Road/ I-15 NB ramps ▪ Add second southbound right turn lane

Station Site Option	Existing	2013	2030
Project Mitigation	2. Stoddard Wells Road/ Quarry Road ▪ Signalize		
Mitigation TRAF-5: Southern Station – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	1. Tropicana/Valley View ▪ Add exclusive southbound free right turn lane. 2. Tropicana/Dean Martin Drive-Industrial ▪ Optimize signal offset along Tropicana. 6. Hacienda/Polaris ▪ Signalize this intersection. 9. Russell/I-15 SB ramps ▪ Optimize signal offset along Russell Road.	1. Tropicana/Valley View ▪ Add exclusive westbound right turn lane. ▪ Add second southbound left turn lane. 2. Tropicana/Dean Martin Drive-Industrial ▪ Add fourth eastbound through lane. ▪ Add fourth westbound through lane. 3. Tropicana/I-15 NB Ramps ▪ Add second northbound right turn lane. 7. Hacienda/Valley View ▪ Add second eastbound left turn lane. ▪ Add exclusive eastbound right turn lane. ▪ Add third eastbound through lane. ▪ Add exclusive westbound right turn lane. ▪ Add third westbound through lane. ▪ Add second northbound left turn lane. ▪ Add third northbound through lane. 10. Russell/I-15 NB ramps ▪ Optimize signal offset along Russell Road.
Mitigation TRAF-6: Southern Station – Project Mitigation	N/A	2. Tropicana/Dean Martin Drive-Industrial ▪ Add exclusive westbound right turn lane ▪ Add exclusive northbound right turn lane 5. Hacienda/Aldebaran ▪ Signalize this intersection. 6. Hacienda/Polaris ▪ Add exclusive eastbound right turn lane	1. Tropicana/Valley View ▪ Add second westbound left turn lane. 2. Tropicana/ Dean Martin Drive/Industrial ▪ Add exclusive westbound right turn lane. ▪ Add third northbound through lane. ▪ Add exclusive northbound right turn lane. 6. Hacienda/Polaris

Station Site Option	Existing	2013	2030
		▪ Add second westbound left turn lane ▪ Add exclusive northbound left turn lane 8. Russell/Polaris ▪ Add exclusive westbound right turn lane. ▪ Add exclusive northbound right turn lane. ▪ Add southbound dual left turn lanes. ▪ Add exclusive southbound right turn lane. 9. Russell/I-15 SB ramps ▪ Add second southbound right turn lane.	▪ Add third westbound left turn lane ▪ Add exclusive northbound right turn lane 7. Hacienda/Valley View ▪ Add third eastbound left turn lane ▪ Add second westbound left turn lane ▪ Add second southbound left turn lane. 8. Russell/Polaris ▪ Add third southbound left turn lane. 9. Russell/I-15 SB ramps ▪ Add second eastbound right turn lane. ▪ Add second westbound left turn lane. 10. Russell/I-15 NB ramps ▪ Add third eastbound left turn lane ▪ Add second northbound left turn lane
Mitigation TRAF-7: Central Station A – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	2. Twain Avenue/Valley View ▪ Optimize network offset.	2. Twain Avenue/Valley View ▪ Add exclusive westbound right turn lane. 6. Industrial/Frank Sinatra ▪ Add second westbound right turn lane 10. Flamingo/Valley View ▪ Add exclusive northbound right turn lane.
Mitigation TRAF8: Central	N/A	5. Twain Avenue/Dean Martin Drive-Industrial	8. Flamingo/I-15 NB ramps ▪ Add third eastbound left

Station Site Option	Existing	2013	2030
Station A – Project Mitigation		▪ Add second southbound right turn lane. 6. Industrial/Frank Sinatra ▪ Add second westbound right turn lane 8. Flamingo/I-15 NB Ramps ▪ Add third eastbound right turn lane 11. Flamingo/Hotel Rio Drive ▪ Add third southbound left turn lane. ▪ Add fourth westbound through lane. ▪ Add second westbound right turn lane. ▪ Add fourth eastbound through lane.	turn lane. ▪ Add fourth westbound through lane.
Mitigation TRAF-9: Central Station B – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	7. Tropicana Avenue/Dean Martin Drive ▪ Optimize signal offset along Tropicana Avenue.	7. Tropicana Avenue/Dean Martin Drive ▪ Add exclusive northbound right turn lane. 9. Tropicana Avenue/I-15 NB ramps ▪ Optimize signal offsets along Tropicana Avenue.
Mitigation TRAF-10: Central Station B – Project Mitigation	N/A	1. Flamingo Road/Hotel Rio Drive ▪ Add fourth eastbound through lane. ▪ Add second westbound left turn lane. ▪ Add fourth westbound through lane. ▪ Add second northbound	1. Flamingo/Hotel Rio Drive ▪ Stripe existing northbound through lane as a share through/right turn lane. 3. Flamingo/I-15 NB ramps ▪ Add fourth westbound through lane.

Station Site Option	Existing	2013	2030
		right turn lane. 4. Hotel Rio Drive/Dean Martin Drive ▪ Modify eastbound right turn to have overlap phasing. 7. Tropicana Avenue/Dean Martin Drive ▪ Add exclusive eastbound right turn lane. ▪ Add exclusive westbound right turn lane. ▪ Add exclusive northbound right turn lane. ▪ Add third southbound left turn lane.	4. Hotel Rio Drive/ Dean Martin Drive ▪ Add second northbound left turn lane. 7. Tropicana Avenue/ Dean Martin Drive ▪ Add fourth eastbound through lane. ▪ Add fourth westbound through lane. 9. Tropicana Avenue/I-15 NB Ramp ▪ Add second northbound right turn lane.
Mitigation TRAF-11: Downtown Station Site Option – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)		2. Bonneville/Main Street ▪ Add exclusive westbound right turn lane. 4. Bonneville/S. Martin Luther King Boulevard ▪ Add second eastbound left turn lane. 6. Charleston/S. Martin Luther King Boulevard ▪ Optimize network offset and signal timing. 8. Grand Central Parkway/W. Charleston Boulevard ▪ Optimize network offset and signal timing. 10. S. Martin Luther King Boulevard/I-15 southbound on-ramp ▪ Signalize the intersection.	2. Bonneville/Main Street ▪ Optimize network offset and signal timing. 4. Bonneville/S. Martin Luther King Boulevard ▪ Add exclusive southbound right turn lane. 8. Grand Central Parkway/W. Charleston Boulevard ▪ Add second eastbound left turn lane. ▪ Add third southbound right turn lane. 9. Main Street/Charleston Boulevard ▪ Optimize network offset and signal timing. 15. I-15 ramps/Charleston Boulevard (SPUI Interchange) ▪ Optimize network offset and signal timing.
Mitigation TRAF-12: Downtown Station Site Option – Project Mitigation	N/A	6. Charleston/S. Martin Luther King Boulevard ▪ Add exclusive eastbound right turn lane. 9. Main Street/Charleston	4. Bonneville/S. Martin Luther King Boulevard ▪ Add exclusive westbound right turn lane. 8. Grand Central

Station Site Option	Existing	2013	2030
		Boulevard ▪ Add fourth westbound through lane. ▪ Add exclusive westbound right turn lane. ▪ Add second eastbound left turn lane. ▪ Add exclusive eastbound right turn lane. ▪ Add exclusive dual southbound right turn lanes.	Parkway/W. Charleston Boulevard ▪ Add fourth westbound through lane. 9. Main Street/Charleston Boulevard ▪ Add third eastbound left turn lane. ▪ Add second northbound left turn lane. ▪ Add exclusive northbound right turn lane. ▪ Add fifth westbound through lane. ▪ Add second southbound left turn lane. 15. I-15 Ramps/Charleston Boulevard (SPUI Interchange) ▪ Add third southbound left turn lane. ▪ Add fourth westbound through lane.

Source: DMJM Harris, 2008.

Table 3.5-29: Action Alternative Mitigations – DEMU Alternatives

Station Site Option	Existing	2013	2030
Mitigation TRAF-13: Victorville Site Option 1 – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	1. Outer Highway/ I-15 NB ramps ▪ Add second eastbound right turn lane 2. Outer Highway/ Stoddard Wells Road ▪ Add second northbound left turn lane ▪ Add second southbound right turn lane 3. Stoddard Wells Road/ I-15 SB on-ramp ▪ Add second southbound left turn lane	7: Stoddard Wells Road/ I-15 SB ramps ▪ Add eastbound left turn lane ▪ Add eastbound through lane 8: Stoddard Wells Road/ I-15 NB ramps ▪ Add eastbound left turn lane ▪ Add northbound right turn lane *Even with implementation of cumulative mitigation measures, future LOS at intersections 7 and 8 would remain at an unacceptable level. Adverse cumulative effects to intersections cannot be feasibly mitigated.*
Mitigation TRAF-14: Victorville Site Option 1 – Project Mitigation	#1. Outer Highway & I-15 NB ramps ▪ Signalize #4. Stoddard Wells Road & I-15 SB off-ramp ▪ Signalize		5: Stoddard Wells Road/Station Access #1 ▪ Add third southbound through lane *Even with implementation of the cumulative mitigation measures, future LOS at intersections 7 and 8 would remain at an unacceptable level. Adverse effects to intersections cannot be feasibly mitigated.*
Mitigation TRAF-15: Victorville Site Option 1 – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the	N/A	N/A	N/A

Station Site Option	Existing	2013	2030
adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)			
Mitigation TRAF-16: Victorville Site Option 2 – Project Mitigation	N/A	1. Stoddard Wells Road/ I-15 NB Ramps ▪ Signalize	N/A
Mitigation TRAF-17: Southern Station – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	1. Tropicana/Valley View ▪ Add exclusive southbound free right turn lane. 2. Tropicana/Dean Martin Drive-Industrial ▪ Optimize signal offset along Tropicana. 6. Hacienda/Polaris ▪ Signalize this intersection. 9. Russell/I-15 SB Ramps ▪ Optimize signal offset along Russell Road.	1. Tropicana/Valley View ▪ Add exclusive westbound right turn lane. ▪ Add second southbound left turn lane. 2. Tropicana/Dean Martin Drive-Industrial ▪ Add fourth eastbound through lane. ▪ Add fourth westbound through lane. 3. Tropicana/I-15 NB Ramps ▪ Add second northbound right turn lane. 7. Hacienda/Valley View ▪ Add second eastbound left turn lane. ▪ Add exclusive eastbound right turn lane. ▪ Add third eastbound through lane. ▪ Add exclusive westbound right turn lane. ▪ Add third westbound through lane. ▪ Add second northbound left turn lane. ▪ Add third northbound through lane. 8. Russell/Polaris ▪ Add exclusive northbound right turn lane. ▪ Add exclusive

Station Site Option	Existing	2013	2030
			southbound left turn lane. 9. Russell/I-15 SB ramps ▪ Add second southbound right turn lane. 10. Russell/I-15 NB ramps ▪ Optimize signal offset along Russell Road.
Mitigation TRAF-18: Southern Station – Project Mitigation	N/A	2. Tropicana/Dean Martin Drive-Industrial ▪ Add exclusive westbound right turn lane. ▪ Add exclusive northbound right turn lane. 5. Hacienda/Aldebaran ▪ Signalize this intersection. 6. Hacienda/Polaris ▪ Add exclusive northbound left turn lane. 8. Russell/Polaris ▪ Add exclusive westbound right turn lane. ▪ Add exclusive northbound right turn lane. ▪ Add southbound dual left turn lanes.	1. Tropicana/Valley View ▪ Add second westbound left turn lane. 6. Hacienda/Polaris ▪ Add exclusive northbound right turn lane. 7. Hacienda/Valley View ▪ Add third eastbound left turn lane. ▪ Add second westbound left turn lane. 8. Russell/Polaris ▪ Add third southbound left turn lane. 9. Russell/I-15 SB ramps ▪ Add second eastbound right turn lane. 10. Russell/I-15 NB ramps ▪ Add second northbound left turn lane.
Mitigation TRAF-19: Central Station A – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark	N/A	2. Twain Avenue/Valley View ▪ Optimize network offset.	2. Twain Avenue/Valley View ▪ Add exclusive westbound right turn lane. 6. Industrial/Frank Sinatra ▪ Add second westbound right turn lane 10. Flamingo/Valley View ▪ Add exclusive northbound right turn lane.

Station Site Option	Existing	2013	2030
County, or the City of Las Vegas)			
Mitigation TRAF-20: Central Station A – Project Mitigation	N/A	5. Twain Avenue/Dean Martin Drive-Industrial ▪ Optimize network offset. 8. Flamingo/I-15 NB Ramps ▪ Optimize network offset. 11. Flamingo/Hotel Rio Drive ▪ Add third southbound left turn lane. ▪ Add fourth westbound through lane. ▪ Add second westbound right turn lane. ▪ Add fourth eastbound through lane.	5. Twain Avenue/Dean Martin Drive/Industrial ▪ Add second southbound right turn lane. 8. Flamingo/I-15 NB Ramps ▪ Add third eastbound left turn lane
Mitigation TRAF-21: Central Station B – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	7. Tropicana Avenue/Dean Martin Drive ▪ Optimize signal offset along Tropicana Avenue.	7. Tropicana Avenue/Dean Martin Drive ▪ Add exclusive northbound right turn lane. 9. Tropicana Avenue/I-15 NB ramps ▪ Optimize signal offsets along Tropicana Avenue.
Mitigation TRAF-22: Central Station B – Project Mitigation	N/A	1. Flamingo Road/Hotel Rio Drive ▪ Add fourth eastbound through lane. ▪ Add second westbound left turn lane. ▪ Add second northbound right turn lane. 7. Tropicana Avenue/	1. Flamingo/Hotel Rio Drive ▪ Add fourth westbound through lane. ▪ Stripe existing northbound through lane as shared through/right lane. 3. Flamingo Road/I-15 NB ramps Optimize signal offsets

Station Site Option	Existing	2013	2030
		Dean Martin Drive ▪ Add exclusive eastbound right turn lane.	along Flamingo Road. 7. Tropicana Avenue/Dean Martin Drive ▪ Add fourth eastbound through lane. ▪ Add fourth westbound through lane. ▪ Add exclusive westbound right turn lane. ▪ Add third southbound left turn lane. 9. Tropicana Avenue/I-15 NB Ramps ▪ Add second northbound right turn lane.
Mitigation TRAF-23: Downtown Station – Cumulative Mitigation The project applicant would be responsible to contribute to these mitigations equal to their fair-share of the adverse effect as determined by the appropriate jurisdictional authority (i.e. Caltrans, San Bernardino County, Clark County, or the City of Las Vegas)	N/A	2. Bonneville/Main Street ▪ Add exclusive westbound right turn lane. 4. Bonneville/S. Martin Luther King Boulevard ▪ Add second eastbound left turn lane. 6. Charleston/S. Martin Luther King Boulevard ▪ Optimize network offset and signal timing. 8. Grand Central Parkway/W. Charleston Boulevard ▪ Optimize network offset and signal timing. 10. S. Martin Luther King Boulevard/ I-15 southbound on-ramp ▪ Signalize the intersection.	2. Bonneville/Main Street ▪ Optimize network offset and signal timing. 4. Bonneville/S. Martin Luther King Boulevard ▪ Add exclusive southbound right turn lane. 8. Grand Central Parkway/W. Charleston Boulevard ▪ Add second eastbound left turn lane. ▪ Add third southbound right turn lane. 9. Main Street/Charleston Boulevard ▪ Optimize network offset and signal timing. 15. I-15 ramps/Charleston Boulevard (SPUI Interchange) ▪ Optimize network offset and signal timing.
Mitigation TRAF-24: Downtown Station – Project Mitigation	N/A	9. Main Street/Charleston Boulevard ▪ Add second eastbound left turn lane ▪ Add exclusive dual southbound right turn lanes	8. Grand Central Parkway/W. Charleston Boulevard ▪ Add fourth westbound through lane. 9. Main Street/Charleston Boulevard ▪ Add third eastbound left turn lane.

Station Site Option	Existing	2013	2030
			▪ Add exclusive eastbound right turn lane. 15. I-15 ramps/Charleston Boulevard (SPUI Interchange) ▪ Add third southbound left turn lane.

Source: DMJM Harris 2008.

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3.6 VISUAL RESOURCES

This section describes the existing visual environment in the project study area and vicinity of the action alternatives, relevant regulations, and policies, and potential aesthetic impacts of the action and alternatives.

3.6.1 REGULATIONS AND STANDARDS

The National Environmental Policy Act of 1969 as amended (NEPA) establishes that the Federal government use all practicable means to ensure all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.[1] Beyond this general statement, NEPA does not specify regulatory requirements or standards related to the evaluation of visual resources. However, individual federal agencies have developed their own guidelines to address topics related to the visual environment. Relevant guidance, detailed below, has been set forth by the Federal Railroad Administration (FRA), Bureau of Land Management (BLM), Federal Highway Administration (FHWA), and the National Park Service (NPS).

3.6.1.1 Federal Railroad Administration

The FRA's *Procedures for Considering Environmental Impacts* (FRA Docket No EP-1, Notice 5, May 26, 1999), states that "the EIS should identify any significant changes likely to occur in the natural landscape and in the developed environment. The EIS should also discuss the consideration given to design quality, art, and architecture in project planning and development as required by DOT Order 5610.4."

3.6.1.2 Bureau of Land Management

The BLM has published guidance documents setting forth standards and procedures to be used in the evaluation of a project's potential visual impacts. The most critical to this evaluation are Manual 8400 (Visual Resource Management) and Manual H-8431 (Visual Resource Contrast Rating). These documents set forth criteria (discussed below) which foster BLM's stewardship of the visual character of government lands.

3.6.1.3 Federal Highway Administration

In its implementation of NEPA [23 U.S.C. 109(h) and 23 CFR Part 771], the FHWA directs that final decisions regarding projects are to be made in the best overall public interest, taking into account adverse environmental impacts, including among others, the destruction or disruption of aesthetic values. To this end, the FHWA has developed

[1] [42 U.S.C. 4331(b)(2)]

specific guidance for the evaluation of visual impacts of highway projects; this guidance is discussed at length in the Methods of Evaluation section below.

3.6.1.4 National Park Service

The Mojave National Preserve (Preserve) is a large expanse of desert lands that represent a combination of Great Basin, Sonoran, and Mojave desert ecosystems. Congress passed the California Desert Protection Act (CDPA) in 1994, in part establishing the Preserve.[2]

Congressional intent in the CDPA was to preserve outstanding natural, cultural, and scenic resources, while providing for scientific, educational, and recreational interests. In particular, the intent in establishing the Preserve was to "preserve and protect the natural and scenic resources of the Mojave Desert, including transitional elements of the Sonoran and Great Basin deserts."[3]

The NPS adopted a General Management Plan for the Preserve in April 2002. The General Management Plan catalogs general goals and policies for preserve management, including the protection of scenic resources. The General Management Plan states that NPS will, at a future date, prepare more specific guidelines to establish visual consistency and themes in facility development. Guidelines will also be created for reaching visual compatibility with surrounding landscapes, significant architectural features, and site details. The primary objective of these guidelines will be to create harmony between the built environment and the natural environment.[4]

As of December 2007, the NPS has not adopted more specific guidelines related to preservation of visual resources in development of facilities within the Preserve. As there are currently no guidelines for assessing impacts to visual resources within the Preserve, this analysis substitutes the blended methodology of BLM and FHWA (discussed in greater detail within the "Methods of Evaluation" section below) to assess visual impacts within the 1.55 mile portion of Segment 4A that would traverse the Preserve. In addition, Segments 3A and 3B would be in close proximity to the Preserve, particularly between Zzyzx Road and Nipton Road. While Segments 3A and 3B would be located entirely outside the physical boundaries of the Preserve, the Preserve, including areas designated as wilderness, is visually prominent from the freeway between these points.

3.6.1.5 State and Local Agency Regulatory Requirements

As stated in Chapter 1.0, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C.

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[2] The CDPA also converted two national monuments (Joshua Tree and Death Valley) into national parks.

[3] 16 U.S.C. §410aaa-41 et seq.

[4] U.S. Department of the Interior, National Park Service. *Mojave General Management Plan*, April 2002, p. 31-32.

10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. Laws and policies regarding visual impacts are considered to fall within the category of "land use and environmental" requirements as broadly defined by STB.

Although the DesertXpress Project is exempt from compliance with state and local regulations related to visual and aesthetic impacts, relevant policy statements and goals are discussed briefly below for informational purposes.

San Bernardino County General Plan

The 2006 San Bernardino County General Plan includes goals and policies that are related to the visual environment/aesthetic considerations. The General Plan includes goals and policies specific to the County's "Desert Region" in which the California portion of the proposed action and alternatives is located.

Within the Open Space Element, Goals OS-4 and OS-5 directly address visual resources in the County. Goal OS-4 calls for the preservation and protection of cultural, natural, and recreational resources that "contribute to a distinct visual experience for visitors and quality of life for residents." Goal OS-5 calls for the maintenance and enhancement of scenic routes in the County. Scenic routes identified under this goal include I-15 from the junction with Interstate 215 northeast to the Nevada state line (Segments 1, 2A/2B, 3A/3B, and 4A/4B) and Cima Road (within Segment 3).[5]

A goal within the Conservation Element seeks to "preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas."

Clark County Comprehensive Plan

The Clark County Comprehensive Plan is the long-term general policy plan for the physical development of unincorporated Clark County.

The Comprehensive Plan does not define or establish any "scenic routes" within the County. However, it does include policies within the Community Design, Air Quality, and Utilities elements that relate to the improvement of visual quality. Relevant policies from the Comprehensive Plan are summarized below.

- As a condition of approval, any visual incompatibilities resulting from a project should be screened from one another.[6]

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[5] The County excludes from this scenic route the following portions: those areas within the Barstow Planning Area and the community of Baker where there is commercial/industrial development; those portions within the Yermo area from Ghost Town Road to the East Yermo Road overcrossing on the south side only and from First Street to the East Yermo Road overcrossing on the north side; and all incorporated areas

[6] Clark County Comprehensive Plan Community Design Element, Policy GM1.1-2.

- Air quality should be improved in order to improve visual clarity.[7]
- The County will support the reduction of visual impacts created by newly constructed utility poles, towers, substations, and equipment buildings.[8] Methods for reducing the effect will be used include: disguising equipment buildings with screening and solid fencing; using architecture design on major utility projects to complement the character of a community; and placement high capacity electrical transmission lines underground where appropriate.

Victorville General Plan

The Victorville General Plan (last amended in April 2006) is the comprehensive, long-term policy framework for physical development in the City of Victorville. The General Plan does not define or establish any "scenic routes" within the City nor set forth any specific goals or policies related directly to the protection or enhancement of the visual environment.

Barstow General Plan

The Community Development Element of the Barstow General Plan (1997) defines scenic corridors, gateways, and crossroads. The Barstow General Plan identifies the I-15 freeway as a scenic highway.[9]

Las Vegas Master Plan

The City of Las Vegas Master Plan (2000) sets forth goals and policies guiding growth and change in the City.[10] The Regional Coordination Element includes a policy seeking to preserve the visual quality of natural drainages (arroyos, washes, etc). The policy states that such drainage features should not be rechanneled or replaced with concrete structures except where required for bank stability or public safety.[11]

3.6.2 AFFECTED ENVIRONMENT

3.6.2.1 Regional Environment

FRA has grouped the landscapes along the project corridor into three overall visual quality and sensitivity categories (low, medium, or high) based on analytical guidelines of the

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[7] Clark County Comprehensive Plan Air Quality Element, Policy CV1-2.0.

[8] Clark County Comprehensive Plan Utilities Element, Policy UT1-8.

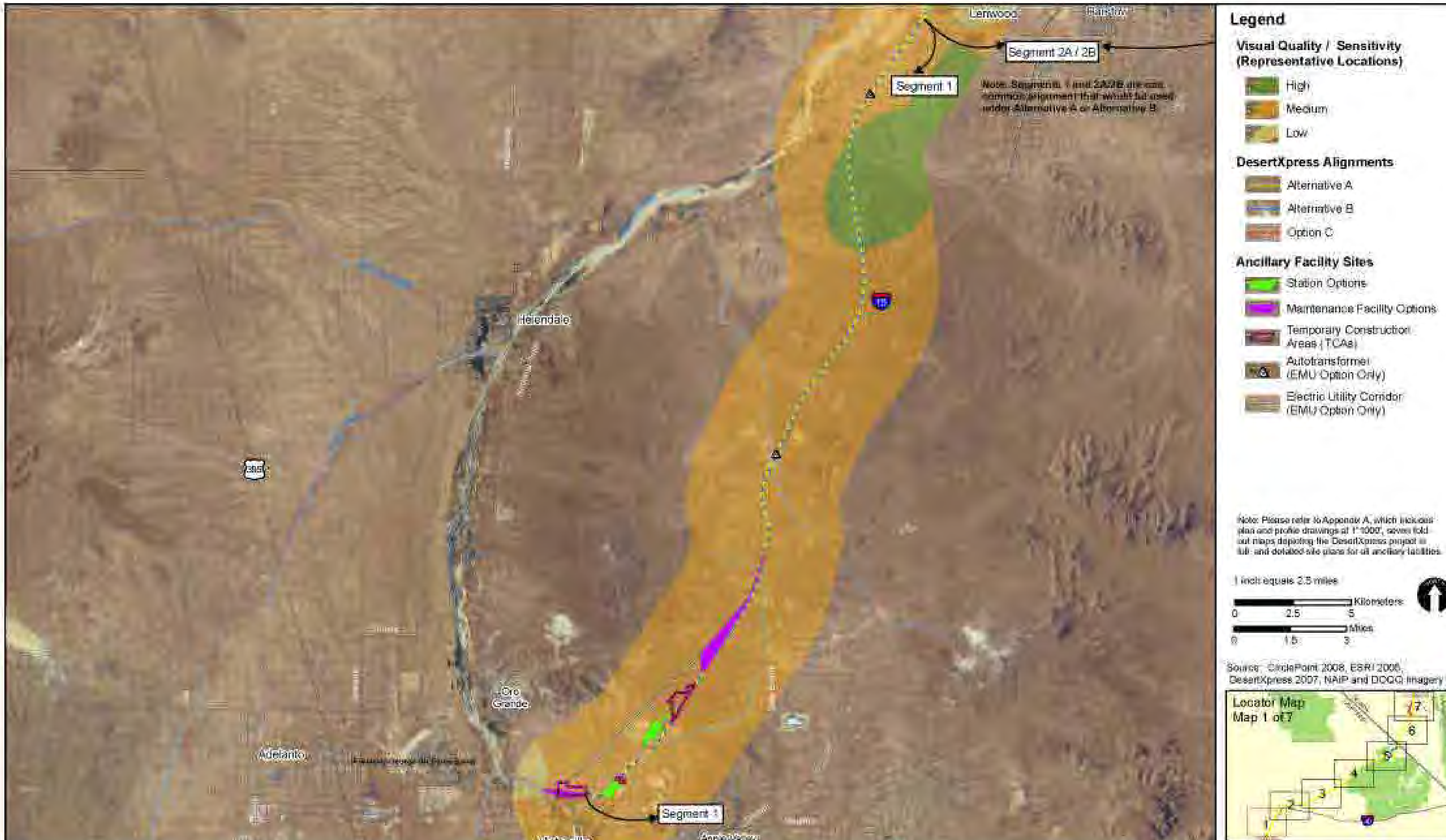
[9] Barstow General Plan Community Development Element, Policy I.14.8.

[10] Unless the terminal station is the Las Vegas Downtown Station, no Project facilities would be located in the City of Las Vegas; the three other station site options are located within unincorporated Clark County and do not cross the corporate limits of the City of Las Vegas.

[11] Las Vegas Master Plan Regional Coordination Element, Policy 7.2.2.

BLM and the FHWA. Figures 3-6.1 through 3.6-7 show the general locations of high, medium, and low sensitivity areas.

- **High visual quality/sensitivity:** Areas that are relatively undisturbed and also have vistas towards undeveloped natural areas. These areas would fall under BLM Class I and/or II and would have high visual ratings for FHWA criteria.
  - **General areas of high visual quality/sensitivity:**
    - Segment 1 south of Lenwood, where the segment diverges from the I-15 corridor
    - Segments 2A/2B, at the proposed Mojave River bridge
    - Areas south/east of Segments 3A/3B, between Zzyzx Road and Nipton Road (Mojave National Preserve)
    - Segment 4A from Mountain Pass to Nipton Road (Mojave National Preserve)
    - Segment 4B through an undeveloped mountainous area
    - Temporary Construction Areas along Segment 4B (TCAs 18-21)
- **Medium visual quality/sensitivity:** These include areas within an established transportation corridor, but which look out to landscapes with moderate to low visual disruption. The great majority of alignment options fall into this category. Much of the proposed action and alternatives traverse the established I-15 and/or other rail corridors, but look out onto relatively undisturbed landscapes. These areas would fall under BLM Class II or III objectives and would have moderate visual ratings under FHWA.
  - **General areas of medium visual sensitivity:**
    - Those portions of Segments 1-6 not otherwise identified as of low or high visual sensitivity.
    - All of the proposed Victorville area station and maintenance facility site options.
    - The Baker Maintenance of Way (MOW) facility in Segment 3
    - Temporary Construction Areas (TCAs) along Segments 3, 5, and 6 (TCAs 5 -10, and 13)



Federal Railroad Administration

DesertXpress Project EIS

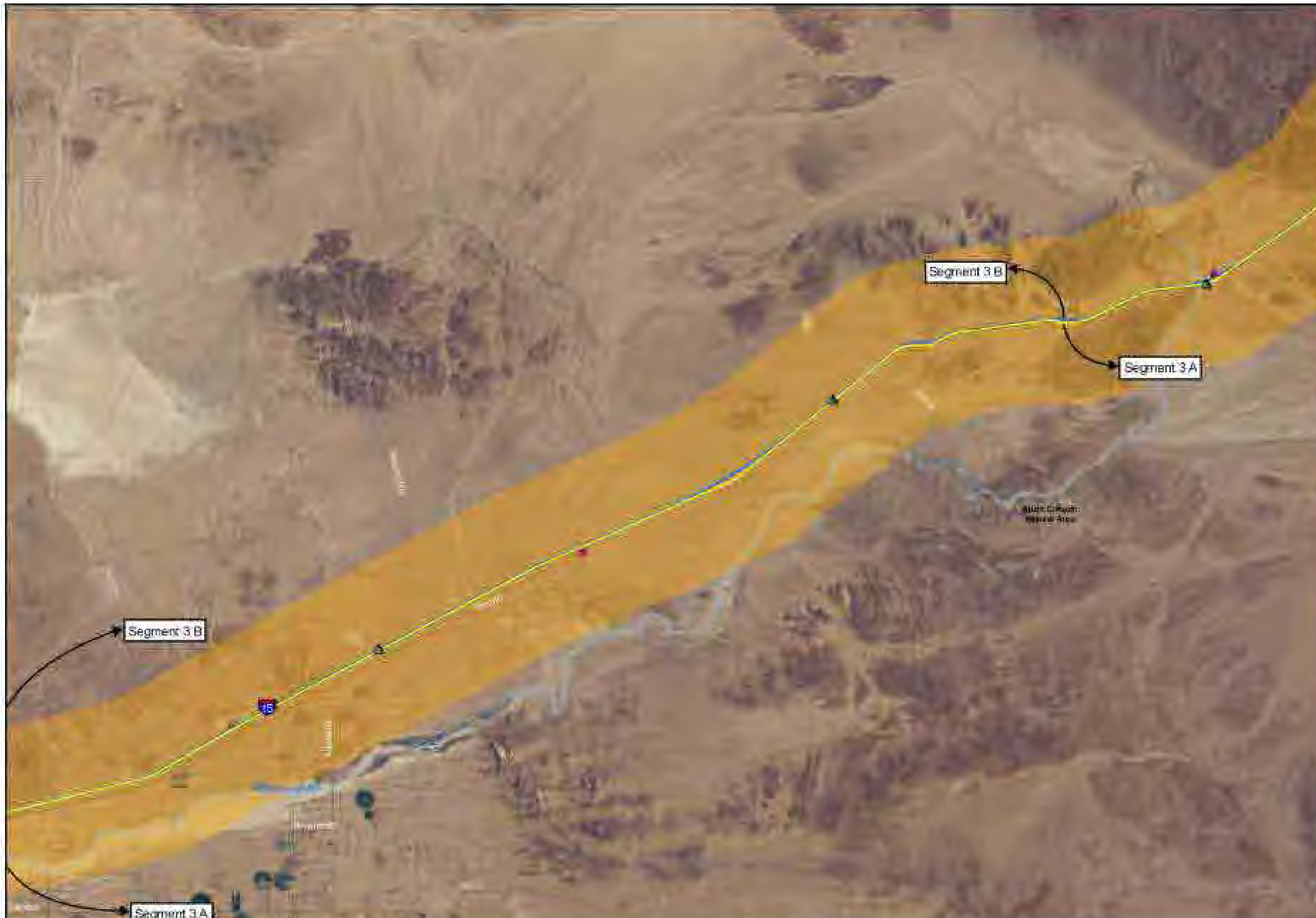
Visual Resources (1) **FIG 3-6.1**

Source: Geographic Consulting 02.03.08

Federal Railroad Administration

DesertXpress Project EIS

Visual Resources (2) **FIG 3-6.2**



Legend

Visual Quality / Sensitivity (Representative Locations)

- High
- Medium
- Low

DesertXpress Alignments

- Alternative A
- Alternative B
- Option C

Ancillary Facility Sites

- Station Options
- Maintenance Facility Options
- Temporary Construction Areas (TCAs)
- Autotransformer (EMU Option Only)
- Electric Utility Corridor (EMU Option Only)

Note: Please refer to Appendix A, which includes plan and profile drawings at 1"3000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.

1 inch equals 2.5 miles

0 2.5 5 Kilometers

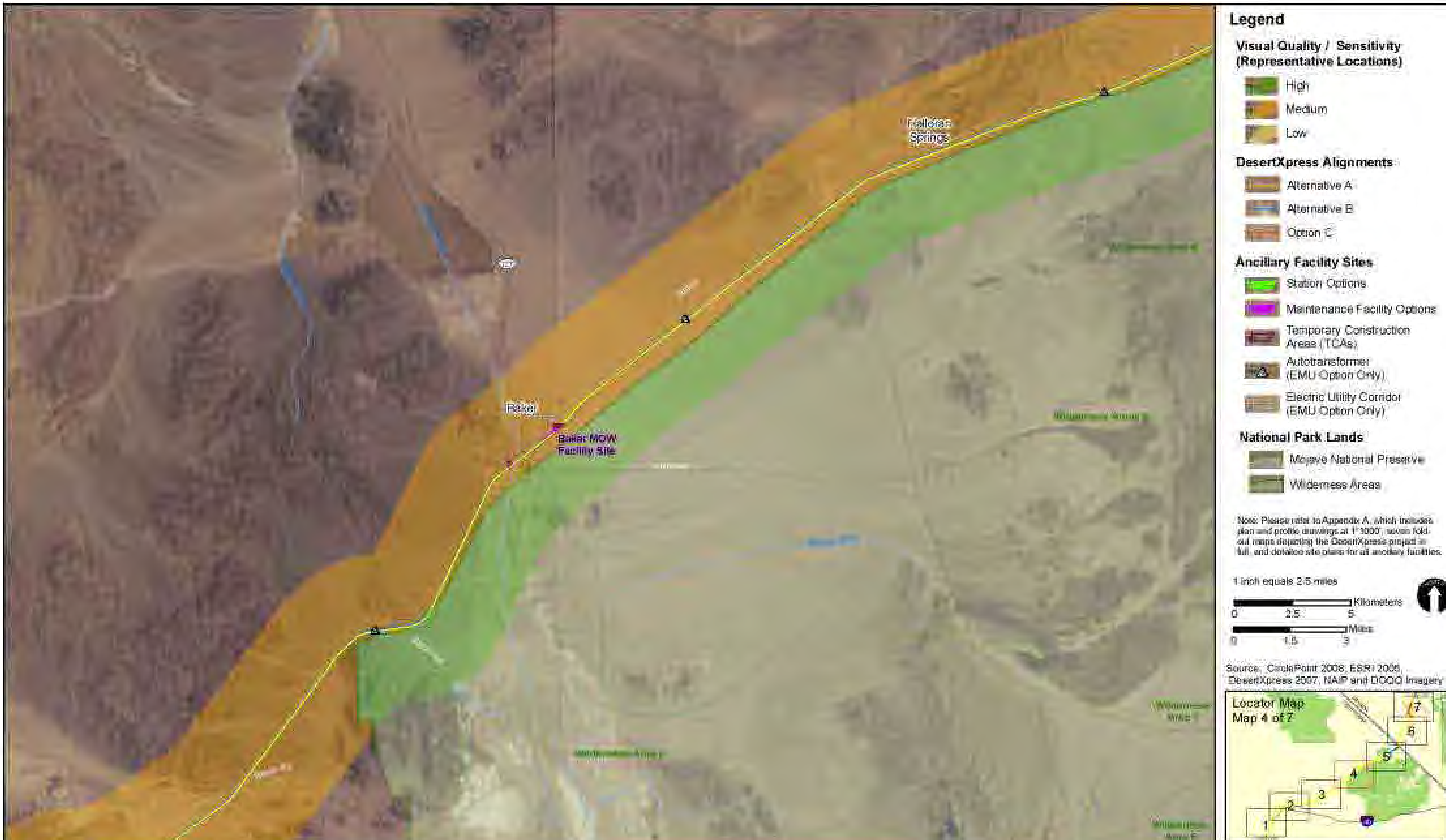
0 1.5 3 Miles

Source: CirclePoint 2008, ESRI 2006, DesertXpress 2007, NAIP and DOQQ Imagery

DesertXpress Project EIS

Visual Resources (3) FIG 3-6.3

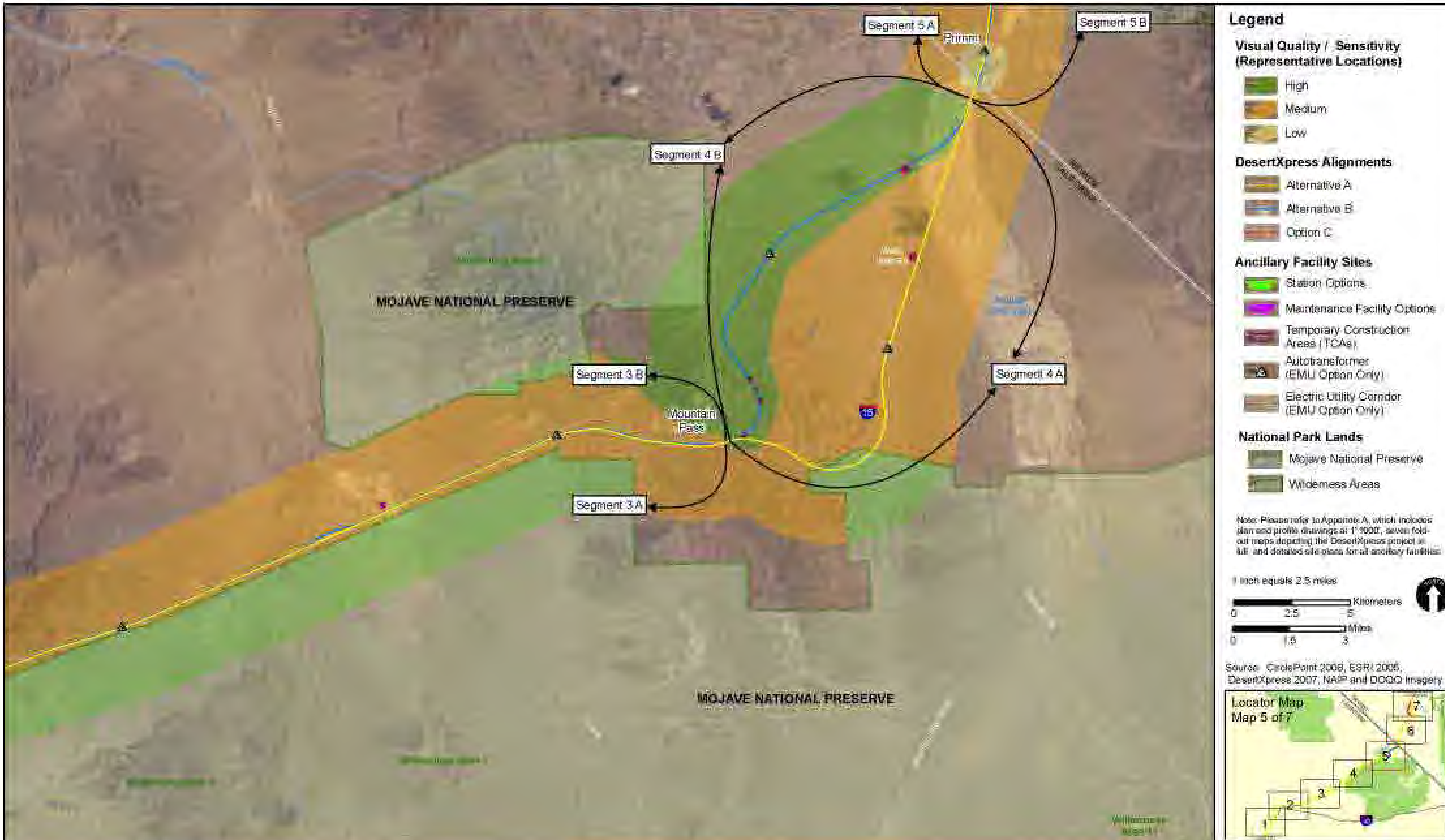
Source: Geographics Consulting 02.03.09



DesertXpress Project EIS

Visual Resources (4)

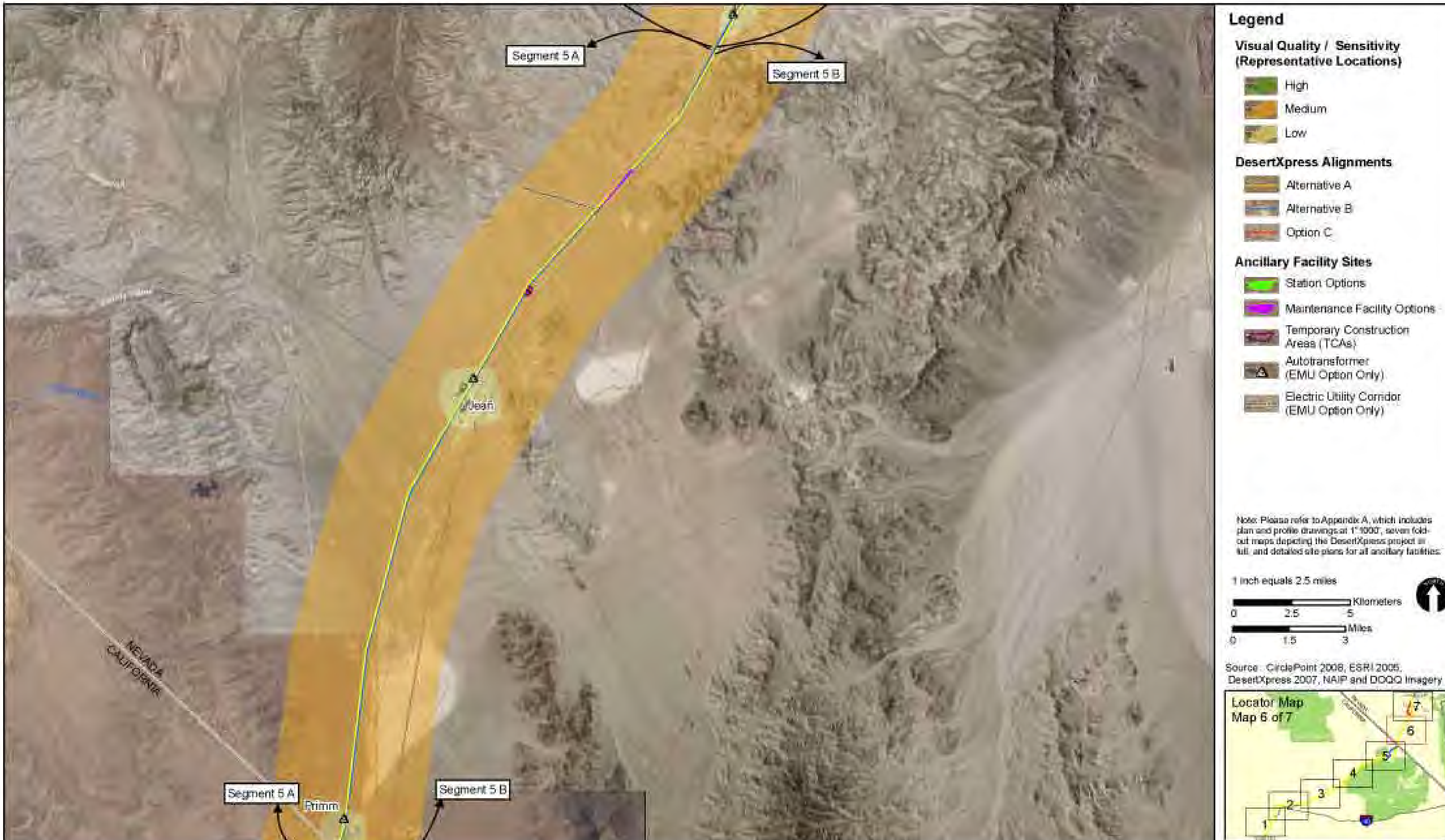
FIG 3-6.4



DesertXpress Project EIS

Visual Resources (5)

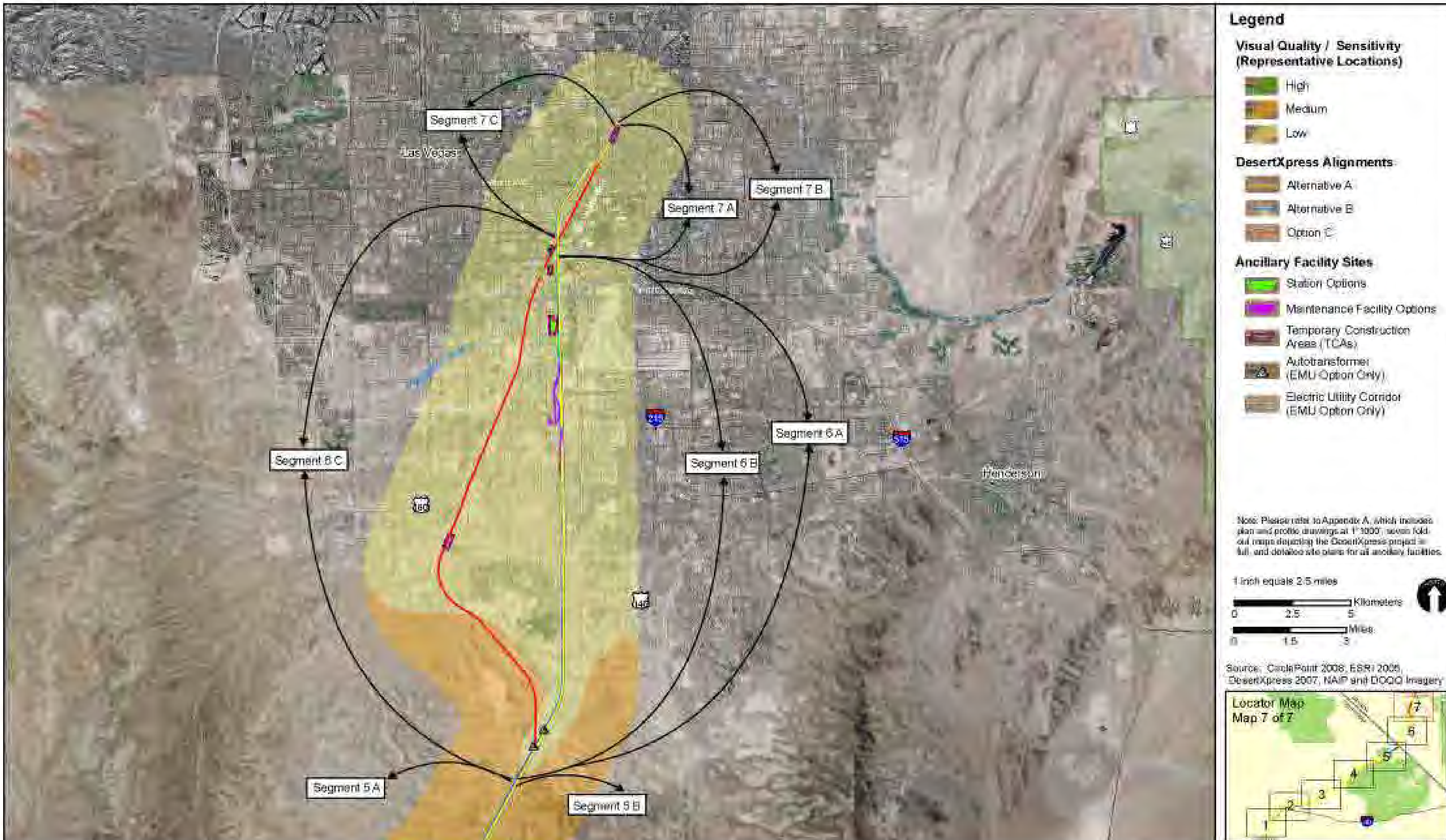
FIG 3-6.5



DesertXpress Project EIS

Visual Resources (6)

FIG 3-6.6



DesertXpress Project EIS

Visual Resources (7) FIG 3-6.7

- **Low visual quality/sensitivity:** These are areas within or immediately adjacent to an established freeway or rail corridor, which traverse a developed suburban/urban area or otherwise highly disturbed landscape. These areas are visually disturbed and look out to other visually disturbed areas. These areas would fall under BLM Class IV objectives and would have low visual ratings under FHWA.
    - **General areas of low visual sensitivity:**
        - Segments 2A/2B through the Barstow area
        - Segment 5 in Primm and Jean
        - Portions of Segment 6 and Option C and all of Segment 7 and within the heavily urbanized Las Vegas metropolitan area
        - All of the proposed Las Vegas area maintenance facility and station site locations
        - Temporary Construction Areas (TCAs) close to the areas identified above (1, and 2A/2B, 3, 4, 14-17)

Areas of Critical Environmental Concern

The BLM has established a number of Areas of Critical Environmental Concern (ACEC) throughout the desert region.[12] For more information on ACEC please refer to Section 3.1, Land Use & Community/Socioeconomic Impacts. The BLM considers Desert Wildlife Management Areas (DWMAs) to also be ACEC.

No rail alignment or any project feature (station, maintenance facility, etc) would be located within any ACEC. However, portions of eight ACEC (including three DWMAs that area also considered ACEC) are located within one mile of the proposed alignment alternatives. FRA selected a one-mile distance as a reasonable distance in which visual changes could possibly be perceptible in or near an ACEC. Table 3.6-1 below identifies all ACEC within 1 mile of any proposed alignment alternative, the type of resource the ACEC were designated to protect, and an evaluation of the potential visual significance of the ACEC. ACEC are depicted in Figure 3.6-8.

[12] The BLM's West Mojave Plan established Areas of Critical Environmental Concern as a land use overlay designation indicating the presence of one or more sensitive resources. ACEC are designated to protect biological, cultural, and scenic resources.

DesertXpress Project EIS

Areas of Critical Environmental Concern FIG 3-6.8

Source: Geographic Consulting (07.02.08)

Table 3.6-1: ACEC Within 1 Mile of Project Area

ACEC Name	Location	Resource Type Protected	Contains Sensitive Visual Resources?
Calico Early Man Site	North of Segments 2A/2B	Paleontological	No
Manix	South of Segments 3A/3B	Paleontological	No
Afton Canyon	Southeast of Segments 3A/3B	Biological; scenic	Yes
Cronese Basin	North of Segments 3A/3B	Paleontological	No
Halloran Wash	North of Segments 3A/3B	Paleontological	No
Superior Cronese DWMA	Adjacent to Segments 2A, 2B, and 3B	Paleontological and Biological – desert tortoise	No
Shadow Valley DWMA	Adjacent to Segment 3B near Halloran Springs	Biological – desert tortoise	No
Ivanpah DWMA	Segment 4A, between Nipton Road and Nevada state line	Biological – desert tortoise	No

Source: West Mojave Plan

Of these five, four ACEC's were developed to specifically protect paleontological resources. Such cultural resources are typically found below ground surface and thus would not be considered scenic or visual resources from the vantage point of the I-15 corridor. Some of the Paleontological ACEC's also include minor biological resources, roads, and/or off-highway vehicle trails. BLM has established DWMAs throughout the Mojave Desert to assist in the recovery of the desert tortoise. The three DWMAs listed in Table 3.6-1 above abut either the I-15 freeway right-of-way and/or existing roadways, such as Nipton Road. BLM has not established any visual regulations specific to DWMAs. Other potential effects of the action alternatives on DWMAs are discussed within other sections of this DEIS, including section 3.1, Land Use and Community Impacts, and 3.14, Biological Resources.

The Afton Canyon ACEC, a portion of which is within one mile of the proposed action and alternatives, was established to protect biological and scenic resources within the Mojave River. Notably, the Mojave River is approximately 3 miles distant from the I-15 corridor. The visually scenic Afton Canyon is obscured by hills and not immediately visible from the I-15 corridor.

Based on the distance, intervening topography, and/or type of resource for which the ACEC was established, FRA determined that the action alternatives would have no adverse visual effect on any of the eight ACEC (including the three DWMAs) within a mile of the Project area. As such, ACEC are not discussed further in this section.

3.6.2.2 Affected Environment by Segment

Table 3.6-2 below summarizes the landscape types and notable visual resources within each project segment. Station site and maintenance facility options in Victorville are considered within the discussion of Segment 1; the same facilities at the Las Vegas end are considered within the discussions of Segments 6, 7, and Option C. Existing conditions at the Baker MOW facility site are described in the discussion for Segment 3.

Table 3.6-2: Summary of Existing Landscape Sensitivities, Visual Resources, and KOPs by Segment

Segment	BLM Objective Class	FHWA Visual Quality and Sensitivity Rating	Typical Visual Resources Present	KOPs	TCAs within or near Segment
1: Victorville to Lenwood via I-15 right-of-way	Class III within the I-15 Corridor	Moderate	Distant mountains, open desert areas	1: Victorville Station site B; 2: OMSF site 2;	1, 2
	Class II where the segment diverges from I-15 corridor	Moderate to High	Open desert areas, rolling hills	3. Segment 1 divergence from I-15 corridor	None
2A/2B: Lenwood to Yermo via Barstow	Class II (at proposed Mojave River Crossing)	Moderate to High	Mojave River	4 Mojave River crossing area	3, 4, 5
	Classes III and IV (through Lenwood and Barstow areas)	Low to Moderate	Croplands, open desert areas, distant mountains	5: Barstow	
3A/3B: Yermo to Mountain Pass	Class I when adjacent to the Preserve; otherwise Class II	High to Moderate	Preserve, including wilderness areas therein; open desert areas, mountains; community of Baker; diverse vegetation in higher altitude areas	None	6, 7, 8, 9, 10
4A: Mountain Pass to state line via Preserve	Class I within Preserve; otherwise, Class II	High to Moderate	Preserve, mountains, open desert	6: Preserve	11
4B: Mountain Pass to state line via tunnels	Class I through Clark Mtns; otherwise, Class	High to Moderate	Mountains, open desert	7: Mountain Pass/Tunnels	12, 18, 19, 20, 21

Segment	BLM Objective Class	FHWA Visual Quality and Sensitivity Rating	Typical Visual Resources Present	KOPs	TCAs within or near Segment
	II.				
5A/5B: State line/Primm to Sloan Road	Class IV within Primm and Jean	Low	Casinos/hotels in Primm and Jean	None	13
	Class II/III for areas outside Jean and Primm	Moderate	Distant mountains, open desert areas	None	
6A/6B: Sloan Road to Southern or Central Stations	Class III (South Las Vegas Valley)	Moderate to Low	Distant mountains,	8: LV MSF Option 1 (Wigwam Avenue)	15, 16
	Class IV (within metropolitan Las Vegas)	Low	Partial views of buildings along Las Vegas Strip and downtown	9: I-15 corridor 10: Central Station A	
7A/7B: West Twain Road to Downtown Station	Class IV	Low	Views are dominated by urban development in Las Vegas	None	15, 17
Option C: Sloan Road to Central or Downtown Station via UPRR corridor	Class III outside metropolitan Las Vegas	Moderate to Low	Distant Mountains, partial views of Las Vegas strip	None	14, 15, 17
	Class IV within metropolitan Las Vegas	Low	Views are dominated by urban development in Las Vegas	10: Central Station A	

Segment 1

Table 3.6-3 below provides additional detail on KOPs within Segment 1.

Table 3.6-3: Summary of Key Observation Points, Segment 1

Key Observation Points (KOPs)	Segment	BLM Objective Class	FHWA Visual Quality/Sensitivity Rating
1: Victorville Station Site B	1	Class III	Low/Moderate
2: Victorville OMSF Site 2	1	Class III	Low/Moderate

Source: CirclePoint, 2009.

Victorville stations and maintenance facilities: The proposed sites for the Victorville stations and maintenance facilities (KOPs 1-2 above) are on the outskirts of the City's urbanized development. The sites are currently undeveloped, but are crossed by electric transmission lines, and surrounded by encroaching suburban development, giving the area a somewhat disturbed visual appearance. Moreover, the nearby I-15 freeway with associated billboards and a nearby dump site are also within the visual sweep of the area. However, the KOPs afford some distant views to nearby rock-covered mountains to the east and west and the canopy of trees over the Mojave River to the south.

In all, the disturbed and semi-developed nature of the KOPs led FRA to classify them as lower visual sensitivity, and low intactness and unity. The area could be considered to have a moderate degree of vividness, in that views to the Mojave River and rocky outcrops on nearby hills are generally unaffected by more proximate visual disturbances.

Currently views of this area from adjacent roadways (I-15 and Stoddard Wells road) include limited industrial development, a landfill, open desert plains, and distant rocky hills. Due to the presence of some undisturbed land, vividness and intactness is considered moderate. However, the paved freeway and residential development to the east create a low level of unity. FRA considers the overall existing visual quality around the station and OMSF site options to be moderate.

Existing conditions in the vicinity of the Victorville station and maintenance facility site options (KOPs 1 through 2) can be seen in Figure 3.6-9 – 3.6-10.

***Segment 1**:* For its first 15 miles from Victorville, Segment 1 would be along the west side of the I-15 freeway corridor. Views to the east and west include small hills and more distant mountains particularly for southbound drivers on I-15. View elements in this area include undeveloped desert areas with scattered, low growing vegetation, and rock outcroppings.

Existing View from Eastbound I-15 of Victorville Station Site B

Source: Environmental Vision, 2008

Existing View from I-15 Eastbound of Victorville OMSF Site 2

Despite the views of undeveloped areas, the first 15 miles of Segment 1 are considered to be of moderate visual quality, since the immediate freeway corridor disturbs the visual environment with manmade elements (the paved roadway, utility wires, billboards and road signs, etc.). These elements interrupt the integrity of the landscape by introducing man-made elements that into an otherwise undeveloped area and diminish the area's intactness and unity. Although the highway does include views into less-disturbed desert areas, these views are not considered especially striking or distinctive in terms of topography, vegetation, or other natural features. FRA therefore considers the vividness of this area to be moderate.

At about 15 miles north of Victorville, Segment 1 would diverge northwesterly from the I-15 corridor, traversing an undeveloped landscape crossed by numerous dirt roads and trails, and marked by low hills, alluvial drainages, and desert vegetation. FRA considers this undeveloped area (see Figure 3.6-11) a moderate to high sensitivity landscape.

This area of moderate to high visual quality stretches from where Segment 1 diverges from the I-15 corridor to just south of the Mojave River near Lenwood. In this area, the natural elements create a moderately vivid setting. Intactness and unity of the landscape elements are high since there are few visual indicators of human development, excepting dirt roads and occasional overhead power lines.

Segments 2A/2B

Segments 2A/2B would traverse a varied visual environment. At the outset, the alignment would traverse an undeveloped open desert area, but one from which development in nearby Lenwood and Barstow can be seen. In addition, a small private airstrip is visible near the start of Segments 2A/2B. The segment would continue through this environment north to the Mojave River, where a new bridge would be constructed over the river. As depicted in figure 3.6-12, the area of bridge construction is relatively undisturbed; it is approximately 800 feet to the west of the existing Lenwood Road bridge. The vicinity of the bridge is the most visually sensitive landscape of the segment, where relatively smooth contours of the river bed traverse an undeveloped area. As shown in Figure 3.6-12, the existing view in the area of the bridge is of flat, undeveloped desert land scatted with brush. The expanse of the Mojave River is visible in the middle ground; there are distant views of trees and hills. The natural landscape elements are encroached upon by utility wires and a roadway in the foreground and buildings in the distance.

For the next several miles, the visual landscape changes to rural-agricultural in character then to urbanized areas north of the Mojave River within and near the City of Barstow. The rural-agricultural area west of Barstow is generally flat, but affords views to distant hills in all directions. Approaching Barstow, these distant hills are still visible in the background, but the visual foreground includes extensive suburban and urban development amidst rolling, sparsely vegetated terrain. Figure 3.6-13 depicts existing

Existing View from I-15 at Exit 169, Hodge Rd., Looking North

Existing Conditions, Where Segment 1 Diverges from I-15

FIG 3.6-11

Source: Environmental Vision, 2008

Existing View from Lenwood Rd. Looking Northwest towards the Mojave River

Existing View from Leona St. Looking South (near Barstow) conditions along Segments 2A/2B north of the City of Barstow. Numerous railroad-related uses can be seen, predominantly but not exclusively south of the Mojave River. A number of over- and/or underpasses would need to be constructed in the Barstow area to ensure that the proposed rail service maintains an exclusive right-of-way. In sum, FRA rates the visual sensitivity in the Barstow area to be low owing to the mostly disturbed/ altered physical environment.

West of Barstow, at Old Highway 58, Segments 2A/2B would parallel the I-15 freeway, but would be located between 300 to 500 feet north of the freeway corridor, traversing a rolling, largely undeveloped desert terrain, with views to distant hills in all directions.

Segments 2A and 2B would diverge about ¼-mile west of Fort Irwin Road. Segment 2A (the preferred action alternative within segment 2) would traverse a generally flat desert region with sparse vegetation, including an area where several alluvial fans converge. This area has patches of rural residential development, including buildings, billboards/signs, and utility lines.[13] This area has a moderate visual sensitivity, particularly in undeveloped portions.

Segment 2B would run to the south of Segment 2A, closer to the I-15 corridor. To the north and west of the alignment is a somewhat vast, flat desert region, with sparse pockets of rural residential development between Fort Irwin Road and Yermo. The alignment travels along the freeway corridor. The immediate freeway corridor is considered disturbed, but offers vistas of less developed areas to the passing traveler, particularly to the north. Based on the foregoing, visual quality and sensitivity are considered moderate.

Segments 2A and 2B would converge at a point just east of the agricultural inspection station on I-15 (the beginning of Segment 3).[14]

Segments 3A and 3B

Baker MOW Site: The Baker MOW site is located in a flat undeveloped desert area between I-15 and the community of Baker. The majority of the view from this location is either of undeveloped desert soil with scattered brush or the I-15 freeway and passing vehicles. Billboards and several small buildings are also visible from this site. Hills are visible in the distance to the east and west of the MOW site.

Segments 3A/3B: Segments 3A and 3B, which extends for some 85 miles, would be in close proximity to each other and traverse a similar visual environment either within the median or on the side of I-15. To facilitate analysis, Segment 3 has been divided into three

[13] Detailed information on land use can be found in Section 3.1, Land Use & Community/Socioeconomic Impacts.

[14] The agricultural inspection station is proposed to be relocated to the Mountain Pass/Ivanpah Valley area along I-15.

units, whose visual character and resources are discussed below: Yermo to Afton Canyon Road; Afton Canyon Road to Zzyzx Road, Zzyzx Road to Baker, and Baker to Mountain Pass. In all, FRA considers Segments 3A/3B to have a medium to high quality visual landscape. The presence of the I-15 corridor and associated manmade features fragment the natural landscape, but the corridor affords vivid views of undeveloped desert areas, hillsides, and mountains. From Zzyzx Road to Mountain Pass the Preserve is immediately adjacent to the south side of the I-15 freeway. Several wilderness areas within the Preserve are located in this area. FRA considers portions of the Preserve visible from the freeway between Zzyzx Road to Mountain Pass to have high visual quality and high visual sensitivity.

Yermo to Afton Canyon Road: This is generally an open desert landscape, edged with hills, rock outcroppings, and sand dunes, with views to distant mountains in many locations. Figure 3.6-14 shows views looking east from the Harvard Road interchange. Scattered residential and commercial development at rural scales is visible near Sunrise Canyon Road, Coyote Lake Road, Harvard Road, and Afton Canyon Road. South of the Afton Canyon Road interchange is the Afton Canyon Natural Area, designated as an ACEC by the BLM's West Mojave Plan. However, the Natural Area and ACEC are not visible from the I-15 freeway corridor.

This portion of Segments 3A/3B includes two visually prominent manmade features. The first is an inoperative waterpark alongside the artificial "Lake Dolores" on the west side of the freeway. Near the community of Newberry Springs, a pistachio orchard is north of the I-15 corridor.

Afton Road to Zzyzx Road: Terrain in this portion includes rocky hills leading to more distant mountains, with very limited signs of visual disturbance outside the freeway corridor. The landscape is dissected by alluvial fans and washes, all of which would be traversed by new bridges or crossings.

Zzyzx Road to Baker: Zzyzx Road is at the northwestern boundary of the Preserve which extend eastward along the south side of the I-15 to Mountain Pass Several wilderness areas within the Preserve are located in this area. The Preserve's sparsely vegetated hills and alluvial valleys adjoin the south/east side of the freeway corridor through the end of the segment. From Zzyzx Road to the northeast, views are of vast, open desert with creosote bush scrub and a dry lake bed. Within the unincorporated community of Baker, the main visual elements include commercial buildings, signage, and a 134-foot tall thermometer that is a tourist attraction within the community. Figure 3.6-15 includes a view of Baker.

Baker to Mountain Pass: The Preserve continues immediately south of I-15 for the majority of this segment. In addition, an isolated portion of the Preserve is located north of I-15 near Mountain Pass. Both portions of the Preserve include NPS-designated wilderness areas. The visual setting remains desert scrub, which changes gradually from creosote bush to cactus and yucca scrub near Halloran Summit. Some visually distinctive

Joshua trees are visible from the freeway corridor from Halloran Summit. The vegetative diversity near Halloran Summit, including Joshua trees, provides a distinct visual environment and sense of place. Distant hills and mountains are visible in all directions, including the 7,929 foot Clark Mountain, located about 5 miles to the north of the freeway corridor near Mountain Pass. Moving eastward toward Mountain Pass, the visual experience is of mountains encroaching ever more closely to the freeway, until their immediate slopes are adjacent to the freeway corridor. Mining operations are partially visible to the north of the I-15 corridor near Bailey Road.

Existing Conditions, View from Harvard Road Looking East

FIG 3.6-14

Source: Environmental Vision, 2008

Existing Conditions, Community of Baker

FIG 3.6-15

Source: Environmental Vision, 2008

Segment 4

Segment 4A: This segment would leave the I-15 freeway corridor at the point that the grade exceeds 4.5 percent, and veer south for approximately four miles, encroaching into the Preserve near Nipton Road. The visual character in this area is of open desert, both inside and outside the Preserve. Typical views are of low-lying desert scrub leading up hillsides and mesas, dissected by occasional washes and alluvial fans. Figure 3.6-16 is the view from Nipton Road within the Preserve. Not shown in the photo but noteworthy is that from points along this stretch of Nipton Road, the community of Primm can be seen about 10 miles distant.

Segment 4A would transition to the median of the I-15 freeway corridor south of Yates Well Road. At Yates Well Road, a major manmade feature is visible – an irrigated golf course on the north side of the freeway. This irrigated facility poses a significant visual contrast with the surrounding environment. Just north of Yates Well Road, the I-15 corridor traverses the dry Ivanpah Lake bed. The lake bed has little to no vegetation or topography, and thus allows for expansive views to distant mountains.

Segment 4B: This segment would follow a roughly S-shaped curve northwards from the I-15 freeway corridor, passing through two new dual track tunnels (one approximately 5,000 feet long and the other approximately 1,300 feet long) as shown in Figure 3.6-17. Segment 4B would have little visual prominence between its exiting of the I-15 corridor before its re-emergence on the eastern (downward) slope of the Clark Mountains. The portions of the segment within tunnels would be completely undetectable except for tunnel portal areas. Other portions of this segment could only be seen from aerial views or from peaks within the northern unit of the Preserve. Although there are not any trails to the top of Clark Mountain, the train infrastructure could be visible to off-trail explorers in this wilderness area.

From the eastern slope of the Clark Mountains, Segment 4B would descend into the open desert landscape of the Ivanpah Valley, crossing the dry Ivanpah Lake bed for about 2 miles before rejoining the I-15 corridor just south of the California-Nevada state line. Project plans show Segment 4B crossing from the west to the east side of the I-15 corridor upon entering the state of Nevada.

Segments 5A & 5B

Segments 5A and 5B would traverse a similar visual landscape: Segment 5A would be entirely within the median of I-15; Segment 5B would run on the east side of I-15.

At the California/Nevada state line, the visual setting is of an open desert region, with the I-15 freeway corridor pointing northeasterly to the community of Primm. Primm brings about an abrupt change in the visual environment. The Primm portion of the freeway corridor includes landscaped areas, but the most prominent visual features are resort

Existing View from Nipton Road Looking East (near the Mojave National Preserve)

Source: Environmental Vision, 2008

Existing View from Eastbound I-15 Looking Northeast towards the Clark Mountains hotels and casinos dominating the visual foreground on both sides of the freeway, as shown in Figure 3.6-18. A small passenger tramway crosses over the I-15 corridor here, linking resort areas on either side of the freeway. The visual environment changes abruptly again at the edge of Primm, where the landscape returns to an open desert with distant mountain views. Between Primm and Jean, the primary manmade features visible are electric transmission lines, billboards, roadways paralleling the freeway, and the Union Pacific Railroad (UPRR) corridor to the east.

At Jean, another abrupt visual change occurs, with a hotel/casino on the east side of the freeway and the pad on which another casino/hotel was located until the building was demolished in 2007. Scenic views from the facilities on the south/east side of the freeway are limited at ground level by buildings and landscaping. From the northern edge of Jean to the end of Segment 5, the visual setting returns to that of a vast desert region with sparse vegetation and distant mountain views. Near the end of Segment 5, the freeway corridor is undercrossed by the UPRR, providing variation in the visual landscape.

Segment 6

Segments 6A and 6B would traverse a similar visual landscape, with Segments 6A in the median of the I-15 freeway and Segment 6B within the freeway right-of-way to the northwest.

Both segments traverse a spectrum of landscape types as they cross from the undeveloped, desert area at the northern edge of the Ivanpah Valley to the highly urbanized metropolitan Las Vegas area. North of West Lake Mead Drive, the southernmost residential development of metropolitan Las Vegas is in the visual foreground, mostly consisting of suburban, single-family developments. Hills and mountains remain visible in the distance. From a point immediately south of Gomer Road, urbanization increases on both sides of the freeway, with a mix of residential and commercial properties prominently visible to the west and east. By the Blue Diamond Parkway, the sense of urbanization is nearly complete, with more residential, commercial, and industrial developments lining the freeway than undeveloped land. Figure 3.6-19 shows urban environment near the I-15 and 215 intersection, north of the Blue Diamond Parkway.

Option C

Option C would travel through a range of landscape types from open desert with scattered suburban development to the city of Las Vegas. From the community of Sloan, where Option C would diverge from I-15, a desert landscape of rocky hillsides presides. Traveling north towards Las Vegas near the UPRR train tracks, the topography flattens out, and views open up to suburban residential development in the community of Bard. Suburban aesthetics continue through the community of Arden where industrial and residential uses are visible. Continuing north, the fully urban landscape of the Las Vegas metro area becomes visible with large commercial buildings adjacent to the UPRR tracks.

Existing Conditions, Community of Primm

FIG 3.6-18

Source: Environmental Vision, 2008

Existing View from Eastbound I-15 near I-215 Looking North

Las Vegas Maintenance Facility Areas

There are three site options for the Las Vegas Maintenance and Storage Facility (MSF); all of which are near Segment 6: Wigwam Avenue, Robindale Avenue, and Sloan Road.

The Wigwam Avenue MSF site is in a suburban area adjacent to the I-15 freeway. The surrounding visual environment consists of an RV park landscaped with trees, single family developments, several large multi-story neutral colored hotel and casinos, and brightly colored billboards along I-15. The site itself is mostly undeveloped with a small neutral colored building housing an industrial use adjacent to the highway. The view of the Wigwam Avenue MSF site from I-15 south is shown in Figure 3.6-20. As shown in Figure 3.6-20, the groundcover includes desert soil and scattered shrubs.

The Robindale Avenue site is similar in character to the Wigwam Avenue site. It is an undeveloped area of desert soil and scattered shrubbery in a suburban location. The Robindale Avenue site is adjacent to single family residential homes to the east and west. Undeveloped flat desert land lies to the north and south of the site. Large white truck transfer facilities are located to the east.

The Sloan Road MSF Facility site option is located along I-15 along a stretch of I-15 surrounded by open desert land. Between Sloan Road and West Lake Mead Drive (SR-146), the visual environment transitions from an open desert landscape with rocky outcroppings and hills, marked with billboards as well as staging areas, industrial areas, and rural residential development signaling the approach into Las Vegas. During daytime hours, buildings in the Las Vegas skyline can be visible from this point, depending on air quality. During evening hours, the reflected “glow” of Las Vegas can become apparent many miles before any buildings can be seen directly.

Las Vegas Area Passenger Station Site Options

Segments 6A, 6B, and Option C could terminate at either the Southern or Central Station (A or B) site options. Both the Southern and Central station site options are located in a highly urbanized environment, just west of the I-15 freeway and Las Vegas strip (Las Vegas Boulevard between Downtown Las Vegas to the north and McCarran International Airport to the south). The urbanized landscape neighboring the station sites consists of commercial buildings and hotels surrounded by paved parking areas, multilane paved roadways, and very little landscaping.

The **Southern Station** would be located on a flat, undeveloped site, surrounded by a highly urbanized landscape, including major roadways.

Central Station A would be located upon an existing parking lot in a highly urbanized landscape adjacent to the highway and the Rio Hotel/Casino. As shown in Figure 3.6-21, the surrounding manmade elements are large multi-story buildings, billboards, and paved

Existing View from Westbound I-15 of Las Vegas MSF Option 1 (Wigwam Avenue) Site

Source: Environmental Vision, 2008

Existing View from Westbound I-15 of Las Vegas Central Station A Site

Source: Environmental Vision, 2008

areas. The Union Pacific Railroad corridor is adjacent. The area appears entirely urbanized.

Central Station B would be in a similar highly urbanized environment near the Las Vegas strip. This site is primarily developed with industrial uses. The buildings on the site contrast in height with tall hotel towers to the west, north, and particularly the east (the Las Vegas strip area). The surrounding landscape at the site for Central Station B consists of commercial uses, paved areas, and neutral colored multifamily residential buildings with some landscaping.

The **Downtown Station** would be located at the southwest corner of Bonneville Street and Main Street alongside the east side of the UPRR corridor. The station area is located within an undeveloped vacant parcel and surrounded by Las Vegas' Art District (predominantly commercial uses), Clark County Government Building (west side of UPRR corridor), the Clark County Amphitheater, and the World Market Center (west side of UPRR corridor).

Segment 7A, 7B, and Option C

In the event that the Downtown Las Vegas station option is selected, Segment 7 would be utilized. Segment 7 would span the area between West Twain Avenue in unincorporated Clark County and West Bonneville Avenue within the City of Las Vegas. This area is highly urbanized, with pockets of heavy industrial uses, particularly along the proposed Option C alignment.

3.6.3 Methods of Evaluation of Impacts

The analysis of visual resources is based on a comparison of existing visual character to conditions following implementation of any of the action alternatives. To address the unique nature of the DesertXpress Project and the cooperation of multiple federal agencies, FRA developed a blended methodological approach, incorporating key aspects of both BLM and FHWA visual guidance documents and regulations. This blended methodology seeks to address both the linear nature of proposed rail alignments, as well as built facilities, such as stations and maintenance facilities.

3.6.3.1 BLM Contrast Rating Process

As a tool in its Visual Resource Management efforts, the BLM uses the "Contrast Rating Process" to analyze potential visual impacts of proposed projects. The process is intended to assist BLM personnel to apply the basic principles of design in the analysis of visual impacts.

The Contrast Rating Process assesses the amount of visual impact upon a particular landscape by measuring visual contrast in pre-project and post-project conditions. Contrast is measured by comparing the project features with the major features in the existing landscape. Critical steps of the Contrast Rating Process are:

1. **Identify Visual Resource Management Objectives.** The area's visual resources are assessed based on a combination of factors including scenic quality, sensitivity levels, and distance zones from the project. Each visual resource is then assigned to one of the following management classes:

    - **Class I:** The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

    - **Class II:** The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

    - **Class III:** The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

    - **Class IV:** The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

2. **Select Key Observation Points**. The contrast rating is based on visual changes assessed from the most critical viewpoints, described as Key Observation Points (KOPs). The selection of KOPs takes the following factors into account: angle of observation, number of viewers, length of time the project is in view, relative project size, season of use, and light conditions.[15]

3. **Prepare Visual Simulations.** Visual simulations depicting the relative scale and extent of a project are prepared.

4. **Determine and Complete the Contrast Rating.** An analyst uses the visual

[15] BLM Manual 8400 (Visual Resource Management) and Manual H-8431

simulations to evaluate potential changes to color, line, form, and texture at the selected observation points.

3.6.3.2 FHWA Visual Impact Assessment

FHWA's *Visual Impact Assessment for Highway Projects* (USDOT, 1990) provides a method for identifying, inventorying, and assessing viewsheds and potential project effects. Key steps in the FHWA visual impact assessment process are as follows:

1. Define the project setting and viewshed.

2. Identify key views for visual assessment.

3. Analyze existing visual resources and viewer response. Visual resources/character analyzes attributes such as line, form, color, texture, dominance, scale, diversity, and continuity. Visual quality is measured by vividness, intactness, and unity.

4. Depict the visual appearance of project alternatives.

5. Assess the visual impacts of project alternatives. This is often done using either a numeric or qualitative rating system, e.g., "The existing visual quality is high; with the project it would be medium."

6. Propose methods to avoid, minimize, and/or mitigate adverse visual impacts. These measures can include enhanced plantings, texture or color coating for structures, contour grading, etc.

FHWA assesses visual impacts by considering the following qualities of a particular landscape:

- **Vividness** is the memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern. For example, the snow-capped San Gabriel/San Bernardino Mountains vista to the south and west of Victorville comprises a highly vivid landscape.

- **Intactness** is the visual integrity of the natural and human -built landscape, especially as it relates to intrusive encroachment. For example, a mining operation in a mountainous area would compromise the landscape's intactness. In addition, isolated urbanized development within an otherwise undeveloped landscape would also reflect a lower level of a landscape's intactness.

  Unity is the degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony or inter-compatibility between landscape elements. For example, distant vistas of mountains within the Preserve as viewed across an undeveloped desert area would constitute a highly unified landscape.

The resulting level of visual impact is determined by combining the severity of resource change with the degree to which people are likely to oppose the change. For this analysis, construction period and operational impacts are considered to be similar in potential for visual impacts.

3.6.3.3 Approach

FRA selected a number of viewpoints or "key observation points" (KOPs) consistent with BLM and FHWA guidance. KOPs were selected to reflect a variety of criteria, including different project segments, population centers, known areas of visual sensitivity, and locations where stations or maintenance facilities are proposed. A list of KOPs as well as photographs of existing conditions at each KOP, are provided within the "Resources by Segment" discussion of the "Affected Environment" section below.

KOPs were assigned visual management classes per BLM criteria (classes I, II, III, or IV) as well as visual quality and sensitivity ratings per FHWA criteria.

BLM visual management class assignments were based on a qualitative review of site photography and field reconnaissance at the KOPs.

FHWA visual quality and visual sensitivity ratings were determined by assessing the vividness, intactness, unity, and adjacent character of each KOP.

Visual quality ratings were determined by developing scores for the vividness, intactness, and unity of KOPs, then combining these scores to arrive at a rating. Visual sensitivity ratings were determined by combining scores for intactness and adjacent character. Tables 3.6-4 and 3.6-5 illustrate the scoring and rating systems used in this analysis.

Table 3.6-4 Rating and Scoring System for Vividness, Intactness, Unity, and Adjacent Character

Vividness		**Intactness**		**Unity**		**Adjacent Character**	
Score	*Rating*	*Score*	*Rating*	*Score*	*Rating*	*Score*	*Rating*
0 to 1	Low	0 to 1	Low	0 to 1	Low	0 to 1	Low
2 to 3	Moderate	2 to 3	Moderate	2 to 3	Moderate	2 to 3	Moderate
4 to 5	High	4 to 5	High	4 to 5	High	4 to 5	High

Source: CirclePoint, 2009.

Table 3.6-5 Visual Quality and Visual Sensitivity Rating Determination

Vividness, Intactness, Unity Total Score	Visual Quality Rating	Intactness and Adjacent Character Total Score	Visual Sensitivity Rating
0 to 4	Low	0 to 2	Low
5 to 9	Moderate	3 to 5	Moderate
10 or greater	High	5 to 10	High

Source: CirclePoint, 2009.

FRA photographed each KOP to document existing conditions and in turn, existing visual quality, and visual sensitivity ratings. Photographs and ratings for each KOP are provided in the Affected Environment discussion below.

FRA created visual simulations of conditions under the proposed action and alternatives. Following the BLM's VRM process, FRA developed contrast ratings for existing and proposed conditions for each viewpoint. At the same time, FRA assessed the visual impact of the proposed action and alternatives following FHWA guidelines. FRA thoroughly reviewed both methodologies in determining the overall visual impact of the proposed action and alternatives at each KOP.

3.6.4 Environmental Consequences

3.6.4.1 Regional Effects

Operational Period

No Action Alternative

Under the No Action Alternative, no high-speed passenger railroad would be constructed and operated. No associated facilities would be built.

This alternative would include roadway widening/expansion projects such as the widening of the bridge over the Mojave River in Victorville, widening approximately one mile of the freeway to six lanes and reconstruction of an interchange in Barstow, adding several truck lanes in California along the highway sections with steep grades, the NEON project in Las Vegas (this includes reconstruction of the Charleston interchange, local access improvements and a HOV direct connector from US 95 to I-15), the I-15 South project in Nevada from Sloan Road to Tropicana Avenue (this includes three new interchanges plus reconstruction of the Sloan Road interchange). All of these improvements would occur to accommodate future traffic volumes. Visual impacts from these transportation projects would occur in Victorville, Baker, and along I-15 in Nevada. However, along the majority of the alignment in California, little to no change is anticipated to occur by 2030.

Since the action alternatives include all of the actions proposed under the No Action Alternative plus construction of the DesertXpress project, the No Action Alternative would result in the least amount of development. Overall, the visual impacts from the No Action Alternative would be less severe than those of either action alternative since the No Action Alternative would result in the least amount of visual change to the existing environment.

Comparison of Action Alternatives

Alternative B would have a greater adverse visual effect than Alternative A in the portions of the alignment along I-15. Since Alternative A is located in the median of I-15, it would obstruct motorists' views from either side of the highway when they are looking to the center of the roadway. Since the center of I-15 is already a developed transportation corridor (in all Segments except 3 and 4), the change in visual character would be minimized. In contrast, many areas adjacent to I-15 are undeveloped desert landscapes. Motorists looking at Alternative B, especially from the side of the highway adjacent to the alignment, would experience a greater disruption of existing views, since views of undeveloped desert landscapes would be partially blocked by the rail alignment and associated structures. Both action alternatives would consist of at grade tracks for the majority of the alignment with minimal view blockage. Passing trains would be the main view blocking element where the tracks are at grade. Visual disruption from passing trains would be very short (trains would pass by a stationary point in less than 5 seconds[16]) in duration since the 10 car trains would be passing by at an average speed of 112 mph.

In Segment 2, Alternative A travels further north of developed areas than Alternative B which follows I-15. Since it is further away from the majority of viewers, Alternative A would have less visual impact in this portion of Segment 2 than Alternative B.

In Segment 4 Alternative A would require a large elevated structure to cross over Nipton Road, introducing a major visual feature into this area of the Preserve. Segment 4A would contrast with the existing character, dominate views, and decrease the visual quality of this BLM Class I visual resource in the Preserve. Although Segment 4B would be visible from points within the Preserve and travel through the undeveloped Clark Mountains, it would not be as visible to the public as Segment 4A.

Both Alternatives could require the removal of landscaping either in the median of or along I-15, in the project footprint. FRA did not conduct an inventory of existing landscaping as part of this analysis and therefore this potential adverse effect is not discussed specifically for each segment. However, mitigation measures to reduce any potential adverse effects related to the potential removal and replacement of landscaping is included in Section 3.6.5, Mitigation Measures.

Both Alternatives would also introduce lighting at stations and maintenance facilities into

[16] Meister, Lance Harris Miller Miller & Hanson Inc. Personal Communication. 8/25/08.

undeveloped areas, which would alter the existing night-time natural dark. This potentially adverse effect would be similar between the two alternatives. Mitigation to reduce potential light and glare effects is included in Section 3.6.5, Mitigation Measures.

Of the two technology options, the EMU option would include a greater number of visual features (transformers, substations, and catenary structures), and would thus result in greater visual change than the DEMU option. The additional EMU structures would contribute to view blockage and interruption, alter the existing character, and degrade visual quality in areas along the alignment. As a result, the EMU option would result in a greater adverse visual effect than the DEMU option.

3.6.4.2 Effects by Segment/Major Project Features

Proposed Rail Alignments

Development of the action alternatives would create a new rail line through a variety of existing landscapes, primarily within existing freeway corridors. Visual effects would vary depending on the existing visual quality and the design of the railway at any particular location (raised, at grade, or within retaining walls). At-grade portions of the alignment would appear less visually dominant than raised track portions but would include such highly visible components as crash barriers and graded areas along the side of or within the median of I-15. Since the alignment would be completely grade-separated, overpasses would be constructed at intersections with existing roadways. Raised portions of track would be elevated on pillars or an embankment.

The degree of visual impact would also vary depending on whether the DEMU or EMU option is selected (in the ROD) by the lead and cooperating agencies as the preferred propulsion technology. The EMU option would include 25 foot tall catenary supports and overhead wiring along the entire rail alignment. In undeveloped areas along the majority of the alignment, the 25 foot-tall narrow metallic catenary structures would stand out in color, pattern, and form from the surrounding desert landscape. In many areas the catenary structures would also decrease the vividness and intactness of existing views of the desert.

The EMU option would also entail the placement of 17 transformers along the rail corridor as well as 3 substations. Autotransformers, as shown in Appendix A-5, would include junction boxes, circuit breakers modules, and control buildings fit within a fenced area approximately 3,000 square feet in size. Autotransformers would be located about every 10 miles along the rail alignment; approximately locations are shown on Figures 2.1-1 through 2.1-7; detailed locations are shown within Appendix A-5. Autotransformers will include poles, wires, and cabinet-like control buildings immediately adjacent to the proposed rail alignment areas. Similar to the overhead catenary structures, the autotransformers have the potential to stand out from the surrounding desert landscape and potentially decrease the vividness and intactness of existing desert views.

Electrical substations would be integrated into site plans of the OMSF, the Las Vegas area MSF, and the Baker MOW facility. Discussions of the visual effects of substations and associated utility corridors are therefore incorporated in the discussions of the OMSF, MOW, and MSF below.

The simulations used in this analysis show the EMU option only, as an approach that captures “worst case” visual effects since this option would contain more visually prominent features, namely catenary poles and wires. As a result DEMU option would have the same or a lesser visual effect, but in no case would the DEMU option avoid the general visual effects shown in the simulations. All impacts and mitigation measures discussed in this section would apply to both technology options.

A summary table of the visual effects for each segment is provided below. The results from this table are described in detail in the discussion that follows.

Table 3.6-6: Summary of Visual Effects by Segment

Segment	Existing BLM Objective Class	Existing FHWA Visual Quality and Sensitivity Rating	Consistency with goals of BLM Objective Class with Project Operation	FHWA Visual Quality and Sensitivity Rating with Project Operation
1: Victorville to Lenwood via I-15 right-of-way	Class III within the I-15 Corridor	Moderate	Somewhat Consistent	Low
	Class II where the segment diverges from I-15 corridor	Moderate to High	Not Consistent	Low to Moderate
2A/2B: Lenwood to Yermo via Barstow	Class II (at proposed Mojave River Crossing)	Moderate to High	Somewhat Consistent	Moderate
	Classes III and IV (through Lenwood and Barstow areas)	Low to Moderate	Somewhat Consistent	Low to Moderate
3A/3B: Yermo to Mountain Pass	Class II immediately adjacent to the freeway and in Baker; Class I in areas adjacent to the Preserve	High (in areas adjacent to the Preserve) to Moderate (areas not adjacent to the Preserve)	Somewhat Consistent	Moderate to High
4A: Mountain Pass to state line via Preserve	Class I within the Preserve	High	Not Consistent	Moderate
	Class II outside of the Preserve	Moderate	Not Consistent	Moderate
4B: Mountain Pass to state line via tunnels	Class I through the Clark Mountains	High	Somewhat Consistent	High
	Class II for areas outside the Clark Mountains	Moderate	Somewhat Consistent	Moderate
5A/5B: State line/Primm to Sloan Road	Class IV within Primm and Jean	Low	Consistent	Low
	Class II/III for areas outside Jean and Primm	Moderate	Somewhat Consistent	Moderate

Segment	Existing BLM Objective Class	Existing FHWA Visual Quality and Sensitivity Rating	Consistency with goals of BLM Objective Class with Project Operation	FHWA Visual Quality and Sensitivity Rating with Project Operation
6A/6B: Sloan Road to Southern or Central Stations	Class III (South Las Vegas Valley)	Low to Moderate	Consistent	Low
	Class IV (within metropolitan Las Vegas)	Low	Consistent	Low
7A/7B: West Twain Road to Downtown Station	Class IV	Low	Consistent	Low
Option C: Sloan Road to Central or Downtown Station via UPRR corridor	Class III outside metropolitan Las Vegas	Moderate to Low	Consistent	Moderate to Low
	Class IV within metropolitan Las Vegas	Low	Consistent	Low

Although the effects by segment analysis focuses on the alteration of existing views by the action alternatives, it is important to remember that development of either action alternative will create a new viewer group of approximately 4 to 5 million train passengers per year. These new passengers would be considered a more sensitive viewer group than motorists since train passengers would not need to focus on driving, but could instead concentrate on views from the window. From the train, Alternative A alignment views would include the freeway on either side of the train, since it is located in the I-15 median. For the most part since they would be elevated higher than the cars and freeway elements in the foreground, passengers would still have middle ground and distant views of the existing landscape. Alternative B train passengers would have very different views depending on the side of the train they are sitting on. On one side passengers would have views of I-15 in the foreground and the landscape in the background. On the other side passengers would have uninterrupted views of the existing landscape. Any views from I-15 that would be altered, partially blocked, or degraded by development of Alternative B would be visible in their current condition from the train itself. Views from the train would be especially scenic in Segment 4 where the alignment travels either through the Preserve or the Clark Mountains.

Segment 1

Victorville Station Site Options: The proposed action includes two site options for the Victorville passenger station. These are located immediately west of I-15, north of the Mojave River in Victorville and its sphere of influence area to the north. Both site options were located with the intention of being highly visible from I-15 so as to attract potential riders.

To represent visual impacts of the Victorville Station, FRA chose KOP 1 at Victorville Station Site 2. Station Site Option 1 is located about 1.5 miles to the southwest, within a comparable landscape.

BLM Criteria: Based on site conditions, KOP 1 is within land under BLM Objective Class III. BLM criteria for Class III state that “management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.” The Class III criteria also encourage a partial retention the existing visual character.

As shown in Figure 3.6-22, the Victorville station would somewhat dominate the foreground, partially obstructing views to distant hills. The station would also create a new source of light at night from lighting in and around the station. However, it must be considered that this stationary image would be observed primarily by passing motorists on I-15. Although Figure 3.6-22 poses a stationary image, most viewers would experience the site while moving at freeway speeds in excess of 60 miles per hour. Durations of this view for most viewers would thus be short term. Neither of the Victorville station site options would be visible from the more developed/populated portions of Victorville. There would thus be few “stationary” viewers of the station, at either of the site options.

Existing View from Eastbound I-15 of Victorville Station Site B

KOP 1, Visual Simulation of Victorville Station B

Furthermore, since the existing paved freeway creates a character of a transportation corridor, the addition of the station as an adjunct transportation facility would not be out of character with the exiting landscape. Given the above, the Victorville passenger station would not create significant adverse visual effects.

FHWA Criteria: Development of either station site option would decrease the vividness of the existing open desert landscape west of, and as visible from, I-15. However, since the station would not be incongruous in character with the existing transportation corridor or existing railroad facilities located to the south in Victorville, unity would remain similar. Intactness would decrease slightly since this large building, and the associated lighting at night, would create a less intact desert setting. However, since the view of this structure would occur for only several seconds, the visual effect would not be significantly adverse.

Victorville OMSF Site Options: There are two site options for the Victorville OMSF. Existing visual quality and character at these sites is similar to the character of the station site options, discussed above.

A utility corridor would connect these OMSF sites with an existing power source: either a Victorville Municipal Utility substation, southwest of the OMSF sites, across the Mojave River, or to nearby Southern California Edison (SCE) utility lines, which are in close proximity to the OMSF sites. Since the view already contains tall metal towers associated with the SCE utility lines and two power substations already exist on the west side of the Mojave River across from the OMSF sites, the area is substantially impacted by existing utility infrastructure. The possible addition of another utility line connecting DesertXpress to one of these power sources would therefore result in a minimal adverse visual effect.

BLM Criteria: The BLM Objective Class at these sites is Class III. The same criteria apply as for the station sites. The southernmost of the two OMSF site options (Site 1) is located within the City of Victorville on a bluff above the Mojave River. The northernmost site option (Site 2) is located in unincorporated San Bernardino County, immediately adjacent to I-15 at the Dale Evans Parkway interchange. FRA chose Site Option 2 (also KOP 2) to represent impacts at the Victorville OMSF.

As shown in Figure 3.6-23, the OMSF would partially obstruct views but would not dominate the view of the casual observer. In addition, observers are predominantly motorists on I-15 who would be moving along at freeway speeds and with only a momentary view of the OMSF. Rail yards, electrical substations, and other OMSF components are unlikely to be individually distinguishable by most observers. However, as shown in Figure 3.6-23, the existing view is already disrupted with large electrical transmission towers and associated wires.

Notably, OMSF site option 1 could possibly be seen from currently developed portions of Victorville, including the Route 66 corridor between I-15 and SCLA. This corridor is highly developed with railroad and industrial uses. The addition of the OMSF into this area would be in character with this portion of the City and thus have a negligible additional visual impact. Given the above, no significant visual effects would occur from construction of the Victorville OMSF.

FHWA Criteria: The OMSF would decrease the vividness of the existing open desert landscape that is visible to the west of I-15. However, overall unity would remain similar since the OMSF would appear consistent in character with the visible freeway elements. Intactness would decrease slightly since this large building and associated signal tower would disrupt the intact desert setting and introduce new source of artificial light during the night. However, since the view of this structure from I-15 would occur for only several seconds, the visual effect would not be significantly adverse.

Existing View from Eastbound I-15 of Victorville OMSF Site 2

KOP 2, Visual Simulation of OMSF 2

U.S. Department of Transportation
Federal Railroad Administration

DesertXpress Project EIS

View Comparison, Victorville OMSF Site 2

FIG 3.6-23

Source: Environmental Vision, 2008

Proposed Rail Alignment: The majority (15 miles out of 22) of Segment 1 would be located to the immediate west of I-15, within the immediate freeway corridor. This portion of Segment 1 would traverse a landscape of moderate visual quality under the relevant criteria. The final 7 miles would diverge from I-15 and traverse an area of high visual quality. The following discussion of visual effects distinguishes between these two portions of Segment 1.

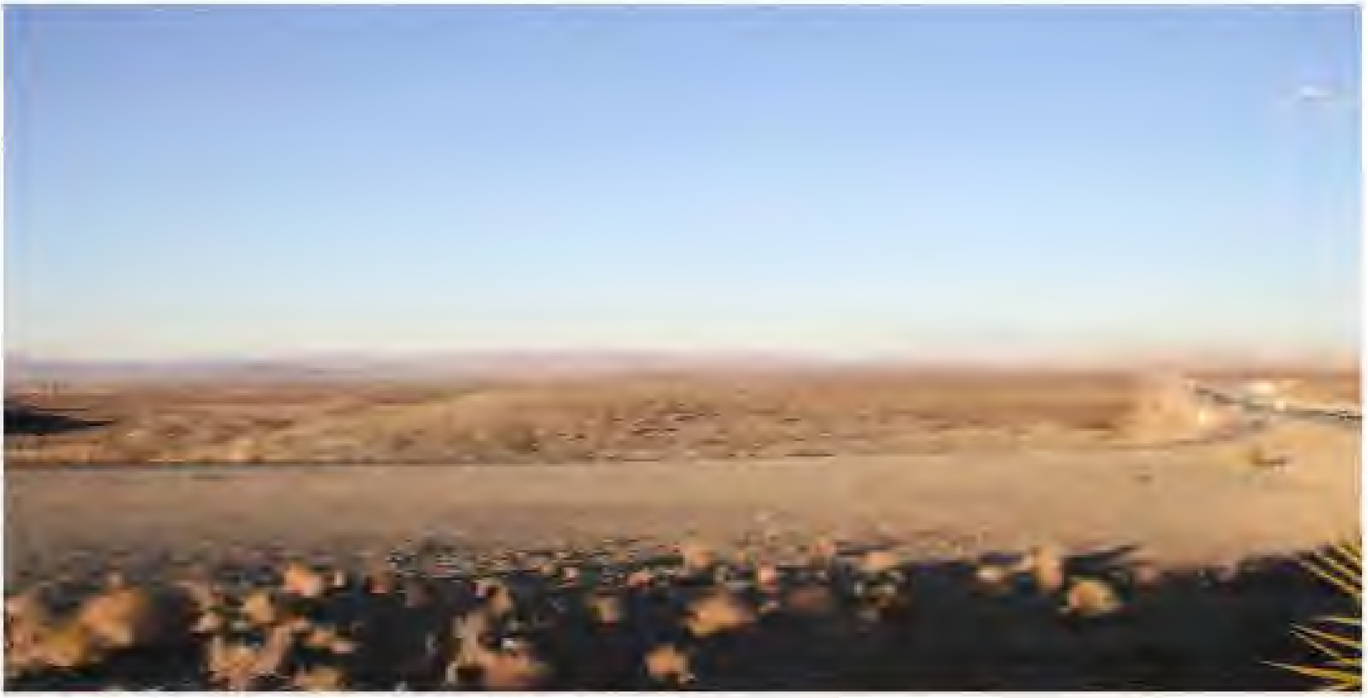
Segment 1 Along I-15: *BLM Criteria*: The first 15 miles of Segment 1 fall into BLM Objective Class III. According to the BLM criteria for Class III, "management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape." The Class III criteria also call for partial retention of the existing character.

Visual elements such as quickly passing trains, elevated tracks, and autotransformers would attract attention but not dominate the landscape due to their small size relative to the open desert landscape. The I-15 corridor is already a major transportation facility; the addition of the proposed rail alignment to the immediate corridor would be in keeping with the corridor's intended purpose. Additionally, the majority of Segment 1 would be constructed at grade and would therefore result in minimal visual change. Landscape changes would be mostly consistent with BLM criteria.

FHWA Criteria: Under FHWA criteria, development of Segment 1 would create a permanent visual change since it would introduce manmade elements into the views of motorists along I-15. These elements would include railway tracks, several associated bridges and overpasses, trains, fences and barriers.

For motorists along I-15, trains, fences, barriers, and several bridges and overpasses would partially obstruct and decrease the vividness of views to the west of desert plains and distant hills and mountains. For southbound motorists, this view disruption would be somewhat more pronounced, since the tracks would be located to the immediate right (west) side of the I-15 corridor. Intactness and unity would decrease for motorists traveling in both directions along I-15 since the raised tracks, trains, and autotransformers would introduce new manmade elements that would disrupt views from I-15 to the desert landscape. For both southbound and northbound motorists, the project would not have any affect on views to the east. Overall, visual quality would decrease from moderate to low using FHWA criteria in both the EMU and DEMU technology options.

Segment 1 After Diverging from I-15: After diverging from I-15, Segment 1 would introduce railway elements into a desert setting largely devoid of visible manmade elements. KOP 3, shown in Figure 3.6-24, represents existing and future conditions along Segment 1 after it diverges from I-15. FRA selected this KOP within an area of high visual quality in order to represent the maximum visual impact. The area shown in KOP 3 falls into BLM Objective Class II.



Existing View from I-15 at Exit 169, Hodge Rd., Looking North

KOP3, Visual Simulation of Segment 1B as it Diverges from I-15

U.S. Department of Transportation
Federal Railroad Administration

DesertXpress
Project EIS

View Comparison,
Where Segment 1 Diverges from I-15

3.6-24

Source: Environmental Vision, 2008

BLM Criteria: According to the BLM Objective Class II criteria, "the level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer." As shown in Figure 3.6-24, due to the topography and distance from the freeway, Segment 1 would be difficult to see and would not attract the attention of a casual observer from I-15. Where visible, Segment 1 would change the landscape and would stand out because of its color and form, which are very different from the surrounding landscape.

FHWA Criteria: Segment 1 would decrease existing visual quality. This portion of Segment 1 would remain visible from I-15. Although the KOP shows Segment 1 further away and therefore less dominant in the view, it would remain visible in middle ground and background of views from the freeway. Overcrossings, fences, and passing trains would break up otherwise undisturbed views of the undeveloped desert landscape, thereby decreasing the intactness and unity of the scene. The addition of the rail alignment to a pristine-looking setting would also decrease vividness. Segment 1 would therefore decrease the overall visual quality from high to moderate.

In all, Segment 1 would have an adverse visual effect in this area.

Segments 2A/2B

Segments 2A and 2B travel as one alignment in the eastern portion of Segment 2, and then diverge near the community of Yermo. Therefore, this discussion separately examines visual effects 1) in the eastern portion of Segment 2 where the Action Alternatives follow the same alignment, and 2) by each Action Alternative where they diverge near Yermo.

Shared Portion of 2A/2B: The shared 2A/2B portion of Segment 2 would run from Lenwood through Barstow through an area that varies in character from rural and agricultural in character, to open space, to suburban, then to open space again. Since the existing visual character and quality along Segments 2A/2B varies greatly with the level of development, visual effects from the rail alignment are discussed first for undeveloped and then developed areas.

Undeveloped Areas: Viewers would primarily be motorists on local roadways and portions of I-15 near Lenwood and Barstow.

BLM Criteria: The shared portion of Segments 2A/2B would begin within a BLM Objective Class III landscape and would cross a BLM Class II landscape at the Mojave River. KOP 4 shows views at the Mojave River, the most undisturbed and thus highest visual quality portion of Segments 2A/2B. The action alternatives would result in the construction of a new, exclusive rail crossing of the Mojave River here, about one-quarter of a mile west of an existing roadway bridge.

As shown in Figure 3.6-25, even after construction of Segments 2A/2B, the desert landscape would dominate the view and therefore, the area would largely retain an undeveloped character, consistent with BLM Class II criteria. However, the raised linear railway would provide somewhat sharp contrast with the softer lines and more neutral colors of the river and surrounding landscape. Furthermore, the color and size of the railway bridge would attract the attention of the casual observer looking out across the landscape.

FHWA Criteria: Segments 2A/2B would create a new manmade linear element that would interrupt views of the undeveloped landscape in the open space areas near Lenwood and Barstow. The concrete elevated linear railway would contrast in form and color with the rolling hills of the desert. However, there are already many disrupting manmade elements in these areas including some scattered development, and tall poles with utility lines. Along undeveloped areas of Segments 2A/2B, the alignment would somewhat decrease the intactness and unity of the desert setting.

Around the area of the Mojave River, the straight, elevated line of the rail alignment would contrast with the natural features of the river, thus compromising the intactness and unity. As shown in Figure 3.6-25, the addition of the alignment would also decrease the vividness of the naturally curved river in a mostly undisturbed desert setting.

Overall, in undeveloped areas, Segments 2A/2B would decrease the visual quality from moderate and high to moderate.

Developed Areas: *BLM Criteria:* Developed areas would fall under Class III criteria. As shown in Figure 3.6-26, Segments 2A/2B would attract attention, but not dominate views from Lenwood or Barstow. Since these Class III areas are characterized by scattered manmade development, Segments 2A/2B would not conflict with the existing character. However, the addition of the raised linear tracks and repeating vertical forms of the support pillars would stand out as unique visual features in this setting.

FHWA Criteria: In the developed areas near Lenwood and Barstow, the existing manmade development appears randomly placed and lacking in unity. Approaching Barstow, many railroad-related uses can be seen. Since the existing unity is low, and since railroad related uses are already located in Barstow, the railway would not affect the unity of the setting. However, the rail alignment, quickly passing trains would disrupt distant views of hills and open desert areas to the north and introduce an additional encroaching element into the desert, thus decreasing the vividness and intactness of the setting. Overall in these developed areas, although visual quality would decrease slightly, it would remain low to moderate.

Existing View from Lenwood Rd. Looking Northwest towards the Mojave River

KOP 4, Visual Simulation of Segment 2A / B Mojave River Crossing

Existing View from Leona St. Looking South (near Barstow)

KOP 5, Visual Simulation of of Segment 2A / B near Barstow

Source: Environmental Vision, 2008

Segment 2A: *BLM Criteria:* The landscape of this segment would be considered BLM Class III. The railroad, trains, and overpasses associated with the proposed railway would contrast with the existing rural residential character. Catenary structures would blend in character with existing utility lines. Although passenger trains and overpasses would contrast with the existing setting, they would not dominate the landscape nor diminish the rural residential character.

FHWA Criteria: Segment 2A would traverse a rural residential area of moderate visual quality. Segment 2A would be visible to the north from both eastbound and westbound motorists on I-15. Segment 2A would have no effect on views to the south from I-15. Segment 2A would be mostly at grade; therefore, passing trains and catenary structures would be the main visible elements. In several places the alignment would include an overpass that would cross an existing roadway.

All of these elements would be visible in the distance from I-15 and would not dominate motorists' views. Existing views of the mountains would remain unobstructed and therefore vividness would remain moderate. Although the catenary structures would not contrast with the existing character since there utility lines are visible from I-15, passenger trains, linear tracks, and several overpasses would contrast with the existing rural residential setting and thereby detract from the intactness and unity of views. Although intactness and unity would decrease, since views of Segment 2A would be distant, this change would be slight, and visual quality would remain moderate.

Segment 2B: *BLM Criteria:* Segment 2B is in a Class III landscape. Segment 2B would introduce a linear rail corridor adjacent to an existing freeway corridor and would therefore be consistent with the BLM criterion that requires partial retention of the existing character. The train would be visible from the highway but would not dominate the view of the casual observer.

FHWA Criteria: Segment 2B would be in the foreground of motorists' views from I-15. Overpasses and trains would be visible. Passing trains, as many as three per hour each direction in peak periods, would temporarily obstruct views to the north from the freeway. Since the 10-car passenger trains will be traveling at an average speed of 112 mph, views will be obstructed for a very short duration of time. Structural elements (overpasses) would also disrupt views. In all, Segment 2B would decrease vividness from moderate to low. The intactness and unity of the setting is low and would remain low with the addition of project structures.

Segments 3A/3B

Segment 3A/3B along I-15 corridor: Segments 3A/3B would travel either adjacent to or in the median of I-15. At no point would either Segment 3A or Segment 3B diverge from the I-15 corridor. Both segments would thus traverse a fragmented, but, save for the freeway, largely undeveloped landscape of moderate to high visual quality. The Preserve, including the wilderness areas within the preserve, is immediately adjacent to the south side of the I-15 freeway.

BLM Criteria: Segments 3A/3B passes almost entirely through BLM Class I land since it is immediately adjacent to the Preserve. The vast majority of Segments 3A/3B would be adjacent to or within I-15, a linear transportation corridor. Additional transportation uses in the vicinity of I-15 would be in keeping with the freeway's existing character. However, roadway overcrossings, passing trains, and MOW facility would be visible from wilderness areas in the Preserve, posing a notable contrast under BLM criteria.

FHWA Criteria: Views from the freeway would be altered by the proposed rail alignment and associated structures. Segment 3A, which would be in the median, would be visible to eastbound travelers looking north and to westbound travelers looking south. Segment 3B, which would be on the north side of I-15, would be visible to motorists traveling in either direction, looking north.

Barriers and passing trains along Segments 3A/3B would detract from the vividness, intactness, and unity of views from the freeway, changing the visual quality rating from moderate through high to a rating with a low through moderate range. Unlike Segment 3A, Segment 3B would include overpasses above existing roadways, which would add additional large manmade elements to views from I-15. Passing trains on Segment 3B would briefly block views to the north from both eastbound and westbound I-15. Views to the north as seen by I-15 eastbound motorists, and views to the south as seen by I-15 westbound motorists would be briefly blocked by passing trains associated with Segment 3A. Intactness and unity would slightly decrease for motorists traveling in both directions along I-15 since the autotransformers, quickly passing trains would interrupt views from I-15 to the undeveloped desert landscape and the Preserve. Overall, vividness would also decrease since more vivid views of the undeveloped desert landscape would be replaced with less vivid views of train structures in front of the landscape. These visual effects would become more pronounced as the alignment moves toward Mountain Pass, since the proximity of the mountains and distinctive vegetation, particularly Joshua trees, create a higher level of vividness along higher elevation portions of Segments 3A/3B. Overall, Segments 3A/3B would decrease the existing visual quality.

Baker MOW Facility: *BLM Criteria:* The Baker MOW facility, which would include a mix of buildings and other features such as a signal tower, would be located in BLM Class II land since it is immediately the highway in an undeveloped area. Development of this transportation facility in the vicinity of I-15 would be in keeping with the freeway's existing character. However, the MOW facility would be visible from wilderness areas in the Preserve (Class I areas), posing a notable contrast under BLM criteria. The signal tower would be visible at night, providing a high level of contrast with night-time views from the Preserve.

FHWA Criteria: An MOW facility on the outskirts of Baker would be visible from northbound and southbound I-15. Since the scattered development Baker is already visible in northwestern views from the freeway, development of the Baker MOW facility would be consistent with the existing visual character and would not substantially alter the existing visual quality views. Moreover, since motorists on I-15 would be driving at fast freeway speeds, views the MOW facility would quickly pass through their viewshed.

Utility Corridor: The utility corridor connecting the Baker MOW facility to an existing power source would further decrease visual quality. The 95 to 135 foot metal utility towers and power lines would be visible from the community of Baker. The utility corridor would alter the visual character of this small desert community by adding large industrial structures. The corridor would run through the community, decreasing the intactness and detracting from the unity of existing views. The tall metal towers would disrupt views from local roadways to the undeveloped desert, decreasing vividness. Overall, the utility corridor associated with the EMU option would result in an adverse effect to visual quality.

Segment 4A

BLM Criteria: Segment 4A would diverge from the I-15 corridor and travel approximately 1.55 miles through the Preserve. The landscapes of Segment 4A would fall under BLM Class I and II criteria. FRA selected KOP 6 to demonstrate visual impacts in the Preserve. As shown in Figure 3.6-27, the elevated linear alignment of Segment 4A would dominate the view of the casual observer. The railway is elevated to pass over Nipton Road. The large manmade cement structure is out of character and scale with the otherwise undeveloped setting. Views of cylindrical cement pillars would contrast with the flat neutral ground below. Due to the level of contrast and change created by Segment 4A, it would not be considered consistent with BLM Class I and II ratings.

FHWA Criteria: The line created by the rail alignment breaks up the continuity of expansive desert views, thus decreasing the intactness of the view. The raised rail alignment would also contrast in scale and color with the natural elements of the setting and detract markedly from the unity of the view. Intactness and vividness would decrease since the raised railway would introduce a highly visible encroaching manmade element into a vivid undeveloped setting. Since visual effects would be dramatic and would affect an important scenic resource, Segment 4A would have adverse visual effects.

Segment 4B

Segment 4B travels near and through the Clark Mountains. Visual effects vary whether the alignment is inside the mountains or west of and along Mountain Pass.

West of and Along Mountain Pass: *BLM Criteria:* Figure 3.6-28 shows KOP 7, the area of Segment 4B that would contrast the most with the existing visual environment. In this BLM Class II area, the railway would travel adjacent to or within I-15, a linear transportation corridor, and therefore would not be inconsistent with the existing character. However, contrary to BLM criteria, concrete pillars supporting raised track, passing trains, would contrast with form, color, and texture of the mountains and attract the attention of the casual observer. Segment 4B would disappear from most viewpoints upon entering the tunnel.

FHWA Criteria: The vividness of current views from I-15 to the north of the mountains would be diminished by the addition of concrete pillars and raised track structures. These elements would create a manmade linear structure through the undeveloped landscape, therefore detracting from the intactness and unity of the view. Although visual quality would decrease, views of the mountains would remain and overall visual quality would remain moderate.

Existing View from Nipton Road Looking East (near the Mojave National Preserve)

KOP 6, Visual Simulation of Segment 4A in the Mojave National Preserve

Source: Environmental Vision, 2008

Existing View from Eastbound I-15 Looking Northeast towards the Clark Mountains

KOP 7, Visual Simulation of Tunnel Portal for Segment 4B

Through the Clark Mountains: *BLM Criteria:* The Clark Mountains are considered BLM Class I. Under BLM criteria, Segment 4B should consist of very low changes to the character of the landscape and must not attract attention. Outside of the tunnels, Segment 4B would include raised and at grade railway. Although not visible from any popular vantage point since there are no public roadways or trails in the area, these elements would be seen from the air or from Clark Mountain, a nearby wilderness area within the Preserve. Trains, tracks, and concrete raised structures would create a linear, manmade feature with repeating elements that would contrast with the irregular, tan colored, natural landscape elements.

FHWA Criteria: Visual effects would only occur west of the first and north of the second tunnel; the majority of Segment 4B would have no visual effect as seen from motorists on I-15.

Segment 5A/5B

Segment 5 traverses two distinct visual environments: inside the communities of Primm and Jean and the areas outside these communities. Both Segments 5A and 5B would be visible from I-15, since they would travel in the median and on the east side of the freeway.

Within Primm and Jean: *BLM Criteria*: These highly developed areas would fall under Class IV objectives. Segments 5A/5B would remain consistent with BLM Class IV objectives. Although a change in character is allowed in BLM Class IV landscapes, the rail alignment would not dramatically alter the existing character since it would be developed along the existing transportation corridor of I-15 in a highly developed area.

FHWA Criteria: Segment 5 would introduce railway elements such as quickly passing trains and crash barriers into motorists' views from I-15. Although these elements would change existing views, they would not block scenic views or breakup the intactness or unity of the landscape. Existing views from I-15 are not very vivid, manmade development appears randomly placed, and there are few natural elements present. The addition of rail elements would not lower this already low level of visual quality.

Outside Primm and Jean: *BLM Criteria*: Segments 5A/5B would pass through a landscape with a BLM Class II and Class III rating. As the rail alignment would travel within/along the I-15 corridor, it would not be inconsistent with the existing character of the landscape. However, contrary to BLM Class II criteria, roadway overcrossings and passing trains would attract the attention of casual observer on the freeway.

FHWA Criteria: The barriers and passing trains in Segments 5A/5B would detract from the vividness, intactness, and unity of the view as determined by the FHWA criteria. Segment 5A, which would be in the median, would be visible to both northbound and southbound travelers. Segment 5B, which would be on the east side of I-15, would be visible to motorists traveling in either direction, looking east.

Unlike Segment 5A, Segment 5B would include development of overpasses above existing roadways, which add an additional manmade element to views from I-15. Views of open desert and distant hills to the west as seen by I-15 northbound motorists, and views of open desert and distant hills to the east as seen by I-15 southbound motorists would be temporarily blocked by passing trains associated with Segment 5A. Passing trains on Segment 5B would temporarily block views to the east from both northbound and southbound I-15. Intactness and unity would decrease for motorists traveling in both directions along I-15 since the passing trains, and autotransformers would disrupt views from I-15 to the desert landscape.

Segments 5A/5B would somewhat decrease visual quality in undeveloped areas as seen from I-15. However, since views of the undeveloped landscape would remain, and since the majority of these views would remain unobstructed, the overall visual quality rating for undeveloped portions of Segments 5A/5B would remain moderate.

Segment 6

Segment 6 includes three alternative rail alignments in two general locations. Action Alternatives A and B would follow I-15 and alignment Option C would follow the UPRR rail tracks to the west. Analysis of visual effects from Segment 6 is therefore discussed first for Segments 6A/6B and then for Segment 6 Option C. Segment 6 would also include the Las Vegas area MSF and could include the passenger station. Visual impacts of these features are discussed separately.

Segment 6A/6B – Rail Alignment

BLM Criteria: Segments 6A/6B would travel along I-15 through an area with a Class III BLM rating, transitioning to a Class IV rating in metropolitan Las Vegas.

As shown in Figure 3.6-29, Segments 6A/6B would be consistent with BLM Class III and IV criteria. As required by the Class III criteria, since Segments 6A/6B would be located along the freeway, a transportation corridor, it would partially retain the existing character. Although passing trains would temporarily block some views from the freeway, this effect would be temporary and Segments 6A/6B would not dominate freeway views. Additionally, since this area is highly developed, the alignment would not conflict with natural landscape features. Greater visual change is allowed by BLM Class IV criteria. Since the alignment would meet the requirements of BLM Class III criteria, it would also meet the requirements of BLM Class IV criteria. Southern portions of Segment 6 are not highly developed. Visual effects in these areas would be similar to those in the northern portion of Segments 5A/5B.

FHWA Criteria: Segments 6A/6B would travel through an area of low visual quality. The visual environment along the I-15 corridor within metropolitan Las Vegas consists of many buildings, lights, billboards, and other manmade elements of varying colors, shapes, and sizes. Since the existing scene is not unified or intact, the addition of the rail line

Existing View from Eastbound I-15 near I-215 Looking North

KOP 9, Visual Simulation of Segment 6B near the I-15 / I-215 Intersection

Source: Environmental Vision, 2008

would do little to detract from the intactness or unity of the view. Vividness of views as seen from I-15 would change as passing trains block views of developed areas to the west. However, view blockage would be temporary and the overall visual quality would remain low.

Option C – Rail Alignment

Option C would travel through two separate visual environments: areas outside of metropolitan Las Vegas, and more developed areas of downtown Las Vegas. The discussion of visual effects from Option C is organized accordingly.

Outside Las Vegas: *BLM Criteria*: Since Option C would be located along the UPRR rail tracks, a high speed railway would not be out of character with the existing environment. This would be consistent with BLM Class III criteria. The alignment would not dominate views from suburban Class III areas since it would remain mostly at grade, and therefore, the majority of new visual elements would be limited to brief views of passing trains. As the alignment crosses Blue Diamond Road, it would transition to an elevated structure. Since motorists on Blue Diamond Road would be traveling up to 45 mph, their views of the overcrossing would be brief. In addition, the overcrossing would only be one manmade element in a view that includes other manmade elements of similar scale including another railway and a large industrial building. Therefore, although development of the overcrossing at Blue Diamond Road would be a noticeable change, it would not dominate views. Option C would be consistent with BLM Class III criteria.

FHWA Criteria: Option C would not greatly detract from the low to moderate levels of existing visual quality in the suburban areas it traverses. Construction of this Option would allow for a rail line to be developed adjacent to an existing rail line. Since the project would not introduce an encroaching element, and since the new rail alignment would appear visually unified with the existing rail alignment, unity and intactness would remain the same. In addition, as discussed above for consistency with BLM criteria, Option C would not substantially block existing views or alter the existing character. Therefore Option C would have little effect on vividness. Visual quality along this portion of the alignment would remain moderate to low.

In Las Vegas: *BLM Criteria:* Although allowed by the BLM Class IV rating, Segment 6, Option C would not be large enough or visually distinct enough to dominate views of metropolitan Las Vegas. In addition, although a change in character is allowed in BLM Class IV landscapes, the rail alignment would not change the existing character of highly developed Las Vegas area. As a result Segment 6, Option C would be consistent with BLM Class IV criteria.

FHWA Criteria: The visual effects of Option C would be similar to those of Segments 6A/6B. These developed areas consist of many buildings, billboards, and other manmade elements of varying colors, shapes, and sizes. Since the existing scene is not unified or intact, the addition of the rail alignment would do little to detract from the intactness or unity of the view. Vividness of views as seen from I-15 would change temporarily as passing trains block views of Las Vegas. However the overall visual quality in this area would remain low.

Las Vegas Station Site Options

BLM Criteria: The action alternatives include one of four site options for the Las Vegas passenger station. Three of these site options are located along Segment 6. To represent visual impacts from development of the Las Vegas Station, FRA selected KOP 10 at Central Station A. This area is considered to be in BLM Objective Class IV. According to the BLM criteria for Class IV, "The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention."

Although BLM criteria would allow for drastic changes to the landscape character at this site, Central Station A would not dominate the existing view or change the character of the existing landscape, as shown in Figure 3.6-30. The station would be entirely surrounded by numerous manmade elements including tall buildings which catch the observer's eye. The smaller more neutrally colored station would not dominate views or be the major focus of viewer attention. The station building would blend in with the urban character of Las Vegas. This is consistent with BLM Class IV criteria. Visual effects would be with development of the Southern, Central Station B, and Downtown station sites, since all of these sites are within similar highly urbanized, complexly visual landscapes.

FHWA Criteria: Any of the Las Vegas passenger station sites would be seen by motorists on I-15, as well as from other surrounding roadways. The passenger station sites would also be visible from tall buildings in the vicinity. Views from I-15 are of developed metropolitan areas dominated by large brightly lit buildings, roadways, and billboards. The existing vividness, intactness, and unity are low. As shown in Figure 3.6-30, views of the long glass walled passenger station building would not radically change views from I-15 and would not alter the visual quality of these views. According to FHWA criteria, the Las Vegas Station would not have an adverse visual effect. Visual quality would remain low.

MSF Facility Options

BLM Criteria: The action alternatives include three site options for the Las Vegas MSF. The BLM Objective Class at these sites is Class IV, except for the site at Sloan Road which is BLM Objective Class II/III. For the BLM Objective Class IV sites, the same BLM criteria apply as outlined above for the station sites.

FRA selected KOP 9 at the Wigwam Avenue MSF site to represent visual effects from construction of MSF facilities in Las Vegas. As shown in Figure 3.6-31, the MSF would be hidden behind a wall. Therefore, although allowed by BLM criteria, the MSF would not dominate the view of the casual observer on I-15. Furthermore, since the freeway and

Existing View from Westbound I-15 of Las Vegas Central Station A Site

KOP 10, Visual Simulation of Las Vegas Central Station A

Existing View from Westbound I-15 of Las Vegas MSF Option 1 (Wigwam Avenue) Site

KOP 8, Visual Simulation of Las Vegas MSF Option 1 (Wigwam Avenue)

U.S. Department of Transportation
Federal Railroad Administration

DesertXpress Project EIS

View Comparison, Las Vegas MSF Option 1 (Wigwam Avenue) Site

FIG 3.6-31

Source: Environmental Vision, 2008

utility lines give the existing scene a character consistent with a transportation corridor, the addition of the MSF, a transportation facility, would not be out of character with the exiting landscape. The Las Vegas MSF would be consistent with BLM criteria. With the exception of its signal tower, the Las Vegas MSF at Wigwam would not be seen from the highway and therefore would not decrease the already low visual quality as determined by FHWA criteria.

Similar visual effects would take place at the Robindale Avenue MSF site. Instead of a wall blocking views of the Robindale Ave MSF, the view of the MSF from I-15 would be blocked by several large storage buildings located between I-15 and the MSF. The approximately 122-foot signal tower would be visible above the buildings, especially when lit up at night. Only the MSF site at Sloan Road, and associated structures, such as the signal tower and utility corridor would be visible from the freeway. At this location impacts would be more severe since the MSF would be visible from I-15 and since this undeveloped desert location is categorized as a BLM Objective Class II/III. At night the Sloan Road MSF and the signal tower would be a new source of light in a naturally dark area, visible from the freeway.

FHWA Criteria: The MSF would be seen by motorists on I-15 and surrounding suburban roadways. Views from I-15 are of suburban tracts, light industrial uses, and commercial uses. Existing vividness, intactness, and unity are low. The MSF would be a relatively minor additional feature in the landscape. No adverse effect would result.

The DesertXpress utility corridor for the Sloan MSF site would be visible from I-15. The 95 feet to 135 feet tall towers and power lines would be visible as they climb up an undeveloped hill northwest of the Sloan MSF site. Although the hill appears undeveloped from the freeway, there are existing Nevada Power transmission lines and towers which run behind the hill and pop in and out of view from the freeway. Given that motorists, traveling at freeway speeds, will only view the proposed utility corridor for several seconds, and that a utility corridor already exists in the general vicinity, the DesertXpress utility corridor would not be out of character with the existing landscape. Adverse effects to visual quality would be minimal.

Segments 7A/7B

Segments 7A/7B would continue along I-15 within an intensely urbanized setting with a Class IV BLM rating and a low level of visual quality. Visual effects from construction of this segment would be similar to those from Segment 6 in downtown Las Vegas.

BLM Criteria: Although allowed by the BLM Class IV rating, Segments 7A/7B would not be large enough or visually distinct enough to dominate views of metropolitan Las Vegas. In addition, although a change in character is allowed in BLM Class IV landscapes, the rail alignment would not change the existing character of highly developed downtown Las Vegas. As a result Segments 7A/7B would be consistent with BLM Class IV criteria.

FHWA Criteria: Views of the metropolitan area surrounding Segment 7 are characterized by non-unified placements of buildings and structures of different sizes, shapes, and colors. The addition of a railway into this environment would not change the existing landscape or detract from the already low intactness and unity. Passing trains may temporarily block views of downtown Las Vegas, but vividness would not significantly be altered. The visual quality in this area would remain low.

Construction Period Impacts

TCAs are located along the alignment as an area to concentrate temporary construction equipment and activities. Construction activities would involve the use of heavy equipment, stockpiling of soils and materials, and other visual signs of construction.

Construction activities would likely take place in phases such that the entire line would not be under construction all at one time and would tend to occur in phases from earthmoving and grading, to track construction, though testing and operation. So that construction-period visual effects of constructing the rail line would vary over time and depend on location.

Construction of stations and OMSF, MSF, and MOW facilities would be similar to constriction of typical commercial/industrial facilities and would include site preparation and foundation work, framing and structural construction and finishing work.

Construction related visual changes as along the alignment would be temporary in nature and small in scale. Mitigation to reduce these temporary visual impacts is provided in the following “Mitigation Measures” section.

3.6.5 Mitigation Measures

3.6.5.1 Operational Period Mitigation Measures

Mitigation Measure VIS-1: Rail Features: Rail features; including pillars, raised tracks, trains, catenary structures, crash barriers, and embankments; shall be designed to blend with or represent the surrounding desert environment. Features shall be created in muted desert colors. Bright colors and highly reflective materials shall be avoided. Rail features in the final design shall include visual elements, which create a sense of place and a memorable experience for both motorists and pedestrians. Concrete shall be embossed with symbols or patterns, where appropriate, which create a visual link between rail features and the surrounding communities and/or the desert landscape. Final design of rail features in the I-15 right-of-way shall be reviewed by Caltrans or NDOT as appropriate.

Mitigation Measure VIS-2: Victorville Station Features: The Victorville Station and associated elements, such as the parking garage and pedestrian walkways, shall be developed with architecture, muted colors, and landscaping that reflect the surrounding desert aesthetic. The landscaping plan shall include the use of drought resistant desert plants, gravel, and stone. Pedestrian elements such as pathways and portals in both the station building and the associated garage shall incorporate desert elements such as landscaping, muted colors and the use of desert-related symbols and patterns. Signage shall be consistent with the scale and character of the site and surroundings and avoid the use of highly reflective materials or bright neon lights.

Mitigation Measure VIS-3: Maintenance Facility Features: Maintenance facilities shall be designed to be aesthetically appropriate for the surrounding desert landscape through the use of muted colors and desert landscaping. The use of highly reflective materials shall be avoided. Concrete may be embossed with desert symbols and patters.

Mitigation Measure VIS-4: Contour Grading: Where feasible contour grading techniques should be employed to reduce the visual appearance of cuts and fill slopes. Grades, cuts, and fills shall be shaped so as to appear consistent and continuous with the natural landscape forms.

Mitigation Measure VIS-5: Light and Glare Reduction: Lighting at stations and maintenance facilities outside of metropolitan Las Vegas shall be designed to minimize disruption of the natural dark at night in the desert landscape. The final lighting plan for these stations and maintenance facilities shall incorporate light and glare screening measures such as the use of plantings to screen well-lit areas, use of downward cast lighting, and the use of motion sensor lighting where appropriate.

Mitigation Measure VIS-6: Educational Displays: Provide interpretive displays and artwork in station pedestrian areas in order to create a coherent pedestrian landscape and sense of place. Such displays shall be consistent with the Desert Managers Group's Caltrans Safety Roadside Rest Stop Interpretive Exhibit Design.

3.6.5.2 Construction Period Mitigation Measures

Mitigation Measure VIS-7: Construction Site Management: Construction will be maintained in an orderly manner, including proper containment and disposal of litter and debris to prevent dispersal onto adjacent properties or streets.

Mitigation Measure VIS-8: Construction Site Lighting: Construction crews working at night will direct any artificial lighting onto the work area to minimize the spillover of light or glare onto adjacent areas. Where feasible, construction lighting shall be screened from viewer groups - such as motorists on the freeway or residents in nearby towns and communities to prevent visible lighting overflow into the natural dark of the desert at night.

Mitigation Measure VIS-9: Visual Screening: Visual screening shall be erected along construction and staging areas as appropriate.

Mitigation Measure VIS-10: Freeway Landscaping: Replace landscaping that will be removed during construction as directed by the California Department of Transportation (Caltrans), or the Nevada Department of Transportation (NDOT) as appropriate. Landscaping in Nevada along I-15 shall follow NDOT's I-*15 Landscape and Aesthetics Corridor Plan*, 2005. Replacement landscaping shall occur in the median, along the shoulder, and in other right-of-way areas along I-15, as appropriate within six months of the completion of construction.

In addition to **Mitigation Measure VIS-10** above, effects from tree and plant removal will be mitigated through **Mitigation Measure BIO-6** which ensures that disturbed areas of native vegetation will be restored to preconstruction site conditions. See Section 3.14, Biological Resources for a complete discussion of this mitigation measure.

3.6.5.3 Residual Impacts Following Mitigation

The incorporation of the above mitigation measures would mitigate effects related to the project construction and operation, but even with mitigation, the project would result in the permanent introduction of new element to the project area, ultimately resulting in a permanent visual change within the viewshed.

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3.7 CULTURAL AND PALEONTOLOGICAL RESOURCES

This chapter describes the regulatory setting for cultural and paleontological resources, as well the affected environmental (know cultural and paleontological resources) within the project study area and the impacts to these resources that would result from the action alternatives. Mitigation measures are identified to reduce these impacts. Cultural resources customarily include archaeological resources, ethnographic resources, and those of the historic built environment (architectural resources). Paleontological resources include the fossilized remains of vertebrates, invertebrates, and plants, as well as fossil tracks and trackways.

3.7.1 REGULATIONS AND STANDARDS

3.7.1.1 Federal Laws and Regulations

National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA), as amended,[1] establishes the Federal policy of protecting important historic, cultural, and natural aspects of our national heritage during Federal project planning. NEPA also obligates federal agencies to consider the environmental consequences and costs of their projects and programs as part of the planning process. All Federal or federally assisted projects requiring action pursuant to Section 102 of the Act must take into account the effects on cultural resources.

According to the NEPA regulations, in considering whether an action may "significantly affect the quality of the human environment," an agency must consider, among other things, unique characteristics of the geographic area such as proximity to historic or cultural resources[2] and the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP).[3]

The NEPA regulations also require that to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with environmental impact analyses and related surveys and studies required by the National Historic Preservation Act (NHPA).[4] Section 106 of the NHPA requires federal agencies to consider the effects of their actions on historic properties and provide the President's Advisory Council on Historic Preservation (ACHP) an opportunity to comment on a proposed action before it is implemented. Regulations for implementing the Section 106

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[1] 42 U.S.C. 4321-4347.

[2] 40 CFR 1508.27(b)(3).

[3] 40 CFR § 1508.27(b)(8).

[4] 40 CFR § 1502.25(a).

process are provided in 36 CFR § 800. Agencies should consider their Section 106 responsibilities as early as possible in the NEPA process, and plan their public participation, analysis, and review in such as way that they can meet the purposes and requirements of both statutes in a timely and efficient manner. The determination of whether an action is a "major Federal action significantly affecting the quality of the human environment," and therefore requires preparation of an EIS under NEPA, should include consideration of the undertaking's likely effects on historic properties. A finding of adverse effect on a historic property does not necessarily require an EIS under NEPA.[5]

NEPA does not provide specific guidance regarding paleontological resources, but the NEPA requirement that federal agencies take all practicable measures to "preserve important historic, cultural, and natural aspects of our national heritage" (NEPA Sec. 101[b][4]) is interpreted as applying to paleontological materials. Under NEPA, paleontological resources are typically treated in a manner similar to that used for cultural resources but are not subject to the NHPA.

Section 106 of the National Historic Preservation Act

Due to the involvement of a number of federal agencies, this project requires compliance with NHPA and its implementing regulations[6] would apply. The NHPA establishes the federal government policy on historic preservation and the programs, including the NRHP, through which this policy is implemented. Authorized by the NHPA, the National Park Service's NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources. Under the NHPA, historic properties include any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP.[7]

Section 106 requires that impacts on significant cultural resources, hereafter called historic properties, be taken into consideration in any federal undertaking. "Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization that meet the NRHP criteria."[8]

The Section 106 process contains five steps including:

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[5] 36 CFR 800.8(a)(1).

[6] 16 U.S.C. 470 et seq., 36 CFR § 800, 36 CFR § 60, and 36 CFR § 63.

[7] 16 U.S.C. 470w (5).

[8] 36 CFR § 800.16(l).

- Initiate Section 106 process;
- Identify historic properties;
- Assess adverse effects;
- Resolve adverse effects; and
- Implement project.

Section 106 affords the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the NRHP. Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for inclusion in the NRHP. Under the NHPA, a property is significant if it meets the National Register criteria listed in 36 CFR 60.4.

To comply with NEPA and Section 106, cultural resources studies for the action alternatives have been conducted as described below. These studies are subject to the procedures of and review of the Federal Railroad Administration (FRA), and the cooperating agencies (BLM, STB, NPS and FHWA) in consultation with the California and Nevada SHPOs. These studies are shaped by the ACHP regulations[9] for implementing Section 106. Section 106 studies provide the information necessary to satisfy legal requirements for environmental documents under NEPA. The SHPO acts as a reviewing agency in the Section 106 process, but the final responsibility to carry out this regulation belongs to FRA, the designated lead federal agency.

The FRA and cooperating agencies are developing a programmatic agreement (PA) in compliance with Section 106. The PA will describe a phased identification and evaluation process which defers portions of the cultural resources studies until after the environmental document is completed in accordance with 36 CFR § 800.4(b)(2).

The PA will be executed among the lead and cooperating federal agencies including the FRA, STB, the California and Nevada SHPOs, the California and Nevada BLM, FHWA, and NPS prior to the issuance of the final environmental impact statement (FEIS). The ACHP may also choose to participate. Invited signatories include the project applicant, DesertXpress Enterprises Inc, and Native American tribes.

While the PA will defer portions of the identification and evaluation process until after the environmental document is completed, the PA will be a legally binding document that specifies the steps necessary to complete the identification and evaluation of resources within the APE and requires mitigation for resources found to be of significance. The PA

[9] 36 CFR § 800.

will include stipulations that require additional technical studies and the preparation of inventory and evaluation reports. In addition, the PA will require the preparation of a historic property treatment plan (HPTP) that describes how significant resources will be mitigated. Finally, the PA will specify how monitoring will be conducted and will include stipulations to be followed in the event of unanticipated discoveries during project implementation.

Antiquities Act

The Antiquities Act of 1906[10] was enacted with the primary goal of protecting cultural resources in the United States. As such, it prohibits appropriation, excavation, injury, or destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government, without permission of the secretary of the federal department with jurisdiction. It also establishes criminal penalties, including fines or imprisonment, for these acts, and sets forth a permit requirement for collection of antiquities on federally owned lands.

Neither the Antiquities Act itself nor its implementing regulations (43 CFR 3) specifically mentions paleontological resources. However, several federal agencies—including the National Park Service, U.S. Bureau of Land Management, and U.S. Forest Service—have interpreted objects of antiquity as including fossils. Consequently, the Antiquities Act represents an early cornerstone for efforts to protect the nation's paleontological resources.

The Archaeological Resources Protection Act

The Archaeological Resources Protection Act (ARPA) was enacted in 1979 and amended in 1988. ARPA states that archaeological resources on public or Indian lands are an accessible and irreplaceable part of the nation's heritage and provides for the following:

- Establishes protection for archaeological resources to prevent loss and destruction due to uncontrolled excavations and pillaging;
- Encourages increased cooperation and an exchange of information between government authorities, the professional archaeological community, and private individuals having collections of archaeological resources prior to the enactment of this act; and
- Establishes permit procedures to permit excavation or removal of archaeological resources (and associated activities) located on public or Indian land.

ARPA defines excavation, removal, damage, or other alteration or defacing of archaeological resources as "prohibited act[s]" and provides for criminal and monetary rewards to be paid to individuals furnishing information leading to the finding of a civil violation or conviction of a criminal violator.

[10] 16 United States Code [USC] 431-433.

Section 4 of ARPA and Sections 5-12 of the uniform regulations establish a permitting system through which federal agencies can authorize professional scientific excavation and removal of archaeological resources from their lands. Permits for these activities can still be issued under the Antiquities Act of 1906, but ARPA is now the standard federal archaeological permitting authority. Important provisions of these sections of the law and the regulations deal with applications for permits, the requirements to be met for permit issuance, consultation with Indian tribes regarding permits, and suspension and revocation of permits.

The American Indian Religious Freedom Act (AIRFA)

The American Indian Religious Freedom Act(1978) (AIRFA) proclaims that the U.S. Government will respect and protect the rights of Indian tribes to the free exercise of their traditional religions; the courts have interpreted this as requiring agencies to consider the effects of their actions on traditional religious practices.

Native American Graves Protection and Repatriation Act (NAGPRA)

The Native American Graves Protection and Repatriation Act (1990)[11] (NAGPRA) will also apply to this project if human remains of Native American origin are discovered on federal land during implementation of the project. NAGPRA requires Federal agencies and federally assisted museums to return "Native American cultural items" to the Federally recognized Indian tribes or Native Hawaiian groups with which they are associated. Regulations[12] stipulate the following procedures be followed.

- If Native American human remains are discovered, the following provisions would be followed by the project sponsor to comply with regulations:
  - Notify, in writing, the responsible federal agency; and
  - Cease activity in the area of discovery and protect the human remains.
- Upon notification that human remains have been discovered on federal land, the responsible federal agencies should:
  - Certify receipt of the notification;
  - Take steps to secure and protect the remains;
  - Notify the Native American tribes or tribes likely to be culturally affiliated with the discovered human remains within 1 working day; and

[11] 104 Stat. 3048-3058.

[12] 43 CFR 10.

- o Initiate consultation with the Native American tribe or tribes in accordance with regulations described in 43 CFR, Part 10, Subpart B, Section 10.5.

The National Natural Landmarks Program

The National Natural Landmarks (NNL) Program was established in 1962 under authority of the Historic Sites Act of 1935, with the following goals.

- Encouraging the preservation of sites that illustrate the nation's geological and ecological character.
- Enhancing the scientific and educational value of the sites preserved.
- Strengthening public appreciation of natural history and foster increased concern for the conservation of the nation's natural heritage.

Under the NNL Program, sites that represent the nation's "best" examples of various types of biological communities or geologic features (meaning that they are in good condition and effectively illustrate the specific character of a certain type of resource) are listed on the National Registry of Natural Landmarks (NRNL). At present, the NRNL includes 587 sites, ranging in size from 7 acres to almost 1 million acres. Examples of sites designated as NNLs for their paleontological value include Sharktooth Hill in Kern County, Rancho La Brea in Los Angeles, and Rainbow Basin north of Barstow in San Bernardino County.

The NNL Program is administered by the National Park Service. However, most sites listed on the NRNL are not transferred to federal ownership and most do not become units in the National Parks system; most continue to be managed by their current owners following listing. At present, about 50% of the nation's NNLs are managed by public agencies, about 30% are privately owned and managed, and about 20% are managed through collaboration between agencies and private entities. The NPS is responsible for maintaining relationships with NNL landowners and monitoring the condition of all NNLs.

3.7.1.2 California Laws and Regulations

California Public Resource Code (PRC) 5097

If human remains of Native American origin are discovered during project construction not on federal land, it will be necessary to comply with state laws relating to the disposition of Native American burials, which fall within the jurisdiction of the Native American Heritage Commission NAHC.[13] If any human remains are discovered or recognized in any location other than a dedicated cemetery, there will be no further

[13] PRC 5097.

excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:

- the county coroner has been informed and has determined that no investigation of the cause of death is required; and
- if the remains are of Native American origin:
    - the descendants of the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in PRC 5097.98, or
    - the NAHC was unable to identify a descendant or the descendant failed to make a recommendation within 48 hours after being notified by the NAHC.

According to California Health and Safety Code, six or more human burials at one location constitute a cemetery[14] and disturbance of Native American cemeteries is a felony.[15] Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are Native American in origin.

Several sections of the California Public Resources Code protect paleontological resources. Section 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontologic feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted express permission. Section 30244 requires reasonable mitigation for impacts on paleontological resources that occur as a result of development on public lands.

California Administrative Code

The sections of the California Administrative Code relating to the State Division of Beaches and Parks (Sec. 4307 – 4309) afford protection to geologic features and "paleontological materials" but grant the director of the state park system authority to issue permits for specific activities that may result in damage to such resources, if the activities are in the interest of the state park system and for state park purposes.

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14 Section 8100.

15 Section 7052.

3.7.1.3 Nevada Laws and Regulations

Nevada Revised Statutes (§381.195 through §381.219)

This statute declares that no person shall investigate, explore or excavate a historic or prehistoric site on federal or state lands in Nevada or remove any object from such sites unless the person holds a valid permit from the director of the Department of Museums, Library and Arts or the director's designee, as well as a permit from the appropriate federal agency if the site is on federal land.

Nevada Revised Statutes (§383.160)

Directs the Nevada SHPO to: assist an interested landowner, upon application by the landowner, in negotiating an agreement with an Indian tribe for the treatment and disposition of an Indian burial site and any artifacts and human remains associated with the site; or, upon application of either party, to mediate a dispute arising between a landowner and an Indian tribe relating to such treatment and disposition.

Nevada Revised Statutes (§383.170)

This statute requires a person to report to the Nevada SHPO immediately upon discovery of a previously unreported cairn or burial site of a native Indian disturbed through inadvertence while that person is engaged in a lawful activity such as construction, mining, logging or farming. Further, it directs the office to consult immediately with the Nevada Indian Commission and notify the appropriate Indian tribe.

3.7.2 Methods of Evaluation of Impacts

3.7.2.1 Cultural Resources

Area of Potential Effects

Section 106 requires that an Area of Potential Effects (APE) be defined for the project. The APE is defined in 36 CFR § 800.16(d) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. In accordance with 36 CFR § 800.4(a)(1), the FRA determined and documented an APE in coordination with the STB and California and Nevada BLM. The FRA submitted the APE to the California and Nevada SHPOs in November 2007 for review (see Appendix G).

The APE is defined as all areas of ground that would be disturbed by construction or construction staging of the DesertXpress system. This includes up to 200 feet on either side (up to a total of 400 feet) of the DesertXpress rail alignment centerline or to the nearest paved area (freeway shoulder). The APE includes areas that were left undisturbed by Interstate construction within the I-15 right-of-way and within the I-15 median (e.g., medians of great width, right-of-way that extends well beyond the shoulder or rest areas, etc.). The APE also includes the facility footprint for stations, OMSFs, MSFs, MOW, and areas to be used for temporary construction staging. The APE also includes transformer and autotransformer sites as well as up to 100 feet on either side of electrical utility corridors that would be necessary with the EMU technology option.[16]

The APE includes all buildings, structures, and objects that would be altered or that could be affected by visual changes to their setting. In addition, any bridges or culverts that could be potentially altered are also included within the APE. The Interstate Highway System is exempt from Section 106 review except for elements of national and exceptional importance, and the section of I-15 between Victorville and Las Vegas was found by FHWA headquarters to contain no such elements in 2006. Therefore, there is no potential to affect buildings or structures that could be eligible for the NRHP in disturbed areas of I-15. Exceptions to this definition would be if there are non-interstate bridges or other overcrossings that would have to be altered to accommodate the DesertXpress project. Those non-interstate bridges or other overcrossings are included in the APE.

The construction of the proposed DesertXpress project may require some of the following: storm water detention basins, utility realignments, access roads, storage areas, borrow sites, and disposal sites. The footprint and construction areas for these facilities will added to the APE as project plans become available.

Significance Criteria

NEPA and NHPA require federal agencies to consider the effect of their undertakings on significant resources, known as historic properties. The federal significance of an archaeological site or an architectural resource is defined by the NRHP. These criteria, defined in 36 CFR § 60.4, state that a resource must be at least 50 years old (unless meeting exceptional criteria) and possess the quality of significance in American history, architecture, archaeology, engineering, and culture and is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

A. Is associated with events that have made a significant contribution to the broad patterns of history;

B. Is associated with the lives of persons significant in the past;

C. Embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, possesses high artistic values, or

[16]A map of the APE is available on CD-ROM or upon request.

represents a significant and distinguishable entity whose components may lack individual distinction; or

D. Has yielded, or may be likely to yield, information important in prehistory or history.

If a particular resource meets one of these criteria and retains integrity, it is considered as an eligible “historic property” for listing in the NRHP.

Application of the Criteria of Adverse Effect

To comply with Section 106 of the NHPA, any effects of the proposed undertaking on properties listed in or determined eligible for inclusion in the NRHP must be analyzed by applying the Criteria of Adverse Effect,[17] as follows:

> An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.
>
> Adverse effects on historic properties include, but are not limited to:
>
> (i) Physical destruction of or damage to all or part of the property;
>
> (ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary’s Standards for the Treatment of Historic Properties[18] and applicable guidelines;
>
> (iii) Removal of the property from its historic location;
>
> (iv) Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance;
>
> (v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property’s significant historic features;

[17] 36 CFR § 800.5(a).

[18] 36 CFR § 68.

(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long term preservation of the property's historic significance.

Native American Consultation

The BLM agreed to act as the point of contact for Native American consultation for both the BLM and FRA since the majority of this proposed project is located on public land administered by BLM.

FRA's third-party EIS contractor contacted the California Native American Heritage Commission (NAHC) regarding its sacred lands file and a list of interested individuals who might have information concerning important Native American sites near the APE. The NAHC determined that the sacred lands file does not contain any records of Native American sacred sites including Traditional Cultural Properties within or adjacent to the APE. The NAHC also provided a list of Native American representatives with potential interest in the project area. Furthermore the California and Nevada BLM provided additional groups and representatives who might also have information or interest in the project. This combined list of 16 tribal representatives, from 12 tribes, were contacted and advised of the project and to request additional information on important resources to the Native American community within or adjacent to the APE. A letter (dated March 8, 2007) from FRA describing the proposed DesertXpress project was sent to each Native American representative (see Appendix G). Individuals were also contacted by telephone by FRA's third-party EIS contractor between April 2 and 3, 2007. The March 2007 letters requesting information on properties that may be of interest to the Native American community were sent to the groups and individuals listed in Table 3.7-1. Native American consultation is ongoing.

Table 3.7-1: Native American Consultation

San Manuel Band of Mission Indians	Ti'At Society
Serrano Band of Indians	Colorado River Reservation
Soboba Band of Mission Indians	Morongo Band of Mission Indians
Chemehuevi Reservation	Kern Valley Indian Council
Las Vegas Paiute Tribe	Timbisha Shoshone
Fort Mojave Indian Tribe	Moapa Band of Paiutes

As of October 17, 2008, two tribes responded with a letter to the BLM Barstow Field Office requesting further participation in the project.

- Serrano Band of Indians. A letter was received indicating a general interest in the project and a request to be kept informed.

- Morongo Band of Mission Indians. A letter was received indicating a general interest in the project and a request to be kept informed.

At least two follow-up phone calls were made with each of the remaining tribes who had not responded by letter. Four of the tribes contacted by phone responded with a desire to be kept informed about additional aspects of the project. Three of these requested that a meeting be held to inform tribal representatives about the project and to provide a forum for questions and answers. The tribes are listed below.

- Soboba Band of Mission Indians. Requested to be informed and suggested and requested a Native American Monitor be present for the entire project.

- Timbisha Shoshone. The tribe requested that representatives of the project conduct a meeting to describe the project to the Tribal Elders. The meeting was conducted August 19, 2008 between personnel from the Barstow Field Office of the BLM, members of FRA's EIS third party contractor team, and the Timbisha Shoshone. The meeting took place at the Tribal Headquarters in Death Valley, California. The meeting broadly characterized the scope of the project and resources identified during the archival research and the field investigation described below. In light of several resources considered to be sensitive, the Timbisha Shoshone requested continued consultation.

- Las Vegas Paiute Tribe. The tribe requested that representatives of the project conduct a meeting to describe the project to the Tribal Elders. However, the tribe later indicated to the BLM that they were no longer concerned with the project and thus did not wish to participate in a meeting.

- Moapa Band of Paiutes. The tribe requested that representatives of the project conduct a meeting to describe the project to the Tribal Elders. However, the tribe later indicated to the BLM that they were no longer concerned with the project and thus did not wish to participate in a meeting.

The remaining 10 tribal representatives did not respond to follow-up phone call messages. Information regarding the cultural technical report will be made available to the tribal representatives at their convenience.

Archaeological Resources Investigation

A record search was conducted of the prehistoric and historic resource files at the San Bernardino County Archaeological Information Center (California) as well as at the Harry

Reid Center for Environmental Studies Division of Cultural Resources at University of Nevada, Las Vegas in September of 2006. Both of these institutions provided information regarding nearly 1,200 resources within a mile of the proposed track alignments. Other sources consulted during the records search included historic maps; national, state, and local listings of historic and archaeological resources; and secondary sources related to the history of California and Nevada.

FRA's EIS third-party contractor archaeologists meeting the Secretary of the Interior's Professional Qualifications Standards[19] conducted a pedestrian survey of the APE from March 3, 2008 to January 16, 2009 for those areas outside of the I-15 Caltrans and NDOT right-of-way fence and where previous surveys were recently conducted along Segment 5. Most of the APE consisted of rural undeveloped desert. Specifically, Segments 1-6 largely consisted of rural landscape with only Segment 7 comprising of mostly built environment. Crews ranged between 2 to 8 archaeologists spaced 15 to 20 meters apart dependent on field conditions and survey area. Visibility was excellent often exceeding 90 percent. The direction of survey for the alignments was typically conducted parallel to I-15. Large acreage survey areas (TCAs, Stations, OMSFs, etc) were surveyed in any number of ways that facilitated the accurate coverage of the proposed APE.

BLM guidance required two different policies for what constituted an archaeological site based on the state where they were identified. In California, clusters of three or more artifacts within 50 meters by 50 meters (2,500 square meters) were identified as archaeological sites. However in Nevada, clusters of more than one artifact within an area measuring less than 30 meters by 30 meters (900 square meters) were identified as archaeological sites. Artifacts that did not meet the requirement for a site were recorded as an isolated artifact. Isolated features such as prehistoric rock shelters, or historic cairns, foundations, berms, or other structural remains were recorded as sites. No artifacts were collected during the archaeological survey. Diagnostic artifacts such as projectile points, ceramic rim sherds, and beads were measured, drawn, and photographed in addition to recording the position with a GPS receiver. Archaeological resources include precontact or prehistoric and post-contact or historic resources. Prehistoric resources are physical properties that result from human activities that predate European contact with native peoples in America. Prehistoric archaeological sites may include villages, campsites, lithic or artifact scatters, roasting pits/hearths, milling features, rock art (petroglyphs/pictographs), rock features, and burials. Historical archaeological sites consist of the physical remains (unoccupied ruins) of structures or built objects that result from the work of Euro-Americans. These physical remains must be more than 50 years old and postdate contact between Europeans and Native Americans. Historic archaeological sites my include town sites, homesteads, agricultural or ranching features, mining-related features, roads, transmission lines, rock cairns and refuse concentrations.

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[19] 36 CFR § 61.

Preliminary Evaluations: The preliminary NRHP evaluations provided here are based on archival research and field assessment of identified resources in consultation with the appropriate BLM Field Office. Eligibility status of previously evaluated resources was obtained from the San Bernardino Archaeological Information Center, the Harry Reid Center for Environmental Studies, and input from the BLM. Numerous resources in California were consulted including: *California Historic Landmarks*, *National Register of Historic Places*, *California Register of Historical Resources*, *California Points of Historical Interest*, *California Inventory of Historic Resources*. In Nevada the following resources were reviewed: *Nevada Historic Landmarks* and the *National Register of Historic Places.*

In the tables that follow, previously identified sites listed by the information centers or BLM as "eligible" for the NRHP are indicated as such. Sites where the information center had no information regarding the status of eligibility are listed as "assumption of eligibility" for California and Nevada. And lastly, sites officially listed as "not eligible" were likewise indicated in the tables below.

The field crews utilized the following approach for preliminary evaluations of identified resources along the entire route. This approach closely follows the Nevada Protocol between BLM and Nevada SHPO wherein the following sites are categorically exempt from an eligible listing:

A. Isolate artifact: A single artifact or pieces from a single artifact, i.e., 10 pieces of glass from a single bottle.

B. Isolated or Unassociated feature: A single feature unassociated with other features or artifacts scatters that were undatable; e.g., a prospect pit, a claim marker, an adit, or a shaft. If these features were elements to a historic district, they were not considered isolated or unassociated. In addition, if an isolated feature was unique because of its construction (elaborate stonework claim marker) or distinctive qualities, the feature will need to be evaluated for eligibility. Isolated features that have potential data (fire hearth), should also be evaluated for eligibility.

C. Post-1958 Archaeological Components: Sites that post-date 1958 (or contain a majority of artifacts that post-date 1958) were not considered eligible for the purposes of Section 106 compliance unless the site could demonstrate it is of exceptional significance under Criteria Consideration G.

D. Linear Resources: Linear resources in isolation from other linear resources, archeological deposits, and building/structures were also considered not eligible. Artifacts directly associated with that linear resource, such as an insulator for a telecommunication line was considered inclusive to that linear resource. Roads/Trails: If a road or trail was undatable, or could not be historically associated with a historic theme, lacked engineering features associated with the road or trail, and bladed, then the segment was considered not eligible under all criteria.

a. Water conveyance: Furthermore, if a water conveyance system was undatable, could not be historically associated with a historic theme, and lacked definitive engineering features, then that segment was considered not eligible under all criteria.

b. Fences: If a fence was undatable, lacked unique construction features, or was constructed of metal T-posts and barbed wire, then that segment was considered not eligible under all criteria.

c. Telecommunication lines (telegraph, telephone, power transmission): If a telecommunication line was undatable, lacked unique engineering features associated with that segment of the telecommunication line, then that segment was considered not eligible under all criteria.

These criteria were only used as guidelines by which to provide a preliminary evaluation of the resources encountered during the survey. Essentially, sites whose surface expressions did not lend themselves to depth (e.g., desert pavement, bedrock outcrops, etc.) and did not appear to possess any additional data potential were recorded in detail and assigned a preliminary evaluation of "not eligible." Often these sites included late period historic refuse deposits, habitation sites, rock cairns, power lines, and well sites whose surface expression represented the total artifact assemblage. Sites where subsurface components were possible or may possess additional research potential were assumed eligible. In other instances, more complex sites with some subsurface potential were preliminarily evaluated as "not eligible" if the resource lacked integrity or was substantially altered to limit its research potential. This occurred within the APE in California but not Nevada. All sites assigned a preliminary evaluation for the purposes of the EIS will be subject to formal evaluations following selection of a Preferred Alternative as required under the Programmatic Agreement to be executed for the project. Any recommendations of NRHP eligibility identified for this project will be subject to both California and Nevada SHPO concurrence of these findings. Formal determinations will be made in consultation with the California and Nevada BLM for resources on BLM land.

Architectural Resources Investigation

To identify historic buildings, structures, and objects that may meet NRHP criteria, qualified architectural historians conducted a records search and field survey, requested information from groups and individuals likely to have information on historic properties, and evaluated all properties within the APE. A records search was conducted at the San Bernardino Archaeological Information Center, which included a review of the previously evaluated buildings recorded in the California Historical Resources Information System (CHRIS). In Nevada, a review was made of previous historic resources surveys on file at the State of Nevada Department of Cultural Affairs, SHPO Office. Several of these surveys overlapped with the proposed project APE, and the results of these inventories were recorded.

FRA's EIS third party contractor architectural historians (meeting the Secretary of the Interior's Professional Qualifications Standards[20]) conducted a field investigation of all historic buildings, structures and objects in the APE in 2006 through 2008. In March 2007, letters requesting information on historic properties that may be in the APE were sent to groups and individuals listed in Table 3.7-2, in accordance with 36 CFR 800.4(a)(3) (see Appendix G).

Table 3.7-2: Historic Properties Consultation

BLM California Desert District	Chinese American Museum
Sierra Club, San Gorgonio Chapter, Mojave Group	Nevada Historical Society
Friends of Nevada Wilderness	Nevada State Museum & Historical Society
Sierra Club, Toiyabe Chapter	Nevada State Railroad Museum
The Nevada Environmental Coalition, Inc.	Baker Community Services District
California Preservation Foundation	City of Barstow Community Development
Preserve Nevada, UNLV Dept. of History	California Route 66 Preservation Foundation
Preservation Association of Clark County	City of Victorville Development Director
Mojave River Valley Museum	City of Las Vegas Development Services Director
California Historical Society	Pacific Railroad Society
Clark County Commission	Southern Pacific Historical & Technical Society
California State Railroad Museum	San Bernardino Railroad Historical Society
National Historic Route 66 Federation	Las Vegas Railroad Society
The Center for Land Use Interpretation	

*California: A*s discussed above, FRA sent a letter to the California SHPO initiating the Section 106 process and proposing the scope of efforts to identify historic properties in November 2007. FRA's third-party EIS contractor contacted the California SHPO in December 2007 through April 2008 regarding concurrence on the APE. In the absence of formal concurrence from the California SHPO, FRA initiated the cultural resources analysis.[21] FRA and their third-party contractor met with the California SHPO on January 23, 2009 to discuss the APE, Programmatic Agreement, and findings of pedestrian surveys.

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[20] 36 CFR § 61.

[21] FRA's third-party EIS contractor contacted SHPO staff member David Byrd in December 2007. The SHPO commented that portions of Route 66 visible from the proposed project right-of-way of Segment 1A should be included in the APE. This segment was later removed as a potential project alternative. For more information, see Section 2.0, Alternatives, and refer to the discussion of alternatives considered but rejected.

Nevada: Following FRA's initiation of the Section 106 process, FRA's EIS third-party contractor architectural historians met with the Nevada SHPO to discuss the proposed project on February 26, 2008. The meeting focused upon previous historic surveys conducted in or near the proposed project APE, procedures for delineating the APE, and guidelines for evaluating and documenting structures over 45 years old within the APE. The Nevada SHPO requested that architectural resources be included in the APE if they were within the viewshed of an elevated portion of the proposed project. Review of pre-existing historic resource surveys already completed within the APE was undertaken to identify resources. Approximately 30 percent of the APE within Nevada has already been surveyed and does not need to be resurveyed. Project Neon, a Nevada Department of Transportation (NDOT) project, for I-15 improvements between US 95 and Edna Avenue in Las Vegas already surveyed a large portion of the APE, and SHPO concurred with those finding on September 16, 2008. FRA and their third-party contractor met with the Nevada SHPO on January 14, 2009 to discuss the APE, Programmatic Agreement, and findings of pedestrian surveys.

3.7.2.2 Paleontological Resources

Impacts on paleontological resources were evaluated following guidelines published by the SVP.[22] This analysis reflects professional judgment of the project paleontologist in light of information available from the published geologic and paleontologic literature and museum databases. No new paleontological fieldwork or research was conducted for this EIS.

SVP's guidelines were developed in response to a recognized need for standardized methods to assess and mitigate impacts on paleontological resources and are now widely accepted as an industry standard. Because many fossil materials are buried in subsurface geologic units rather than exposed at the ground surface, a lead agency often cannot be certain until project earthwork has made substantial progress whether any such resources will actually be encountered. Thus, impact analysis for paleontological resources operates based on probabilities of impact, with the goal of developing flexible strategies to support adaptive management based on information that may quite literally "come to light" during project construction. The first step in the process is to assess the likelihood that the project area contains significant nonrenewable paleontological resources[23] that could be

[22] Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee, 1995.

[23] *Significant* paleontological materials are those that meet one or more of the following criteria: provide important information shedding light on evolutionary trends and/or helping to relate living organisms to extinct organisms; provide important information regarding the development of biological communities; demonstrate unusual circumstances in the history of life; represent a rare taxon or a rare or unique occurrence; are in short supply and in danger of being destroyed or depleted; have a special and particular quality, such as being the oldest of their type or the best available example of their type; or provide important information used to correlate strata for which it may be difficult to obtain other types of age dates. Vertebrate fossils are typically considered significant, and other types of materials (invertebrates, plants, trace fossils) may also qualify (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

directly or indirectly impacted, damaged, or destroyed as a result of the proposed project. This baseline is referred to as an area's *paleontological sensitivity* or *sensitivity for paleontological resources*. Once the project area's paleontological sensitivity is known, the likelihood of impact is constrained and an appropriate mitigation strategy can be developed, as summarized in Table 3.7-3.

Table 3.7-3: Society of Vertebrate Paleontology's Recommended Treatment for Paleontological Resources, by Sensitivity Category

Sensitivity Category	**Definition**	**Recommended Treatment**
High sensitivity	Areas underlain by geologic units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered	• Preliminary survey and surface salvage before construction begins • Monitoring and salvage during construction • Specimen preparation; identification, cataloging, curation, and storage of materials recovered • Preparation of final report describing finds and discussing their significance • All work should be supervised by a professional paleontologist who maintains the necessary collecting permits and repository agreements
Undetermined sensitivity	Areas underlain by geologic units for which little information is available	• Preliminary field surveys by a qualified vertebrate paleontologist to assess project area's sensitivity • Design and implementation of mitigation if needed, based on results of field survey
Low sensitivity	Areas underlain by geologic units that are not known to have produced a substantial body of significant paleontologic material	• Protection and salvage are generally not required. However, a qualified paleontologist should be contacted if fossils are discovered during construction, in order to salvage finds and assess the need for further mitigation
Source: Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995.		

Literature reviewed for this analysis included the following: geologic and topographic maps, data, and other publications of the California Geological Survey (CGS) (formerly the California Division of Mines and Geology [CDMG], United States Geological Survey (USGS), Geological Society of America, South Coast Geological Society, American Geophysical Union, and Society of Vertebrate Paleontology. Specific reference information is provided in the text.

In addition to published literature and map materials, a limited invertebrate fossil locality search from the University of California, Riverside was requested on September 25, 2008 and conducted on October 15, 2008, and an informal search of the San Bernardino County Museum's online locality database was conducted on October 29, 2008. Fossil locality searches have also been requested from the Los Angeles County Museum of Natural History, University of Nevada, Las Vegas, and San Bernardino County Museum, but results are not available as of the date of preparation of this draft document. The San Diego Natural History Museum and Las Vegas Natural History Museum were also contacted but do not have materials from the project area.

3.7.3 AFFECTED ENVIRONMENT

3.7.3.1 Cultural Resources Setting

Below is a brief discussion of the prehistoric, ethnographic, and historic context related to the project study area. A detailed context is provided in Appendix F1.

Prehistoric Context

The prehistoric context is presented from various sources in the southwestern portion of the Great Basin, and includes regional data from the Colorado River and Lower Virgin River areas. Cultural resource documents demonstrate that Native Americans have occupied the Three Corners region (western Arizona, southern Nevada, and southeastern California) since the end of the Pleistocene (10,000 Before Christ [BC]), continuing through the initial and middle stages of the Holocene (8000 - 2000 BC) and until the ethnographic present (2000 BC – Present).

Ethnographic Context

The project area extends across the traditional use areas of several Native American groups including the Kawaiisu, Mojave, Shoshone, Serrano/Vanyume and Southern Paiute. Each of these groups represents highly effective, mobile hunter gatherer groups loosely organized into small patrilinial clans. The area inhabited by these groups incorporated a wide variety of terrain that yielded great diversity in flora and fauna for the inhabitants. Given the large traditional use areas of many of them, boundaries and natural resources were often shared by neighboring groups.

Historic Context

European influence in the greater Southwest began with the arrival and influx of Spanish explorers during the 16th and 17th centuries. Written accounts attest to the expansion of the Spanish Borderlands into the southwest as early as the 1530s. The colonization formula utilized by the Spaniards by the latter half of the 1700s consisted of the tried and tested tripartite—mission, presidio, and pueblo. Within the Mojave Desert, the harsh conditions and remoteness did not promote a cost-effective outpost for the Spanish Empire, which with time lost its hold on the region. In 1821 following an 11-year war with Spain, Mexico achieved independence. With the admitting of Texas to the Union in 1842, the United States had effectively annexed a significant portion of Mexico's northern territory. Increased hostility and expansionist ideals resulted in the United States declaring war on Mexico in 1846. In 1848, the signing of the Treaty of Guadalupe Hidalgo ended the war between the United States and Mexico, and resulted in the transition of California and Nevada (in addition to parts of Wyoming, Colorado, New Mexico, Arizona, and all of Utah) to the American territory. In 1850, California was admitted to the Union, and 14 years later, Nevada followed. Soon the two states were crossed by roads, trails, and railroads which facilitated additional rapid growth.

Archaeological Resources

As a result of the records search and field survey (discussed above under Methodology), prehistoric and historic archaeological sites were identified within the APE. The number of previously identified archaeological sites as well as those identified during the field survey are listed in Table 3.7-4.

Table 3.7-4: Summary of Archaeological Resources in the APE

Segment[1]	Historic (sites)	Prehistoric (sites)	Historic / Prehistoric (sites)	Total (sites)
Segment 1				
Rail Alignment	26	1	-	27
Victorville Station Site Option 1	5	-	-	5
Victorville Station Site Option 2	2	-	-	2
Victorville OMSF Site Option 1	7	-	-	7
Victorville OMSF Site Option 2	18	-	-	18
Victorville Utility Corridor	8	1	1	10
TCA #1A	7	-	-	7
TCA #1B	3	-	-	3
Segment 2				
2A/2B	8	8	2	18
2A	30	2	1	33
2B	9	1	-	10
TCA #4	1	2	-	3
Segment 3				
3A	12	9	-	21
3B	29	24	1	54
Baker Utility Corridor	1	-	-	1
TCA #6	-	2	-	2
TCA #7	-	3	-	3
Segment 4				
4A	7	3	-	10
4B	20	-	-	20
TCA #12	1	-	-	1
Segment 5				
5A	6	1		7
5B	20	13	3	36

Segment[1]	Historic (sites)	Prehistoric (sites)	Historic / Prehistoric (sites)	Total (sites)
Sloan Utility Corridor	-	-	-	0
Segment 6				
6A	2	2	-	4
6B	2	3	-	5
Option C	19	8	-	27
TCA #14	2	-	-	2
Segment 7 (no sites)				
[1] Only those project elements where archaeological resources were identified within the APE are listed.				

Source: ICF Jones & Stokes, 2008; EDAW, 2008

A total of 282 sites were identified within the APE for all action alternatives as part of the records search and field survey work conducted for this project.[24] Of the total 282 sites, 205 are historic, 69 are prehistoric, and 8 contain a mixed assemblage of prehistoric and historic artifacts. While final determination of archaeological resource eligibility for the NRHP will occur after the environmental document is completed and preferred alternative is selected, a preliminary evaluation indicates that 134 of the sites are assumed eligible, 33 have previously been determined eligible, and 115 would not be eligible. Each of these sites can be loosely placed in broader thematic categories based on their primary component at each site. In many cases, sites have a mixture of components that may transcend one site type or category. Table 3.7-5 lists the period (historic or prehistoric), category, types, and number of those sites identified within the APE.

Table 3.7-5. Types of Historic and Prehistoric Sites within the APE

Period	Category	Types	Quantity[1]
Historic	Transmission Lines	Pipeline, Telecommunications, Power, Water	9
	Refuse Deposits	Domestic, Commercial, Roadside, Dump, Can Scatter	65
	Roads	Trails, Roads, Highway, Railroad	8
	Markers	Rock Cairn, Survey, Cadastral, Boundary Marker, Post, “C” Monument	52
	Towns	Towns, Station Stop	2
	Mines	Prospector Pits, Mine Shafts, Adits, Stamp Mill, Quarry	11
	Habitation	Residential, Commercial, Campsite, Hearth, homestead	47
	Rock Alignments	Alignments, Cobble Piles, Monument	5
	Fence Line	Fence line	3

[24] The data in Table 3.7-4 do not add up to this total as sites may occur in more than one segment.

Period	Category	Types	Quantity[1]
Prehistoric	Quarries	Cobble Reduction, Quarrying	16
	Rock Alignments	Rock Alignment	1
	Lithic Material Scatter	Lithic Scatter, Groundstone Scatter	28
	Pottery Scatters	Pottery, Pot Drop	1
	Trail	Trail	6
	Habitation	Village, Temporary Camp, Rock Shelter, Food Processing Site, Hearths, Fire Affected Rock	22
	Rock Art	Rock Art	2

[1] Quantities do not add to the total number of sites since some sites contain resources from more than one category/type.

Source: ICF Jones & Stokes, 2008; EDAW, 2008

Historic period categories include: transmission lines, refuse deposits, roads, rock cairns, town sites, mines, habitation sites, and rock alignment. Of these several variations or subgroups are identified.

- Transmission Lines. Transmission lines refer to any system of conveyance across a linear alignment. This type often includes historic pipelines (gas, water), telecommunication lines, power lines, and water (drainages or canals). Resources of this type are common along transportation corridors like I-15 linking towns or old station stops across hundreds of miles.

- Refuse Deposits. Refuse deposits are a common resource found in the Mojave Desert. The enactment of federal and state environmental laws and local ordinances on the proper disposal of refuse reduced the need for individual dumping in the open desert of domestic waste. However prior to these developments in the late 1960s, disposal in the desert was typical. Within the APE these site types are most common in and around areas of past and present habitation and may include domestic or commercial dumping of refuse along old roads. The refuse deposits within the APE date from the 1900s to the 1950s.

- Roads. The project APE is bisected by numerous historic trails and roads as well as highways and rail lines. Highways and rail lines are typically more physically evident than smaller roads and trails, although the later is more prevalent. In many cases along the APE, small roads were bisected by the construction of I-15 leaving numerous small section roads closed to further use. Even smaller highways in California like "State Highway No. 31," U.S. Route 466 and U.S. Route 91 which were only partially incorporated into I-15 were left isolated. Also given the mining history and expansion of towns like Barstow several historic rail lines bisect the APE.

- Markers. Markers of a variety of styles were encountered within the project APE. The most common were individual boundary markers wherein a stacked cobble cairn was erected. These are often called rock cairns. In most cases, nothing further could be deduced from the marker if no other artifacts were associated with the feature. Survey or Cadastral markers were also in evidence; however these provided greater detail with their associated data plate. One marker identified between Barstow, California and Primm, Nevada was the “C” Monument. The “C” Monument is a concrete post set in the ground and is used to delineate the right-of-way for historic highways or state routes.

- Towns. A few town sites were encountered in the APE during the survey. The observed town sites were largely associated with early automobile transportation commonly known as Station Stops. In some cases the Station Stop expanded with population growth becoming a modern town. In other cases, the Station Stop faltered and was reduced to a series of foundations and associated refuse.

- Mines. Mining features in the Mojave Desert are a very common feature along the rugged low mountain ranges surrounding the project APE. Given the local geology and landscape, features like prospector pits, mine shafts, adits, were common throughout the APE in and around foothills and mountains such as in Segments 1, 2, 3, and 4.

- Habitation. Habitation sites include a variety of features or resources that imply a period of occupation. Sites of this category are often identified by refuse deposits or hearth type features located in the area. The habitation often includes some form of dwelling but is not a fundamental component of the category. Early pioneers, miners, ranchers, and others occupied portions of the APE while earning a living in the Mojave Desert.

- Rock Alignments. Historic rock alignments within the APE consist of several cobble features that include alignments, piles, and monuments. Alignments are typically linear in shape but may include historic text or are a series of cobbles demarcating a building footer or garden. Cobble piles lack the definitive characteristics of a rock cairn and usually contain cobbles in excess of 50 individual rocks. Lastly, monuments are cobble piles but appear to be placed systematically for a specific purpose that may not be well understood.

- Fence Line. Fence lines are features that are a common part of the landscape in and around the APE. Fence lines may include wood posts, concrete pedestals, rock supports, but are often a standalone feature without an associated artifact or feature that would comprise a site. In many cases the fence line can be directly attributed to an agricultural feature (plowed fields, irrigation), homestead, or visible foundation, however in this category no specific association is identifiable and as such it is a separate site type here.

Prehistoric period categories represented within the project area include: quarries, rock alignments, lithic material scatter, pottery scatters, trails, habitation, and rock art. Within these categories several more specific site types are represented within the APE.

- Quarries. Quarry sites consist of sites that encompass some form of tool stone procurement. Within the project APE, this almost exclusively consists of cobble procurement followed by reduction either at the source or downstream on alluvial fans and basins. Due to geologic conditions and long-term resource utilization, quarry sites are among the largest resources in the project APE and can be more than a square mile in size.

- Rock Alignments. Prehistoric rock alignments include any culturally-derived systematic aligning of rocks or cobbles. Often the direct purpose or function cannot be inferred from the physical characteristics evident on the surface. A site within the APE in Segment 3, CA-SBR-885, is one example that consisted of several prehistoric rock rings.

- Lithic Material Scatter. Lithic material scatters can be the result of either tool stone knapping (lithic scatter) or groundstone assemblage remnants (groundstone scatter). Lithic scatters by their very nature are usually more dispersed than the heavier components of groundstone. For this reason a groundstone scatter may be fairly small while the lithic scatter may be extensively spread out. Lithic scatters were found throughout the APE.

- Pottery Scatter. A pottery scatter or pot drop is usually the result of an isolated event where a prehistoric pottery vessel has dropped and broken leaving fragments in a relatively small diameter area. Pot drops are usually associated with other site types like trails, or habitation sites, although in the absence of other features or artifacts, can be a standalone site.

- Trail. Trails are a system of travelled paths linking resource procurement areas or other prehistoric cultural resources. Other site components or artifacts do not have to be present to demarcate the trail; however trails are often associated with isolated artifacts, features, or pot drops. Several trails were observed crossing the APE between resources and the Mojave River along Segment 3 in California.

- Habitation. Habitation sites include a variety of features or resources that imply a period of occupation. Sites of this category are often identified by hearths (fire-affected rock), groundstone, or other food processing features or artifacts. Prehistoric habitation sites are usually within a short distance of water sources. Village sites typically imply a longer or more complex occupation than temporary camp or hearth sites. Habitation sites were encountered within the APE along Segments 2, 3, and 4 in California.

- Rock Art. Rock art sites are a unique prehistoric resource afforded a level of significance beyond what is commonly attributed to the other site types discussed here. This site type normally refers to paintings, engravings, and/or shallow relief (scratching or pecking) on natural rock surfaces. Rock art sites are not common resources and often require certain environmental conditions to be present and resist erosion processes over time. Furthermore rock art sites are often attributed a degree of spiritual significance to ethnic groups whose ancestors might have created the art. One extensive rock art site was identified during the survey along Segment 3.

Segment 1

A total of 70 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 1 as listed in Tables 3.7-6.[25] Of these, 67were identified as being in the historic period and three within the prehistoric period. Preliminary evaluations of these sites indicate that 40 sites would not be eligible for inclusion in the NRHP, 25 would be assumed eligible, and five would be eligible. Those sites considered to be not eligible include some refuse deposits, markers and rock cairns, and habitation sites lacking a subsurface component and integrity. Based on archival research, five additional sites have already been recommended as eligible for inclusion in the NRHP. In three instances, sites previously evaluated as not eligible have been reexamined and are now considered to be assumed eligible. CA-SBR-6323 and CA-SBR-6325 were evaluated in 1992 at which time they were found to be less than 45 years of age and therefore not eligible. These sites are now over 50 years of age and considered potentially significance. In addition, site CA-SBR-8700 was determined to not be eligible in 1997; however the survey identified a new locus with data potential not previously recorded.

The majority of sites identified within Segment 1 consist of roadside dumped domestic refuse. This is consistent with expansion of Victorville and Barstow after World War II and prior to the environmental movements of the 1960s. Municipal trash collection also reduced this impact resulting in fewer opportunistic residential dumping since the 1970s.

Historic habitation and mining sites were also identified in modest quantities within Segment 1. These sites often correlated with each other and are mostly identified in the foothills of the Silver Mountain range east of I-15. Sites like CA-SBR-9359H represented larger intensive mining operations of the 1920s while individual prospector pits (JSA-CS-S-4H) are often undated and best illustrate failed mining attempts.

Three prehistoric habitation sites were identified within Segment 1 (JSA-TC-S-19, CA-SBR-70 and CA-SBR-5227). JSA-TC-S-19 consisted of a sparse lithic scatter with

[25] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for the alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

groundstone, and fire-affected rock. CA-SBR-70 and CA-SBR-5227 both contain elements of prehistoric milling.

Table 3.7-6: Identified Archaeological Resources in Segment 1

Site Number	Period	Type	NRHP Eligibility
Segment 1			
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
CA-SBR-9358H	Historic	Habitation Site	Not Eligible
CA-SBR-9359H	Historic	Mine Site	Not Eligible
CA-SBR-8700H	Historic	Mine, habitation Site	Assumption of Eligibility
JSA-CS-S-3H	Historic	Mine, Refuse Deposit and Rock Cairn	Not Eligible*
JSA-CS-S-4H	Historic	Mine and Refuse Deposit	Not Eligible*
JSA-CS-S-5H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-6H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-7H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-8H	Historic	Survey Marker	Not Eligible*
JSA-CS-S-9H	Historic	Survey Marker	Not Eligible*
JSA-CS-S-10H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-11H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-12H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-13H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-14H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-15H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-16H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-TC-S-8H	Historic	Refuse Deposit	Not Eligible*
JSA-TC-S-19	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-TC-S-20H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-76H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-78H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-88H	Historic	Habitation Site	Assumption of Eligibility
JSA-KT-S-2H	Historic	Marker	Not Eligible*
JSA-KT-S-3H	Historic	Marker	Not Eligible*
JSA-KT-S-4H	Historic	Hearth	Assumption of Eligibility
Victorville Station Site 1 Option			
CA-SBR-4411H	Historic	Road	Eligible
JSA-TC-S-8H	Historic	Refuse Deposit	Not Eligible*
JSA-TC-S-7H	Historic	Refuse Deposit	Not Eligible*
JSA-TC-S-6H	Historic	Refuse Deposit	Not Eligible*
CA-SBR-9360	Historic	Road	Assumption of Eligibility
Victorville Station Site 2 Option			
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
JSA -TC-S-9H	Historic	Refuse Deposit	Not Eligible*
Victorville OMSF Option 1			
CA-SBR-7694H	Historic	Power Transmission Line	Eligible

Site Number	Period	Type	NRHP Eligibility
JSA-CS-S-2H	Historic	Fence Line	Not Eligible*
CA-SBR-6317H	Historic	Mine Site	Not Eligible
JSA-TC-S-3H	Historic	Refuse Deposit	Assumption of Eligibility
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
CA-SBR-4411H	Historic	Road	Eligible
CA-SBR-6323H	Historic	Refuse Deposit	Assumption of Eligibility
Victorville OMSF Option 2			
JSA-CS-S-73H	Historic	Fence Line	Not Eligible*
JSA-CS-S-74H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-75H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-76H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-77H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-78H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-79H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-80H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-81H	Historic	Refuse Deposit, Road, Rock Cairn	Assumption of Eligibility
JSA-CS-S-82H	Historic	Monument	Not Eligible*
JSA-CS-S-83H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-84H	Historic	Mining Site	Assumption of Eligibility
JSA-CS-S-85H	Historic	Prospector Pit, Refuse Deposit	Assumption of Eligibility
JSA-CS-S-86H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-87H	Historic	Prospector Pit	Not Eligible*
JSA-CS-S-88H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-90H	Historic	Cobble Piles	Not Eligible*
JSA-CS-S-99H	Historic	Rock Cairn	Not Eligible*
Victorville Utility Corridor			
CA-SBR-70	Prehistoric / Historic	Habitation Site and Refuse Deposit	Eligible
CA-SBR-3159H	Historic	Railroad	Assumption of Eligibility
CA-SBR-5227	Prehistoric	Habitation Site	Eligible
CA-SBR-8392H	Historic	Railroad	Assumption of Eligibility
JSA-CS-S-191H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-192H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-193H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-194H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-195H	Historic	Railroad Feature	Assumption of Eligibility
JSA-CS-S-198H	Historic	Refuse Deposit	Not Eligible*
Temporary Construction Area #1A			
CA-SBR-7694H	Historic	Power Transmission Line	Eligible
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
CA-SBR-12132H	Historic	Habitation Site	Assumption of Eligibility
CA-SBR-6325H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-TC-S-4H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-TC-S-3H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-2H	Historic	Fence Line	Not Eligible*

Site Number	Period	Type	NRHP Eligibility
Temporary Construction Area #1B			
JSA-TC-S-10H	Historic	Claim Marker	Not Eligible*
JSA-TC-S-11H	Historic	Habitation Site, Well	Assumption of Eligibility
JSA-TC-S-12H	Historic	Refuse Deposit	Not Eligible*
Note: * Preliminary recommendations of *not eligible* for inclusion on the NRHP were based on the results of the field survey, follow-up archival research, and BLM consultation. The preliminary notations of “Not Eligible*” and “Assumption of Eligibility” are based on existing data and are not a determination of eligibility. SHPO has not concurred on these findings.			
Source: ICF Jones & Stokes, 2008			

Segment 2

A total of 59 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 2 as listed in Tables 3.7-7.[26] Of these, 46 were identified as being in the historic period, 10 sites within the prehistoric period, and three sites exhibiting both prehistoric and historic periods. Preliminary evaluations of these sites indicate that 36 sites would not be eligible for inclusion in the NRHP, 22 would be assumed eligible, and one would be eligible. Those sites considered to be not eligible include some refuse deposits, markers and rock cairns, rock alignments, a mine, lithic scatter, and habitation sites lacking a subsurface component and integrity. Based on archival research, one additional site has already been recommended as eligible for inclusion in the NRHP.

Segment 2 yielded similar site composition as seen with Segment 1 with refuse deposits and habitation sites comprising the majority of historic period sites. The largest difference was in the quantity of cobble-based markers or rock cairns. These stacked stone markers were often used to demarcate property boundaries or points of interest. Given the intensive mining of the Barstow area at the turn of the twentieth century the number of cairns is not surprising.

Prehistoric sites within Segment 2 consisted primarily of habitation sites near the Mojave River and cobble quarry sites within the Mitchell Ranges and the alluvial fans of the Calico Mountains north of the APE. The habitation sites observed consisted of a varied artifact assemblage which was often dominated by fire affected rock, lithics, groundstone, and occasionally pottery (e.g. CA-SBR-2294). The cobble reduction sites were often consistent in their composition with tested cobbles surrounded by localized debitage repeated across broad portions of the landscape (e.g. CA-SBR-4615).

The relatively few sites containing both prehistoric and historic period assemblages are represented primarily by rock cairns and refuse deposits on the broad lithic reduction

[26] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for more than one alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

landscape that characterizes the developing desert pavement south of the Calico Mountains.

Table 3.7-7: Identified Archaeological Resources in Segment 2

Site Number	Period	Type	NRHP Eligibility
Segment 2A/2B (Joint Portion)			
CA-SBR-2294	Prehistoric	Village Site	Assumption of Eligibility
CA-SBR-4525H	Historic	Road	Assumption of Eligibility
CA-SBR-4615	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
CA-SBR-6793H	Historic	Railroad	Eligible
JSA-CS-S-18H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-28	Prehistoric	Lithic Scatter	Not Eligible*
JSA-CS-S-29/H	Historic / Prehistoric	Hearth/Rock Circle and Lithic	Not Eligible*
JSA-CS-S-30H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-31/H	Historic / Prehistoric	Rock Cairn and Quarry	Assumption of Eligibility
JSA-CS-S-32	Prehistoric	Quarry	Assumption of Eligibility
JSA-CS-S-33H	Historic	Refuse Deposit	Not Eligible*
JSA-TC-S-21H	Historic	Refuse Deposit	Not Eligible*
JSA-TC-S-23	Prehistoric	Habitation Site	Assumption of Eligibility
JSA-TC-S-24H	Historic	Well	Not Eligible*
JSA-TC-S-29	Prehistoric	Habitation Site	Assumption of Eligibility
JSA-TC-S-30	Prehistoric	Habitation Site	Assumption of Eligibility
JSA-TC-S-31	Prehistoric	Habitation Site	Assumption of Eligibility
JSA-CS-S-115H	Historic	Monuments	Assumption of Eligibility
Segment 2A			
CA-SBR-10398H	Historic	Road	Assumption of Eligibility
CA-SBR-4085H	Historic	Railroad	Assumption of Eligibility
JSA-CS-S-34	Prehistoric	Quarry	Assumption of Eligibility
JSA-CS-S-35H	Historic	Mine	Not Eligible*
JSA-CS-S-36H	Historic	Refuse Deposit and Utility Pole	Not Eligible*
JSA-CS-S-38H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-39H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-40H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-45H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-47/H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-48/H	Historic / Prehistoric	Refuse Deposit and Lithic Scatter	Assumption of Eligibility
JSA-CS-S-49H	Historic	Rock Cairn and Rock Alignment	Not Eligible*
JSA-CS-S-50H	Historic	Rock Cairn and Refuse Deposit	Not Eligible*
JSA-CS-S-52H	Historic	Hearth	Not Eligible*
JSA-CS-S-53H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-54H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-55H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-56H	Historic	Habitation Site	Not Eligible*

Site Number	Period	Type	NRHP Eligibility
JSA-CS-S-57H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-58H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-59H	Historic	Rock Alignment	Not Eligible*
JSA-CS-S-60H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-63H	Historic	Rock Cairn and Road	Not Eligible*
JSA-CS-S-64H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-65H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-67H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-68H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-69H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-71H	Historic	Post	Not Eligible*
JSA-CS-S-72H	Historic	Habitation Site	Not Eligible*
P-1812-2	Prehistoric	Trail	Assumption of Eligibility
JSA-CS-S-101H	Historic	Berm	Assumption of Eligibility
JSA-RN-S-5H	Historic	Flume	Assumption of Eligibility
Segment 2B			
JSA-RN-S-5H	Historic	Flume	Assumption of Eligibility
JSA-CS-S-20H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-21H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-22H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-23H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-24H	Historic	Refuse Deposit and Roads	Not Eligible*
JSA-CS-S-26H	Historic	Road	Not Eligible*
JSA-CS-S-27H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-34	Prehistoric	Quarry	Assumption of Eligibility
JSA-CS-S-102H	Historic	Refuse Deposit	Assumption of Eligibility
Temporary Construction Area #4			
CA-SBR-6793H	Historic	Railroad	Eligible
JSA-TC-S-30	Prehistoric	Habitation Site	Assumption of Eligibility
JSA-TC-S-31	Prehistoric	Habitation Site	Assumption of Eligibility

Note: * Preliminary recommendations of *not eligible* for inclusion on the NRHP were based on the results of the field survey, follow-up archival research, and BLM consultation. The preliminary notations of “Not Eligible*” and “Assumption of Eligibility” are based on existing data and are not a determination of eligibility. SHPO has not concurred on these findings. .

Source: ICF Jones & Stokes, 2008; EDAW, 2008

Segment 3

A total of 63 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 3 as listed in Tables 3.7-8.[27] Of these, 32 were identified as being in the historic period, 30 sites within the prehistoric period, and one

[27] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for more than one alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

site exhibiting both prehistoric and historic periods. Preliminary evaluations of these sites indicate that 10 sites would not be eligible for inclusion in the NRHP, 50 would be assumed eligible, and three would be eligible. Those sites considered to be not eligible include some refuse deposits, markers and rock cairns, a transmission line, and a habitation site lacking a subsurface component and integrity. Based on archival research, three additional sites have already been recommended as eligible for inclusion in the NRHP.

Segment 3, the longest of the seven segments, would generally follow the course of I-15 across the east central portion of the Mojave Desert. This area consists of numerous mountain ranges, valleys and drainages, of which the Mojave River is the primary link between them. Sites in this region reflect this broad diversity of natural resources. The majority of sites identified in Segment 3 were extensive prehistoric cobble reduction sites collectively creating a lithic landscape. The full extent of these sites was often in excess of a mile across with no significant change in tool stone or assemblage (e.g. CA-SBR-2131). Given the geology of the area, with its naturally occurring cryptocrystalline sources, prehistoric people have long tested and used the available tool stone material. Other prehistoric site types identified in Segment 3 included village sites, trails, rock shelters, and a rock art site. The rock art site encompassed over 150 individual elements and included pottery and groundstone in its assemblage (P2272-2). The APE for Segment 3A contains a number of previously surveyed sites which may either extend under I-15 and into the freeway median or be located entirely within the median of I-15. A larger number of sites were identified within the APE for Segment 3B due to its location alongside I-15 which is relatively undisturbed outside of the freeway right-of-way.

In and around the areas of existing and previous development along Segment 3, refuse deposits were the dominant historic period site type; however, in other locations, historic roads and transmission lines were also identified. One remnant of the early highway system still visible that preceded I-15 was the concrete “C” monuments that delineate the early transportation right-of-way. The “C” monuments largely followed the recorded route of the National Trails Highway between the California state line and Barstow within the APE (CA-SBR-7689H).

Table 3.7-8: Identified Archaeological Resources in Segment 3

Site Number	Period	Type	NRHP Eligibility
Segment 3A			
CA-SBR-7694H	Historic	Power Transmission Line	Eligible
PSBR-64H	Historic	Water Transmission Line	Assumption of Eligibility
CA-SBR-2129	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-4272H	Historic	Spanish Trail	Assumption of Eligibility
CA-SBR-223	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
CA-SBR-2131	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
CA-SBR-3694	Prehistoric	Village Site	Eligible

Site Number	Period	Type	NRHP Eligibility
PSBR-52	Prehistoric	Trail System	Assumption of Eligibility
CA-SBR-5127H	Historic	Refuse Deposit	Assumption of Eligibility
P2044-12H	Historic	Refuse Deposit	Assumption of Eligibility
P2044-5	Prehistoric	Food Processing Site	Assumption of Eligibility
CA-SBR-7689H	Historic	Road	Assumption of Eligibility
CA-SBR-1068	Prehistoric	Trail	Assumption of Eligibility
CA-SBR-541	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-2340H	Historic	Railroad	Assumption of Eligibility
P2284-6H	Historic	Town Site	Assumption of Eligibility
P2273-1H	Historic	Habitation	Assumption of Eligibility*
P2272-2	Prehistoric	Rock Art Area	Assumption of Eligibility
P2271-2H	Historic	Town Site	Assumption of Eligibility
CA-SBR-1074H	Historic	Refuse Deposit	Not Eligible*
Segment 3B			
PSBR-64H	Historic	Water Transmission Line	Assumption of Eligibility
CA-SBR-7694H	Historic	Power Transmission Line	Eligible
CA-SBR-2129	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-4272H	Historic	Spanish Trail	Assumption of Eligibility
CA-SBR-2591	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-2092	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
CA-SBR-223	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-10315H	Historic	Power Transmission Line	Eligible
CA-SBR-3694	Prehistoric	Village Site	Eligible
CA-SBR-5329	Prehistoric	Lithic Scatter	Assumption of Eligibility
PSBR-52	Prehistoric	Trail System	Assumption of Eligibility
P2044-12H	Historic	Refuse Deposit	Assumption of Eligibility
P2044-5	Prehistoric	Food Processing Site	Assumption of Eligibility
CA-SBR-7689H	Historic	Road	Assumption of Eligibility
CA-SBR-885	Prehistoric	Rock alignment	Assumption of Eligibility
CA-SBR-4054/H	Historic/ Prehistoric	Refuse Deposit / Groundstone	Assumption of Eligibility
P2262-2H	Historic	Habitation Site	Assumption of Eligibility
CA-SBR-541	Prehistoric	Quarry	Assumption of Eligibility
CA-SBR-2340H	Historic	Railroad	Assumption of Eligibility
P2284-6H	Historic	Town Site	Assumption of Eligibility
P2272-2	Prehistoric	Rock Art Area	Assumption of Eligibility
CA-SBR-2532	Prehistoric	Pottery Scatter	Assumption of Eligibility
P2271-2H	Historic	Town Site	Assumption of Eligibility
CA-SBR-1074H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-42H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-43H	Historic	Rock Cairn and Refuse Deposit	Not Eligible*
JSA-CS-S-44H	Historic	Refuse Deposit and Well	Not Eligible*
JSA-RN-S-3H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-RN-S-4H	Historic	Habitation Site	Not Eligible*
JSA-CS-S-46H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-124	Prehistoric	Lithic Scatter	Assumption of Eligibility

Site Number	Period	Type	NRHP Eligibility
JSA-CS-S-125	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-126H	Historic	Construction Refuse Deposit	Assumption of Eligibility
JSA-CS-S-129H	Historic	Refuse Deposit	Not Eligible*
JSA-CS-S-130H	Historic	Well	Assumption of Eligibility
JSA-CS-S-131	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
JSA-CS-S-132H	Historic	Rock Cairn	Assumption of Eligibility
JSA-CS-S-133	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-134	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
JSA-CS-S-135	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-136	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-137H	Historic	Power Transmission Line	Not Eligible*
JSA-CS-S-138	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-144H	Historic	Fence line	Not Eligible*
JSA-CS-S-145H	Historic	Prospector Pit	Assumption of Eligibility
JSA-CS-S-146H	Historic	Cadastral Marker	Not Eligible*
JSA-CS-S-151	Prehistoric	Hearth	Assumption of Eligibility
JSA-CS-S-152	Prehistoric	Hearth	Assumption of Eligibility
JSA-CS-S-153	Prehistoric	Trail	Assumption of Eligibility
JSA-CS-S-154	Prehistoric	Trail	Assumption of Eligibility
JSA-RN-S-6H	Historic	Well	Not Eligible*
JSA-RN-S-7H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-RN-S-8H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-RN-S-9H	Historic	Refuse Deposit	Assumption of Eligibility
Baker Utility Corridor			
JSA-CS-S-196H	Historic	Habitation Site	Assumption of Eligibility
Temporary Construction Area #6			
CA-SBR-2131	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
CA-SBR-6022	Prehistoric	Cobble Reduction Site	Assumption of Eligibility
Temporary Construction Area #7			
CA-SBR-4198	Prehistoric	Habitation Site	Assumption of Eligibility
P2044-9	Prehistoric	Rock Art	Assumption of Eligibility
P2044-11	Prehistoric	Quarry and Habitation Site	Assumption of Eligibility

Note: * Preliminary recommendations of *not eligible* for inclusion on the NRHP were based on the results of the field survey, follow-up archival research, and BLM consultation. The preliminary notations of “Not Eligible*” and “Assumption of Eligibility” are based on existing data and are not a determination of eligibility. SHPO has not concurred on these findings.

Source: ICF Jones & Stokes, 2008

Segment 4

A total of 28 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 4 as listed in Tables 3.7-9.[28] Of these, 25 were identified as being in the historic period and three sites within the prehistoric period. Preliminary evaluations of these sites indicate that 11 sites would not be eligible for the inclusion in the NRHP, 16 would be assumed eligible, and one would be eligible. Those sites considered to be not eligible include some rock cairns. Based on archival research, one additional site has already been recommended as eligible for inclusion in the NRHP.

Segment 4A crosses the northerly facing alluvial fans of the Ivanpah Mountains at the southerly end of Ivanpah Valley. Sites within this segment are primarily from the historic period consisting of roads and refuse deposits as well as remnants of earlier transportation corridors within the loose alluvium in the area. Three prehistoric sites were recorded on the upper terraces in the developing desert pavement. Site JSA-CS-S-92 was the best preserved at the higher elevations and included groundstone, fire affected rock, debitage, cores, a trail, and a projectile point

Segment 4B would bisect the Clark Mountains with two proposed tunnels before proceeding northward down the alluvial fans into Ivanpah Valley. Historically, the vicinity was a prominent mining area and the recorded sites along this alignment reflect that former usage. All of the recorded sites along Segment 4B were historic and consisted primarily of mining cairns and roads. Two of the identified rock cairns (JSA-CS-S-110H and JSA-CS-S-121H) still contained closed Prince Albert tobacco tins (post-1907).

Table 3.7-9: Identified Archaeological Resources in Segment 4

Site Number	Period	Type	NRHP Eligibility
Segment 4A			
CA-SBR-7689H	Historic	Road	Assumption of Eligibility
CA-SBR-3048H	Historic	Road	Assumption of Eligibility
JSA-CS-S-91H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-92	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-94H	Historic	Road	Not Eligible*
JSA-CS-S-95	Prehistoric	Lithic and Groundstone Scatter	Assumption of Eligibility
JSA-CS-S-96	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-97H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-103H	Historic	Habitation Site	Assumption of Eligibility
JSA-CS-S-105H	Historic	Monuments	Assumption of Eligibility
Segment 4B			
CA-SBR-10315H	Historic	Power Transmission Line	Eligible

[28] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for more than one alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

Site Number	Period	Type	NRHP Eligibility
CA-SBR-7347H	Historic	Road	Assumption of Eligibility
CA-SBR-3048H	Historic	Road	Assumption of Eligibility
JSA-CS-S-104H	Historic	Road	Not Eligible*
JSA-CS-S-105H	Historic	Monuments	Assumption of Eligibility
JSA-CS-S-106H	Historic	Rock Cairn and Quarry	Assumption of Eligibility
JSA-CS-S-107H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-108H	Historic	Road	Not Eligible*
JSA-CS-S-109H	Historic	Road	Not Eligible*
JSA-CS-S-110H	Historic	Rock Cairn	Assumption of Eligibility
JSA-CS-S-111H	Historic	Road	Not Eligible*
JSA-CS-S-112H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-113H	Historic	Road	Assumption of Eligibility
JSA-CS-S-114H	Historic	Rock Alignment	Assumption of Eligibility
JSA-CS-S-116H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-117H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-119H	Historic	Rock Cairn	Assumption of Eligibility
JSA-CS-S-121H	Historic	Rock Cairn	Assumption of Eligibility
JSA-CS-S-122H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-123H	Historic	Rock Cairn	Not Eligible*
Temporary Construction Area #12			
CA-SBR-10315H	Historic	Power Transmission Line	Eligible

Note: * Preliminary recommendations of *not eligible* for inclusion on the NRHP were based on the results of the field survey, follow-up archival research, and BLM consultation. The preliminary notations of "Not Eligible*" and "Assumption of Eligibility" are based on existing data and are not a determination of eligibility. SHPO has not concurred on these findings.

Source: ICF Jones & Stokes, 2008

Segment 5

A total of 37 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 5 as listed in Tables 3.7-10.[29] Of these, 21 were identified as being in the historic period, 13 sites within the prehistoric period, and three sites exhibiting both prehistoric and historic periods. Preliminary evaluations of these sites indicate that 11 sites would not be eligible for inclusion in the NRHP, 22 would be eligible, and 4 would be assumed eligible. Those sites considered to be not eligible include a refuse deposit, rock cairns, lithic scatter, transmission lines, railroad grade, and a road. The APE for Segment 5A contains a number of previously surveyed sites which may either extend under I-15 and into the freeway median or be located entirely within the median of I-15. A larger number of sites were identified within the APE for Segment 5B due to its location alongside I-15 which is relatively undisturbed outside of the freeway right-of-way.

[29] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for more than one alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

Table 3.7-10: Identified Archaeological Resources in Segment 5

Site Number	Period	Type	NRHP Eligibility
Segment 5A			
26CK3825	Prehistoric	Habitation	Eligible
26CK7218	Historic	Road	Eligible
26CK5180	Historic	Transmission Line	Eligible
26CK3540	Historic	Construction Camp	Eligible
26CK3541	Historic	Railroad Construction Camp	Eligible
26CK3542	Historic	Railroad Grade	Not Eligible
26CK5685	Historic	Railroad Grade	Eligible
Segment 5B			
26CK3540	Historic	Railroad Camp	Eligible
26CK3541	Historic	Railroad Construction Camp	Eligible
26CK5685	Historic	Railroad Grade	Eligible
26CK3808	Prehistoric	Lithic Scatter	Eligible
26CK3820	Prehistoric	Habitation	Eligible
26CK3821	Prehistoric	Habitation	Eligible
26CK3822	Prehistoric	Habitation	Eligible
26CK3823	Prehistoric	Habitation	Eligible
26CK3824	Prehistoric	Habitation	Eligible
26CK3825	Prehistoric	Habitation	Eligible
26CK3832	Prehistoric	Lithic Scatter	Eligible
26CK3833	Prehistoric	Lithic Scatter	Eligible
26CK3834	Prehistoric	Lithic Scatter	Eligible
26CK3836	Prehistoric	Lithic Scatter	Eligible
26CK4958	Historic	Road	Eligible
26CK5180	Historic	Transmission Line	Eligible
26CK6715	Prehistoric/ Historic	Railroad Construction Camp and Groundstone	Eligible
26CK7166	Prehistoric / Historic	Habitation Site	Eligible
26CK7167	Prehistoric	Habitation Site	Eligible
26CK7181	Prehistoric	Lithic Scatter	Not Eligible
26CK7212	Historic	Road	Eligible
26CK7214	Historic	Road	Not Eligible
26CK7217	Historic	Road and Refuse Deposit	Eligible
26CK7218	Historic	Road	Eligible
26CK7223	Historic	Transmission Line	Not Eligible
26CK8273	Historic	Mine Site	Not Eligible
26CK8276	Historic	Refuse Deposit	Not Eligible
26CK8347	Historic / Prehistoric	Railroad Construction Camp and Lithic Scatter	Not Eligible
JSA-CS-S-160H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-161H	Historic	Habitation Site and Refuse Deposit	Assumption of Eligibility

Site Number	Period	Type	NRHP Eligibility
JSA-CS-S-162H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-163H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-164H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-165H	Historic	Rock Cairn	Not Eligible*
JSA-CS-S-166H	Historic	Cobble Piles	Not Eligible*
JSA-CS-S-190H	Historic	Railroad Camp	Assumption of Eligibility

Note: * Preliminary recommendations of *not eligible* for inclusion on the NRHP were based on the results of the field survey, follow-up archival research, and BLM consultation. The preliminary notations of "Not Eligible*" and "Assumption of Eligibility" are based on existing data and are not a determination of eligibility. SHPO has not concurred on these findings.

Source: ICF Jones & Stokes; EDAW, 2008

Segment 6

A total of 32 different sites were identified within the APE, some of which are within the APE in multiple locations for Segment 6 as listed in Table 3.7-11.[30] Of these, 21 were identified as being in the historic period and 11 sites within the prehistoric period. Preliminary evaluations of these sites indicate that nine sites would not be eligible for inclusion in the NRHP, five would be eligible, and 18 would be assumed eligible. Those sites considered to be not eligible include some lithic scatters, refuse deposits, berms associated with the railroad, and a construction camp.

Segments 6A, within the median of I-15, and 6B, alongside of I-15, follow I-15 from Sloan towards Las Vegas in which most of the APE is a highly disturbed or urbanized landscape. Of the six sites recorded within these segments, three were historic and consisted of a cadastral marker, a railroad berm, and a rail line. The prehistoric sites consisted of sparse lithic scatters. As noted in Table 3.7-11, 3 of the sites within Segments 6A and 6B are the same indicating that the sites likely extend under I-15 and the median.

Option C of Segment 6 also proceeds from Sloan towards Las Vegas but departs I-15 and proceeds westward along the eastern margin of the Bird Spring Range loosely following the course of the Union Pacific Railroad. Sites in this vicinity were predominantly historic railroad construction camps or refuse associated with building of the rail line in 1905. Prehistoric sites consisted largely of prehistoric lithic quarries and scatters near cryptocrystalline sources within the limestone beds comprising this area.

Table 3.7-11: Identified Archaeological Resources in Segment 6

Site Number	Period	Type	NRHP Eligibility
Segment 6A			

[30] Some sites are listed more than once because they are in more than one location within the APE. For example, some sites may be within the APE for more than one alignment and within the APE of a facility and were only counted once. The number of sites discussed removes the duplicate sites.

26CK3542	Historic	Railroad Berm	Not Eligible
26CK5374	Prehistoric	Lithic Scatter	Not Eligible
26CK1995	Prehistoric	Lithic Scatter	Not Eligible
26CK5685	Historic	Railroad	Eligible
Segment 6B			
26CK3542	Historic	Railroad Berm	Not Eligible
26CK5369	Prehistoric	Lithic Scatter	Not Eligible
26CK5374	Prehistoric	Lithic Scatter	Not Eligible
26CK1995	Prehistoric	Lithic Scatter	Not Eligible
JSA-CS-S-167H	Historic	Cadastral Marker	Assumption of Eligibility
Option C			
26CK5729	Historic	Railroad Construction Camp	Eligible
26CK5801	Historic	Berm	Not Eligible
26CK5747	Historic	Refuse Deposit	Not Eligible
26CK6035	Historic	Railroad Construction Camp	Not Eligible
26CK4356	Historic	Refuse Deposit and Bard Siding	Not Eligible
26CK5685	Historic	Railroad	Eligible
26CK5347	Historic	Refuse Deposit	Not Eligible
26CK5353	Historic	Habitation Site	Eligible
26CK4400	Historic	Railroad Construction Camp	Eligible
26CK3542	Historic	Railroad Berm	Not Eligible
26CK5694	Historic	Railroad Construction Camp	Eligible
JSA-CS-S-149H	Historic	Power Transmission Line	Assumption of Eligibility
JSA-CS-S-169	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-170	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-175	Prehistoric	Rock Shelter	Assumption of Eligibility
JSA-CS-S-176H	Historic	Railroad Camp	Assumption of Eligibility
JSA-CS-S-177H	Historic	Railroad Camp	Assumption of Eligibility
JSA-CS-S-178H	Historic	Railroad Dump Site	Assumption of Eligibility
JSA-CS-S-179H	Historic	Railroad Dump Site	Assumption of Eligibility
JSA-CS-S-180H	Historic	Cadastral Marker	Assumption of Eligibility
JSA-CS-S-181	Prehistoric	Lithic Scatter	Assumption of Eligibility
JSA-CS-S-183	Prehistoric	Quarry	Assumption of Eligibility
JSA-CS-S-184H	Historic	Cadastral Marker	Assumption of Eligibility
JSA-CS-S-185	Prehistoric	Rock shelter	Assumption of Eligibility
JSA-CS-S-186	Prehistoric	Trail	Assumption of Eligibility
JSA-CS-S-187	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-188	Prehistoric	Quarry	Assumption of Eligibility
Temporary Construction Area #14			
JSA-CS-S-148H	Historic	Refuse Deposit	Assumption of Eligibility
JSA-CS-S-149H	Historic	Power Transmission Line	Assumption of Eligibility

Note: * The preliminary notation of “Assumption of Eligibility” is based on existing data and is not a determination of eligibility. SHPO has not concurred on these findings.

Source: ICF Jones & Stokes, 2008; EDAW, 2008

Segment 7

Given the urban environment along Segment 7, the archaeological survey did not identify any new resources within the APE, nor were there any previously recorded sites within the APE.

3.7.3.2 Architectural Resources

As a result of the records search, field investigation, and responses from interested parties, the buildings, structures and objects identified within the APE that are eligible for the NRHP, or are likely to be eligible for the NRHP, pending future SHPO concurrence are discussed below.

California

The APE between the Mojave River, near Victorville, and the state line includes little development aside from I-15 and areas around Barstow and Baker. Segment 2 bypasses most of the City of Barstow. Segment 2 is located outside the locus of development, instead skirting west and then just north of the Barstow city limits through areas of light residential and agricultural development. Through the town of Baker, the APE for Segment 3 parallels I-15 and east of the developed portion of the town, which includes a nearby cluster of abandoned residences that were determined to be not eligible for the NRHP. No NRHP-eligible resources were identified within the APE in California which includes Segments 1, 2A/2B, 2A, 2B, 3A, 3B, 4A, and 4B.

Nevada

The APE for segments through most of Nevada between Primm and Sloan, traverse open, undeveloped desert, much of which has either never been previously surveyed, or possesses no known above-ground cultural resources. The APE for Segment 5 traverses sections of open space with very few buildings, structures or objects, and no known above ground cultural resources. The context changes for Segments 6 and 7, however, which extend into suburban Clark County and into the City of Las Vegas proper. No NRHP-eligible resources were identified within the APE in Nevada for Segments 5A, 5B, 6A, 6B, and Option C in Segment 6. As listed in Table 3.7-12 and shown in Figure 3-7.1, resources were identified within the APE for Segments 7A, 7B and Option C in Segment 7. This list of previously determined NRHP-eligible resources consists primarily of resources identified as part of other survey and Section 106 projects having occurred within the last ten years, as provided by the Nevada SHPO and revisited as part of this project. This table includes resources adjacent to Segment 7 which are those located on adjacent property and within the APE, and it also includes those properties visible from but outside the APE.

Table 3.7-12: NRHP-Eligible Architectural Resources Within/Adjacent to the APE

Map ID	Address (Las Vegas)	Historic/ Current Building Name or Type	Built	Note	Segment

Map ID	Address (Las Vegas)	Historic/ Current Building Name or Type	Built	Note	Segment
1	2300 Western Avenue, South[4,5]	Gas Station	1965	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
2	1801-3 & 1805-7 Western Avenue[2]	Amer. Building Products	1956	located on adjacent property within the APE	7C
3	1800 Industrial Road[4,5]	Commercial Professional Services	1964		7C
4	1706 (1718) Industrial Road[4,5]	Commercial Professional Services: International Enzymes Inc.; Tattoo Parlor	1954		7C
6	311 Utah Avenue, West[4,5]	United Rentals Warehouse	1956	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
7	331 Utah Avenue, West[4,5]	Fire Station No. 4	1955		7A, 7B, 7C
8	1502 Commerce Street, South[1]	Office Building	c.1948		7A, 7B, 7C
10	1415 Western Avenue[2]	Adams' Western Store	1956	located on adjacent property within the APE	7A, 7B, 7C
11	1414 Industrial Road[4,5]	Industrial Manufacturing: A.T.I.S.	1953	located on adjacent property within the APE	7A, 7B, 7C
12	320 Utah Avenue, West[4,5]	Incubator Industrial Buildings	1954	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
13	1400 Industrial Road[4,5]	Nevada Film Wardrobe & Barquist Sheet Metal	1955	located on adjacent property within the APE	7A, 7B, 7C
14	1408 Western Avenue[2]	Meyers Electric	1955	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
15	1407 Western Avenue[2]	Silver State Petroleum	1958	located on adjacent property within the APE	7A, 7B, 7C
16	1400 Western Avenue[2]	Tri-City Air Conditioning & associated yard	1956	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
18	1300-1302 Western Avenue[2]	John Van Hooves' Upholstery Design Studio	1957		7A, 7B, 7C
19	1326 Main Street, South[1]	Imperial Motel	c.1936		7A, 7B, 7C

Map ID	Address (Las Vegas)	Historic/ Current Building Name or Type	Built	Note	Segment
20	317 Wall Street[2]	unknown/ vacant	1956	located on adjacent property within the APE	7A, 7B, 7C
21	313 Wall Street[2]	unknown/ vacant	1958	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
22	1201 Main Street, South[1]	Image Custom Furniture	c.1945		7A, 7B, 7C
23	310 Wall Street[2]	T.J. Wholesale/ Tedes Auto Sales	1955		7A, 7B, 7C
24	316 Wall Street[2]	Brinks	1955		7A, 7B, 7C
25	322 Wall Street[2]	Nevada Tool Supply	1955		7A, 7B, 7C
26	200 Wall Street[2]	Andy's Electric Motors	1955	located on adjacent property within the APE	7A, 7B, 7C
27	299 Charleston Blvd[2] 299 Charleston Blvd[2]	Holsum Bread Office Holsum Bread Bakery	1954 1955	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
28	307 Charleston Blvd, West[2]	Red Rooster Antiques & Gifts	1953		7A, 7B, 7C
29	303 Charleston Blvd[2]	Ellingham's Paint & Body Shop	1958		7A, 7B, 7C
30	9 Charleston Blvd, West[4,5]	Johnny Tocco's Ringside Gym	1942		7A, 7B, 7C
31	1070 Commerce Street, South[1]	Uniforms Inc.	c.1953	located on adjacent property within the APE	7A, 7B, 7C
33	1065 Main Street, South[1]	Morgan's Termite & Pest Control	c.1940	located on non-adjacent property outside of the APE, but within the viewshed of a proposed elevated structure	7A, 7B, 7C
34	1001 First Street, South[1]	Commercial	c.1950		7A, 7B, 7C
35	823 First Street, South[1]	Residential (3 buildings)	c.1933		7A, 7B, 7C
36	825 First Street, South[1]	Residential	c.1933		7A, 7B, 7C
37	807 Main Street, South[1]	El Sombrero Café	c.1955		7A, 7B, 7C Downtown Station
38	200, 208 Garces Avenue[3]	Duplex	1949		7A, 7B, 7C
39	105 Bonneville, East[3]	Residential	1915		7A, 7B, 7C
40	625 First Street, South[1,3]	Commercial	1932		7A, 7B, 7C
41	114, 116 Bonneville Avenue, East[1]	Residential	c.1928		7A, 7B, 7C
42	110, 112 Bonneville Avenue, East[1]	Residential	c.1928		7A, 7B, 7C

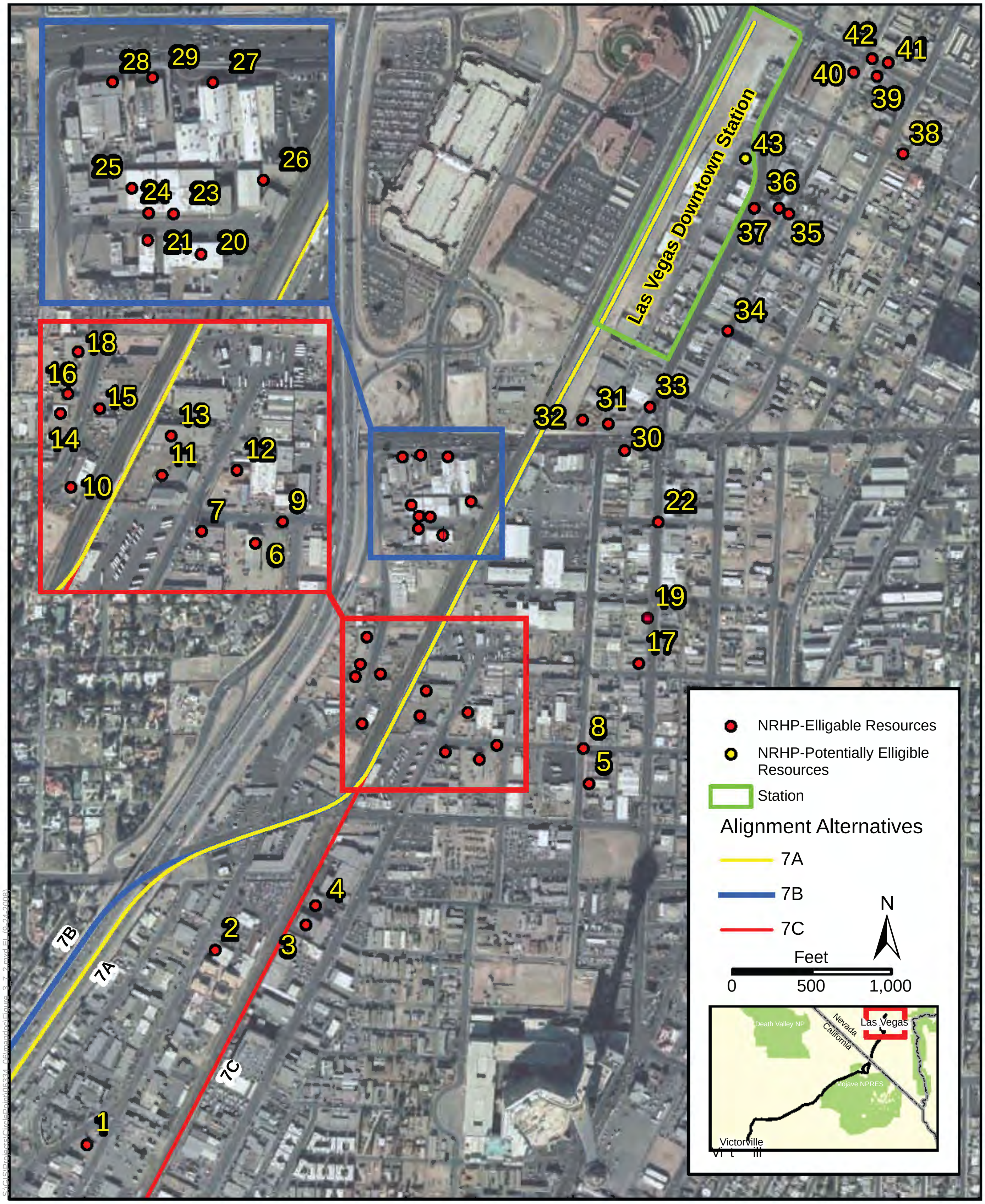
Sources:
[1] Knight & Leavitt Associates, Inc. 2002.
[2] Ryden Architects 1998.
[3] Marshall and Marshall 2007.
[4] NDOT 2008.
[5] Louis Berger Group, Inc. 2008.

Of the resources identified in Table 3.7-12 and shown in Figure 3-7.1 (Map ID #37), one previously identified NRHP eligible property adjacent to the APE warrants further discussion because of its close proximity to the proposed project. The one location is El

Sombrero Café at 807 South Main Street.[31] This resource is a single-story, square plan Spanish Eclectic restaurant building dating from 1935 and located across Main Street from the APE of the Las Vegas Downtown Station site option in Segment 7. The building was determined NRHP-eligible under Criteria A and C in 2002. The reasons why the El Sombrero Café was found NRHP-eligible is because of its history as a successful restaurant during the Great Depression, in addition its expression of the Spanish Eclectic style and the likelihood that it is just one of two adobe buildings left in the City of Las Vegas.

Research also identified an NRHP submission to the Nevada SHPO for the Main Street Historic District prepared in May 2006 by Civic Visions and the City of Las Vegas. The Nevada SHPO has not concurred on this submission. Several properties within the APE for the Las Vegas Downtown Station would be located within the proposed district which covers 38 acres and 148 properties in the downtown area generally bounded by South Commerce Street, Colorado Avenue, Casino Center Boulevard, and West Bonneville Avenue.

[31] Map ID 37.



NOT TO SCALE

U.S. Department of Transportation
Federal Railroad Administration

DesertXpress Project EIS

Architectural Resources Within or Adjacent to the APE

FIG 3-7.1

3.7.3.3 Paleontological Resources

Regional Geology

As discussed in Section 3.9, Geology and Soils, the proposed project crosses two geomorphic regions. Generally speaking, the California portion of the alignment is within the Mojave Desert Geomorphic Province, and the Nevada portion of the study area is within the Basin and Range Geomorphic Province. Both regions are characterized by bedrock mountain ranges that are partially buried and separated by broad alluviated basins.

Geology and Paleontological Resources by Segment

Table 3.7-13 lists the geologic units potentially involved in construction along each segment; identifies their paleontological resources, if any; and evaluates their paleontological sensitivity based on the SVP's criteria. Geology along the project alignment is shown in the figures in Section 3.9, Geology and Soils.

In general, the following geological units along the project alignment are considered highly sensitive for paleontological resources.

- Nonmarine continental (alluvial fan, fluvial, lakebed) deposits of Pleistocene age. In California, these include the deposits of the Pleistocene Mojave River–Lake Mojave–Lake Manix system, which contain a rich and diverse vertebrate assemblage (e.g., Bowen 1954, Reynolds and Reynolds 1994, Scott et al. 1997, Walker et al. 2002). Along the Nevada portion of the alignment, a key Pleistocene deposit is the Las Vegas Formation, also documented as containing abundant vertebrate remains (Simpson 1933, Mawby 1967, Reynolds et al. 1991, San Bernardino County Museum 2008). Other nonmarine strata of Pleistocene age along the alignment should also be considered highly sensitive for paleontological resources in California. Some of them are known to contain vertebrate materials, but even those not documented as fossiliferous are likely sensitive. California's Pleistocene nonmarine deposits are generally considered highly sensitive because of their potential to contain vertebrate materials. California is home to the type sections for the two North American Land Mammal Stages within the Pleistocene (Rancholabrean, type section in the Los Angeles area; and Irvingtonian, type section in Fremont), and the literature is rich in examples of vertebrate faunas unexpectedly discovered as a result of excavations in Pleistocene materials.

- Barstow Formation of Miocene age and correlative deposits. The Barstow Formation is the principal fossiliferous unit at Rainbow Basin NNL near Barstow, and preserves remains of numerous vertebrate and invertebrate taxa (reference).

Several marine sedimentary units of Paleozoic age, including the Cambrian Monte Cristo Formation (Monte Cristo Limestone), Devonian Sultan Formation (Sultan Limestone) and

Goodsprings Formation, and the Pennsylvanian Bird Spring Formation, are also known to be fossiliferous. Their sensitivity is undetermined and requires further evaluation, but could be high.

Table 3.7-13. Geology and Paleontology of the DXE Alignment, by Segment

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
1 (Figure 3.9-3)	**Q, Qa** Younger alluvial valley sediments	Holocene	Low sensitivity. Materials of Holocene age (i.e., those younger than about 10,000 years) are not typically considered sensitive for paleontological resources because biological remains are not considered fossils unless they are older than 10,000 years. However, note that materials of Holocene age may occur as a thin veneer covering more paleontologically sensitive older units in the subsurface.
	Qw Younger alluvial river/wash deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive deposits in the subsurface.
	Qo, Qoa, Qod Older alluvial valley and fan sediments	Pleistocene	High sensitivity. Pleistocene nonmarine deposits are almost universally considered highly sensitive for paleontological resources in California, because of their potential to contain vertebrate materials. California is home to the type sections for the two North American Land Mammal Stages within the Pleistocene (Rancholabrean, type section in the Los Angeles area; and Irvingtonian, type section in Fremont), and the literature is rich in examples of vertebrate faunas unexpectedly discovered as a result of excavations in Pleistocene materials. Strata mapped as Qo, Qoa, and Qod are may be at least in part correlative with deposits of Pleistocene Lake Mojave/Lake Manix, which include numerous scattered localities with mammalian remains, including horses, mammoths, and cotton rat (e.g., Bowen 1954, Reynolds and Reynolds 1994, Scott et al. 1997, and Walker et al. 2002).
	Qof Older fanglomerate deposits	Pleistocene	High sensitivity. Pleistocene nonmarine deposits. Strata mapped as Qof may be at least in part correlative with deposits of Pleistocene Lake Mojave/Lake Manix, discussed above.
	KJqm, Qm, Gqm, Hd Quartz monzonite and allied intrusive igneous rocks.	Late Jurassic–Cretaceous	Intrusive igneous (plutonic) rocks; not sensitive for paleontological resources.
	Mzv, Lp, Pf Metavolcanic and volcanic rocks with sedimentary/ metasedimentary interbeds; includes Sidewinder Volcanic Series (Bowen 1954) and Oro Grande Formation (Hershey 1902)	Paleozoic and Mesozoic	Undetermined, but includes several potentially sensitive units: limestone interbeds of Oro Grande Formation contain corals and crinoids; those of Fairview Valley Formation (contains corals, brachiopods, gastropods, echinoids, bryozoans, archaeocyathans) (Bowen 1954).
2A, 2B	**Qrs, Qw** Younger river/wash	Holocene	Low sensitivity because of Holocene age. Note however that materials of Holocene age may occur as a thin

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
(Figure 3.9-3)	sediments, including Mojave River sand		veneer overlying more paleontologically sensitive older units in the subsurface.
	Q, Qa Younger alluvial valley/fan sediments	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Ql, Qc Younger alluvial valley sediments; lake deposits and clay of small playas	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qf Younger alluvial fan sediments	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
2A only (Figure 3.9-3)	**Qs** Aeolian sand deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qo, Qoa Older alluvial sediments	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Strata mapped as Qo and Qoa may be at least in part correlative with deposits of Pleistocene Lake Mojave and Lake Manix, which include numerous scattered localities with mammalian remains, including horses, mammoths, and cotton rat (e.g., Bowen 1954, Reynolds and Reynolds 1994, Scott et al. 1997, and Walker et al. 2002).
	Qof, Qoc, Qt Older alluvial valley sediments, including fanglomerate (Qof), other continental gravel, sand, silt, and clay deposits (Qt), and clay and marl (Qoc)	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Strata mapped as Qof, Qoc, and Qt may be at least in part correlative with deposits of Pleistocene Lake Mojave and Lake Manix, discussed above.
	Jhd, Qm, Hd Granitic rocks	Late Jurassic–Cretaceous	Intrusive igneous (plutonic rocks); not sensitive for paleontological resources.
	Mzv, Ql, Ap Primarily metavolcanic and volcanic rocks	Mesozoic	Low sensitivity. Very unlikely to contain fossils; no known fossil resources.
	Wg Waterman Gneiss of Bowen (1954) (quartz diorite gneiss)	Paleozoic	High-grade metamorphic rock; not sensitive for paleontological resources.
3A, 3B (Figures 3.9-3 through 3.9-5)	**Q, Qa, Qal** Younger alluvial valley and fan sediments	Holocene	Low sensitivity because of Holocene age. Note however that materials of Holocene age may occur as a thin veneer covering more paleontologically sensitive older units in the subsurface.
	Qw, Qrs Younger alluvial river/wash sediments	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qf Younger alluvial fan sediments	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Ql Younger lake and play deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
	Qof, Qt Older alluvial valley sediments	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Strata mapped as Qof and Qt may be at least in part correlative with deposits of Pleistocene Lake Mojave/Lake Manis, which contains remains of fishes, turtles, numerous species of birds, and mammals (ground sloth, mammoth, jackrabbit, mouse, dire wolf, coyote, short-faced bear, mountain lion, black bear, scimitar-toth cat, horse, extinct camels, llama, pronghorn, mountain sheep, and antique bison), as well as invertebrates (ostracodes freshwater clams and snails) (Jefferson 2003).
	Qms, Qol Older lacustrine deposits, including Manix Lake sediments	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Strata mapped as Qms include the Manix Lake deposits, which contain a rich and abundant vertebrate fauna, including remains of fishes, turtles, numerous species of birds, and mammals (ground sloth, mammoth, jackrabbit, mouse, dire wolf, coyote, short-faced bear, mountain lion, black bear, scimitar-toth cat, horse, extinct camels, llama, pronghorn, mountain sheep, and antique bison), as well as invertebrates (ostracodes freshwater clams and snails) (Jefferson 2003).
	Qpv, Qeb Basalt flows	Pleistocene	Very unlikely to contain fossils; no known fossil resources. Low sensitivity.
	Qc, Qp, Qo, Qoa, Qt Older alluvial and terrace deposits	Pleistocene, Plio-Pleistocene	High sensitivity; Pleistocene nonmarine deposits.
	Tv, Tc Volcanic and sedimentary rocks (rhyolite flows, continental sedimentary rocks)	Tertiary	Sensitivity varies with lithology; some Tertiary sedimentary units are highly sensitive for vertebrate and other remains. Portions of the units mapped as Tv and Tc may be related to and/or include the Barstow Formation of Miocene age, which contains remains of camels, horses, mastodons, and flamingos, as well as various invertebrates (Lindsay 1972, Bureau of Land Management 1992, University of California Museum of Paleontology 2008), and is the principal fossiliferous unit at Rainbow Basin NNL near Barstow.
	Gr, Tkq Granitic rocks; includes Teutonia Quartz Monzonite of Hewett (1956)	Tertiary and Mesozoic	Intrusive igneous (plutonic) rocks; not sensitive for paleontological resources.
	Gr-M Granitic and metamorphic rock	Mesozoic	Intrusive igneous (plutonic) and metamorphic rocks; not sensitive for paleontological resources.
	Cm Marine sedimentary and meta-sedimentary rocks; includes Monte Cristo Limestone of Hewett (1956)	Paleozoic (Carboniferous)	Undetermined; potentially high. Reported to be fossiliferous by Stewart (1980). Monte Cristo Formation contains echinoderm remains (University of California Museum of Paleontology 2008).
	Ds, Dsv, Dsi Marine sedimentary and meta-sedimentary rocks; includes Sultan Limestone of Hewett (1956)	Paleozoic (Devonian)	Undetermined; potentially high. Sultan Formation contains stromatolites, conodonts (Cooper 1987, Miller and Cameron 1982), and brachiopods (Zenger 1982).

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
	Ip/Ls, Dєg, Dєgu, Dєgb1 Marine sedimentary and meta-sedimentary rocks; includes Upper Cambrian Goodsprings Dolomite of Hewett (1956).	Paleozoic (Upper Cambrian and Devonian)	Undetermined; potentially high. Goodsprings Formation contains corals, crinoid columnals (stem segments), and conodonts (University of California, Riverside 2008). Bird Springs Formation contains remains of crinoids, corals, sharks, primitive mollusks (University of California, Riverside 2008), and fusulinid foraminifera (Rich 1961).
	Epє, Pєg, Pєga, Pєgc Pєgb Metamorphic rocks (gneiss, schist)	Precambrian	High-grade metamorphic rocks; not sensitive for paleontological resources.
	Pєgr Granitic rocks	Precambrian	Intrusive igneous (plutonic) rocks; not sensitive for paleontological resources.
4A, 4B (Figure 3.9-5)	**Qal** Younger alluvial stream and wash deposits	Holocene	Low sensitivity because of Holocene age. Note however that materials of Holocene age may occur as a thin veneer overlying more paleontologically sensitive older units in the subsurface.
	Ql Younger lake and playa sediments; includes Ivanpah Lake deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Epє, Pєg Metamorphic rocks () Metamorphic rocks.	Precambrian	High-grade metamorphic rocks; not sensitive for paleontological resources.
5A, 5B (Figures 3.9-5 and 3.9-6)	**Qx** Areas of disturbed and modified substrate (artificial fill, commercial development areas, I-15 corridor)	Latest Holocene	Not sensitive for paleontological resources because of Holocene age and highly disturbed condition or anthropogenic origin.
	Qay3 Youngest alluvium () Active wash and alluvial fan deposits	Late Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qa, Qal, Qay Young alluvial fan and wash deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qpf Playa fringe deposits	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qay2 Young alluvium of intermittently active alluvial fans and washes	Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qay1 Alluvium of inactive alluvial fans and washes	Early Holocene	Low sensitivity because of Holocene age. May locally overlie more sensitive units in the subsurface.
	Qai “Intermediate Alluvium” (deposits of inactive alluvial fans)	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Strata mapped as Qai likely at least in part correlative with deposits known to be highly fossiliferous (Lake Manix/Lake Mojave deposits, Las Vegas Formation).
	Qao, Qta	Pleistocene–Late	High sensitivity; Pleistocene nonmarine deposits. Strata

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
	Older alluvial fan deposits	Miocene	mapped as Qao, Qta may be at least in part correlative with deposits known to be highly fossiliferous (Lake Manix/Lake Mojave deposits, Las Vegas Formation).
	Tao Fluvial sedimentary rocks	Tertiary	Undetermined, potentially high. May be in part related to/correlative with Barstow Formation and/or other vertebrate-bearing Miocene units.
	Tv, Tsf Volcanic rocks ranging from basalt to rhyolite	Tertiary	Low sensitivity; no known fossil content.
	Pbs, Ppmb, Mzpzs Marine sedimentary and metasedimentary rocks; includes Bird Spring Formation	Mesozoic–Paleozoic (Carboniferous)	Undetermined; potentially high. Bird Spring Formation contains crinoids, corals, sharks, primitive mollusks (University of California, Riverside 2008), and fusulinid foraminifera (Rich 1961).
	Dєg, Mzpzs Marine sedimentary and meta-sedimentary rocks; includes Good Springs Dolomite and Carbonate Rocks of Hewett (1956)	Paleozoic (Cambrian, Devonian)	Undetermined; potentially high. Goodsprings Formation contains corals, crinoids columnals (stem segments), and conodonts (University of California, Riverside 2008).
6A, 6B (Figure 3.9-6)	**Qa, Qal, Qs** Younger alluvial deposits of active fans and washes	Holocene	Low sensitivity because of Holocene age. Note however that materials of Holocene age may occur as a thin veneer overlying more paleontologically sensitive older units in the subsurface.
	Qai Intermediate alluvial deposits of inactive fans	Pleistocene–Holocene	Pleistocene portions of this sequence are highly sensitive. Pleistocene portions may be correlative with the richly fossiliferous Las Vegas Formation, which contains remains of the following: toad (*Bufo* sp.), tree frogs (*Hyla* spp.), frog (*Rana* sp.), tortoise (*Gopherus* sp.), lizards (*Sceloporus* sp., *Callisaurus* sp.), horned lizard (*Phyrnosoma* sp.), non-venomous snakes (family Colubridae), widgeon (*Mareca americana*), ring-necked duck (*Aythya collaris*), lesser scaup (*A. affinis*), common merganser (*Mergus merganser*), extinct teratorn (*Teratornis merriami*), American coot (*Fulica americana*) and extinct small coot (*F. Americana minor*), owl (*Bubo* sp.), an unidentified soaring hawk (Buteoninae), ground sloths, Columbian mammoth (*Mammuthus columbi*), cottontail (*Sylvilagus* sp.), jackrabbit (*Lepus* sp.), various rodents, coyote (*Canis latrans*), muskrat (*Ondatra zibethicus*), badger (*Taxidea taxus*), large cats, including a probable lynx *(?Lynx* sp.) and one similar to the modern mountain lion (Felidae cf. *Puma concolor*), extinct horses (*Equus* spp.), an extinct large camel (*Camelops* sp.), a large bovid (Bovidae), and extinct bison (*Bison* sp. cf. *B. antiquus*) (Simpson 1933, Mawby 1967, Reynolds et al. 1991, San Bernardino County Museum 2008)
	Qoa Older alluvial deposits	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. Likely at least in part correlative with/related to Las Vegas Formation, described above.
	Qts Consolidated sediments	Pliocene–Pleistocene	Pleistocene portion—high sensitivity; Pleistocene nonmarine deposits. Pleistocene portion may be in part related to Las Vegas Formation (see above).

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
	Mmc, Mm Marine sedimentary and metasedimentary rocks; includes Monte Cristo Limestone of Hewett (1956)	Paleozoic (Carboniferous)–Mesozoic	Undetermined; potentially high. Monte Cristo Formation contains echinoderms (University of California, Museum of Paleontology 2008).
Option C (Figure 3.9-6)	**Qa, Qal, Qs** Younger alluvial deposits active fans and washes	Late Holocene	Low sensitivity because of Holocene age. Note however that materials of Holocene age may occur as a thin veneer overlying more paleontologically sensitive older units in the subsurface.
	Qai Intermediate alluvial deposits of inactive fans	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. May be correlative with the richly fossiliferous Las Vegas Formation, which contains remains of the following: toad (*Bufo* sp.), tree frogs (*Hyla* spp.), frog (*Rana* sp.), tortoise (*Gopherus* sp.), lizards (*Sceloporus* sp., *Callisaurus* sp.), horned lizard (*Phyrnosoma* sp.), non-venomous snakes (family Colubridae), widgeon (*Mareca americana*), ring-necked duck (*Aythya collaris*), lesser scaup (*A. affinis*), common merganser (*Mergus merganser*), extinct teratorn (*Teratornis merriami*), American coot (*Fulica americana*) and extinct small coot (*F. Americana minor*), owl (*Bubo* sp.), an unidentified soaring hawk (Buteoninae), ground sloths, Columbian mammoth (*Mammuthus columbi*), cottontail (*Sylvilagus* sp.), jackrabbit (*Lepus* sp.), various rodents, coyote (*Canis latrans*), muskrat (*Ondatra zibethicus*), badger (*Taxidea taxus*), large cats, including a probable lynx (*?Lynx* sp.) and one similar to the modern mountain lion (Felidae cf. *Puma concolor*), extinct horses (*Equus* spp.), an extinct large camel (*Camelops* sp.), a large bovid (Bovidae), and extinct bison (*Bison* sp. cf. *B. antiquus*) (Simpson 1933, Mawby 1967, Reynolds et al. 1991, San Bernardino County Museum 2008).
	Qoa Older alluvial deposits	Pleistocene	High sensitivity; Pleistocene nonmarine deposits. May be in part correlative with Las Vegas Formation described above.
	Qog Older alluvial deposits of inactive fans; capped by a matrix-supported caliche deposit more than 10 fee thick	Pleistocene	High sensitivity: Pleistocene nonmarine deposits. May be in part correlative with Las Vegas Formation described above.
	Qts Consolidated sediments	Pliocene–Pleistocene	Pleistocene strata—high sensitivity. Pleistocene portion may be in part related to Las Vegas Formation (see above). Pliocene strata—undetermined sensitivity.
	Pbs, Ppmb Marine sedimentary and meta-sedimentary rocks; includes Bird Spring Formation.	Paleozoic–Mesozoic	Undetermined; potentially high. Bird Spring Formation contains crinoids, corals, sharks, primitive mollusks (University of California, Riverside 2008), and fusulinid foraminifera (Rich 1961).
	Ds Marine sedimentary and	Paleozoic (Devonian)	Undetermined; potentially high. Sultan Formation contains stromatolites, conodonts (Cooper 1987, Miller

Segment	Geologic Unit*	Age	Fossil Content and Paleontological Sensitivity**
	meta-sedimentary rocks (Sultan Limestone of Hewett 1956)		and Cameron 1982), and brachiopods (Zenger 1982).
Sources: Bowen 1954; Bureau of Land Management 1992; California Division of Mines and Geology 1987 [Kingman sheet];; Cooper 1987; Jefferson 2003; Lindsay 1972; Mawby 1967; Miller and Cameron 1982; Nevada Bureau of Mines and Geology, 1985, 1987, 2006; Ninyo & Moore (2007); Reynolds and Reynolds 1994; Reynolds et al. 1991; Rich 1961; San Bernardino County Museum 2008; Scott et al. 1997; Simpson 1933; Stewart 1980; University of California, Riverside 2008; University of California Museum of Paleontology 2008; Walker et al. 2002; Zenger 1982. * Map symbols are the same as those used in the geologic maps in Figures 3.9-3 through 3.9-6. ** Paleontological sensitivity was evaluated using the criteria of the Society of Vertebrate Paleontology (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995)			

3.7.4 Environmental Consequences

3.7.4.1 No Action Alternative

Under the No Action Alternative, no privately-financed high speed passenger rail system would be constructed or operated in the project area. No adverse affects to cultural or paleontological resources would be expected to occur.

Under the No Action Alternative, public agencies in California and/or Nevada are anticipated to move forward with physical and/or operational roadway improvements to increase the capacity of the I-15 corridor. These improvements would be located in the same vicinity as the action alternatives, and would thus contend with many of the same cultural resource and paleontological impacts described herein. Project-specific environmental review to be undertaken by the sponsoring lead agency/agencies would more precisely determine the environmental effects associated with such improvements. The No Action Alternative is not discussed further in this section.

3.7.4.2 Action Alternatives

To comply with Section 106 of the NHPA, any effects of the proposed undertaking on properties listed in or recommended eligible for inclusion in the NRHP were analyzed by applying the Criteria of Adverse Effect.[32]

Archaeological Resources

Impacts to archaeological resources are largely the result of the physical destruction of or damage to all or part of the property. Such damage can be caused by ground disturbance during construction or operation of the facility.

Direct and indirect impacts are assessed as the impact on archaeological resources resulting from the action alternatives. Direct impacts are the anticipated impacts from

[32] 36 CFR § 800.5(a).

actual placement of the rail line and facilities within the APE. Direct impacts are considered to include placement of rail tracks, structures, cut slopes, drainages, retaining walls, and or berms to a maximum extent of 115 feet on either side of the proposed rail centerline. Direct impacts for the utility corridor are considered to include placement of the power lines and access roadway to a maximum extent of 50 feet on either side of the proposed utility line. Direct impacts include the construction footprint for the placement of stations, OMSF, MSF, Baker MOW, utility corridors, and autotransformers (only for the EMU technology option). Direct impacts also include the footprint for the TCAs since these locations would involve ground disturbing activities. Indirect impacts are those impacts that while not directly anticipated, may occur through construction or maintenance activities along the route. Indirect impacts are assessed as the maximum distance of the APE at 200 feet on either side of the proposed rail centerline and 100 feet on either side of the proposed utility line.

Construction of the action alternatives, or Option C would result in ground-disturbing activities and would therefore result in impacts to known and unknown archaeological resources within the APE. Operation of the DesertXpress rail line, stations, and maintenance facilities would not result in ground-disturbing activities and would not result in additional impacts beyond those from construction.

The FRA has initiated consultation with the California and Nevada SHPOs in compliance with Section 106 of the NHPA and it is anticipated that this process will conclude with the execution of a PA outlining the remaining steps needed to further inventory and evaluate the resources within the APE, assess the effects of the project on NRHP-eligible resources, and develop mitigation to reduce adverse impacts.

Although a complete inventory for archaeological resources has been conducted for the entire APE, completion of the inventory report and process necessary to determine the NRHP eligibility of archaeological resources has been deferred until after a decision is made to proceed with the project (see discussion under Section 106 of the National Historic Preservation Act above). Preliminary determinations of eligibility recommendations have been generated based on observations of surface features of each resource within the APE so that impacts could be preliminarily assessed as discussed below. The additional steps needed to further evaluate and assess the effects of the project on significant archaeological resources will be addressed in the PA.

Impacts Resulting from Ground Disturbance at Known Archaeological Sites: The ground-disturbing activities related to the action alternatives and Option C have the potential to impact known archaeological sites within the Direct APE and Indirect APE as discussed for each segment discussed below. Available evidence to date is insufficient to determine whether these sites are all NRHP-eligible resources as noted in Appendix F2. Damage to or destruction of an NRHP-eligible property would be a significant impact. Tables F2-1 through F2-4 in Appendix F2 lists the known archaeological resources potentially affected, by segment, for the action alternatives and Option C. Pending SHPO concurrence on eligibility for new resources or for previously identified resources that have not been fully evaluated, it was assumed that these resources have the potential to be eligible for the NRHP and that the project may result in an adverse effect if resources cannot be avoided. Following formal concurrence by the SHPOs, it is likely that the number of sites potentially affected would be less than what is listed in the following tables and Appendices F2.

Segment 1

Construction of the rail alignment and facilities has the potential to result in adverse effects on up to 67 sites within the direct APE as shown in Table 3.7-14. The resources within the direct APE are characterized in Appendix F2.

Construction of the rail alignment in Segment 1 may result in adverse effects on 18 sites within the direct APE. This includes the previously determined NRHP-eligible historic power transmission line (CA-SBR-10315H). It is likely that the rail alignment could avoid the stanchions of the transmission line. Other than the transmission lines, no other previously determined NRHP-eligible resources would be affected by the rail alignment.

The pair of Victorville Station Site 1 and Victorville OMSF Option 1 may result in adverse effects on 11 sites within the APE as noted in Table 3.7-14. This includes four previously determined NRHP-eligible sites including an historic road (CA-SBR-4411H) which would be potentially affected by both facilities. Victorville OMSF Option 1 would also potentially impact two historic power transmission lines (CA-SBR-10315H and CA-SBR-7694H). A potentially adverse impact would occur if the stanchions of the transmission lines could not be avoided.

The pair of Victorville Station Site 2 and Victorville OMSF Option 2 may result in adverse effects on 20 sites within the APE as noted in Table 3.14-14. This includes the previously determined NRHP-eligible historic power transmission line (CA-SBR-10315H). Similarly, a potentially adverse impact would occur if the stanchions of the transmission line could not be avoided.

Use of the temporary construction areas within Segment 1 may result in adverse effects on 10 sites within the APE as noted in Table 3.14-14. Two of these sites, both on TCA 1A, were previously determined NRHP-eligible sites (CA-SBR-10315H and CA-SBR-7694H). A potentially adverse impact would occur if the stanchions of the transmission lines could not be avoided. No previously determined NRHP-eligible sites were identified on TCA 1B.

The Victorville Utility Corridor, which is only applicable to the EMU option, may result in adverse effects on 8 sites within the APE as noted in Table 3.14-14. This includes two previously determined NRHP-eligible prehistoric village sites (CA-SBR-5227 and CA-SBR-70). A potentially adverse impact would occur if the utility poles or access road associated with the utility corridor could not avoid these sites.

As noted in Table 3.7-14, there are up to 33 sites in the direct APE of Segment 1 that were preliminarily determined as not eligible for inclusion on the NRHP and would therefore likely not be considered to be adversely affected, but are included pending future SHPO concurrence on determination of eligibility. These resources are characterized in Appendix F2. In addition, there were up to 24 sites identified to be assumed eligible for inclusion on the NRHP that could be adversely affected by construction of Segment 1. The resources designated as "assumption of eligibility" include mine sites, habitation sites, roads, refuse deposits, and large lithic scatters where construction could potentially not only affect surface resources but also unknown subsurface deposits. Some of the assumed eligible sites may also be determined to be not eligible following evaluation and would therefore not be adversely affected.

Table 3.7-14. Archaeological Resources Potentially Affected within the APE of Segment 1

	Direct Impacts[3] (sites)[2]				**Indirect Impacts[4] (sites)[2]**			
Project Element[1]	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	*1*	*8*	*9*	**18**	-	-	*6*	**6**
Victorville Site 1 Station	*1*	*1*	*3*	**5**	-	-	-	-
Victorville OMSF Option 1	*3*	*2*	*1*	**6**	-	-	-	-
Victorville Site 2 Station	*1*	-	*1*	**2**	-	-	-	-
Victorville OMSF Option 2	-	*6*	*12*	**18**	-	-	-	-
TCA 1A	*2*	*4*	*1*	**7**	-	-	-	-
TCA 1B	-	*1*	*2*	**3**	-	-	-	-
Victorville Utility Corridor (EMU Option only)	*2*	*2*	*4*	**8**	*2*	*2*	*4*	**8**
Total for Segment 1	*10*	*24*	*33*	**67**	*2*	*2*	*10*	**14**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Within the indirect APE for Segment 1, impacts to resources may occur through construction or maintenance activities. Up to 14 sites may potentially be affected as noted in Table 3.7-14. This includes 2 previously determined NRHP-eligible prehistoric village sites (CA-SBR-5227 and CA-SBR-70) within the indirect APE of the Victorville Utility Corridor. There are up to 10 sites that have been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE, 6 sites within the indirect APE of the rail alignment and 4 sites within the utility corridor alignment. These sites would likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. An additional 2 sites were identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the utility corridor. The resources within the indirect APE are characterized in Appendix F2.

Segment 2

Construction of the rail alignment in Segment 2 of Alternative A (includes Segments 2A/2B and 2A) may result in adverse effects on 34 sites within the direct APE as shown in Table 3.7-15 and characterized in Appendix F2. Use of TCA 4 may result in adverse effects on 3 sites. The previously determined NRHP-eligible railroad (CA-SBR-6793H) could be adversely affected by Segment 2A/2B and TCA 4. This is the only NRHP-eligible resource within Segment 2. Of the 37 sites within Segment 2, 17 have preliminarily been determined to be not eligible for inclusion on the NRHP and would therefore likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. These resources are characterized in Appendix F2. There are also 18 sites identified to be assumed eligible for inclusion on the NRHP. Because the alignment would cross or be near the Mojave River, there are a number of prehistoric resources including a village site, habitation sites, quarries and cobble reduction sites, and a trail. These sites would require additional evaluation to determine their extent and project impacts but the rail alignment would potentially result in an adverse impact on these resources if not avoided. Other assumed eligible resources identified include historic roads, railroad, berm, habitation sites, monuments, and a flume. Some of the assumed eligible resources may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 2 of Alternative A, impacts to resources may occur through construction or maintenance activities. Up to 17 sites may potentially be affected as noted in Table 3.7-15. No previously determined NRHP-eligible sites were identified within the indirect APE. There are 14 sites that have been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE of the rail alignment. These sites would likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. An additional 3 sites were identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment. The resources within the indirect APE are characterized in Appendix F2.

Table 3.7-15. Archaeological Resources Potentially Affected within the APE of Segment 2

Project Element[1]	Alternative A (sites)[2]		Alternative B (sites)[2]	
	Direct Impacts[3]	Indirect Impacts[3]	Direct Impacts[3]	Indirect Impacts[3]

	Eligible	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	*1*	*16*	*17*	**34**	-	*3*	*14*	**17**	*1*	*13*	*7*	**21**	-	*3*	*4*	**7**
TCA 4	*1*	*2*	-	**3**	-	-	-	-	*1*	*2*	-	**3**	-	-	-	-
Total for Segment 2	*2*	*18*	*17*	**37**	*0*	*3*	*14*	**17**	*2*	*15*	*7*	**24**	*0*	*3*	*4*	**7**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Construction of the rail alignment in Segment 2 of Alternative B (includes Segments 2A/2B and 2B) may result in adverse effects on 21 sites within the direct APE as shown in Table 3.7-15 and characterized in Appendix F2. TCA 4 would result in the same impacts as described above for Alternative A. The previously determined NRHP-eligible railroad (CA-SBR-6793H) could be adversely affected by Segment 2A/2B and TCA 4. Of the 21 sites within Segment 2B , 7 have preliminarily been determined to be not eligible for inclusion on the NRHP and would therefore likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. These resources are characterized in Appendix F2. There are also 13 sites along the rail alignment that were identified to be assumed eligible for inclusion on the NRHP including six prehistoric sites, six historic sites, and one site possessing both historic and prehistoric resources. Similar to Alternative A, the alignment would cross or be near the Mojave River where prehistoric resources are located including a village site, habitation sites, quarries, and a rock cairn. These sites would require further evaluation and subsurface testing to determine their extent and project impacts, but the rail alignment would potentially result in an adverse impact on these resources if not avoided. Other assumed eligible resources identified include historic roads, habitation site, monuments, refuse deposit, and a flume. Some of the assumed eligible resources may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 2 of Alternative B, impacts to resources may occur through construction or maintenance activities. Up to 7 sites may potentially be affected as noted in Table 3.7-15. No previously determined NRHP-eligible sites were identified within the indirect APE. There are 4 sites that have been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE of the rail alignment. These sites would likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. An additional 3 sites were identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment. The resources within the indirect APE are characterized in Appendix F2.

Segment 3

Construction of the rail alignment and facilities in Segment 3 of Alternative A has the potential to result in adverse effects on up to 20 sites within the direct APE as shown in Table 3.7-16. The resources within the direct APE are characterized in Appendix F2.

Within the direct APE of Segment 3A, construction of the rail alignment may result in adverse effects on 14 sites. This includes the previously determined NRHP-eligible power transmission lines (CA-SBR-10315H and CA-SBR-7694H) and prehistoric village site (CA-SBR-3694). An adverse effect would occur if the power transmission lines and village site cannot be avoided. There were no sites preliminarily determined to be not eligible for inclusion on the NRHP. Within Segment 3A, there are 17 sites that have been identified to be assumed eligible for inclusion on the NRHP within the rail alignment, TCA 6 and TCA 7, and the Baker Utility Corridor (only applicable to the EMU option). There are 11 prehistoric resources and six historic resources. The prehistoric resources include quarries and cobble reduction sites, habitation sites, rock art sites, and a trail system. These sites would require further evaluation and subsurface testing to determine their extent and project impacts, but Segment 3A would potentially result in an adverse effect on these resources if not avoided. The historic resources include a railroad, habitation site, Spanish trail, town site, and water transmission line. Some of the assumed eligible sites may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 3 of Alternative A, impacts to resources may occur through construction or maintenance activities. Up to 8 sites may potentially be affected as noted in Table 3.7-16. No previously determined NRHP-eligible sites were identified within the indirect APE. There is one site that has been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE of the rail alignment. This site would likely not be considered adversely affected, but is included pending future SHPO concurrence on determination of eligibility. An additional 7 sites were identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment and the Baker Utility Corridor (EMU Option only). The resources within the indirect APE are characterized in Appendix F2.

Table 3.7-16. Archaeological Resources Potentially Affected within the APE of Segment 3

Project Element[1]	Alternative A (sites)[2]		Alternative B (sites)[2]	
	Direct Impacts[3]	Indirect Impacts[3]	Direct Impacts[3]	Indirect Impacts[3]

	Eligible	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	*3*	*11*	-	**14**	-	*6*	*1*	**7**	*3*	*32*	*7*	**42**	-	*9*	*3*	**12**
Baker Utility Corridor (EMU Option only)	-	*1*	-	**1**	-	*1*	-	**1**	-	*1*	-	**1**	-	*1*	-	**1**
TCA 6	-	*2*	-	**2**	-	-	-	-	-	*2*	-	**2**	-	-	-	-
TCA 7	-	*3*	-	**3**	-	-	-	-	-	*3*	-	**3**	-	-	-	-
Total for Segment 3	*3*	*17*	*0*	**20**	*0*	*7*	*1*	**8**	*3*	*38*	*7*	**48**	*0*	*10*	*3*	**13**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Construction of the rail alignment and facilities in Segment 3 of Alternative B has the potential to result in adverse effects on up to 48 sites within the direct APE as shown in Table 3.7-16. The resources within the direct APE are characterized in Appendix F2.

Potential impacts to sites from TCA 6 and TCA 7 and the Baker Utility Corridor would be the same as in Segment 3A. Within the direct APE of Segment 3B, construction of the rail alignment may result in adverse effects on 42 sites. Similar to Segment 3A, this includes the previously determined NRHP-eligible power transmission lines (CA-10315H and CA-SBR-7694H) and prehistoric village site (CA-SBR-3694). An adverse effect would occur if the village site cannot be avoided. Within the rail alignment of Segment 3B, 7 sites have been preliminarily determined to be not eligible for inclusion on the NRHP and would therefore likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. These resources are characterized in Appendix F2. There are also 32 sites identified to be assumed eligible for inclusion on the NRHP. There are a number of prehistoric resources including quarries and cobble reduction sites, lithic scatters, trails, a habitation site, a food processing site, a rock alignment, and rock art sites. These sites would require additional evaluation to determine their extent and project impacts but Segment 3B would potentially result in an adverse effect on these resources if not avoided. Other assumed eligible resources identified include historic road, railroad, habitation site, refuse deposits, and town sites.

Some of the assumed eligible sites may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 3 of Alternative B, impacts to resources may occur through construction or maintenance activities. Up to 13 sites may potentially be affected as noted in Table 3.7-16. No previously determined NRHP-eligible sites were identified within the indirect APE. There are three sites that have been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE of the rail alignment. These sites would likely not be considered adversely affected, but are included pending future SHPO concurrence on determination of eligibility. An additional 10 sites were identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment and the Baker Utility Corridor (EMU Option only). The resources within the indirect APE are characterized in Appendix F2.

Segment 4

Construction of the rail alignment and facilities in Segment 4 of Alternative A has the potential to result in adverse effects on up to 8 sites within the direct APE as shown in Table 3.7-17. The resources within the direct APE are characterized in Appendix F2.

Construction of the rail alignment may result in adverse effects on 8 sites within the direct APE of Segment 4A. There were no previously determined NRHP-eligible sites within Segment 4A. There is one site that has been preliminarily determined to be not eligible for inclusion in the NRHP within the indirect APE of the rail alignment. This site would likely not be considered adversely affected, but is included pending future SHPO concurrence on determination of eligibility. There are 7 sites within the rail alignment in Segment 4A that were identified to be assumed eligible for inclusion on the NRHP. Three prehistoric resources including lithic scatters and a groundstone that require further evaluation to determine their extent and project impacts but the rail alignment would potentially result in an adverse effect on these resources if not avoided. Other assumed eligible resources identified include an historic road, habitation site, monument, and refuse deposits. Some of the assumed eligible resources may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 4 of Alternative A, impacts to resources may occur through construction or maintenance activities. Only one site was identified that may potentially be affected as noted in Table 3.7-17. One historic site, a road, was identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment. The one resource within the indirect APE is characterized in Appendix F2.

Table 3.7-17. Archaeological Resources Potentially Affected within the APE of Segment 4

Project Element[1]	Alternative A (sites)[2]		Alternative B (sites)[2]	
	Direct Impacts[3]	Indirect Impacts[3]	Direct Impacts[3]	Indirect Impacts[3]

	Eligible	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	-	*7*	*1*	**8**	-	*1*	-	**1**	-	*8*	*10*	**18**	-	*1*	-	**1**
Total for Segment 4	*0*	*7*	*1*	**8**	*0*	*1*	*0*	**1**	*0*	*8*	*10*	**18**	*0*	*1*	*0*	**1**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Construction of the rail alignment in Segment 4 of Alternative B may result in adverse effects on 18 sites within the direct APE. No previously determined NRHP-eligible sites were identified. There are 10 sites preliminarily determined to be not eligible for inclusion on the NRHP within the rail alignment. The 8 sites that were identified to be assumed eligible for inclusion on the NRHP are all historic. These sites include roads, monument, rock cairns, and rock alignment. Some of these sites are likely associated with historic mining that occurred in the area. Some of the assumed eligible resources may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 4 of Alternative B, impacts to resources may occur through construction or maintenance activities. Only one site was identified that may potentially be affected as noted in Table 3.7-17. One historic site, a rock cairn, was identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment. The one resource within the indirect APE is characterized in Appendix F2.

Segment 5

Construction of the rail alignment in Segment 5 of Alternative A may result in adverse effects on 4 sites within the direct APE. There are four previously determined NRHP-eligible sites that include a transmission line, railroad grade, and construction camps. The rail alignment would potentially result in an adverse effect on these resources if not avoided.

Within the indirect APE for Segment 5 of Alternative A, impacts to resources may occur through construction or maintenance activities. There are two previously determined

NRHP-eligible sites including one historic road and one prehistoric habitation site as noted in Table 3.7-18 and characterized in Appendix F2.

Table 3.7-18. Archaeological Resources Potentially Affected within the APE of Segment 5

Project Element[1]	Alternative A (sites)[2]								Alternative B (sites)[2]							
	Direct Impacts[3]				Indirect Impacts[3]				Direct Impacts[3]				Indirect Impacts[3]			
	Eligible	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	*4*	-	-	**4**	*2*	-	-	**2**	*14*	*2*	-	**16**	*10*	-	*4*	**14**
Total for Segment 5	*4*	*0*	*0*	**4**	*2*	*0*	*0*	**2**	*14*	*2*	*0*	**16**	*10*	*0*	*4*	**14**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Construction of the rail alignment in Segment 5 of Alternative B may result in adverse effects on 16 sites within the direct APE of Segment 5B. There are 14 previously determined NRHP-eligible sites and two sites that have not been evaluated for eligibility to the NRHP. The 14 previously determined eligible sites include 6 historic sites, 6 prehistoric sites, and 2 sites exhibiting both prehistoric and historic periods. The historic sites include a railroad grade, transmission line, railroad construction camps, and roads. The prehistoric sites include lithic scatters and habitation sites. An adverse effect would occur if these historic and prehistoric resources cannot be avoided. The two sites that have not been evaluated include historic refuse deposits and a habitation site. The rail alignment would potentially result in an adverse effect on these resources if not avoided. Some of the resources that have not been evaluated may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE for Segment 5 of Alternative B, impacts to resources may occur through construction or maintenance activities. There are 10 previously determined NRHP-eligible sites including 4 historic sites (roads, refuse deposit, and railroad camp) and 6 prehistoric sites (habitation sites and lithic scatter). There are 4 sites preliminarily determined to be not eligible for inclusion on the NRHP within the rail alignment as noted in Table 3.7-18. The resources within the indirect APE are characterized in Appendix F2.

Segment 6

Construction of the rail alignment in Segment 6 of Alternative A would result in a potential adverse effect on one previously determined NRHP-eligible historic railroad site (26CK5685H) within the direct APE as shown in Table 3.7-19. The resources within the direct APE are characterized in Appendix F2. No additional sites were identified within the indirect APE of the rail alignment in Segment 6A.

No resources were identified within the direct APE of the rail alignment in Segment 6 of Alternative B as shown in Table 3.7-19. One resource was identified within the indirect APE of the rail alignment in Segment 6B. This one historic cadastral marker (JSA-CS-S-167H) was identified as being assumed eligible for inclusion on the NRHP within the indirect APE of the rail alignment. The one resource within the indirect APE is characterized in Appendix F2

Construction of Option C would potentially result in adverse effects on 19 sites. Within the rail alignment of Option C, 17 sites were identified within the direct APE as shown in Table 3.7-19. There are five previously determined NRHP-eligible sites within Option C and 12 sites that have not been evaluated for eligibility to the NRHP. The five previously determined eligible sites include an historic railroad grade, railroad construction camps, and a habitation site. An adverse effect would occur if these resources cannot be avoided. The 12 sites that have not been evaluated include four historic sites and eight prehistoric sites. The historic sites include a power transmission line, refuse deposit, cadastral marker, and a railroad construction camp. The transmission line (JSA-CS-S-149H) that would cross the Option C alignment and over TCA 14. Because the TCA is used for storage and staging, it is likely that the transmission line stanchions or poles could be avoided. The prehistoric resources include lithic scatters, quarries, rock shelters, and a trail that require further evaluation and subsurface testing to determine their extent and project impacts. TCA 14 would also potentially result in an adverse effect on a refuse deposit that was identified as being assumed eligible for inclusion on the NRHP. The rail alignment and TCA 14 would potentially result in an adverse effect on these resources if not avoided. Some of the resources that have not been evaluated may be determined to be not eligible and would therefore not be adversely affected.

Within the indirect APE of the rail alignment in Option C, four resources were identified as noted in Table 3.7-19. These four historic sites include railroad features and a cadastral marker that were identified as being assumed eligible for inclusion on the NRHP. These resources are characterized in Appendix F2.

Segment 7

Construction of Alternative A, Alternative B, or Option C would not result in adverse effects on any known sites within the direct or indirect APE of Segment 7.

Table 3.7-19. Archaeological Resources Potentially Affected within the APE of Segment 6

	Alternative A (sites)[2]								**Alternative B (sites)[2]**								**Option C (sites)[2]**							
	Direct Impacts[3]				**Indirect Impacts[3]**				**Direct Impacts[3]**				**Indirect Impacts[3]**				**Direct Impacts[3]**				**Indirect Impacts[3]**			
Project Element[1]	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Direct**	*Eligible*	*Assumption of Eligibility*	*Not Eligible**	**Total Indirect**
Rail Alignment	*1*	-	-	**1**	-	-	-	**0**	-	-	-	**0**	-	*1*	-	**1**	*5*	*12*	-	**17**	-	*4*	-	**4**
TCA 14	-	-	-	**0**	-	-	-	*0*	-	-	-	**0**	-	-	-	-	-	*2*	-	**2**	-	-	-	**0**
Total for Segment 6	*1*	*0*	*0*	**1**	*0*	*0*	*0*	**0**	*0*	*0*	*0*	**0**	*0*	*1*	*0*	**1**	*5*	*14*	*0*	**19**	*0*	*4*	*0*	**4**

[1] Only those project elements that would result in a potential impact are listed.
[2] The number of sites potentially affected includes previously determined NRHP-eligible resources, those that have not been evaluated (assumption of eligibility), and those with preliminary determinations of *not eligible*, SHPO concurrence would occur as defined by the PA (see Section 106 of the National Historic Preservation Act above).
[3] Direct APE impacts would likely occur within 115 feet on either side of the DesertXpress alignment centerline, within 50 feet on either side of the utility corridor (EMU option only), and within the footprint of project facilities.
[4] Indirect APE impacts, related to construction, would likely occur within 116 to 200 feet on either side of the DesertXpress alignment centerline and within 51 to 100 feet on either side of the utility corridor (EMU option only.

Impacts Resulting from Ground Disturbance at Undiscovered Archaeological Sites: Ground-disturbing activities have the potential to adversely affect buried archaeological sites that could not be identified using standard archaeological survey methods. The entire APE within California and a portion of the APE in Nevada including Segment 5 and a part of Segment 6 are highly sensitive for the presence of buried archaeological sites. The remainder of the APE in Segment 6 and all of Segment 7 are located in the urban areas of Clark County and Las Vegas in Nevada and would be moderately sensitive. Inadvertent damage to or destruction of buried archaeological sites would be a significant impact.

Impacts Resulting from Ground Disturbance at Sites of Human Remains: Ground disturbance associated with construction of the action alternatives, including any of its options, has the potential to damage or destroy buried human remains that were not identified using standard archaeological inventory methods such as surface surveys. This potential is greatest at archaeologically sensitive locations. Inadvertent damage to or destruction of human remains would be a significant impact.

Architectural Resources

For the DesertXpress project, only three of the seven Section 106 Criteria of Adverse Effect [36 CFR § 800.5(a)] would be applicable to architectural resources, as follows:

- *i) physical destruction of or damage to all or part of the property;*
- *iv) change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance; and*
- *v) the introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.*

None of the other Section 106 Criteria of Adverse Effect would apply because no NRHP-eligible architectural resource would be subject to: *ii)* incompatible alteration, *iii)* removal or relocation, *vi)* neglect, or *vii)* transfer out of federal ownership.

Throughout the entirety of the APE within California, no resources were either determined or are recommended to be eligible for the NRHP, and therefore there are no architectural properties that would be adversely effected or subject to significant impacts within the California portion of the project.

Within the Nevada portion of the APE, there are 41 architectural resources previously identified as eligible for the NRHP (see Table 3.7-12). The NRHP-eligible resources are within the viewshed of an elevated alignment in Segment 7, but would not be adversely affected because they either already have an association with the railroad that would remain with the proposed project or because of their distance from the project. The distance would be great enough that it would not diminish the integrity of the properties significant historic features, and there would be no adverse effect.

Segments 7A and 7B, along with portions of Option C, would be elevated and traverse through an industrial section of Las Vegas. Where NRHP-eligible resources are only related to the proposed segments through a viewshed, there would be no adverse effect based on completed survey work. The physical features of setting that contribute to the property's historic significance would not be affected by an elevated rail structure.[33] The "significant historic features"[34] of the NRHP-eligible properties along Segments 7A, 7B, and Option C would not be diminished by the presence of an elevated rail structure. Aside from Criterion C (design significance) of various examples of the pre-identified buildings, many are significant for their visible relationship to the at-grade rail tracks often immediately behind the resources. This relationship would not be diminished with any of the action alternatives and would still be visible with the presence of the new, elevated rail structure.

Therefore, while the proposed project would be visible from the vast majority of NRHP-eligible resources listed in Table 3.7-12, in most cases, it would not "change...physical features within the property's setting that contribute to its historic significance" (Criteria of Adverse Effect *iv*) or "introduce visual...elements that diminish the integrity of the property's significant historic features (Criteria of Adverse Effect *v*.)"

There is one property that warrants further discussion: El Sombrero Café at 807 South Main Street (NRHP eligible). The proposed Las Vegas Downtown Station site option would be located across Main Street from the NRHP-eligible El Sombrero Café (Figure 3-7.2). The proposed station site would have a paved parking lot, with the station itself set back upon the property roughly 120 feet away from Main Street. At the present time, one and two story commercial buildings are present across the street from the El Sombrero Cafe. The proposed project would alter the setting[35] of the El Sombrero Café. The reasons why this resource was found NRHP-eligible are not based upon historic setting; therefore, the change of setting would not present an adverse effect upon the El Sombrero Café. Depending on the degree of noise and vibration during the construction phase of the proposed undertaking there is a potential to damage the adobe construction material of this building. Without adequate mitigation to limit vibration levels, construction of the project may result in "physical destruction of or damage to all or part of the property."[36]

[33] 36 CFR § 800.5 (a)(2)(iv).

[34] 36 CFR § 800.5 (a)(2)(v).

[35] 36 CFR § 800.5 (a)(2)(iv).

[36] 36 CFR § 800.5 (a)(2)(i).

Figure 3-7.2. NRHP-Eligible—807 South Main Street, Las Vegas

Other NRHP-Eligible Structures: Based on available information, there are no other anticipated adverse effects upon other Nevada resources. The rail alignment along Segments 7A and 7B, along with large portions of Segment 7C, would be elevated and traverse through an industrial section of Las Vegas. Where elevated structures would be visible only at a distance from historic resources, based on completed survey work there would be no potential for an adverse effect. Except for the above-mentioned buildings, the physical features of setting that contribute to the property's historic significance would not be affected by an elevated rail structure.[37] The "significant historic features"[38] of the NRHP-eligible properties along segments 7A, 7B, and 7C are not diminished by the presence of an elevated rail right-of-way.

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37 36 CFR § 800.5 (a)(2)(iv).

38 36 CFR § 800.5 (a)(2)(v).

Paleontological Resources

Table 3.7-13, above, identifies the paleontologically sensitive geologic units along the project alignment. Their surface distribution is depicted at a regional scale in Figures included in Appendix F4.

Construction of Alternatives A and B, or Option C would likely result in adverse effects on paleontological resources in the following two situations: where the proposed rail alignment or facility crosses paleontologically sensitive geologic units exposed at the surface; and where the rail alignment or facility is situated on Holocene materials that overlie highly sensitive materials, and ground disturbance would be deep enough to affect underlying sensitive strata. More specifically, adverse effects would be possible in all areas of Pleistocene substrate, in any portions of the alternatives immediately underlain by the Barstow Formation or correlative strata of Miocene age, and in areas where Holocene materials form a thin veneer and ground disturbance would involve underlying Pleistocene strata, Barstow Formation, or Barstow correlatives.

Adverse effects could also occur during construction in portions of Alternatives A and B, or Option C immediately underlain by fossiliferous Paleozoic strata and in portions where a Holocene veneer is present but ground disturbance would involve underlying Paleozoic strata. The sensitivity of these units is currently undetermined and would need to be further evaluated on a site-specific basis, as discussed in Section 3.7.5.3.

The potential for adverse effects would be less in previously disturbed areas—for instance, Segment 3A is proposed to lie within the I-15 median and Segment 3B would be within the I-15 corridor—if all ground disturbance is confined to the previously disturbed envelope (area and depth). However, given the highly sensitive nature of some of the deposits involved in construction (e.g., the Lake Mojave/Lake Manix deposits, Las Vegas Formation, and Barstow Formation), there may be some potential for adverse effects even in previously disturbed substrate.

Like construction, ground-disturbing maintenance activities in areas of sensitive substrate would have some potential for adverse impacts on paleontological resources. The majority of maintenance activities are expected to take place within the corridor already disturbed by construction; most maintenance would not involve more extensive or deeper ground disturbance than construction, and is therefore unlikely to result in new adverse impacts even in areas of sensitive substrate. Accordingly, maintenance activities confined to the pre-existing (construction-related) disturbance envelope do not require mitigation for effects on paleontological resources. However, maintenance activities that “break new ground,” resulting in disturbance of previously undisturbed substrate of high or undetermined sensitivity, could result in adverse effects on paleontological resources.

3.7.5 Mitigation Measures

3.7.5.1 Archaeological Resources

Construction of Alternative A, Alternative B, and Option C would cause an adverse effect on significant archaeological resources within all segments except Segments 7A, 7B, and Option C of Segment 7.

Three strategies for the mitigation of adverse effects on significant archaeological resources will be employed consisting of avoidance, evaluation and data recovery or other mitigation through archaeological investigation, and monitoring during construction. These strategies will form the basis of the stipulations to be outlined in the HPTP and the PA to resolve the adverse effects of the project.

Mitigation Measure CR-1: Avoidance of Archaeological Resources

When detailed construction information becomes available, it may be possible to avoid resources through project design. Prior to determining whether avoidance is feasible however, it may be necessary to conduct test excavations to determine the vertical and horizontal extent of resources. Once avoidance can be assured, resource location information would be placed on construction drawings as locations to be monitored during construction. If during monitoring it was determined that avoidance was infeasible then the process outlined below under Evaluation and Data Recovery would be followed.

Mitigation Measure CR-2: Evaluation and Data Recovery/Other Measures

It is presumed that it will not be possible to avoid the majority of archaeological resources within the APE. Resources that cannot be avoided will be subject to test excavations to determine their significance and if determined significant, subject to data recovery. Resources that are determined to be significant under NRHP Criteria A, B, and C (36 CFR 60.4) will be subject to mitigation that will likely include recordation such as the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) program. The process that will be followed to determine resource significance and conduct data recovery/other mitigation will be outlined in the HPTP as stipulated in the PA. All archaeological work on NRHP-eligible properties will be conducted in accordance with "Treatment of Archaeological Properties: A Handbook"[39] and "Archaeology and Historic Preservation: the Secretary of the Interior's Standards and Guidelines."[40] Investigations shall be performed under the supervision of professionals

[39] ACHP 1990.

[40] 48 FR 44716-44742.

whose education and experience meet or exceed the Secretary of the Interior's "Professional Qualifications Standards."[41]

Should human remains be found during archaeological investigation, either state or federal laws regarding the discovery of human remains will be followed. On federal land, the requirements of the NAGPRA will be followed. If the remains are found on state or private land within California, the requirements of PRC 5097 will be met. If human remains are identified on state or private land within Nevada, the requirements of Nevada Revised Statutes (Section 383.160) and (Section 383.170) will be followed.

Mitigation Measure CR-3: Monitoring

Portions of the APE have been determined to have the potential for buried resources. During construction, archaeological monitoring will be conducted within those sections identified in the HPTP as moderately to highly sensitive for prehistoric and historical archaeological deposits. The HPTP will also outline the locations of monitoring, frequency and duration as well as the process to follow when monitoring results in an unanticipated discovery. Specifically, any unanticipated resources that are identified during monitoring will be evaluated and treated in accordance with the requirements of the HPTP and PA. If human remains are discovered during monitoring, the regulatory requirements described above will be followed.

3.7.5.2 Architectural Resources

Mitigation Measure CR-4: Vibration Monitoring for Fragile Historic Buildings

Although damage by vibration during construction is not anticipated, the El Sombrero Café is constructed of adobe and may be considered a fragile historic building. If the Downtown Las Vegas Station is selected, the project sponsor will monitor vibration at the El Sombrero Café (807 South Main Street) during construction. If vibration levels are detected that may cause damage, steps will be taken to stop the vibration before damage to historic buildings occurs. If historic buildings are damaged, they will be repaired in accordance with the Secretary of the Interior's Standards. With mitigation, the effect on the El Sombrero Café would be less than adverse.

3.7.5.3 Paleontological Resources

This section presents the mitigation measures developed to address the adverse effects of project construction and maintenance on paleontological resources. In general, mitigation for each segment will apply to all ground disturbing activities within that segment, during both construction and operational periods, as stipulated in individual measures.

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[41] 48 FR 44738-44739.

Mitigation Measure CR-5: Site-Specific Confirmation of Impact Potential

The project sponsor will ensure that the site-specific engineering geologic studies prepared for project construction confirm all geologic units potentially affected by each segment of the project, including Quaternary and bedrock units. This information will be used to guide mitigation requirements on a site-specific basis during construction and during maintenance activities that require ground disturbance, as follows.

- Mitigation Measure CR-7 will apply to all ground-disturbing construction and maintenance activities, although this measure will likely only need to be implemented once, during project design.
- Mitigation Measures CR-8, CR-9, CR-11, and CR-12 will apply to all ground-disturbing construction and maintenance activities.
- Mitigation Measures CR-10 will apply to all ground-disturbing construction activities that affect geologic units identified as highly sensitive for paleontological resources, and to all maintenance activities that would involve new or extended ground disturbance in highly sensitive units.

Mitigation Measure CR-6: Further Evaluation of Geologic Units with "Undetermined" Sensitivity

Before ground-disturbing activities begin, the project sponsor will retain a qualified paleontologist as defined by the SVP (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) or other appropriate personnel (e.g., California licensed professional geologist with appropriate experience and expertise) to conduct further literature review and discussion with subject area experts in order to resolve the paleontological sensitivity of the geologic units identified in Table 3.7-13 as "undetermined." If site-specific engineering geologic or geotechnical studies for the project identify additional units likely to be affected by project construction and not included in Table 3.7-13, they will also be evaluated for paleontological sensitivity under this measure. The results of the evaluation conducted for this mitigation measure will be used to guide the application of mitigation during project construction and maintenance activities.

Mitigation Measure CR-7: Evaluation of Site-Specific Impact Potential in Areas of Holocene Substrate

The project sponsor will retain appropriately qualified and licensed personnel (e.g., California licensed professional geologist with appropriate experience and expertise) to evaluate the potential for impacts on paleontologically sensitive strata that may be present in the subsurface in areas with strata of Holocene age exposed at the surface. The evaluation will be based on available geologic and geotechnical information; project design; proposed construction and/or maintenance methods, including anticipated depth of disturbance; and existing site conditions, including pre-existing disturbance, if any. In areas where highly sensitive strata would be involved in project-related ground disturbance, Mitigation Measures CR-9, CR-10, CR-11, and CR-12 will apply.

Mitigation Measure CR-8: Preconstruction Meeting and Worker Awareness Training

The project sponsor will ensure that all construction and maintenance personnel receive paleontological resources awareness training that includes information on the possibility of encountering fossils during construction; the types of fossils likely to be seen, based on finds in the site vicinity; and proper procedures in the event fossils are encountered.

Worker training will be prepared and presented by a qualified paleontologist as defined by the SVP (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) or other appropriate personnel (e.g., California licensed professional geologist with appropriate experience and expertise) experienced in teaching non-specialists. It may be delivered at the same time as other pre-planned construction worker education, or it may be presented separately.

Mitigation Measure CR-9: Paleontological Monitoring

Full-time paleontological monitoring will be conducted for all ground-disturbing activities in portions of the proposed rail alignment and facilities with substrate materials identified as highly sensitive for paleontological resources (see Table 3.7-13 above). Full-time monitoring will also be required where Holocene materials overlie highly sensitive strata and site-specific investigations have identified the potential for project activities to involve the underlying sensitive strata.

A trained paleontological monitor will oversee all ground-disturbing activities that affect highly sensitive substrate materials, including vegetation removal, site preparation, construction grading and excavation, and any drilling for piers or pilings. Paleontological monitoring will consist of observing operations and periodically inspecting disturbed, graded, and excavated surfaces. The monitor will have authority to divert grading or excavation away from exposed surfaces temporarily in order to examine disturbed areas more closely, and/or recover fossils. The responsible paleontologist will coordinate with the construction manager to ensure that monitoring is thorough but does not result in unnecessary delays.

If additional personnel are needed for effective monitoring, the responsible paleontologist may train other consultant or in-house staff in paleontological monitoring. Once training is complete, individuals trained by the qualified paleontologist may then monitor the proposed project construction independently, and will have the same responsibilities as described above.

Mitigation Measure CR-10: Stop Work Requirement

If fossil materials are discovered during any project-related activity, including but not limited to project grading and excavation, all ground-disturbing work in the vicinity of the find will stop immediately until the responsible paleontologist can assess the nature and importance of the find and recommend appropriate treatment. Assessment will occur in a timely manner, and recommendations for treatment will be consistent with SVP guidelines (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995). Treatment may include preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection, and may also include preparation of a report for publication describing the finds. If no report is required, the project sponsor will nonetheless ensure that information on the nature, location, and depth of all finds is readily available to the scientific community. The responsible paleontologist and all paleontological monitors will be empowered to temporarily halt or redirect the excavation equipment away from fossils to be salvaged.

Mitigation Measure CR-11: Fossil Recovery and Curation

If fossil materials are discovered during project-related activities, the responsible paleontologist will determine whether recovery and curation is warranted, and will be empowered to confer with local area experts as needed to arrive at a determination. All materials warranting recovery will be stabilized on the site and then salvaged consistent with currently accepted procedures and the prevailing standard of care for paleontological excavations. The responsible paleontologist will coordinate with the construction manager to ensure that specimen recovery proceeds in a timely manner.

Recovered fossils will be prepared for identification consistent with currently accepted procedures and the prevailing standard of care. They will then be identified by competent specialists, potentially including, but not necessarily limited to, the responsible paleontologist. If possible, identification will include genus, species, and, if applicable, subspecies. If species-level identification is not feasible, the maximum feasible level of specificity will be provided. The fossil assemblage will then be analyzed by stratigraphic occurrence and any other applicable parameters, such as size, taxa present, and/or taphonomic conditions. A faunal list will be developed.

Any specimens (fossils) of paleontological significance found during construction will be temporarily housed in an appropriate museum or university collection. If curation is required, the responsible paleontologist will develop appropriate curation agreements, consistent with applicable protocols and the prevailing standard of care.

The responsible paleontologist will prepare a final report that includes at least the following components:

- information on site geology and stratigraphy, including a stratigraphic column;
- a description of field and laboratory methods;
- a faunal list, with stratigraphy ranges/occurrences for each taxon;

- a concise discussion of the significance of the site and its and relationship to other nearby and/or similar fossil localities;
- a list of references consulted during the project, including published geologic maps for the site and vicinity; and
- a complete set of field notes, field photographs, and any new geologic maps developed for or during the project.

Full copies of the final report, including any appended materials, will be put on file with any repository institution(s). Depending on the nature of the materials recovered, it may also be appropriate to prepare a report for publication in an appropriate peer-reviewed professional journal. Such publication will be at the discretion of the responsible paleontologist.

3.8 HYDROLOGY AND WATER QUALITY

This section examines the potential impacts of the action alternatives related to hydrology and water quality. The aspects of water resources that are specifically analyzed are surface water hydrology, groundwater hydrology, surface water quality, and groundwater quality, and flooding.

3.8.1 REGULATIONS AND STANDARDS

3.8.1.1 Federal Regulations

Clean Water Act (CWA)

The CWA is the primary Federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. It operates on the principle that any discharge of pollutants into the nation's waters is prohibited unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool.

The following paragraphs provide additional details on specific sections of the CWA.

CWA Section 404 Permits for Fill Placement in Waters and Wetlands: CWA Section 404 regulates the discharge of dredged and fill materials into "waters of the United States," which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project proponents must obtain a permit from the United States Army Core of Engineers (USACE) for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Before any actions that may impact surface waters are carried out, a delineation of jurisdictional waters of the United States must be completed, following USACE protocols in order to determine the presence of wetlands or other waters of the United States that qualify for CWA protection. These include any or all of the following.

- Areas within the ordinary high water mark of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned.
- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." [1]

[1] 33 CFR 328.3, 40 CFR 230.3.

CWA Section 404 permits may be issued only for the least environmentally damaging practicable alternative. That is, authorization of a proposed discharge is prohibited if there is a practicable alternative that would have less adverse impacts and lacks other significant adverse consequences.

CWA Section 402 NPDES Permits for Discharge to Surface Waters: CWA Section 402 regulates discharges to surface waters through the National Pollution Discharge Elimination System (NPDES) program, administered by the U.S. Environmental Protection Agency (EPA).

Most construction projects that disturb 1 acre of land or more are required to obtain coverage under the NPDES General Permit for Construction Activities (also known as a General Construction Permit), which requires the property owner to file a Notice of Intent (NOI) to discharge stormwater and to prepare and implement a storm water pollution prevention plan (SWPPP). The SWPPP includes a site map and a description of proposed construction activities, along with demonstration of compliance with relevant local ordinances and regulations. The SWPPP must also describe the project specific Best Management Practices (BMPs) that will be implemented to prevent or reduce the discharge of construction-related pollutants, including sediments, into stormwater runoff and surface drainage. Permittees are required to conduct monitoring and reporting to ensure that BMPs are correctly implemented and effective in controlling the discharge of construction-related pollutants into stormwater runoff.

CWA Section 303(d) List of Impaired Waterbodies: CWA Section 303(d) requires the identification of waterbodies that do not meet, or are expected to not meet water quality standards, or are considered impaired. The affected waterbody and associated pollutant is then prioritized in the 303(d) list. The Mojave River was listed on the 1998 303(d) List for Priority Organics. However, the Mojave River has been removed from the more recently updated 2002 303(d) List. No other waterbodies within the study area are listed on the 303(d) List.

CWA Section 401 Water Quality Certification: Under CWA Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate, or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect the quality of the state's waters (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401.

Federal Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 have been enacted to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues flood insurance rate maps for communities participating in the National Flood Insurance Program. These maps delineate flood hazard zones in the community. The locations of FEMA-designated floodplains in the project area are included in the discussion of physical setting below.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. The order requires that Federal agency construction, permitting, or funding of a project must:

- Avoid incompatible floodplain development,
- Be consistent with the standards and criteria of the National Flood Insurance Program, and
- Restore and preserve natural and beneficial floodplain values.

This order will apply to the DesertXpress project if a Section 404 permit is determined to be required.

3.8.1.2 State of California Regulations

As stated in Chapter 1, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements.. Such laws include the California Environmental Quality Act (CEQA). As a result of the declaratory order, no Environmental Impact Report (EIR) is required. Nevertheless, state and local plans and policies related to hydrology and water quality are considered below in the analysis of the action alternatives (Alternative A, Alternative B, Option C, and associated ancillary facilities) effects related to hydrology and water quality.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, passed in 1969, articulates with the Federal CWA (see the *Clean Water Act* section above). It established the State Water Resources Control Board (SWRCB) and divided the state into nine regions, each overseen by a regional water quality control board (RWQCB). While the SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA, Sections 401, 402, and 303(d). In general, the SWRCB manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions. The Lahontan Regional Water Quality Control Board (LRWQCB) is the agency responsible for regulating discharges to the local waterways within the study area for the DesertXpress project in California.

The Porter-Cologne Act also provides for the development and periodic review of basin plans that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met (see discussion of the NPDES system in the Clean Water Act section above). Basin plans are updated every three years, and provide the technical basis for determining waste discharge requirements and taking enforcement actions. The Lahontan Region Basin Plan covers the project study area within California.

The LRWQCB has set water quality objectives, both narrative and numeric, for both surface waters and groundwater in its region. Surface water objectives are established for the following substances/parameters: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses. Groundwater quality objectives have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity (LRWQCB, 1995). One method the LRWQCB uses to implement basin plan criteria is through the issuance of Waste Discharge Requirements (WDRs), which are issued to any entity that discharges point-source effluent to a surface water body. The WDR permit also serves as a federally required NPDES permit (under the Federal Clean Water Act) and incorporates the requirements of other applicable regulations.

Dewatering Activities

On 18 June 2002, the LRWQCB adopted Order No. 5-00-175 (General Dewatering Permit). This general NPDES permit covers the discharge to waters of the United States of clean or relatively pollutant-free wastewater that poses little or no threat to water quality. This order covers well development water, construction dewatering, pump/well testing, pipeline/tank pressure testing, pipeline/tank flushing or dewatering, condensate discharges, water supply system discharges, and miscellaneous dewatering/low threat discharges.

The General Dewatering Permit would be applicable to the DesertXpress project if any excavation below the water table would be required.

3.8.1.3 State of Nevada Regulations

Department of Conservation & Natural Resources

The Nevada Department of Conservation & Natural Resources houses the Nevada Division of Water Resources (NDWR), which is the primary agency in charge of the hydrology and water quality related issues in Nevada. The mission of the NDWR is to conserve, protect, manage, and enhance the State's water resources through the appropriation and reallocation of public waters. In addition, the NDWR is responsible for quantifying existing water rights; monitoring water use; distributing water in accordance with court decrees; reviewing water availability for new subdivisions and condominiums; reviewing the construction and operation of dams; appropriating geothermal water; licensing and regulating well drillers and water rights surveyors; reviewing flood control projects; monitoring water resource data and records; and providing technical assistance to the public and governmental agencies.

Nevada Division of Environmental Protection

The Nevada Division of Environmental Protection (NDEP) is the lead agency for Nevada's Comprehensive State Groundwater Protection Program (CSGWPP). The core of the CSGWPP is comprised of pollution control programs that address potential water quality impacts from mining, underground storage tanks, underground injection wells, discharges to groundwater, landfills, and hazardous waste storage. In addition, NDEP is responsible for enforcing Federal and state regulations including the CWA sections 404, 402 and 401.

3.8.1.4 Local Regulations

California – San Bernardino County

The Conservation Element of the San Bernardino County General Plan includes policies intended to conserve and protect County water resources. The County is responsible for constructing debris basins[2] and maintenance of debris basins.

Nevada – Clark County

The Clark County Comprehensive Plan includes policies related to flood control, water quality, and water resources. Specifically, policies of the County state that development should not occur within floodplains. Where development occurs, policies encourage the installation of adequate stormwater systems and all projects should be coordinated with the Clark County Regional Flood Control District. As portions of the Colorado River and its tributaries are located within Clark County, the County recognizes the importance of the Colorado River and has programs to ensure the water quality of the river in terms of discharges that enter the river.

3.8.2 Methods of Evaluation of Impacts

The evaluation of surface hydrology and water quality effects is based on professional standards and the conclusions of any relevant technical reports, such as the CDWR Bulletin 118 reports. The key effects were identified and evaluated based on the physical characteristics of the project study area and the magnitude, intensity, and duration of activities. Direct and indirect impacts to the 100-year floodplain and drainages, including the Mojave River, intermittent streams, washes, and ditches were evaluated. The direct impacts were identified for the area that would be directly affected by Alternative A, Alterative B, and Option C, including all facility footprints for stations, OMSFs, and MSFs, and approximately 37.5 feet on either side of the DesertXpress alignment (75-foot study corridor). Autotransformers are generally contained within the 75-foot study corridor

Direct impacts can be either permanent or temporary. Examples of permanent impacts include removal or altering of a resource either during the construction phase (temporary) or by permanent project features. Indirect impacts to water resources were evaluated for the area within the limits of influence where construction would likely occur. This included an additional 62.5 feet on either side of the direct impact analysis area which equates to a 200-foot wide corridor.

[2] The function of the debris basin is to separate debris, including rocks, mud and vegetation, from storm water that flows down the mountains during the winter rainy season and thereby prevent damage to property and downstream flood control structures. A debris basin usually consists of an earthen dam, an excavated pit, and a spillway to channel water past the dam.

Impacts on hydrology and water quality that may result from construction are primarily described at a qualitative project level. Specific mitigation measures to avoid, minimize, reduce, and compensate for potentially significant impacts on hydrology or water quality are described, as necessary.

3.8.2.1 Methods for Determining Significance under NEPA

The standards for determining adverse effects under NEPA are based on both the direct and indirect environmental effects. For this analysis, an effect on hydrology and water quality was considered adverse and would require mitigation if it would:

- Violate any water quality standards or waste discharge requirements, or substantially degrade water quality;
- Place structures within a 100-year floodplain or place structures that would impede or redirect flood flows;
- Substantially alter existing drainage patterns in a manner that would result in substantial erosion, siltation, or flooding onsite or offsite;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff; or
- Use surface or groundwater in a wasteful or inefficient manner resulting in a reduction in water availability.

3.8.3 AFFECTED ENVIRONMENT

3.8.3.1 Regional Climate

The action alternatives are located in an arid high desert region with average monthly temperatures ranging from the 30s to the 90s in Fahrenheit (°F). The area is characterized by short, mild winters and long, hot summers. As such, precipitation in the area is limited, which influences hydrology within the area.

The Western Regional Climate Center provides climatological data summaries for weather stations throughout the western United States. Table 3.8-1 provides a summary of climatological data for the Victorville weather station from July 1948 through June 2007 and Table 3.8-2 provides summary data for the Las Vegas weather station from February 1937 through December 2007.

Table 3.8-1: Monthly Climate Summary for Victorville, CA (July 1948–June 2007)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temp (ºF)	59	62	67	74	82	92	98	97	91	81	68	59	77
Average Min Temp (ºF)	30	34	37	42	48	55	61	60	55	45	36	30	44
Average Precipitation (in)	1.0	1.0	0.8	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.5	0.7	5.5
Average Snowfall (in)	1.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.4

Source: Western Regional Climate Center 2008a

Table 3.8-2: Monthly Climate Summary for Las Vegas, NV (February 1937–December 2007)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max Temp (ºF)	57	63	69	78	89	99	105	102	95	81	66	57	80
Average Min Temp (ºF)	34	39	44	52	61	70	76	75	66	54	42	35	54
Average Tot Precipitation (in)	0.5	0.6	0.5	0.2	0.2	0.1	0.4	0.5	0.3	0.3	0.4	0.4	4.2
Average Tot Snowfall (in)	0.7	0	0	0	0	0	0	0	0	0	0.1	0	0.9

Source: Western Regional Climate Center 2008b

In the Victorville area, the average maximum temperature (98°F) peaks in July, while the average minimum temperature (30°F) occurs in December and January. Average monthly precipitation (1.0 inch) peaks in February, and average annual rainfall totals approximately 5.5 inches. Snowfall in this portion of the southern Sierra Nevada is approximately 1.4 inches per year (Western Regional Climate Center 2008a).

In the Las Vegas area, the average maximum temperature (104.5°F) peaks in July, while the average minimum temperature (34°F) occurs in January. Average monthly precipitation (0.6 inch) peaks in February, and average annual rainfall totals approximately 4.2 inches. Snowfall in this portion of the Nevada is less than one inch per year (Western Regional Climate Center 2008b).

3.8.3.2 Regional Environment

There are over 300 waterways that would either cross the proposed rail alignments, or are prominent water bodies that are in close proximity to the action alternatives.

Most of the waterways in vicinity of Alternative A, Alternative B, and Option C and associated ancillary facilities are desert washes that are shaped over a long period of time from small to large flashy intermittent storm water flows that create rills and gullies. However, most of these washes remain dry for most of the year and carry water only after infrequent rain events (which are most likely to occur between October and April).

The major water feature in the DesertXpress project vicinity is the Mojave River. Most of the Mojave River flows underground, sprouting up occasionally where ground surface elevation and soil type permits. The Mojave River's subterranean journey ends near the City of Barstow where the river comes to the surface. However, a small amount of subterranean flows still continue downstream of Barstow where riverbed substrate is porous.

3.8.3.3 Regional Surface Water Quality

Regional surface water quality is largely affected by surrounding land uses, with both point-source and nonpoint-source[3] discharges contributing contaminants to surface waters. Alternative A, Alternative B, and Option C and associated ancillary facilities are located across urban, agricultural, rural and undeveloped desert areas.

Pollutant sources in urban areas such as Victorville or Las Vegas include parking lots and streets, roof tops, exposed earth at construction sites, and landscaped areas. Other contaminants in urban runoff include sediment, hydrocarbons, metals, pesticides, bacteria, and trash. Runoff from agricultural areas is characterized by constituents such as fertilizers, herbicides, and pesticides, and often contains bacteria, high nutrient content and dissolved solids.

Flows into waterways during the dry season may be entirely comprised of nonpoint source runoff. This is particularly true for in portions of the study area around urban and agricultural areas. During the wet season, stormwater discharge conveys precipitation from areas of saturation or impermeable surfaces to low lying collection areas and drainages. “First flush” storm events (where pollutants that have accumulated and concentrated throughout the dry season are flushed with little dilution by the initial storm event of the season) are thought to have the largest adverse impact on receiving waters.

The impacts of nonpoint source pollutants on aquatic systems are many and varied. Polluted runoff can result in adverse effects to aquatic ecosystems, public use, human health from ground and surface water contamination, damage to and destruction of wildlife habitat, decline in fisheries, and loss of recreational opportunities. Small soil particles washed into streams can smother spawning grounds and marsh habitat. Suspended particulates can restrict light penetration into water and limit photosynthesis of aquatic biota. Metals and petroleum hydrocarbons washed off from roadways and parking lots, and fertilizers, pesticides and herbicides from landscaped areas, may cause toxic responses in aquatic life or contaminate possible water supply sources such as reservoirs or aquifers.

In general, surface water flowing in the many washes that cross the study area tend to be high in total dissolved solids (TDS) with some locations displaying elevated concentrations of boron and nitrates (N). TDS, boron, and nitrates occur naturally and are typically

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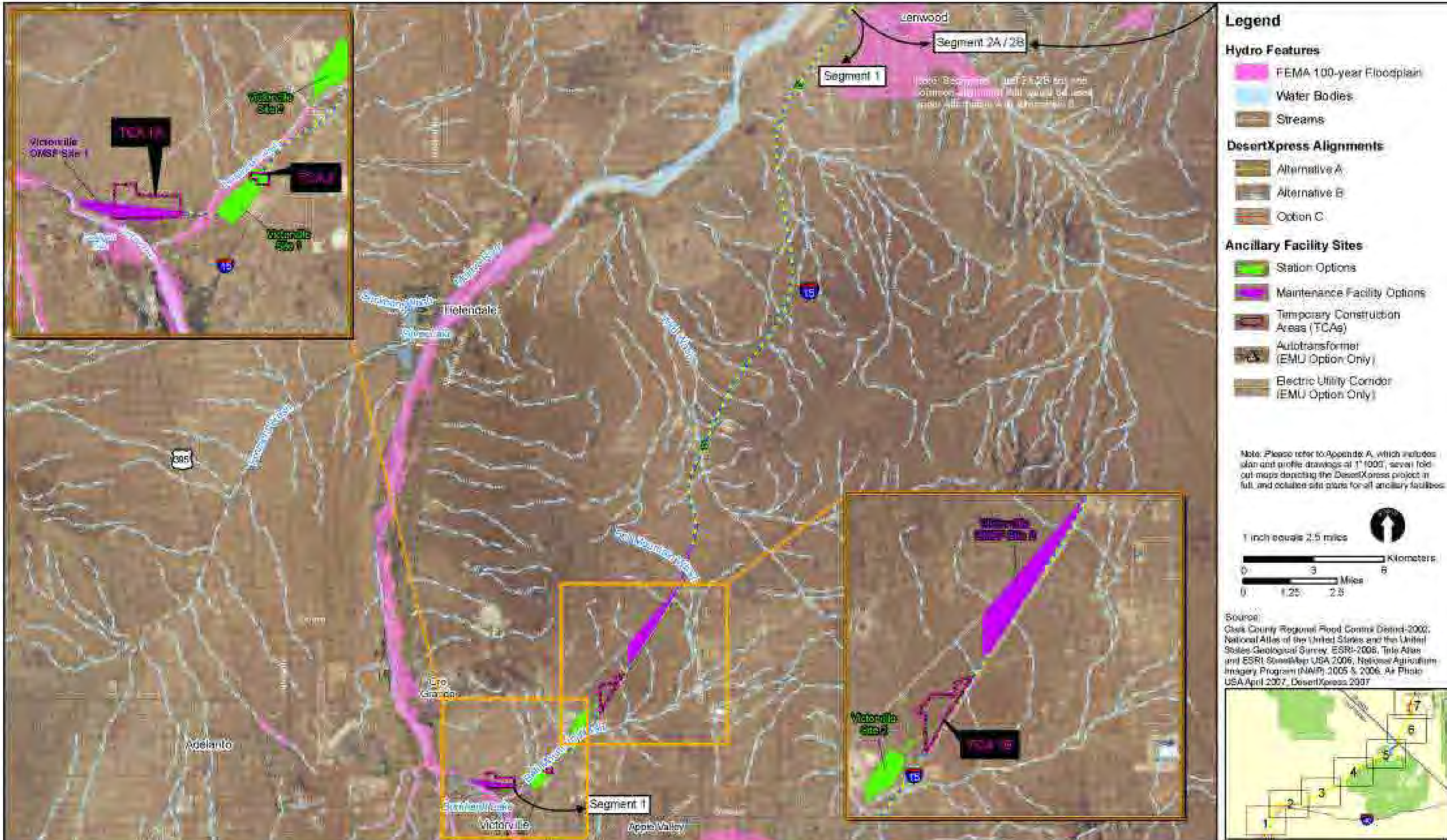
[3] *Point source* is a stationary location or fixed facility, such as the end of a pipe, from which pollutants are discharged. *Nonpoint source* pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water (U.S. Environmental Protection Agency 2008).

captured and transported in stormwater. Elevated levels of nitrate may be associated with areas of animal grazing and animal confinement facilities. Elevated levels of nitrate cause the “blue baby syndrome” which typically results in mild retardation in infants. The naturally occurring nitrate in the wash water around the project area will most likely be under the Federal criteria for nitrate due to the proximity of animal confinement facilities in relation to the project. Similar to shallow groundwater quality, wash water TDS values tend to increase in the downstream direction. Coliform bacteria is another concern in wash water, although, there is insufficient data available regarding coliform to make conclusions on the extent of impairments from coliform. Water quality impairments occur when one or more constituent is elevated above a state or Federal water quality criterion. State and Federal water quality criteria are developed for the protection of aquatic and human health.

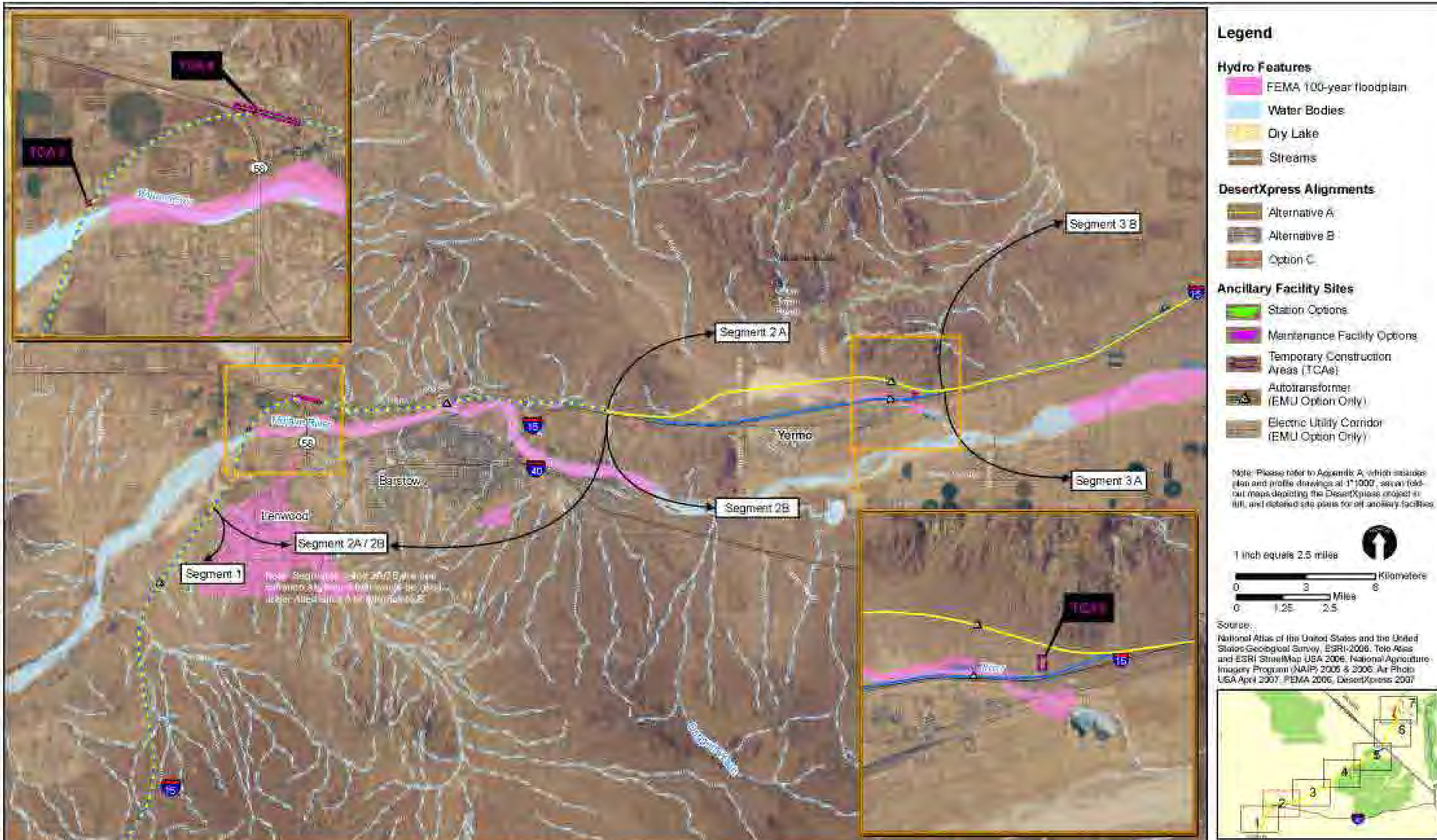
3.8.3.4 Hydrology Resources by Segment

Figures 3-8.1 through 3-8.7 illustrate water bodies, streams, and floodplains in the vicinity of action alternatives.



DesertXpress Project EIS

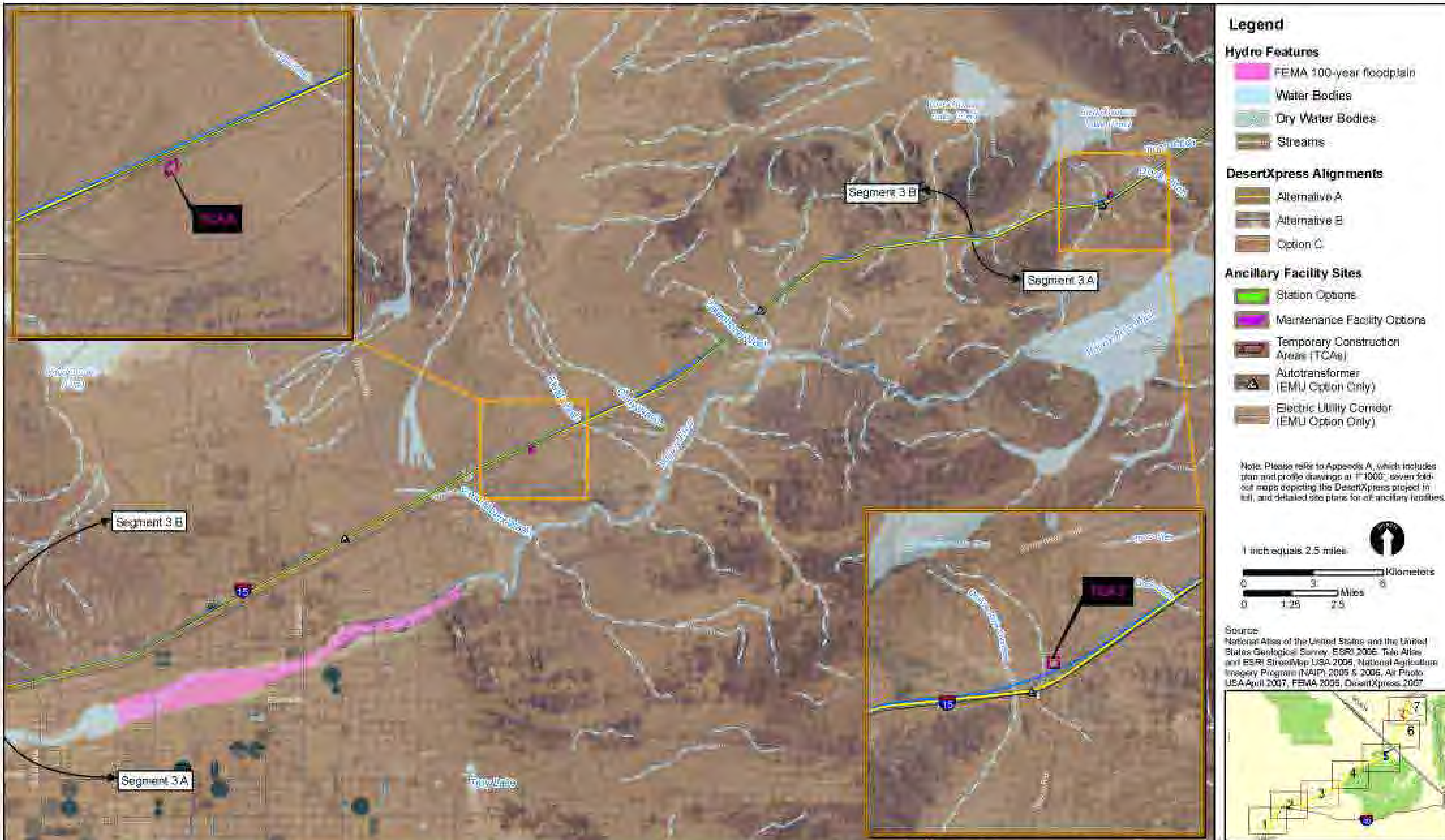
Hydrology and Floodplains (1) FIG 3.8-1



DesertXpress
Project EIS

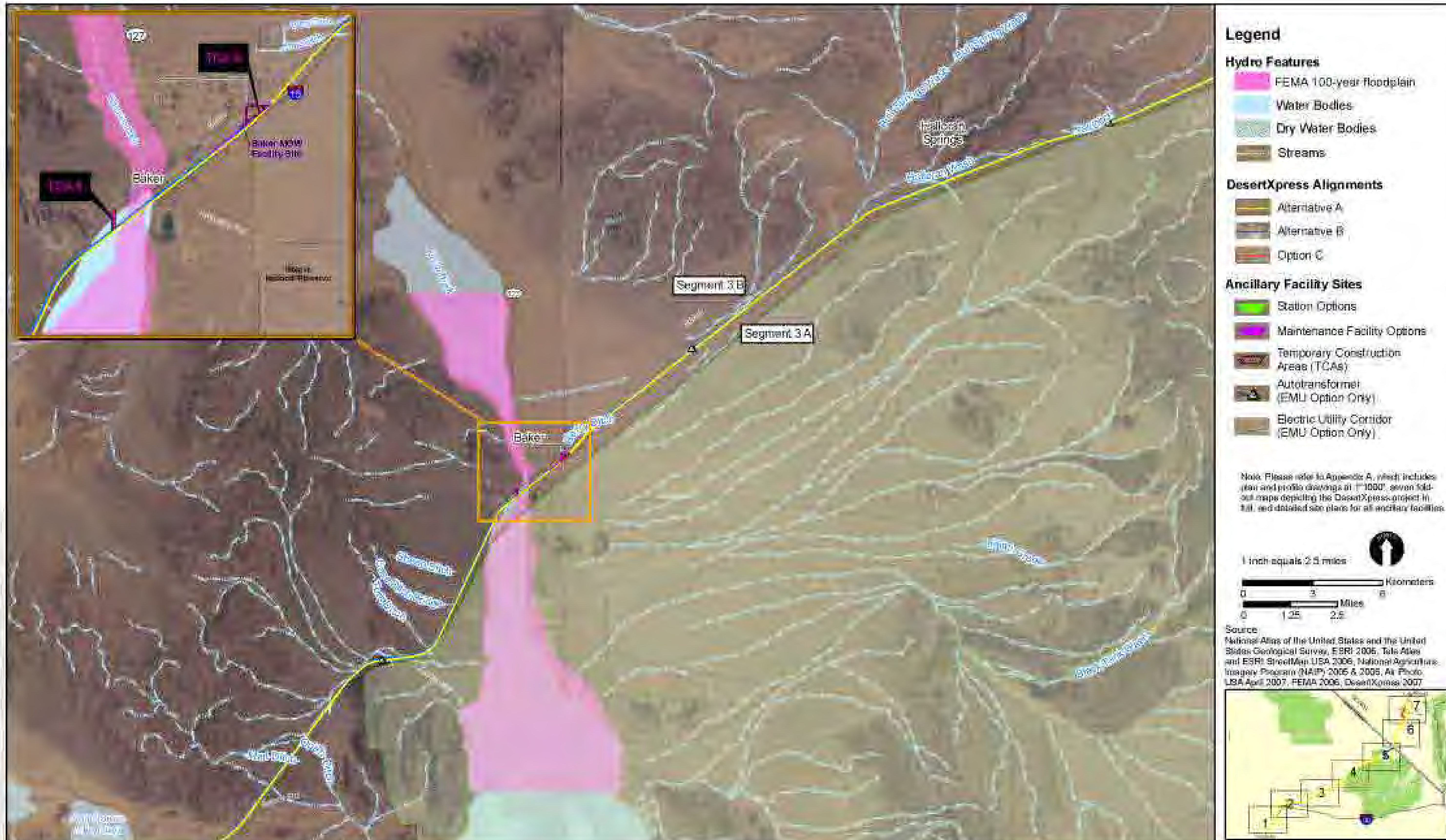
Hydrology and Floodplains (2)

FIG 3-8. 2

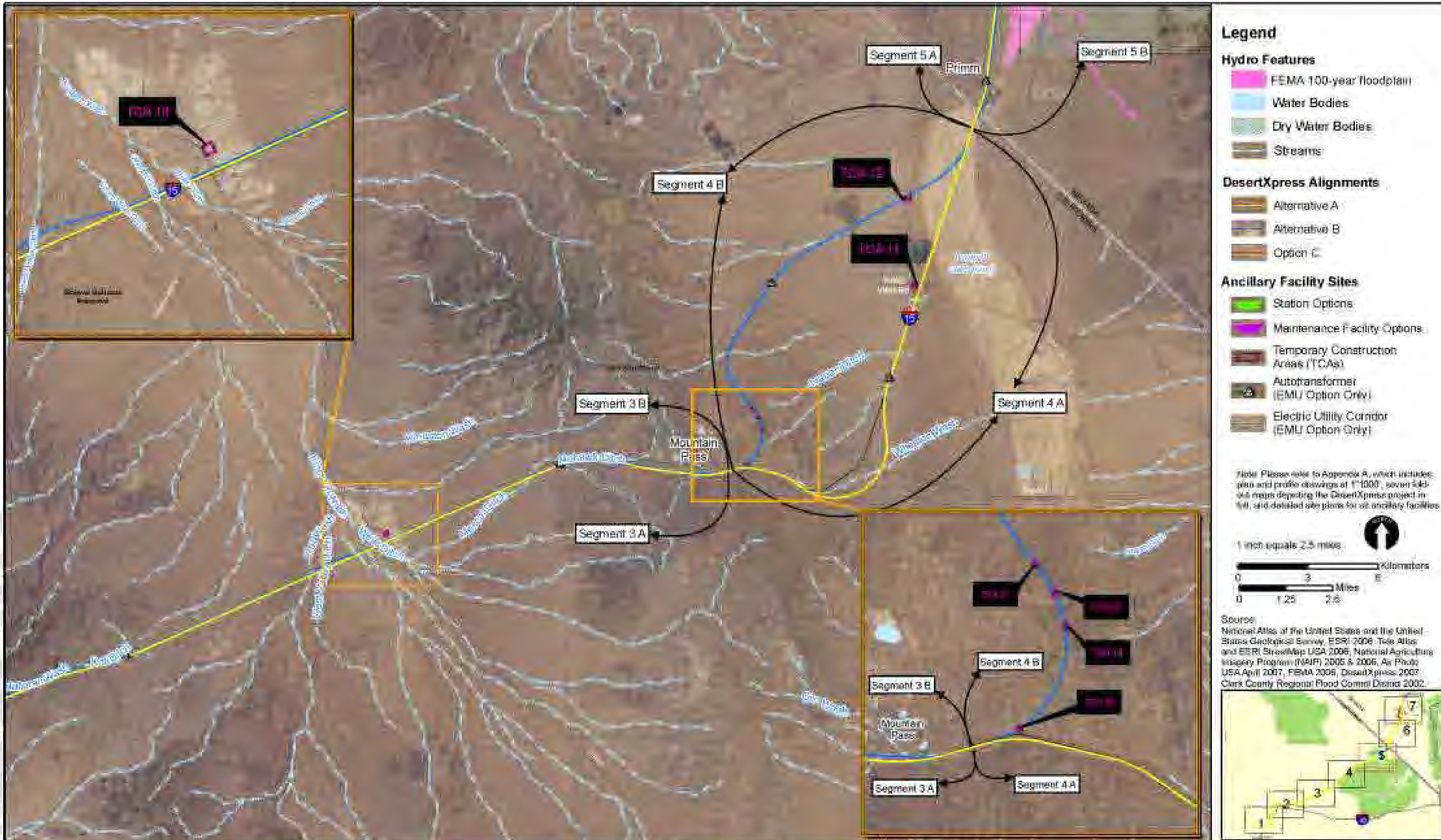


DesertXpress Project EIS

Hydrology and Floodplains (3) **FIG 3.8-3**



Legend
Hydro Features
FEMA 100-year floodplain
Water Bodies
Dry Water Bodies
Streams
DesertXpress Alignments
Alternative A
Alternative B
Option C
Ancillary Facility Sites
Station Options
Maintenance Facility Options
Temporary Construction Areas (TCAs)
Autotransformer (EMU Option Only)
Electric Utility Corridor (EMU Option Only)
1 inch equals 2.5 miles
Kilometers
0 3 6
Miles
0 1.25 2.5
Source
National Atlas of the United States and the United States Geological Survey, ESRI 2005, Tele Atlas and ESRI StreetMap USA 2006, National Agriculture Imagery Program (NAIP) 2005 & 2005, Air Photo USA April 2007, FEMA 2006, DesertXpress 2007
Segment 3 B
Segment 3 A
Baker
Halloran Springs

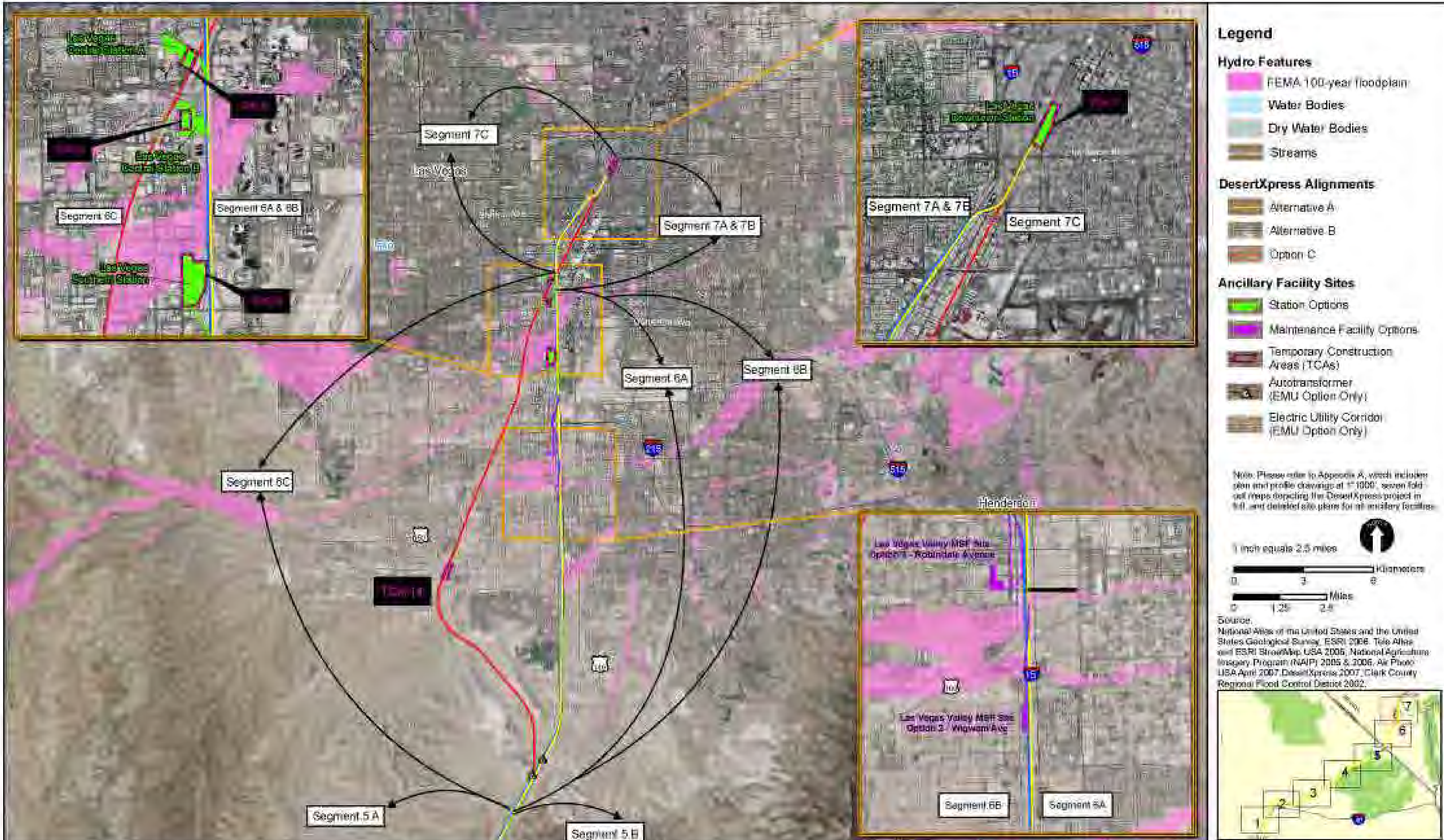


DesertXpress Project EIS

Hydrology and Floodplains (5)

FIG 3.8-5


Legend
Hydro Features
FEMA 100-year floodplain
Water Bodies
Dry Water Bodies
Streams
DesertXpress Alignments
Alternative A
Alternative B
Option C
Ancillary Facility Sites
Station Options
Maintenance Facility Options
Temporary Construction Areas (TCAs)
Autotransformer (EMU Option Only)
Electric Utility Corridor (EMU Option Only)
Note: Please refer to Appendix A, which includes plan and profile drawings at 1":1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.
1 inch equals 2.5 miles
Kilometers
0
3
6
Miles
0
1.25
2.5
Source:
National Atlas of the United States and the United States Geological Survey, ESRI 2006, Tele Atlas and ESRI StreetMap USA 2006, National Agriculture Imagery Program (NAIP) 2005 & 2006, Air Photo USA April 2007, DesertXpress 2007, Clark County Regional Flood Control District 2002.
Segment 5 A
Segment 5 B
Jean
Primm
NEVADA
CALIFORNIA
Las Vegas MSF Site Option 1 - Mount
1
2
3
4
5
6
7



Source:
National Atlas of the United States and the United States Geological Survey, ESRI 2006, Tele Atlas and ESRI StreetMap USA 2005, National Agriculture Imagery Program (NAIP) 2005 & 2006, Air Photo USA April 2007, DesertXpress 2007, Clark County Regional Flood Control District 2002.

Segment 1

Water Resources: The major hydrological resource within the project study area for Segment 1 is the Mojave River, which is located near the south and north ends of this segment.

There are also multiple small unnamed creeks and washes that drain into the Mojave River or end before reaching the river. Other than the Mojave River, the Bell Mountain Wash and Wild Wash are the two main drainages in Segment 1.

Groundwater Resources and Groundwater Quality: Segment 1 is located in both the Upper Mojave and Middle Mojave River Valley Groundwater Basins.[4]

The total surface area of the Upper Basin (CDWR Basin 6-42) is 413,000 acres or 645 square miles. The Upper Basin is bounded by the San Bernardino Mountains on the south, and follows the Mojave River through Victorville in Apple Valley, and ends near the community of Helendale. Natural groundwater recharge of the basin occurs from direct precipitation, ephemeral stream flow, infrequent surface flow of the Mojave River, and underflow of the Mojave River. The general groundwater level trend in the Upper Basin is declining. Published total storage capacity for the basin varies. However, the California Department of Water Resources (CDWR) estimates that the total groundwater storage capacity is 27,839,000 acre-feet (af).[5]

CDWR characterizes the groundwater quality in the Upper Mojave River Valley Groundwater Basin to be a calcium bicarbonate type near the San Bernardino Mountains with a sodium bicarbonate type near Victorville.[6] Sodium bicarbonate-sulfate water is found near Adelanto, and sodium-calcium sulfate water occurs west of Victorville. TDS are typically less than 500 mg/L, but concentrations up to 1,105 mg/L were found near Apple Valley.[7] The LRWQCB Basin Plan criteria for TDS is 500 mg/L.

The Middle Mojave River Valley Groundwater Basin generally flows east starting near the town of Helendale and ends at the Waterman fault. The total surface area of the basin is 211,000 acres or 330 square miles. Natural recharge of the basin occurs through precipitation, ephemeral stream flow, infrequent surface flow of the Mojave River, and underflow of the Mojave River. Groundwater level trends tend to vary with the amount of

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[4] A map of statewide groundwater sub-basins can be accessed at http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/maps/correct_statewide_basin_map_V3_subbas.pdf

[5] DWR, 2004.

[6] CDWR, 2004.

[7] Ibid.

rainfall. Like the upper basin, published groundwater storage capacity varies. CDWR estimates that the basin storage capacity is 8,050,000 af.[8]

Groundwater impairments include high nitrate concentrations in the southern portion of the basin and high iron and manganese concentrations near Oro Grande.[9] In addition, groundwater has been contaminated with trichloroethane (TCE) at the former George Air Force Base, now a Federal Superfund site.[10] However, it is unlikely that the groundwater contamination has spread to the project area, due to the Mojave River canyon acting as a barrier between George Air Force Base and the project area. Leaking underground storage tanks have introduced fuel additives benzene, toluene, ethlybenzene, xylene, and methyl tertiary butyl ether (MTBE) into groundwater around Victorville.[11]

The groundwater in the Middle Mojave River Valley Groundwater Basin (CDWR Basin 6-41) is of predominately sodium bicarbonate character near the Mojave River. Sodium sulfate-chloride character occurs near Helendale, and sodium-calcium sulfate character occurs near Hodge. Sodium bicarbonate-sulfate character waters occurs near Lenwood, and sodium chloride-sulfate character occurs just east of the Shadow Mountains.[12] The average amount of TDS in the basin is about 500 mg/L, with readings as high as 1,000 mg/L near Helendale. Electrical Conductivity (EC) values reach 1,460 µmhos near Helendale, with lower values of 570 µmhos near Hinkley and 400 in Stoddard Valley.[13] EC values in this area are naturally high and typical water quality objectives for EC depends on the natural background conditions. Levels of EC that meet drinking water standards would range between 25 µmhos to 300 µmhos.

Groundwater quality impairments in the Middle Mojave River Valley Groundwater Basin include volatile organic compounds, salts, and nitrates that have leached into the groundwater from the Lenwood landfill in the lower part of the basin.[14] Some values have exceeded the recommended maximum contaminant level for nitrate near Hodge, and fluoride near Lenwood.[15]

Flooding: FEMA issues Flood Insurance Rate Maps (FIRMs) to assess the potential and affect of a 100-year storm event. At the south end of Segment 1 is the 100-year floodplain along the Mojave River and Bell Mountain Wash near Stoddard Wells Road. The north end of Segment 1 is located within one mile of the 100-year floodplain that encompasses

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[8] DWR, 2003.

[9] CDWR, 2004.

[10] DWR, 2004.

[11] CDWR, 2004.

[12] CDWR, 2003.

[13] Ibid.

[14] CDWR, 2003.

[15] Ibid.

the southwestern corner of Lenwood along Sylvan Avenue. Figure 3-8.1 depicts the FEMA designated 100-year floodplain in Segment 1.

Segment 2

Water Resources: The Mojave River is the largest drainage system in the Mojave Desert. Within Segment 2, the Mojave River exhibits intermittent flow. Within any given month, the river could have a range of flow levels. The flow in this area can be both lower and higher than upstream locations for two main reasons. The flow can be higher because less of the flow has infiltrated into the groundwater system than near Victorville. However, the flow can be lower because not all of the subterranean flow has surfaced in addition to any inflows downstream of this location. Table 3.8-3 contains flow data in cubic feet per second (cfs) for the Mojave River next to the City of Barstow from 1930 to 2007.

Table 3.8-3: Mojave River Flow near Barstow from 1930 to 2007

Month	Count[1]	Minimum Flow (cfs)	Mean Flow (cfs)	Max Flow (cfs)
January	1,104	0	93	16,300
February	1,137	0	177	14,800
March	1,372	0	176	18,100
April	1,414	0	60	2,500
May	1,250	0	9	742
June	1,021	0	0	2
July	1,058	0	0	6
August	1,054	0	0	40
September	1,024	0	0	13
October	1,055	0	0	6
November	1,028	0	1	576
December	1,073	0	7	3,370

Source: www.usgs.gov. Site number 10262500. Data is monthly average from 1930 to 2007.

[1] Data points refer to each individual flow number for a particular day. For example, the month of January contained 1,104 data points. Furthermore, based on the 1,104 data points for January, the average flow was 93 cfs. Count provides a statistical comparison number when viewing the minimum, average, and maximum flow.

Segment 2 includes five unnamed drainages (see Figure 3-8.2) in addition to the Waterman Avenue Channel, Arrowhead Channel, and North Barstow Channel. An intermittent canal extends along both sides of I-15 east of Calico Road. The Daggett Wash drains north into the Mojave River on the south side of Yermo at the north end of Segment 2.

Groundwater Resources and Groundwater Quality: Portions of Segment 2 are also located in the Middle Mojave River Valley Groundwater Basin. A discussion of the character and groundwater quality of this groundwater basin is provided in above relative to Segment 1.

Other portions of Segment 2 are also located in the Lower Mojave River Valley Groundwater Basin (CDWR Basin 6-40). The Lower Mojave River Valley Groundwater Basin surface area is 286,000 acres or 447 square miles. The groundwater basin underlies an elongated east-west valley, flowing from the Waterman fault and exiting the valley to the east through Afton Canyon.[16] The total groundwater storage capacity is estimated to be about 9,010,000 af.

Groundwater in the Lower Mojave River Valley Groundwater Basin is characterized predominantly by a sodium bicarbonate character. Specifically, sodium-calcium sulfate character occurs near Dagget and Newberry Springs. Sodium chloride, sodium-calcium chloride, and sodium chloride-sulfate characters occur east of Troy Lake. Sodium bicarbonate-chloride predominates the Afton area. TDS levels range from 300 mg/L near Dagget to 2,000 mg/L near Newberry Springs. Data from 41 public supply wells indicated that TDS ranges from 265 mg/L to 2,370 mg/L with an average concentration of 665 mmg/L. EC values are 533 µmhos near Yermo, 475 µmhos near Toomey, and 61 µmhos near Troy Lake.[17]

Groundwater quality impairments in the basin include elevated levels of fluoride near Newberry Springs, along with high concentrations of boron and fluoride near Camp Cady. There are nine sites in the Barstow area where underground fuel storage tanks are leaking and introducing benzene, toluene, ethylbenzene, xylene, and MTBE into the groundwater. In addition, Superfund sites are located in the Nebo and Yermo Marine Corps depots for contaminated plumes of the industrial solvent trichloroethane.[18]

Flooding: As shown in Figure 3-8.2, the 100-year floodplain generally follows the Mojave River. There is a portion along the river from Lenwood Road south to Indian Trail where there is no floodplain mapped (this area is currently not defined by FEMA as a 100-year floodplain, however based on a review of the FEMA FIRM maps, it is anticipated that this area would be within the 100-year floodplain if it were studied). There are additional floodplain areas within this segment south of the BNSF railroad tracks in the community of Lenwood, west of the Old Highway 58 and I-15 interchange, and at the west end of the segment along the intermittent canal between Ghost Town Road and Yermo Road.

[16] CDWR, 2004a.

[17] Ibid.

[18] Ibid. For a discussion of groundwater contamination within the project area, please refer to Chapter 3.10, Hazardous Materials.

Segment 3

Water Resources: There are multiple unnamed drainages that meander down the Calico Mountains near the western half of Segment 3. To the north of I-15 are the West and East Cronese Lakes and to the south is the Mojave River Wash (see Figure 3-8.3).

In the eastern portion of Segment 3, the major waterbodies in the vicinity are Silver Lake to the north and Soda Dry Lake to the south (see Figure 3-8.4). Silver Lake and Soda Dry Lake make up the remnants of Lake Mojave. These lakes are small round depressions in the surface of the ground that tend to fill with water when it rains.

There are numerous washes and ditches in Segment 3, as shown in Figures 3-8.3, 3-8.4, and 3-8.5. Washes and ditches include: West Manix Wash, East Manix Wash, Mound Wash, Flat Ditch, Field Wash, Cady Wash, Midway Wash, Telephone Wash, Bird Ditch, Mojave River overflow, Dock Ditch, Tono Ditch, Marl Ditch, Opah Ditch, Turtle Ditch, Oat Ditch, Tork Ditch, Case Ditch, Sheep Ditch, Mobi Ditch, Mojave River, Baker Inn Ditch, Pand Ditch, Berry Ditch, Hack Wash, Halloran Wash, Dale Ditch, Kali Ditch, Hot Wash, West Valley Wells Ditch, Valley Wells Ditch, Windmill Ditch, Wells Ditch, Mescal Ditch, Clark Mountain Ditch, Mohawk Ditch, Macro Ditch, and Cenda Ditch.

Groundwater Resources and Groundwater Quality: The beginning portions of Segment 3 are located in the Caves Canyon Valley Groundwater Basin (Basin 6-38). This basin underlies a portion of the Lower Mojave River Valley located in central San Bernardino County. The Caves Canyon basin is bound by non-water-bearing rocks of the Cady Mountains on the southeast, the Cronese Mountains on the east, the Cave Mountains on the northeast, low hills on the north, and the Alvord Mountains on the northeast.[19] The estimated total groundwater storage capacity of the basin is 4,152,000 af.

Groundwater quality of the Caves Canyon Valley Groundwater Basin is characterized by sodium being the dominate cation, whereas the anion varies between bicarbonate, chloride, and sulfate. [20] Historical measurements of TDS levels range from 622 to 1,272 mg/L and an average of 904 mg/L. There are no known impairments in the basin; however, the basin has been deemed inferior for irrigation due to high TDS, and rated between suitable and inferior for domestic use.[21]

The next groundwater basin that Segments 3A and 3B travel over is the Soda Lake Valley Groundwater Basin (Basin 6-33). This basin underlies a northeast-trending valley located

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[19] CDWR, 2003a.

[20] An atom that has unequal numbers of electrons and protons (and is therefore charged) is called an ion. A negatively charged ion is called an "anion" and a positively charged ion is called a "cation". Ions are denoted by a superscripted "+" (for cations) or "–" (for anions) symbol next to their chemical symbol, as in the examples Na^+ (sodium cation) and Cl^- (chloride anion). The number of –'s (or +'s) tells you how many extra electrons the ion has (or is missing). For example, the carbonate anion (with two extra electrons) has the symbol CO_3.

[21] CDWR, 2003a.

in northeast San Bernardino County. The basin is bounded by nonwater-bearing rocks of the Marl and Kelso Mountains to the east, the Bristol and Cady Mountains to the south, and the Soda and Cave Mountains to the west. Recharge to the basin occurs primarily from Mojave River percolation and percolation of runoff from the alluvial fan deposits at the base of the surrounding mountains. Groundwater level trends have been relatively stable throughout the period of record. However, declining levels have been observed in a couple of wells, and the most fluctuation occurs in wells near the Mojave River Sink. The total estimated storage capacity of the basin is approximately 9,300,300 af.[22]

The Soda Lake Valley Groundwater Basin is typically characterized by a sodium chloride or sodium bicarbonate, and often includes sulfate. Specifically, sodium bicarbonate water is more prevalent in the vicinity of the Mojave River Sink; whereas, sodium chloride water is found primarily near Soda Lake.[23] The eastern part of the basin is dominated with significant sulfate content.

The quality of the groundwater in the Soda Lake Valley Groundwater Basin is rated to be moderate to inferior for both domestic and irrigation use. Monitoring of 66 wells concluded elevated concentrations of fluoride, boron, and TDS. Specifically, fluoride concentrations at or above 0.9 mg/L have impaired domestic consumption wells in 31 of 35 wells throughout the basin. The average fluoride concentration in the groundwater is about 3.5 mg/L, although levels as high as 33.3 mg/L have been reported. Boron concentrations greater than 1.0 mg/L occur in 22 of 35 wells, which inhibit the use of groundwater for irrigation purposes. TDS concentrations of 1,000 mg/L and above occur in 20 of 35 wells. The highest TDS levels occur near Soda Lake where reported levels have approached 8,300 mg/L. The average TDS concentration in the basin is about 1,500 mg/L.[24]

Flooding: Within Segment 3, the 100-year floodplain of the Mojave River is just east of Yermo. Figures 3-8.3 through 3-8.5 depict the 100-year floodplain in Segment 3. North of I-15 in the community of Baker is the 100-year floodplain of Silver Lake. South of I-15 and Baker is the 100-year floodplain for Soda Dry Lake (see Figure 3-8.4).

Soda Dry Lake and Silver Lake remain dry most of the time with the exception of receiving stormwater runoff occasionally. The water evaporates and/or sinks into the ground. Capillary action draws some of the water back to the surface as well. Since the water evaporates, the salts that were contained in the water are left behind; giving the dry lake its crusty, white surface.

[22] CDWR, 2004b.

[23] Ibid.

[24] Ibid.

Segment 4

Water Resources: There are multiple small drainages within Segment 4 on the downgrade into Ivanpah Dry Lake. The named drainages near I-15 include Wheaton Wash and Ivanpah Ditch (see Figure 3-8.5).

Along alignment 4B, there are several small unnamed washes as the segment extends to the east towards Primm.

Groundwater Resources and Groundwater Quality: Segment 4 is located in the Ivanpah Valley Groundwater Basin (CDWR Basin 6-30). The Ivanpah Valley Groundwater Basin total surface area is 199,000 acres or 311 square miles. The basin underlies a north-trending valley located along the California-Nevada border in northeast San Bernardino County. Elevation of the valley floor ranges from 2,595 feet at Ivanpah Lake (dry) to about 4,000 feet at the southern end of the valley. To the northeast, the basin is bounded by nonwater-bearing rocks of the Clark Mountains, the Ivanpah Range on the west, and the New York Mountains on the southwest. The estimated total storage capacity of the basin is 3,090,00 af.[25]

The groundwater quality of the Ivanpah Valley Groundwater Basin varies significantly around the basin. However, sodium and calcium are generally the predominant cations, while bicarbonate is generally the major anion.[26] Around Ivanpah Dry Lake, the groundwater is predominantly sodium chloride (common salt).

The groundwater quality in the basin is rated marginal to inferior for both domestic and irrigation purposes due to elevated levels of fluoride and sodium. In 18 of 33 wells, fluoride was found in concentrations at or above 0.9 mg/L, and has an average concentration of 1.0 mg/L. TDS concentrations generally range from about 300 to 500 mg/L, although near Ivanpah Dry Lake, TDS concentrations have been recorded as high as 7,702 and 27,501 mg/L.[27]

Flooding: The FEMA flood maps identify the area around Segment 4 as Zone D including the Ivanpah Dry Lake. Zone D is used to designate areas where there are possible but undetermined flood hazards. In areas designated as Zone D no analysis of flood hazards has been conducted (see figure 3.8-5).

Segment 5

Water Resources: There are many small unnamed drainages along Segment 5 that drain from the Toiyabe National Forest to the northwest, and the North McCullough

[25] CDWR, 2004c.

[26] Ibid.

[27] DWR, 2004c.

Mountains Wilderness Study Area to the east (see Figure 3-8.6). The primary named drainages in the study area of Segment 5 include the Bonanza Wash and the Porter Wash. These washes appear to connect to other unnamed drainages that stop just prior to I-15.

Groundwater Resources and Groundwater Quality: A short, 0.5 mile, section of Segment 5 would be within California and located in the Ivanpah Valley Groundwater Basin (CDWR Basin 6-30).

The State of Nevada delineates groundwater basins but does not collect or publish detailed groundwater basin information. In Nevada, Segment 5 would be located in the northern Ivanpah Valley Groundwater Basin (Nevada Basin Number 164A) and the Jean Lake Valley Groundwater Basin (Nevada Basin Number 165).

Flooding: The Roach Dry Lake 100-year floodplain is located just north of Primm (see Figure 3-8.6). This lake runs approximately 5 miles along the east side of I-15. Near the community of Jean, there are several 100-year floodplains east and west of I-15.

Segments 6 and 7

Water Resources: The Las Vegas Wash is the primary water feature located near Segment 6. The Las Vegas Wash drains from east to west out of the Lake Mead National Recreation Area. The Las Vegas Wash has become highly channelized within the Las Vegas urban environment. The upstream portion of Las Vegas Wash (Telephone Line Road to Lake Mead) is on the CWA Section 303(d) List for being impaired for iron and total suspended solids (TSS).[28] This portion of the wash is outside of the project study area and would not be affected.

Multiple drainage canals meander off Las Vegas Wash to the north, while Duck Creek splits to the southwest (see Figure 3.8-7). The Tropicana Wash is another major drainage that meanders from west to east out of the Red Rock Canyon National Conservation Area (see Figure 3.8-7).

Segment 7 does not include any natural drainages; only urban landscapes. Las Vegas Creek meanders west to east along I-515.

Groundwater Resources and Groundwater Quality: Segment 6 and Segment 7 are located in the Las Vegas Groundwater Basin (Nevada Basin Number 212) (DCNR, 2007). The Las Vegas Groundwater Basin is estimated to be 1,000,960 acres (DCNR, 2007).

The quality of the shallow groundwater in the Las Vegas Valley is saline with TDS ranging from 550 to greater than 7,000 mg/L (LVGMP, 2007).

[28] NDEP, 2002.

Flooding: Within metropolitan Las Vegas, there are washes, a few channeled creeks, and canals comprising a highly urbanized environment. Figure 3-8.7 depicts the 100-year floodplains around Segments 6 and 7.

Within in Segment 6, 100-year floodplains are located along an unnamed wash between West Cactus Avenue and East Silverado Ranch Boulevard. This wash becomes the Duck Creek Drainage Canal moving east to west. The Tropicana Wash runs from southwest to northeast through natural and lined canals before it converges with the Flamingo Wash and drains to Lake Las Vegas. Within the area between I-15 and the UPRR tracks is the Tropicana Wash 100-year floodplain which extends south of East Tropicana Avenue, west of I-15, and along the railway tracks east of Wynn Road and north of West Oquendo Road. However, according to the Clark County Regional Flood Control District, several new conveyances and basins have been completed within this area, which have significantly reduced the area of the 100-year floodplain. Above the Tropicana Wash and east of I-15, there is another 100-year floodplain that extends south of West Flamingo Road, west of South Las Vegas Boulevard, north of West Tropicana Avenue, and east of I-15. The Clark County Regional Flood Control District has constructed and proposed new conveyances within this area that have also significantly reduced the area of the 100-year floodplain.

3.8.4 Environmental Consequences

3.8.4.1 No Action Alternative

Under the No Action Alternative, no privately-financed high speed passenger rail system would be constructed or operated in the project study area. The hydrology and water quality related adverse effects associated with the action alternatives (Alternative A, Alternative B, Option C, and associated ancillary facilities) would not be expected to occur.

Under the No Action Alternative, public agencies in California and/or Nevada are anticipated to move forward with physical and/or operational roadway improvements to increase the capacity of the I-15 corridor. These improvements would be located in the same vicinity as the action alternatives, and would thus present many of the same hydrological impacts described herein. Project-specific environmental review to be undertaken by the sponsoring lead agency/agencies would more precisely determine the environmental effects associated with such improvements. The No Action Alternative is not discussed further in this section.

3.8.4.2 Action Alternatives

Table 3.8-4 provides a summary of potential 100-year floodplain encroachments and impacts to water resources.

Table 3.8-4: Summary of Hydrology and Water Resources Affected by Alternative A, Alternative B, and Option C

Hydrology and Water Resources	Alternative A	Alternative B	Option C
100-Year Floodplain: Direct (acres)	20.2 to 42.2[1] 24.8 to 42.3[2]	47.1 to 66.8[1] 26 to 43.1[2]	N/A[3]
Hydrologic Resources: Direct (linear feet) Indirect (linear feet)	 8,424 to 10,993[4] 30,003	 12,049 to 14,618[4] 43,628	 N/A[5] N/A[6]

Source: Jones and Stokes, 2008.

[1] Impact range without Segment 7.

[2] Impact range with Segment 7 (LV Downtown station).

[3] Option C would reduce 100-year floodplain impacts by 16.6 to 19.6 acres to the Alternative B totals, and reduce Alternative A totals from 3.6 to 8.5 acres.

[4] Impact range depending on Victorville OMSF option.

[5] Option C would add 77 linear feet of impact to the Alternative A and Alternative B totals.

[6] Option C would add 538 linear feet of impact to the Alternative A and Alternative B totals.

3.8.4.3 Resource-Specific Effects

Violate Any Water Quality Standards or Waste Discharge Requirements, or Substantially Degrade Water Quality

Permanent Impacts: Operation of Alternative A or Alternative B and associated ancillary facilities, including station and maintenance facilities, would result in potential impacts to water quality due to pollutants deposited within the proposed rail right-of-way from train operation and track maintenance activities that could contaminate adjacent drainages and washes following a storm event. Segments within the median of I-15 would discharge into drainages designed to integrate with existing I-15 drainage systems. Stormwater runoff around the stations and maintenance facilities would also potentially impact water quality due to pollutants deposited from vehicles and maintenance activities including potentially hazardous materials.

Alternative A would cross the Mojave River and a number of named and unnamed intermittent drainages and washes along the corridor. As shown in Table 3.8-5, this alternative would have the potential to directly impact 8,424 to 10,993 linear feet of these hydrologic resources. Compared to Alternative B, this Alternative A would have less potential impact due to its location within the I-15 freeway median. The range of impacts associated with this alternative are related to the OMSF site options in Victorville. Extending to the Las Vegas Downtown station site along Segment 7A would not result in any additional impact. Segment 6, Option C would result in an additional 77 linear feet of water resources to be impacted.

Alternative B would cross the Mojave River and a number of named and unnamed intermittent drainages and washes along the corridor similar to Alternative A. As shown in Table 3.8-5, this alternative would have potential impacts on hydrologic resources ranging from 12,049 to 14,618 linear feet depending on which Victorville OMSF site option is utilized. Extending the alternative to the Las Vegas Downtown station site along Segment 7B would not result in any additional impact. Segment 6, Option C would result in an additional 77 linear feet of water resources to be impacted. Implementation of Alternative B would have the potential to degrade water quality.

Table 3.8-5: Direct Impacts to Water Resources

Project Element[1]	Alternative A (linear feet)	Alternative B (linear feet)	Option C (linear feet)
Segment 1			
Alignment	2,491	2,491	N/A
Victorville OMSF Option 1	12	12	N/A
Victorville OMSF Option 2	2,581	2,581	

Project Element[1]	Alternative A (linear feet)	Alternative B (linear feet)	Option C (linear feet)
Total for Segment 1	*2,503 to 5,072*	*2,503 to 5,072*	*N/A*
Segment 2			
Alignment 2A/2B	937	937	N/A
Alignment 2A	191	N/A	N/A
Alignment 2B	N/A	98	N/A
Total for Segment 2	*1,128*	*1,035*	*N/A*
Segment 3			
Alignment 3A	3954	N/A	N/A
Alignment 3B	N/A	8,087	N/A
Autotransformer 7	38	38	N/A
Autotransformer 11	66	66	N/A
Total for Segment 3	*4,059*	*8,192*	*N/A*
Segment 4			
Alignment 4A	735	N/A	N/A
Alignment 4B	N/A	319	N/A
Total for Segment 4	*734*	*319*	N/A
Segment 5 (no impacts)			
Segment 6			
Option C Central A	N/A	N/A	77
Option C Central B	N/A	N/A	77
Total for Segment 6	*0*	*0*	*77*
Segment 7 (no impacts)			
TOTAL FOR ALTERNATIVE	**8,424 to 10,993[2]**	**12,049 to 14,618[3]**	**N/A[4]**

Source: Jones and Stokes, 2008.

[1] Only those project elements that would result in a direct impact are listed.

[2] Alternative A totals range from 8,424 feet with Victorville OMSF 1 to 10,993 feet with Victorville OMSF 2.

[3] Alternative B totals range from 12,049 feet with Victorville OMSF 1 to 14,618 feet with Victorville OMSF 2.

[4] Option C would add 77 feet to the Alternative A and Alternative B totals.

Construction Period: During site grading and construction activities for all action alternatives, areas of bare soil would likely be exposed to erosive forces. Bare soils are much more likely to erode than vegetated areas due to the lack of dispersion, infiltration, and retention created by covering vegetation. Construction activities involving soil disturbance, excavation, cutting/filling, stockpiling, and grading activities could result in increased erosion and sedimentation to surface waters. If precautions are not taken to contain contaminants, construction could produce contaminated stormwater runoff, a major contributor to the degradation of water quality. Hazardous materials associated with construction equipment could also adversely affect water quality if spilled or stored improperly. In addition, construction in areas of high groundwater such as near the Mojave River in Segments 2A/2B could require dewatering for bridge column construction, with subsequent discharge to surface waters. This process could result in the release of sediment or other contaminants to surface waters.

Construction of the segments would require intermittent stream, wash, and ditch crossings. Construction within the drainages could provide a direct path for construction related contaminants. Because of the minimal amount of rainfall within the project study area, in-water work would be unlikely to occur. Construction related contaminants could also be transported to a drainage or wash during the storm season if a leak or spill were to occur. Construction within the limits of influence for Alternative A could impact 30,000 linear feet, Alternative B could impact 43,630 linear feet, and Option C would add an additional 540 linear feet to each of these alternatives (see Table 3.8-4).

Segments 2A/2B would involve constructing a bridge over the Mojave River. Excavation from bridge construction may involve in-water construction; this could provide for a direct path of construction related contaminants to reach the Mojave River. In addition, bridge support construction would require excavation and dewatering from a sheet-pile coffer dam. This may provide a direct path for construction related contaminants to reach the groundwater table. Segment 4B would require tunneling which would allow for a direct path for construction related contaminants to reach the groundwater table. Construction activities for Segments 6A, 6B and Option C as well as Segments 7A, 7B, and Option C would include the construction of elevated track through urban areas of Las Vegas where construction related contaminants could be easily transported to the local stormwater runoff system in the event of a storm.

Construction activities for the Victorville station site options and OMSF options could affect the water quality by increasing sediments in flowing water such as the Mojave River or various washes near these facilities including Bell Mountain Wash and Wild Wash.

Construction activities and storage at the TCAs could also affect water quality. Construction related contaminants and sediments from stockpiles could produce contaminated stormwater runoff affecting nearby drainages and waterbodies.

Water quality impacts from construction activities could violate water quality standards, exceed contaminant loadings, provide additional sources of polluted runoff, or otherwise degrade water quality.

Substantially Alter Existing Drainage Patterns in a Manner That Would Result in Substantial Erosion, Siltation, or Flooding Onsite or Offsite

Permanent Impacts: When complete, the action alternatives would bridge over the Mojave River, and numerous intermittent streams, washes, and ditches that would be crossed along the 200-mile corridor. Based on preliminary design information from the

Applicant the crossings of these water resources would not permanently alter the course or flows of these water resources. Stormwater runoff from the trackway would generally be directed away from the trackway and into existing drainage facilities associated with the I-15 freeway or other local drainage systems. Along Segment 3A in Alternative A, and other I-15 median running alignments, drainage for the trackway would be designed to integrate with the existing I-15 drainage system.

There is a minor potential that tunneling in Segment 4B could result in the redirection of some surface water that currently permeates into the groundwater system. However, the amount of water that could be potentially redirected is considered to be minimal in comparison to the overall surface flow that would supply the current groundwater system. Therefore, any impact associated with groundwater recharge is considered to be minimal.

In Segment 1, the access road from Stoddard Wells Road to the Victorville OMSF site option 1 would cross over the Bell Mountain Wash but would not substantially alter this drainage. The Victorville OMSF site option 2 would be bisected by two small washes that connect to the Bell Mountain Wash. Depending on final design of this site, these washes may be altered and result in flooding on the west side of this site.

The EMU technology option would include autotransformers along and adjacent to the segment alignments. Autotransformer 7 would be located adjacent to Telephone Wash in Segment 3 and may result in a minor alteration to the drainage. Autotransformer 11 in Segment 3 would alter Kali Ditch.

Construction Period: Construction of all action alternatives would involve the use of heavy earth moving equipment. Operation of heavy earth moving equipment during construction would expose disturbed and loosened soils to erosion from rainfall, runoff, and wind. Most natural erosion occurs at slow rates; however, the rate increases when the land is cleared or altered and left disturbed. Construction activities would remove the protective cover of vegetation and reduce natural soil resistance to rainfall impact erosion. Sheet erosion occurs when length and runoff velocity increase slope erosion on disturbed areas. As runoff accumulates, it concentrates into rivulets that cut grooves (rills) into the soil surface. If the flow is sufficient, these rills could develop into gullies causing sedimentation to local waterways. Similar impacts may also occur at TCAs where construction staging, equipment, and stockpiling would occur.

Place Housing or Structures Within a 100-Year Floodplain or Place Structures That Would Impede or Redirect Flood Flows

Permanent Impacts: Alternative A, Alternative B, and Option C would cross or be located adjacent to the 100-year floodplain of either the Mojave River, or specified washes along the project area. Table 3.8-6 shows the direct impacts of Alternative A, Alternative B, and Option C to the 100-year floodplain.

Table 3.8-6: Direct Impacts to the 100-Year Floodplain

Project Element[1]	Alternative A (acres)	Alternative B (acres)	Option C (acres)
Segment 1			
Alignment 1	2.8	2.8	N/A
Victorville Station Site 1	13.5	13.5	N/A
Victorville OMSF Site Option 1	1.9	1.9	N/A
Total for Segment 1	*2.8 to 16.3*	*2.8 to 16.3*	*N/A*
Segment 2			
Alignment 2A/2B	9.2	9.2	N/A
Alignment 2A	0	N/A	N/A
Alignment 2B	N/A	10.3	N/A
Total for Segment 2	*9.2*	*19.5*	*N/A*
Segment 3			
Alignment 3A	0	N/A	N/A
Alignment 3B	N/A	2.7	N/A
Total for Segment 3	*0*	*2.7*	*N/A*
Segment 4			
Alignment 4A	0	N/A	N/A
Alignment 4B	N/A	0	N/A
Total for Segment 4	*0*	*0*	N/A
Segment 5			
Alignment 5A	0	N/A	N/A
Alignment 5B	N/A	0.9	N/A
Total for Segment 5	*0*	*0.9*	*N/A*
Segment 6			
Alignment 6A Central A	12.6	N/A	N/A
Alignment 6A Central B	7.3	N/A	N/A
Alignment 6A Southern	0.8	N/A	N/A
Alignment 6B Central A	N/A	23.1	N/A
Alignment 6B Central B	NA	20.3	N/A
Alignment 6B Southern	N/A	11.9	N/A
Option C Central A	N/A	N/A	4.2
Option C Central B	N/A	N/A	3.7
LV Central Station B	0.9	0.9	N/A
LV Southern Station	11.9	11.9	N/A

Project Element[1]	Alternative A (acres)	Alternative B (acres)	Option C (acres)
Wigwam Avenue MSF (option for A and B)	2.1	1.7	N/A
Total for Segment 6	*8.2 to 14.8*	*21.2 to 25.9*	*3.7 to 4.2*
Segment 7			
Alignment 7A	0.2	N/A	N/A
Alignment 7B	N/A	0.1	N/A
Total for Segment 7	*0.2*	*0.1*	N/A
TOTAL FOR ALTERNATIVE	**20.2 to 42.2[2]** **24.8 to 42.3[3]**	**47.1 to 66.8[4]** **26 to 43.1[5]**	**N/A[6]**

Source: Jones and Stokes, 2008.

[1] Only those project elements that would result in a direct impact are listed.

[2] Alternative A totals range from 20.2 acres with Victorville Station 2 and OMSF 2 (no impacts), either Sloan Road MSF or Robindale MSF (no impacts), and LV Central Station B to 42.2 acres with Victorville Station 1 and OMSF 1, Wigwam MSF, and LV Southern Station.

[3] Alternative A (with Segment 7) total ranges from 24.8 acres with Victorville Station 2 and OMSF 2 (no impacts), either Sloan Road MSF or Robindale MSF (no impacts), and LV Downtown Station to 42.3 acres with Victorville Station 1 and OMSF 1, Wigwam MSF, and LV Downtown Station.

[4] Alternative B totals range from 47.1 acres with Victorville Station 2 and OMSF 2 (no impacts), either Sloan Road MSF or Robindale MSF (no impacts), and LV Central Station B to 66.8 acres with Victorville Station 1 and OMSF 1, Wigwam MSF, and LV Southern Station.

[5] Alternative B (with Segment 7) total ranges from 26 acres with Victorville Station 2 and OMSF 2 (no impacts), either Sloan Road MSF or Robindale MSF (no impacts), and LV Downtown Station to 43.1 acres with Victorville Station 1 and OMSF 1, Wigwam MSF, and LV Downtown Station.

[6] Option C would reduce 100-year floodplain impacts by 16.6 to 19.6 acres to the Alternative B totals, and reduce Alternative A totals from 3.6 to 8.5 acres.

Alternative A would increase the size of the 100-year floodplain and impede or redirect flood flows. As shown in Table 3.8-6, this alternative would impact between 20.2 and 42.2 acres and result in less potential impact on the 100-year floodplain than Alternative B, since in most locations it is within the I-15 freeway median. Within Segment 1, the Victorville Station site option 1 would be adjacent to and encroach upon the 100-year floodplain and result in a potential impact of 13.5 acres along the Bell Mountain Wash. Additionally, the access road from Stoddard Wells Road to the Victorville OMSF site option 1 would impact approximately 1.9 acres of the floodplain also along the Bell Mountain Wash. Portions of Alternative A would cross or be adjacent to the 100-year floodplain of the Mojave River. Where Segment 2A crosses the Mojave River floodplain, the bridge or structure that would cross has been designed to not impede or redirect flows within the 100-year year floodplain; therefore, minimal impact is anticipated at this location.

In addition to the station and OMSF site options in Victorville and station sites in Las Vegas, the Wigwam Avenue MSF option and its lead tracks would extend into the 100-year floodplain. Extending Alternative A to the Las Vegas Downtown station site along Segment 7A would result in a small overall increase in the extent of impacted area. If

Option C were utilized impacts to the 100-year floodplain would be reduced by 3.6 to 8.5 acres, depending on station, OMSF, and MSF options selected. Option 6C would have less impact on the floodplain than Segment 6A.

Alternative B would increase the size of the 100-year floodplain and impede or redirect flood flows. As shown in Table 3.8-6, Alternative B would have a potential impact on the 100-year floodplain of between 47.1 and 66.8 acres. Within Segment 1, the Victorville Station site option 1 would be adjacent to and encroach upon the 100-year floodplain and result in a potential impact of 13.5 acres along the Bell Mountain Wash. Similar to Segment 2A, where Segment 2B crosses the Mojave River floodplain, the bridge or structure that would cross has been designed to not impede or redirect flows within the 100-year year floodplain; therefore, minimal impact is anticipated at this location. Segment 3B would cross the 100-year floodplain of Silver Lake and Soda Dry Lake when passing through Baker. These two lakes remain dry for most of the year, but in the unlikely chance of a 100-year storm event the trackway could be submerged or impede and redirect flood flows. Portions of Segment 5B will be crossing or banking up against the 100-year floodplain north of Jean. Portions of Segment 6B will be crossing or banking up against the 100-year floodplain of multiple drainages including Duck Creek and Tropicana Wash. While this segment would be elevated, column placement would likely fall within the floodplain. The Las Vegas Southern station site and the Las Vegas Central B station site would both fall within the 100-year floodplain. If Option C were utilized in an alignment otherwise comprised of Alternative B segments, this would reduce impacts to the 100-year floodplain by 16.6 to 19.6 acres, depending on station, OMSF, and MSF options selected. Option 6C would have substantially less impact on the floodplain than Segment 6B.

Construction Period: Construction would have the potential to result in temporary impacts on the 100-year floodplain and pose a risk to equipment, workers, and structures. None of the TCAs associated with construction of the project would be within a 100-year floodplain. Within the limits of construction, Alternative A, Alternative B, Option C and associated ancillary facilities would have the potential to increase the size of the 100-year floodplain and impede or redirect flood flows depending on activity occurring within specific areas.

Create or Contribute Runoff Water That Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems, or Provide Substantial Additional Sources of Polluted Runoff

Permanent Impacts: As noted above, Alternative A, Alternative B, and Option C would include drainage along the proposed trackway as part of the project to channel stormwater runoff away from the trackway. Along Segment 3A and other I-15 median running alignments, drainage for the trackway would be designed to integrate with the existing I-15 drainage system. The trackway is itself would not produce any considerable amount of runoff given the permeable nature of construction on ballast rather than paved or solid impervious surface. However, bridges and elevated structures constructed as part of the project would provide new impervious surfaces and contribute polluted runoff water.

The proposed Victorville and Las Vegas station options would produce a substantial amount of additional runoff. These facilities could create additional runoff from parking and paved surfaces where previously open ground existed. The rational method was used to calculate the peak discharge (100-year 24-hour storm event) for the stations. The dimensionless runoff coefficient used was 0.72 and the rainfall intensity that was used was 2.93 inches.[29] The analysis shown in Table 3.8-7 concluded that the action alternatives could have peak stormwater runoff for a 100-year 24 hour storm event of between 296 cfs and 374 cfs. The lower end of the range assumes a start at Victorville station site 1 and a terminus at Las Vegas Central Station A. The higher end of the range assumes a start at Victorville station site 2 and a terminus at the Las Vegas Southern Station. If the Alternatives A and B were to extend to Segment 7, the range would be 276 cfs with Victorville station site 1 and Las Vegas Downtown Station to 292 cfs with Victorville Site 2 Station and Las Vegas Downtown Station.

With Option C, the range would be 296 cfs with Victorville station option 1 and Las Vegas Central Station A to 329 cfs with Victorville station option 2 and Las Vegas Central Station B. To a much lesser extent, the OMSF and MSF options and Baker MOW would result in some additional runoff related to access roads and parking at these facilities. The majority of these sites would not be paved over, in contrast to the station areas, which would be extensively paved for parking.

Because there are numerous other locations in the watersheds for groundwater recharge, the increase in impervious surface by the action alternatives would not result in a considerable loss of groundwater recharge and would not substantially affect groundwater levels.

Construction Period: The project may result in additional sources of polluted runoff during construction which could impact water quality particularly on and around the TCA sites and within the limits of construction influence.

Use Surface or Groundwater in Wasteful or Inefficient Manner Resulting in a Reduction in Water Availability

Permanent Impacts: The operation of the Alternative A, Alternative B, Option C, and associated ancillary facilities would not use surface or groundwater resources. The water that is required at stations and the OMSF and MSF would be obtained from existing water utility service providers. Potential effects related to water service are discussed in Section 3.4, Utilities and Service Systems.

[29] U.S. Department of Commerce, 2008.

Construction Period: The project would require water for use in construction activities such as concrete batching, washing vehicles and equipment, and dust suppression. As discussed above, existing surface and groundwater resources of adequate quality are limited or declining through most of the project study area. The applicant has not identified a source(s) of water for construction activities. It is assumed that water for construction will be obtained from existing commercially available sources such as water utility service providers in the project area. However, if the applicant proposed the installation of groundwater wells or other sources of water for construction purposes, the development of these sources would be subject to future environmental review and federal, state and local permitting as appropriate and legally required.

Table 3.8-7: Peak Discharge of Stations (100-year 24-hour storm event)

Project Element[1]	Alternative A (cfs)	Alternative B (cfs)	Option C (cfs)
Segment 1			
Victorville Station Site 1	227	227	227
Victorville Station Site 2	243	243	243
Total for Segment 1	*227 to 243*	*227 to 243*	*227 to 243*
Segment 6			
LV Central Station A	69	69	69
LV Central Station B	86	86	86
LV Southern Station	131	131	N/A
Total for Segment 6	*69 to 131*	*69 to 131*	*60 to 86*
Segment 7			
LV Downtown Station	49	49	49
Total for Segment 7	*49*	*49*	*49*
TOTAL FOR ALTERNATIVE	**296 to 374[2]** **276 to 292[4]**	**296 to 374[2]** **276 to 292[4]**	**296 to 329[3]** **276 to 292[4]**

Source: Jones and Stokes, 2008.

[1] Only those project elements that would result in a direct impact are listed.

[2] Alternative A and Alternative B total ranges from 296 cfs with Victorville Station 1 and LV Central Station A to 374 cfs with Victorville Station 2 and LV Southern Station.

[3] Option C with Alternative A and Alternative B total ranges from 296 cfs with Victorville Station 1 and LV Central Station A to 329 cfs with Victorville Station 2 and LV Central Station B.

[4] Alternative A, and Alternative B (with Segment 7 and Option C) total ranges from 276 cfs with Victorville Station 1 and LV Downtown Station to 292 cfs with Victorville Station 2 and LV Downtown Station.

3.8.5 MITIGATION MEASURES

To address the potential hydrologic and water quality related impacts described above, mitigation measures have been developed. Mitigation measures are classified by impact type and are further divided by measures to address impacts during the operational and construction periods, respectively. These measures are intended to apply to any project features (stations, OMSFs, MSFs, etc.) located within each segment unless otherwise noted.

Mitigation Measure HYD-1: Incorporate Site-Specific Permanent Water Quality Treatment Devices: To protect water quality, permanent water quality treatment devices shall be installed. Examples of water quality best management practices (BMPs) may include a vegetated swale, traction sand traps, or settling basin to help remove sediments and nutrients. Such BMPs will be sized properly and designed by a registered professional engineer and will not allow untreated stormwater runoff to reach the Mojave River or any washes along the alignment including the urbanized area of Las Vegas.

Mitigation Measure HYD-2: Implement Construction-Related Best Management Practices: Construction activities will begin with the installation of erosion control BMPs. In the final construction plans, the contractor will identify specifications of BMPs for grading and erosion control that are necessary to reduce erosion and sedimentation. These BMPs will be selected to achieve maximum sediment removal and represent the best available technology that is economically achievable. Standard erosion control measures, such as management, structural, and vegetative controls, shall be implemented for all construction activities that expose soil. BMPs to be implemented as part of this mitigation measure may include, but are not limited to, the following measures:

Temporary erosion control measures that would apply to construction of the stations, maintenance facilities and the rail (such as silt fences, staked straw bales/wattles, silt/sediment basins and traps, check dams, geofabric, sandbag dikes, and temporary revegetation or other ground cover) will be employed to control erosion from disturbed areas. Grass or other vegetative cover will be established on the construction site as soon as possible after disturbance. Erosion in disturbed areas will be controlled by grading so that direct routes for conveying runoff to drainage channels are eliminated.

The general contractors and subcontractors conducting the work will construct or implement, regularly inspect, and maintain the BMPs in the construction plans. Some methods of Construction BMPs for rail installation that will be included in the project are:

- Install erosion control material consisting of silt fences along the outside limits of construction on both sides of the disturbance corridor for track construction;
- Clear the construction area of brush and vegetation;
- Strip any topsoil and transport it to stockpile;

- Excavate material as required to extend any culverts using good quality material as fill and transport poor quality material to stockpile;
- Place quality fill material to establish the subgrade;
- Install the sub-ballast on the subgrade, composed of crushed rock that has sufficient strength to withstand settling from loads;
- Place standard rail ties, made of wood or concrete, on the sub-ballast, then place the rail on the ties, and anchor the rail to the ties;
- Bring in ballast and dump ballast rock between and along the sides of the track; and
- Use a tamper to raise the track and tamp the ballast beneath the ties.

Mitigation Measure HYD-3: Comply with the NPDES Construction General Permit: The project sponsor will obtain coverage under the NPDES Construction General Permit. Implementing the requirements in the NPDES Construction General Permit will reduce or eliminate construction-related water quality effects. The project sponsor will ensure that construction activities comply with the conditions in this permit, which will require preparation of a stormwater pollution prevention plan (SWPPP), implementation of BMPs identified in the SWPPP, and monitoring to ensure that effects on water quality are minimized.

Mitigation Measure HYD-4: Implement SWPPP: The implementation of the SWPPP described above will reduce the likelihood that stormwater will carry any spilled contaminants to water channels. Implementation of the SWPPP along with the following mitigation measures will reduce construction related impacts. Mitigation Measure HYD-5 addresses the potentiality of a spill during construction.

Mitigation Measure HYD-5: Implement Spill Prevention, Control, and Countermeasure Plan: The contractor will develop a spill prevention, control, and countermeasure plan (SPCCP) to prevent accidental releases of chemicals that are stored on site and measures to use in the case of a spill. The BMPs described in this plan will apply to construction activities and operation activities.

The contractor will implement appropriate hazardous material management practices identified in the SPCCP to reduce the potential for chemical spills or releases of contaminants, including any non-stormwater discharge to drainage channels. If a spill occurs, cleanup, containment, and response measures in the SPCCP will be implemented by the project sponsor.

The Federal reportable spill quantity for petroleum products, as defined in the EPA's CFR (40 CFR 110) is any oil spill that (1) violates applicable water quality standards, (2) causes a film or sheen upon or discoloration of the water surface or adjoining shoreline, or (3) causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, a superintendent will notify appropriate agencies and the contractor will need to take action to contact any other appropriate safety and clean-up crews to ensure the SPCCP is followed. A written description of reportable releases will be submitted to the appropriate agency. This submittal will include a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The release will be documented on a spill report form.

Mitigation Measure HYD-6: Proper Design of Station and Maintenance Facility Drainage Systems: Most of the rail segments would not result in a large amount of impervious surface that could concentrate and redirect stormwater flow causing onsite erosion. However, the stations and maintenance facilities would have parking lots that could concentrate and redirect stormwater flows. In order to determine the adequate size of drainage facilities, the total increase in impervious surface of the final design of the facilities will be included in a Rational Method (a way of calculating flow intensity) calculation to determine the increase in peak storm discharges resulting from the action alternatives. The 100-year, 24-hour storm event will be used to determine the appropriate size of drainage facilities needed for the action alternatives. Drainage facilities will need to retain flows and not contribute to additional flows in the Mojave River or other streams and washes. This could be achieved with several detention basins.

In addition, drainage facilities will need to be sized accordingly to handle adequate flow. It is important to note that when a culvert is used, the footprint of the rail will need to be reinforced with rip-rap, and the culvert will need to be large enough to handle the 100-year 24-hour storm flow so on site flooding can be avoided. Other drainage features such as bridge crossings will need to be designed to not increase the size of the floodplain.

Mitigation Measure HYD-7: Reduce Encroachment into the 100-Year Floodplain: When selected project features are located within the 100-year floodplain, the base elevation of rail and stations, including maintenance facilities should be elevated above the 100-year floodplain or relocated to avoid any impact. This may be achieved by elevating or relocating the rail alignment out of the 100-year floodplain and shifting the facility out of the 100-year floodplain (Victorville station site 1, Victorville OMSF Option 1, Las Vegas Central Station B, Las Vegas Southern Station, and Wigwam Avenue MSF). Portions of the rail alignment may utilize track support columns that are located in the 100-year floodplain. Specific engineering plans and modeling, using HEC-RES, or similar, shall be completed by a registered professional during the final design phase.

Mitigation Measure HYD-8: No Construction Equipment or Materials Within the 100-Year Floodplain: The contractor will not store construction equipment or materials within the limits of influence that are located in areas of the 100-year floodplain so as to avoid redirecting 100-year flood flows that could cause structural damage or pose a safety risk to workers.

Mitigation Measure HYD-9: Minimize Impact of OMSF Site 2 on Water Resources: During final design, the Victorville OMSF site option 2 tracks and facilities will be designed by the project sponsor to avoid or bridge over the two small washes that feed into the Bell Mountain Wash (applies to Segment 1 only).

Mitigation Measure HYD-10: Minimize Impacts of Autotransformers 7 and 11 on Water Resources: During final design, the project sponsor will relocate autotransformers 7 and 11 within the limits of influence to avoid Telephone Wash and Kali Ditch, respectively, and to avoid other water resources (applies to Segment 3 only).

Mitigation Measure HYD-11: Minimize Impacts on Water Availability: During construction of the action alternatives, the contractor will obtain water from existing commercially available water sources. New groundwater wells or surface water impoundments would require subsequent environmental review as well as federal, state and local permits as appropriate and legally required.

3.9 GEOLOGY AND SOILS

This section discusses existing geological and soil conditions within the DesertXpress study area, the environmental consequences of implementation of the action alternatives, and appropriate mitigation measures. This section is based on research and analysis conducted by Ninyo and Moore in 2006 and 2007,[1] included as Appendix H.

The study area for geology and soils encompasses the footprint of the action alternatives including rail alignments, stations, and maintenance and ancillary facilities. In addition, the geologic and soil characteristics of the surrounding areas and Southwestern United States were evaluated and considered in order to better understand issues that may be encountered during construction and operation.

The action alternatives would be constructed and would operate within an area susceptible to numerous potential geologic and soil-related hazards. Such hazards include surface fault rupture, ground shaking, liquefaction, dam inundation, settlement, corrosive and/or expansive soils, landslides, area of soil cementation ("caliche"), shallow groundwater, ground fissures, and hazards related to tunneling. This section describes these impacts and related mitigation measures to reduce their potential adverse effects.

3.9.1 REGULATIONS AND STANDARDS

As stated in Chapter 1, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. However, existing building codes, municipal laws and legislative regulations present guideline for design parameters and construction activities related to geotechnical aspects of the proposed rail line and associated stations, maintenance facilities, and other ancillary features. Various public agencies would typically have regulatory authority over both construction and operational activities related to geotechnical aspects of the project. Such agencies may include:

- Incorporated cities: Victorville, Barstow, and Las Vegas
- San Bernardino County and Clark County
- The California Geological Survey (CGS)
- California Division of Occupational Safety and Health (DOSH)
- California Department of Transportation (Caltrans)
- Nevada Department of Transportation (NDOT)
- Nevada Bureau of Mines and Geology (NBMG)
- U.S. Department of Interior, Bureau of Land Management (BLM)

[1] Preliminary Geotechnical Evaluation, DesertXpress Rail Line, Victorville, California to Las Vegas, Nevada. Ninyo and Moore, 2007.

During the design and permitting stages of the project, STB and possibly some of the agencies listed above would have authority to review design plans and consultant reports for conformance with geotechnical-related issues of applicable geotechnical guidelines, codes, and legislative acts. Some regulatory agencies may seek third party review of project plans/reports.

During construction of the project, STB and possibly some of the agencies listed above would have authority to inspect various geotechnical and safety aspects of construction such as excavations for shallow and deep foundations of the rail system and associated structures, excavations of areas which would receive fill, tunneling excavations, and subsurface drainage improvements.

During project operation, some of the regulatory agencies listed above may have authority over operational activities related to geotechnical issues. For example, if a potential geotechnical hazard affected the operation of the proposed rail system, certain agencies may have authority over the inspection/testing of the system, or maintenance/repair of the system.

3.9.2 Methods of Evaluation of Impacts

This evaluation involved the review of readily available geologic and seismic literature, maps, conceptual plans of the action alternatives, and other relevant information. Literature reviewed included, but was not limited to the following: aerial photographs; geologic, seismic, and topographic maps, data, and other publications by the California Division of Mines and Geology (CDMG), CGS, United States Geological Survey (USGS), NBMG, the San Bernardino County General Plan Safety Element, and available geotechnical reports and as-built highway plans from Caltrans pertinent to the action alternatives.

3.9.3 Affected Environment

3.9.3.1 Regional Geography

The physical geography of the study area varies from low-lying valleys to higher elevation mountainous areas. Much of the area lies between elevations of about 2,000 and 4,000 feet above mean sea level (AMSL). The lowest elevation point is at approximate elevation 920 feet AMSL in Baker, California. The highest point is at the summit of the Mountain Pass area at an approximate elevation of 4,600 feet AMSL.

Surface conditions over much of the study area consist of open desert terrain comprising extensive soil and rock exposures.

Annual precipitation amounts vary across the region. Historic rainfall data show annual precipitation levels have ranged from 1 to 16 inches at the western end of the region and less than 1 inch to 9 inches at the eastern end. Rainfall data from points along the study area are shown in Table 3.9-1.

Table 3.9-1 Range of Annual Rainfall Totals at Selected Alignment Locations

Alignment Segment	Rainfall Station Location	Rainfall Record Years	Range Of Annual Rainfall Totals (Inches)
Segment 1	Victorville	1939 To 2006	1.23 To 15.98
Segment 2	Barstow	1960 To 2006	1.11 To 11.27
Segments 2 and 3	Yermo	1961 To 2006	0.36 To 8.03
Segment 3	Baker	1956 To 2006	0.40 To 7.52
Segment 4	Mountain Pass	1954 To 2006	2.29 To 14.32
Segment 5	Jean	1990 To 2006	0.16 To 8.38
Segment 6	Las Vegas (South)	1989 To 2006	0.44 To 9.10
Segment 6	Las Vegas (North)	1989 To 2006	0.64 To 7.09
Segment 7	Las Vegas (North)	1989 To 2006	0.64 To 7.09

Source: Ninyo & Moore, 2007.

3.9.3.2 Surface Water and Groundwater

The Mojave River is the major drainage crossing the region, originating in the San Bernardino Mountains and crossing the study area near Segment 2 just west of Barstow. The river terminates at Soda Lake near Baker. Much of the Mojave River flows underground, except where shallow bedrock causes water to surface or during periods of high rainfall or snowmelt.[2]

Numerous ephemeral (seasonal) streams and relatively shallow drainages cross the study area. Many of these streams and drainages are typically dry and will see relatively limited duration water flow during the rainy season. Surface flow within streams and washes within the study area typically occurs during or shortly after intense periods of rain. Some of the dry stream beds are susceptible to flash flooding. During periods of heavy rain, water may also pool in dry lake beds and in scattered low-lying areas within alluvial flood plains and washes.

Groundwater in the region is generally deep, typically on the order of a few hundred feet, although some exceptions do occur, based on varied topographic and geologic conditions. The depths to groundwater may be influenced by seasonal variations, precipitation, irrigation, soil/rock types, and groundwater pumping.

Shallow groundwater conditions are anticipated at the Mojave River and active washes as well as in places where groundwater is perched. San Bernardino County has indicated some locations within the study area with potential for shallow groundwater:

- Areas along the Mojave River (Segments 2A, 2B, 3A and 3B);
- Areas adjacent to faults that form groundwater barriers (which can cause groundwater to

[2] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

rise): areas southwest of the Calico and Lockhart faults (Segments 2A/2B);

- The Mojave River wash area (south of I-15 at Basin Road (Segments 3A/3B); and
- The area between Baker and Silver Lake (north end of Segments 3A/3B).

Caltrans log of test boring (LOTB) sheets for the corridor along I-15 contain information on groundwater encountered in borings, primarily in Segment 3 (the longest of all project segments). Table 3.9-2 below lists boring locations by segment, including the identified depth to groundwater.

Table 3.9-2. Depth To Groundwater in California Borings

Alignment Segment and Alternative, (location)	Structure at Boring Location	Boring Number (date)	Surface Elevation (feet)	Depth to Ground-water (feet)
Segment 2 (Barstow)	Hiker Ditch Bridge	B-1 (10/12/1994)	1,996	50
Segment 3 (Soda Mtns)	Marl Ditch Bridge	B-2 (2/2/1957)	1,451	11
Segment 3 (Soda Mtns)	Turtle Ditch Bridge	B-1 (2/1/1957)	1,328	21
Segment 3 (Soda Mtns)	Banner Ditch Bridge	B-1 (1/31/1957)	1,111	10
Segment 3 (Soda Lake)	Sheep Ditch Bridge	B-1 (1/31/1957)	1,067	3
Segment 3 (Soda Lake)	Mobi Ditch Bridge	B-1 (10/22/1956)	920	6
Segment 3 (Soda Lake)	West Baker Overpass	Various (3/25/1959)	921 (Avg)	26
Segment 3 (Baker)	Mojave River Bridge	Various (March 1959)	921 (Avg)	23 To 24
Segment 3 (Baker)	Baker Inn Ditch	B-1(8/20/1959)	944	30
Segment 3 (Halloran Springs)	Halloran Wash Bridge	B-5 (10/27/1956)	2,506	19
Segment 3 (Valley Wells)	Hot Wash Bridge	B-1 (10/26/1956)	3,711	13
Segment 3 (Valley Wells)	West Valley Wells Ditch Bridge	Various (Jan/Feb 1999)	3,700 (Avg)	55 To 74
Segment 3 (Valley Wells)	Valley Wells Ditch Bridge	Various (Feb/Mar 1999)	3,682 (Avg)	31 To 75
Segment 3 (Valley Wells)	Windmill Station Ditch Bridge	Various (Jan 1999)	3,697 (Avg)	63 To 72
Segment 3 (Valley Wells)	Wells Ditch Bridge	Various (Feb/Mar 1999)	3,697 (Avg)	26 To 34

Source: Caltrans LOTB sheets.

Groundwater contour maps from 1979 for the Las Vegas valley indicate that groundwater is 100 feet or deeper beneath the surface along Segment 6 from the southernmost portion of the valley to the Russell Road area. The maps also show that groundwater depth decreases closer to the City of Las Vegas, where groundwater can be found approximately 20 feet below ground surface.

3.9.3.3 Active and Potentially Active Faults: California Study Area

The California portion of the study area is a seismically active region where numerous active and potentially active faults have been mapped.

The CGS defines an "active" fault as one that has had surface displacement within the last 11,000 years (classified as Holocene time). CGS defines a fault as "potentially active" if it shows evidence of surface displacement during Quaternary time (roughly the last 1.6 million years) but for which evidence of Holocene movement has not been established. An inactive fault is one that has not shown evidence of surface displacement during the last 1.6 million years (classified as Quaternary time) but is a remnant of earlier tectonic activity.

Faults generally develop due to tectonic forces resulting in stresses and strains to earth materials. Over geologic time, the seismic environment of a geomorphic region can change due to regional tectonic changes, consequently changing the dynamics of tectonic forces on the rocks.

Table 3.9-3 lists principal regional faults in the California portion of the study area. Figure 3-9.1 shows the approximate locations of these faults within a 30 to 60 mile range of the action alternatives.

Table 3.9-3 Principal Regional Faults in California Study Area

Fault	**Approximate Distance to Project (miles)**	**Maximum Moment Magnitude (M_{max})**	**Fault Type**	**Slip Rate (mm/yr)**	**Historic Earthquakes**
Blackwater	6.8	7.1	SS	0.6	-
Burnt Mountain	58	6.5	SS	0.6	M7.3 Landers, 6/28/92
Calico-Hidalgo	0	7.3	SS	0.6	M5.3 Calico, 4/18/97
Camp Rock	8.5	7.5	SS	1.0	M7.3 Landers, 6/28/92
Clamshell – Sawpit	39	6.5	R	0.5	M5.8 Sierra Madre, 6/28/91
Cleghorn	17.9	6.5	SS	3.0	-
Cucamonga	27.7	6.9	R	5.0	-
Death Valley (South)	28.8	7.1	SS	4.0	-
Elsinore (Chino-Central Avenue)	>60	6.7	SS	1.0	-
Elsinore (Glen Ivy)	>60	6.8	SS	5.0	M6, 5/15/1910
Eureka Peak	58.8	6.4	SS	0.6	M7.3 Landers, 6/28/92
Garlock (East)	20.8	7.5	SS	7.0	-
Garlock (West)	20.8	7.3	SS	6.0	-
Gravel Hills–Harper Lake	0.3	7.1	SS	0.6	-
Helendale-South Lockhart	0	7.3	SS	0.6	-
Homestead Valley	>31	7.0	SS	0.5	M7.3 Landers, 6/28/92
Johnson Valley (Northern)	25	6.7	SS	0.6	M7.3 Landers, 6/28/92
Kickapoo (Landers)	41.8	7.3	SS	0.6	-
Lavic Lake	15.5	6.8	SS	0.8	M7.1 Hector Mine, 10/16/99
Lenwood-Lockhart-Old Woman	0.1	7.5	SS	0.6	-

Fault	Approximate Distance to Project (miles)	Maximum Moment Magnitude (M_{max})	Fault Type	Slip Rate (mm/yr)	Historic Earthquakes
Springs					
Little Lake	56.5	6.9	SS	0.7	-
Lockhart	0.3	7.5	SS	0.8	-
Manix	0	7.0	SS	0.1	M6.5 Manix, 4/10/47
Mt. General	0	N/A	SS	N/A	-
North Frontal Fault Zone (West)	11.3	7.2	R	1.0	-
North Frontal Fault Zone (East)	11.3	6.7	R	0.5	-
Owl Lake	44.3	6.5	SS	2.0	-
Panamint Valley	46.8	7.4	N	2.5	-
Pinto Mountain	47.5	7.2	SS	2.5	-
Pisgah-Bullion Mt.-Mesquite Lake	13	7.3	SS	0.6	-
Puente Hills Blind Thrust	>60	7.1	R	0.7	-
Raymond	47.7	6.5	RO	1.5	-
San Andreas (Mojave)	21.7	7.4	SS	30	M8 Fort Tejon, 1/9/1857
San Andreas (San Bernardino)	>60	7.5	SS	24	-
San Andreas (Coachella)	>60	7.2	SS	25	-
San Andreas (Cholame)	>60	7.3	SS	34	-
San Gabriel	24.5	7.2	SS	1.0	-
San Jacinto (San Bernardino)	23.5	6.7	SS	12	M6.3 Loma Linda, 7/22/1923
San Jacinto (San Jacinto Valley)	>60	6.9	SS	12	M6.8 San Jacinto, 4/21/1918
San Jacinto (Anza)	>60	7.2	SS	12	-
San Jose	38.5	6.4	RO	0.5	M4.7 Upland, 6/28/88 M5.4 Upland, 2/28/90
Sierra Madre	27.5	7.2	R	2.0	-
South Emerson-Copper Mountain	19.5	7.0	SS	0.6	M7.3 Landers, 6/28/92
Tank Canyon	50.4	6.4	N	1.0	-
Upper Elysian Park Blind Thrust	> 25	6.4	R	1.3	-
Verdugo	> 25	6.9	R	0.5	-
Whittier (Elsinore Fault Zone)	> 25	6.8	RO	2.5	M5, 5/15/1910

Notes:

Maximum moment magnitude is a measurement of the energy released in a seismic event.
Fault type abbreviations are: SS: Strike-slip R – Reverse N: Normal thrust RO; Reverse oblique For definitions of these terms, please refer to the Glossary
Slip rate refers to how fast the two sides of a fault are slipping relative to one another
Fault names shown in bold type comprise the Eastern California/Mojave Sheer Zone, discussed below.

Sources: Blake, T.F., 2001b. SCEC, 2007. Co. of San Bernardino, 2005. Ninyo & Moore, 2007.

Note: Please refer to Appendix A, which includes plan and profile drawings at 1"1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.

Source: Bell and Price 1992, NV Bureau of Mines & Geology 1996, CA Division of Mines & Geology 2000, DesertXpress 2007, ESRI 2005, NAIP 2003-2006, US Census Bureau

DesertXpress Project EIS

Principal Regional Faults in California Study Area

FIG 3-9.1

Source: Geographic Consulting 02/02/09

The three potentially active fault zones described below have had a dominant role in forming the present seismic environment of the region. The boundaries of earthquake fault zones are based on the presence of well-defined, active fault traces. Zone boundaries are typically 500 to 660 feet away from the fault traces and are positioned to accommodate imprecise locations of the faults and the possible existence of active branches.

The action alternatives would cross only one of these fault zones, the Eastern California/Mojave Shear Zone.

Eastern California/Mojave Shear Zone

The Eastern California/Mojave Shear Zone (ECMSZ) is an approximate 50-mile-wide zone of tectonic deformation that crosses the central Mojave Desert and is characterized by numerous northwest trending, right lateral, strike-slip faults roughly centered on Barstow. These faults are shown in bold type in Table 3.9-3 above.

The ECMSZ is estimated to accommodate between 9 and 23 percent of the relative motion between the Pacific and North American tectonic plates.[3] The action alternatives would cross the ECMSZ in Segments 1, 2, and 3, between Helendale and Manix, California. Several moderate to large earthquakes have ruptured faults within this region, including the M_{max} 7.3 Landers earthquake (6/28/1992), and the M_{max} 7.1 Hector Mine earthquake (10/16/1999). The Landers earthquake produced an approximate 53-mile-long surface rupture that averaged approximately 10 to 13 feet of slip and occurred along portions of the Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock faults.[4] These surface rupture areas occurred south of the study area.

On March 18, 1997, a M_{max} 5.3 earthquake occurred along the Calico fault approximately 12 miles east-northeast of Barstow. This earthquake was the last aftershock of the Landers earthquake of 1992 to reach M_{max} 5. Although there was no surface rupture attributed to this earthquake, the Calico fault had exhibited some triggered slip during the 1992 Landers event.[5]

San Andreas Fault Zone

The San Andreas Fault zone has long been recognized as the dominant seismotectonic feature in California. The fault is located approximately 21.3 miles southwest of the southwest end of the alignment. Two of California's three largest historic earthquakes occurred along the San Andreas: the 1906 San Francisco earthquake (approximately 400 miles from the study area) and the 1857 Fort Tejon earthquake (the closest surface rupture occurred in Wrightwood, approximately 60 miles from the southwest end of the alignment). The San Andreas is a right lateral strike-slip fault, capable of producing earthquakes in excess of M_{max} 7.5.

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[3] Southern California Earthquake Center, 2007, Faults of Southern California: http://www. scecdc.scec.org/faultmap.html.

[4] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

[5] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

Geologists infer that the segment of the San Andreas closest to the study area is currently locked and is accumulating substantial amounts of strain in response to the stresses generated by the relative movement between the Pacific and North American plates. The available geologic data indicate that this strain is released during infrequent major earthquakes (M_{max} 7 to 8+ events) rather than by more frequent smaller magnitude earthquakes.

Garlock Fault

The Garlock fault is a prominent fault in southern California and crosses the northern part of the Mojave Desert province. The east end of the fault is approximately 20 miles north-northwest of Segment 3. Although this fault has not produced large earthquakes in recorded history, geomorphic and stratigraphic evidence indicates such events occurred in earlier eras. A total of about 30 to 40 miles of left-lateral strike slip has been documented across this fault. The Garlock fault is considered capable of generating about a M_{max} 7.5 earthquake.

Active and Potentially Active Faults Crossing the Proposed Alignment

Several active faults cross the study area, most of which are northwest trending strike-slip faults associated with the ECMSZ. The State of California designates three of these faults (Helendale-South Lockhart, Mt. General, and Calico-Hidalgo) as Alquist-Priolo Earthquake Fault Zones. The Alquist-Priolo Special Studies Zone Act of 1972 prohibits construction of buildings used for human occupancy on the surface trace of active faults.[6] The following section discusses these three active faults as well as others in the vicinity that could contribute to seismic shaking along the corridor. The locations of these faults are shown in Figure 3-9.1.

The active **Helendale-South Lockhart** fault is a right-lateral, strike-slip fault about 56 miles in length and may form a roughly continuous fault system with the active South Lockhart fault located northwest of the study area.[7] These faults could rupture together during an earthquake and are considered capable of producing a M_{max} 7.3 earthquake. Segment 1 would cross an active portion of the Helendale-South Lockhart Fault.

The active **Mt. General** fault is a right-lateral, strike-slip fault approximately 13 miles in length and is considered to have ruptured in the Holocene period along the middle section of the fault.[8] This fault is designated by the state as an Earthquake Fault Zone.

The active **Calico-Hidalgo** fault zone, source of the 1997 Calico Earthquake (M_{max} 5.3), is a right-lateral, strike-slip fault approximately 34 miles in length. The slip rate along this fault is estimated to be approximately 0.6 millimeters per year (mm/yr) and the fault is estimated to be capable of producing a M_{max} 7.3 earthquake. This fault exhibited triggered slip during the 1992 Landers earthquake. This fault zone could rupture simultaneously with the West Calico and

[6] Hart, E.W., and Bryant, W.A., 1997, Fault-Rupture Hazard Zones in California, Alquist-Priolo Special Studies Zone Act of 1972 with Index to Special Studies Zones Maps: California Division of Mines and Geology, Special Publication 42.

[7] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

[8] Southern California Earthquake Center, 2007, Faults of Southern California: http://www. scecdc.scec.org/faultmap.html.

Hidalgo faults to the south.[9]

The potentially active **Gravel Hills-Harper Lake** fault is a fragmented fault about 43 miles in length. The slip rate of this right-lateral, strike-slip fault is estimated to be approximately 0.6 mm/yr, and the fault is considered capable of producing a M_{max} 7.1 earthquake. Active portions of the Gravel Hills-Harper Lake fault are located to the northwest of the study area.

The active **Lenwood-Lockhart-Old Woman Springs** faults are prominent right-lateral, strike-slip faults that may form a continuous system crossing Segments 2A/2B near the community of Lenwood.[10] The Lenwood fault extends for a length of about 47 miles and is reported to have experienced some triggered slip, or creep, in the community of Lenwood in 1992 due to the Landers earthquake.[11] The Lockhart fault extends for a length of about 44 miles northwest of the communities of Lenwood and Barstow. These faults are considered capable of producing a M_{max} 7.5 earthquake.

The active **Manix** fault is a left-lateral, strike slip fault that is located on the southeast side of and is sub-parallel to I-15 in the community of Manix between Barstow and Baker, California. The fault is roughly broken into thirds, with a total length of about 22 miles. Fault maps indicate that the west/southwest end of the Manix fault that crosses the study area is active.[12] The State of California Earthquake Fault Zone for this fault is approximately 4½ miles long and is located on a segment of the fault located approximately 1.3 miles southwest of the study area in Manix. On April 10, 1947, a M_{max} 6.5 earthquake occurred on the Manix fault. The length of the surface rupture was about 3 miles, and the maximum slip was about 5 centimeters.[13] The rupture was located on the zoned segment of the fault. The Manix fault is considered capable of producing a M_{max} 7.0 earthquake.

The potentially active **Baker** fault is not well documented. According to the Southern California Earthquake Center (SCEC), the fault type is uncertain but is probably a right-lateral, strike-slip fault of approximately 28 miles length. It may have ruptured in late-Quaternary time at its southern end. The **Stateline** fault is a concealed, potentially active fault, and is also limited in documentation.[14] A concealed, potentially active fault is mapped in the Cronese Valley. This fault is unnamed, and there is no information about it within the State references reviewed.[15]

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[9] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

[10] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

[11] Ibid.

[12] Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology, California Geologic Data Map Series, Map No. 6, Scale 1:750,000.

[13] County of San Bernardino, 2005d, Safety Background Report, General Plan, Sections 7.1-7.1.2.1

[14] Jennings, C.W., 1994, Map No. 6.

[15] Jennings, C.W., 1994, Map No. 6.

3.9.3.4 Active and Potentially Active Faults: Nevada Study Area

Faults in the Nevada portion of the study area are indicated as active or potentially active on some geologic maps. However, activity on these faults is attributed to land subsidence, not tectonic activity. There is some controversy among Nevada geologists as to the origin of these faults, which are sometimes referred to as “compaction faults.” Differing proposed origins for these faults include the following:

- Differential consolidation or compaction over time of the thick alluvial and lakebed sediments in the Las Vegas Valley.
- Tectonic factors associated with faults that may extend into the basement bedrock beneath the valley’s sediment.
- A combination of differential consolidation and tectonic factors.

Figures 3-9.2a and 3-9.2b show these faults and earth fissures and their relationship to Nevada portions of the study area.

3.9.3.5 Regional Geological Conditions

With limited exceptions, the action alternatives are within broadly similar geologic settings.

The study area is within two geomorphic regions characterized by the morphology of the landforms, the general type and age of the geologic materials, and by tectonic-structural features. Generally speaking, the California portion of the study area is within the Mojave Desert Geomorphic Province, and the Nevada portion of the study area is within the Basin and Range Geomorphic Province. There is a transitional physiographic area between these provinces, although the state line is a commonly used boundary.

Both regions are characterized by mountain ranges and hills of moderate relief that are partially buried and separated by broad alluviated basins. The Basin and Range province includes a large part of the southwestern United States in which elongated mountain ranges are separated by broad, nearly flat valleys.[16] In contrast, valleys in the Mojave Desert province are proportionally broader and mountains are more widely spaced and the mountains generally do not stand as high above their surroundings. Mountain ranges in the Mojave Desert province show less consistency in orientation than those of the Basin and Range province.[17]

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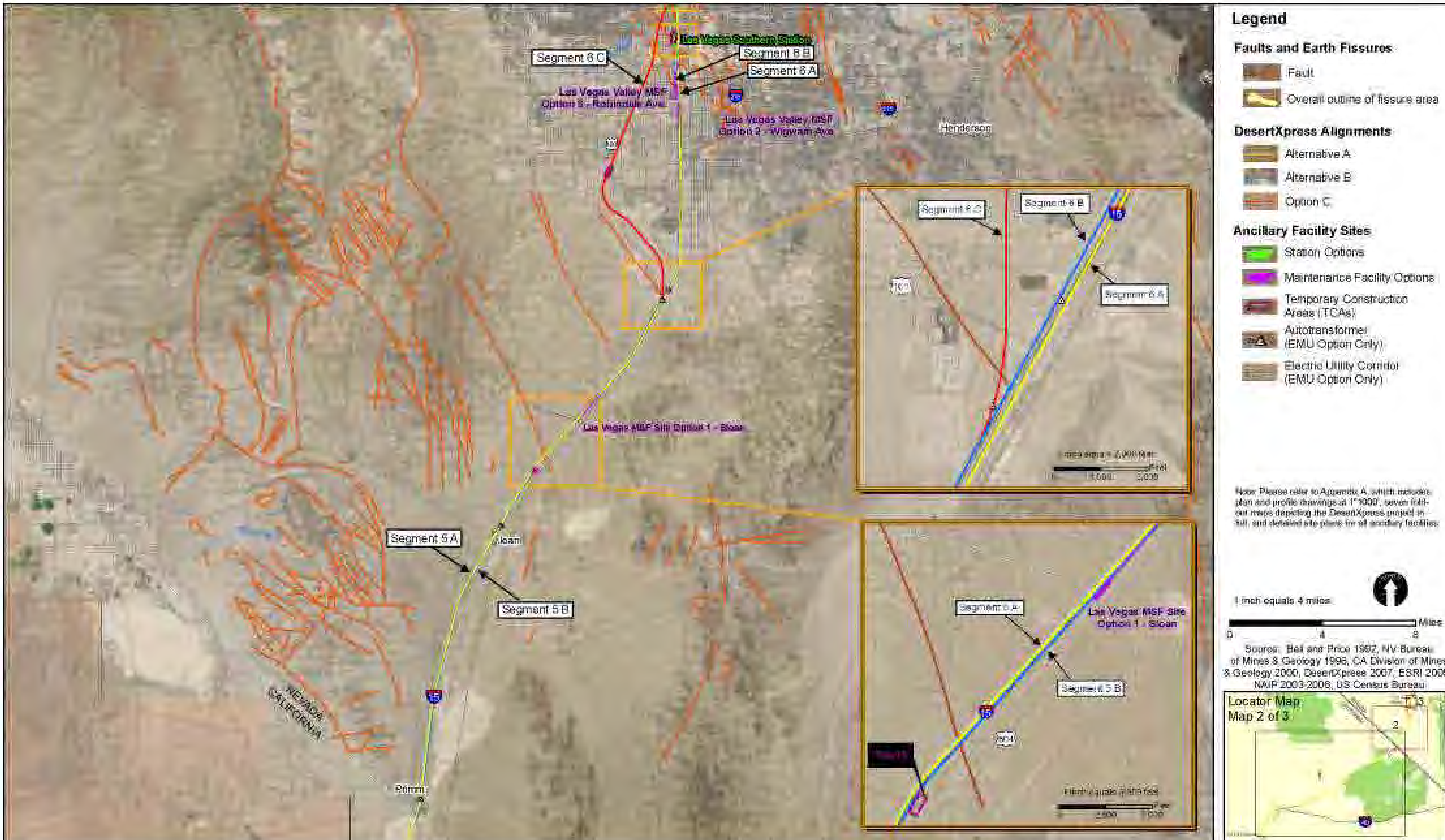
[16] Norris, R.M., and Webb, R.W., 1990, Geology of California: John Wiley & Sons, 541 pp.

[17] Ibid.



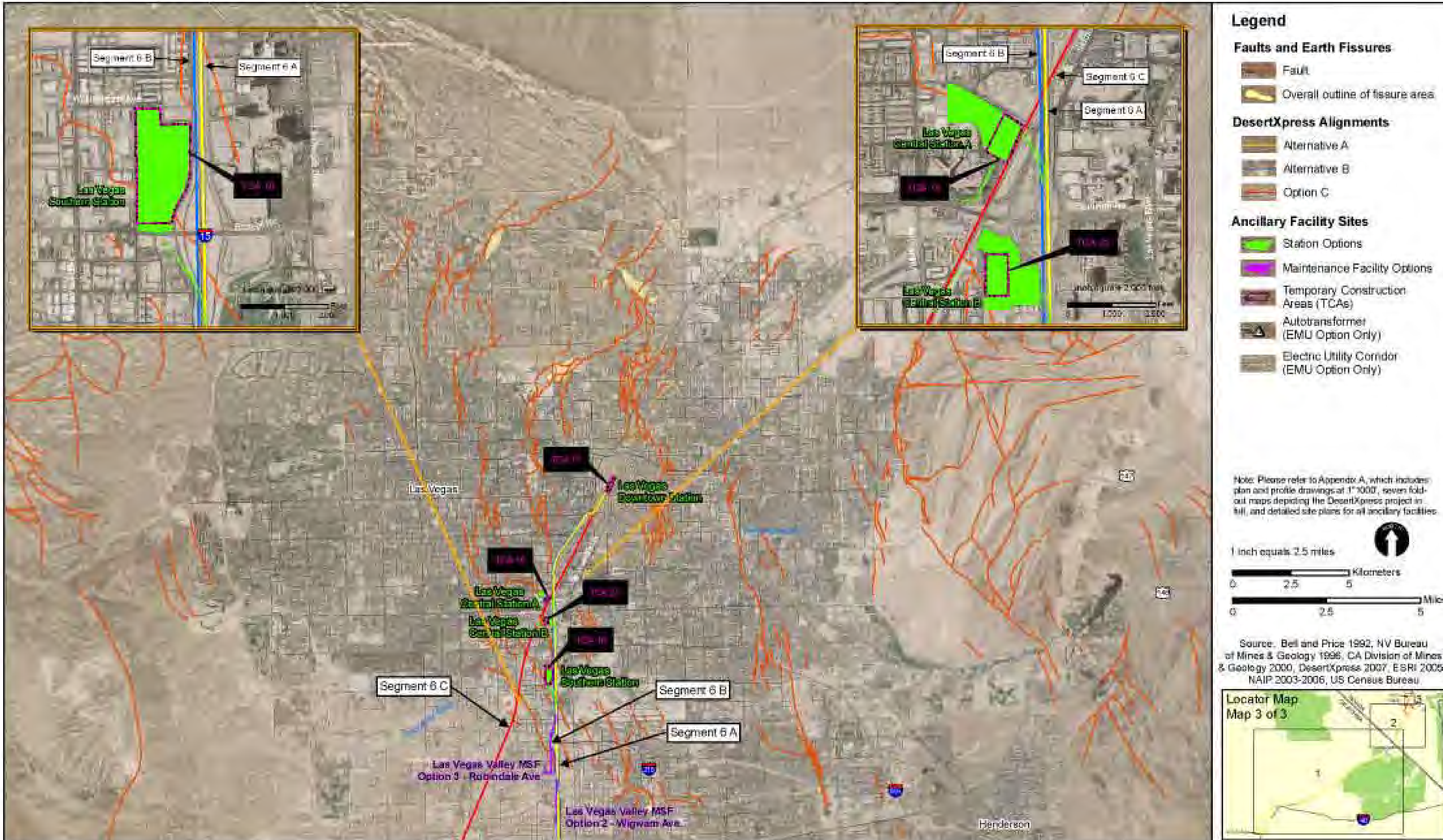
Note: Please refer to Appendix A, which includes plan and profile drawings at 1"1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.

Federal Railroad Administration

DesertXpress Project EIS

Nevada Faults and Earth Fissures (1)

FIG 3-9.2a



DesertXpress Project EIS

Nevada Faults and Earth Fissures (2)

FIG 3-9.2b

Source: Geografika Consulting 02.02.09

The mountain ranges and hills of the region are comprised primarily of Mesozoic era (65 to 245 million years old) granitic and volcanic rocks and Paleozoic era (245 to 570 million years old) metamorphic rocks. These rocks generally include Mesozoic era granite, quartz monzonite, and porphyritic volcanic rocks and Paleozoic era gneiss and limestone. Some Tertiary age (2 to 65 million years old) surface exposures of non-marine volcanic and sedimentary rocks are near Segment 2 east of Barstow, Segment 3 (Soda Mountains), and Segment 5 (Jean Hills).

Valleys, drainage areas, and alluvial fans along the flanks of mountains and valleys within the study area are underlain at depth by the basement rocks described above but have been filled by Quaternary age (last 2 million years) alluvium and other sediments. The Quaternary deposits are generally subdivided into two stratigraphic units according to relative age: younger Holocene deposits (last 11,000 years) and older Pleistocene (11,000 to 2 million years ago) age deposits. Holocene deposits typically consisting of relatively young, poorly consolidated or unconsolidated silt, sand, and gravel are anticipated to be present in washes, valley bottoms, lake beds, and include river sands and Aeolian (wind-blown) sands. Pleistocene age alluvial deposits generally consist of gravel, sand, silt, and clay that is moderately to well consolidated and often slightly cemented. These materials include older alluvial fan deposits, continental terrace deposits, and older lacustrine (lake) or playa deposits.

The majority of the study area extends across alluviated areas in the Mojave River Valley, Cronese Valley, the Baker/Halloran Springs Valley, Shadow Valley, Ivanpah Valley, and the Las Vegas Valley which are underlain by Quaternary alluvial sediments, with the exception of local outcrops and exposures of rock units. Geologic maps indicate that some of the study area is underlain by shallow rock formations that may be encountered at the ground surface.

Figures 3-9.3 through 3-9.6 show regional geologic maps of the study area. The surficial geology of each segment is described in more detail below.

Potential Geology- and Soils-Related Hazards

Many geologic and soils related hazards have the potential to adversely affect the action alternatives. These hazards are discussed below.

Surface Fault Rupture: Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake. Evaluation of the potential hazard of surface fault rupture is based on the concepts of recency and recurrence of faulting along existing faults. In general, the more recent the faulting, the greater the probability for future faulting.[18] Faults of known historic activity during the last 200 years, as a class, have a greater probability for future activity than faults classified as Holocene age (last 11,000 years) and a much greater probability of future activity than faults classified as Quaternary age (last 1.6 million years). However, it should be kept in mind that certain faults have recurrent activity measured in tens or hundreds of years whereas other faults may be inactive for thousands of years before being reactivated. The magnitude, sense, and nature of fault rupture also vary for

[18] Allen, C.R., 1975, Geologic Criteria for Evaluating Seismicity: Geological Society of America Bulletin, v. 86, pp. 1041-1056.

different faults or even along different strands of the same fault. Even so, future faulting generally is expected to recur along pre-existing faults.[19] The development of a new fault or reactivation of a long-inactive fault is relatively uncommon and generally need not be a consideration in project design.

During an earthquake on one of the active faults that cross the study area, potential surface rupture of the fault would manifest in relative displacement of ground across the fault surface. Typically, since the active faults crossing the alignment are strike-slip faults, the displacement would be anticipated in a horizontal direction, but some vertical component of offset may occur.

Fault rupture damage could include offset/damage to portions of at-grade rail lines where they cross the fault rupture; damage to structural elements of the rail line such as aerial guideways or bridges that are placed across a fault rupture; or damage to facilities built across a fault rupture.

The greatest probability for surface fault rupture within the study area is along active faults (Holocene-age), particularly along active faults designated as Alquist-Priolo Earthquake Fault Zones. Active faults crossing the alignment are shown on Figure 3.9-1.[20] Faults in the Las Vegas Valley are indicated as active on the geologic maps reviewed, but the activity is attributed to subsidence, and not tectonic activity, and the potential for surface rupture due to an earthquake is considered low.

Ground Shaking: Ground shaking is the response of the surface to the passing of earthquake wave fronts radiating from the focus of the earthquake. The period of shaking corresponds with the passage of the seismic wave through the site. Strong ground shaking could follow an earthquake along one of the regional active or potentially active faults within the study area. Disregarding local variations in ground conditions, the intensity of shaking can generally be expected to decrease with distance away from an earthquake source. Ground shaking could cause damage in the form of misaligned rail lines and other structural elements, cracks in concrete foundations, walls and structures, and damage to buildings.

Table 3.9-4 summarizes estimated peak horizontal ground accelerations by segment. Higher acceleration rates suggest greater risks relative to ground shaking.

[19] Bonilla, M.G., 1970, Surface Faulting and Related Effects in Wiegel, R.L., Editor, Earthquake Engineering: Prentice Hall, p. 47-74.

[20] Faults in the Las Vegas Valley are indicated as active on the geologic maps reviewed, but the activity is attributed to subsidence, and not tectonic activity, and the potential for surface rupture due to an earthquake is considered low.

Table 3.9-4 Estimated Peak Horizontal Ground Accelerations Anticipated Along Segments of the Alignment

Segment Portion	Estimated Peak Horizontal Ground Accelerations (%G)[1]
Segment 1	0.4 To 0.6 G
Segment 2	0.5 To 0.6 G
Segment 3 (Yermo to Manix)	0.5 To 0.6 G
Segment 3 (Manix to Baker)	0.3 To 0.5 G
Segment 3 (Points northeast Of Baker)	0.2 To 0.3 G
Segment 4 (Mountain Pass)	0.3 To 0.4 G
Segment 4 (Ivanpah Valley)	0.4 To 0.6 G
Segment 5 (Ivanpah Valley)	0.2 To 0.6 G
Segment 5 (North of Ivanpah Valley)	0.1 To 0.2 G
Segment 6 (Las Vegas Valley)	0.1 To 0.2 G [2]
Segment 7 (City Of Las Vegas)	0.1 To 0.2 G [2]

[1] Mualchin, L., 1996a, California Seismic Hazard Detail Index Map, dated July 1996 (Rev. 1).

[2] USGS, 1997 (2002rev), National Seismic Hazard Mapping Project, http://geohazards.cr.usgs.gov.eq.

Source: Ninyo & Moore, 2007.

Liquefaction: Liquefaction is a phenomenon in which soil loses its shear strength for short periods of time during an earthquake. Ground shaking of sufficient duration can result in the loss of grain-to-grain contact, due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for short periods of time. To be susceptible to liquefaction, a soil is typically cohesionless, with a grain size distribution of a specified range (generally sand and silt), loose to medium dense, below the groundwater table, and subjected to a sufficient magnitude and duration of ground shaking. Liquefaction-related damage could include loss of support beneath foundations and other rail improvements from differential settlement, cracking of structure slabs from sand boiling, buckling of deep foundations due to liquefaction-induced ground settlement, and lateral spreading along embankments and natural slopes along drainages.

The State of California Seismic Hazards Mapping Program produces maps identifying areas of the state susceptible to liquefaction but has not yet produced maps of the relatively less populated desert areas including the study area. San Bernardino County has identified some areas within the study area with potential for liquefaction based on where alluvial soils exist with shallow groundwater. These areas include the banks of the Mojave River; the Mojave River Wash, lands adjacent to faults that form groundwater barriers (which can cause groundwater to rise), such as areas southwest of the Calico fault near Barstow and southwest of the Lockhart fault west of Barstow; and the area between Baker and north toward Silver Lake.

The Nevada portion of the study area is underlain by a relatively deep groundwater table. Areas of relatively shallow groundwater may exist along the alignment, particularly in the Roach Lake area and the Las Vegas Valley near the north end of the project, and these areas may have potential for liquefaction.

Dam Inundation: California dams are monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard against the threat of dam failure. Current design and construction practices, and ongoing programs of review, modification, seismic retrofitting or total reconstruction of existing dams are intended to see that dams are capable of withstanding the maximum credible earthquake (MCE) for the site.

San Bernardino County has identified lands within the study area with potential for inundation in the event of dam failure. County mapping data indicate the inundation would potentially occur from Lake Arrowhead and Silverado Lake in the San Bernardino Mountains south of the project area. The data indicate that inundation from these lakes would occur along the Mojave River in the project area between Victorville and Baker, which is the drainage course of the lakes. Since the potential inundation would occur along the Mojave River, portions of the following segments could be affected.

- Segments 2A/2B
- Portions of Segments 3A/3B, located near the Cronese Valley and Soda Lake

Settlement (natural soils and undocumented fill): Much of the study area is mantled by young alluvial soils, which are generally poorly consolidated, reflecting a history without substantial loading. The older alluvial deposits present in the project area are generally relatively dense or weakly cemented and less compressible than the young alluvial soils. However, older alluvial deposits may include potentially collapsible layers above groundwater tables. Collapsible soils are distinguished by their potential to undergo a significant decrease in volume upon an increase in moisture content, even without an increase in external loads.

Portions of the study area contain existing fill soils associated with roadway construction, railway construction, property and structure development, utilities, and other factors. The degree of compaction, material types, and underlying ground conditions of existing fill soils is unknown. Undocumented or poorly compacted fill may be present in these areas. In addition, the alignment transitions between highly variable materials ranging from loose soils to hard rock, and the potential for differential ground movement can exist at these transitions.

Differential settlement of soils can cause damage to proposed improvements including concrete structures and foundations, railway alignment, retaining walls, associated station and maintenance structures and pavements. Potential settlement and/or collapsible soils should be a consideration in design and construction of planned improvements with shallow footings or foundations. Potential settlement of surficial soils is generally not a constraint for construction of deep foundations, tunnels and other deep structures.

Corrosive Soils: Especially in areas of shallow groundwater, corrosive soils present a potential hazard to concrete and metal foundations, utilities, and other buried improvements. Corrosive soils could cause premature deterioration of underground structures.

Expansive Soils: Expansive soils can undergo significant volume change (shrink or swell) due to variations in moisture content. Earth materials susceptible to these volumetric changes include soils and rock formations containing clays. Changes in soil moisture content can result from rainfall, irrigation, utility leakage, surface drainage, perched groundwater, drought, or other factors.

Volumetric change of expansive soil may cause excessive cracking and heaving of structures with shallow foundations, tunnel walls, concrete slabs-on-grade, or pavements supported on these materials. The potential impact of expansive soils is low for deep foundations such as for bridges and aerial guideways, since volumetric changes of expansive soils diminish with overburden depth.

Landslides: Landslides typically occur in areas of steep slopes where underlying earth materials are relatively weak and particularly where high rainfall occurs and/or high groundwater levels are present. Ground shaking due to earthquakes can also cause landslides to develop or trigger landslides that are incipient. Landslides can consist of rock falls, shallow slumps, flows and erosional failures, or deeper-seated rotational and block failures. Shallow failures are typically caused by high incident rainfall or concentrated surface runoff conditions that weaken surficial materials. Rotational and block-type slides form deeper within the ground, typically within rock formations, and are generally related to discontinuities in the rock that manifest into a sliding surface. Rainfall and other water infiltration into the ground can exacerbate and trigger these deeper sliding conditions.

Slope areas within the study area, including constructed cut slopes, fill slopes, natural slopes and rail embankments could potentially be affected by landsliding or surficial slope failures. Slopes may have potential for surficial slope failures during rainfall. Slopes cut in bedrock may be subject to rock fall, rock slides, or other rock slope failures where discontinuities, such as joints and fractures, or weathered rock are encountered. Landslides and surficial slope failures, if not mitigated, can cause damage to slopes, embankments, the rail alignment, foundations and other structures that are upon or impacted by the landslide. A landslide could potentially bury the rail alignment, rendering it non-operational until the landslide debris is removed.

Geologic reports do not indicate the presence of landslide deposits along the action alternatives. Due to the relatively flat-lying nature of the majority of the proposed rail alignment, landslide hazards should not be a significant constraint to construction or implementation. Low average annual precipitation levels in the project area further reduce the hazard of shallow type slope failures, except in areas of moderately steep to steep terrain, such especially Segment 4B near Mountain Pass.

Surface soils along the action alternatives are primarily comprised of sands with variable amounts of gravel, and some fine-grained silt and clay soils. Sandy soils typically have low cohesion, and have a relatively high potential for erosion from surface runoff when exposed in cut slopes or utilized near the face of fill embankments. Sandy soils are also more susceptible to shallow slumps and other surficial failures when saturated by rain or heavy irrigation.

Ground Fissures: Ground fissures, caused by differential stress resulting from regional and local subsidence associated with withdrawal of groundwater may occur near faults in the Las Vegas Valley. Differential movement associated with ground fissures could cause damage to surface planned improvements such as rail alignment, shallow foundations, pavements, as well as the potential Las Vegas maintenance facility and station sites.

Caliche/Hard Rock Excavation: Caliche layers contain calcareous cementation which can be moderately hard, hard, and very hard and may range in thickness from a few inches to several feet. Generally speaking, the hardness of caliche is directly related to its age. It is anticipated that the Quaternary alluvium in the desert of southern Nevada contains scattered layers of caliche that will likely be encountered during construction. These soils may be resistant to excavation, and may pose an impact on construction techniques for both shallow and deep improvements for the rail system in the Las Vegas Valley.

In addition to caliche, portions of the study area are underlain by crystalline bedrock, and other rock types that may be hard. Depending on the depth of excavation into these materials, moderate to difficult excavation may be encountered.

Shallow Groundwater: Shallow groundwater can also impact ground stability, and foundation design of proposed improvements, as well as the methods and costs of construction. If not adequately monitored by the contractor, dewatering of excavations could induce consolidation of the underlying soils, which could cause differential settlement of existing structures and improvements located near the excavation. The amount of consolidation due to dewatering would depend on many factors, including the aerial extent and depth of dewatering, soil type, soil density, and the methods used by the dewatering contractor. Excavations for the underground structures will need to be performed with care to reduce the potential for lateral deflection of excavation sidewalls and/or shoring, which could also cause differential movement of structures located near the excavation.

Excavations extending below the groundwater table for deep foundations in areas with anticipated shallow groundwater, such as the Mojave River bridge and aerial guideways in Las Vegas, may need to be cased/shored and/or dewatered below the groundwater to maintain stability of the excavations and provide access for construction. Areas of shallow excavation and construction would be less affected by shallow groundwater.

3.9.3.6 Geologic Conditions by Segment

This section describes the geology within each segment of the study area. Tables list the geologic unit type and the age and description of geologic units mapped within each segment.

Segment 1

Segment 1 is underlain by both alluvial sediments and older Mesozoic age granitic, volcanic, and metavolcanic rocks. The alluvial deposits include younger Holocene wash sediments (Qw) and valley sediments (Q, Qa), older Pleistocene valley and fan sediments (Qo, Qoa, Qod), and alluvial fanglomerate deposits (Qof). Underlying these alluvial sediments at a relatively shallow depth (and exposed in some places) are granitic quartz monzonite, hornblende diorite-gabbro and granite (KJqm, Qm, Gqm, Hd) and porphyritic metavolcanic rock (Mzv, Lp, Pf). Caltrans LOTB sheets for this area indicate the presence of alluvial sands and gravel of varying density. Weathered granitic rock was encountered in borings at Wild Wash Bridge at depths ranging from 10 to 19 feet below ground surface (bgs) and at a depth of 28 feet bgs in a boring located at

Bell Mountain Wash Bridge.[21]

Table 3.9-5 lists the geologic unit, geologic age, and description of geologic units anticipated in Segment 1. Figure 3-9.3 is a regional geologic map including Segment 1.

Table 3.9-5 Geologic Units Segment 1

Segment	Geologic Unit (Symbol[s])	Geologic Age	Description
Common to Segment 1	Younger alluvial valley sediments (Q, Qa)	Holocene	Unconsolidated, poorly sorted alluvial silt, sand and gravel
	Younger alluvial river/wash deposits (Qw)	Holocene	Alluvial wash deposits.
	Older alluvial valley and fan sediments (Qo, Qoa, Qod)	Pleistocene	Weakly consolidated dissected alluvial gravel, sand, and silt derived mainly from granitic and metamorphic rocks of San Gabriel /San Bernardino Mtns.
	Older alluvial fanglomerate (Qof)	Pleistocene	Cobble fanglomerate and gravel derived from metavolcanic rocks.
	Quartz Monzonite (KJqm, Qm, Gqm, Hd)	Cretaceous - Late Jurassic	Intrusive igneous (Granitic) rock, quartz monzonite, hornblende diorite-gabbro, granite.
	Metavolcanic rocks (Mzv, Lp, Pf)	Mesozoic	Porphyritic volcanic and metavolcanic rocks. Includes Sidewinder Volcanic Series (Bowen, 1954), and Oro Grande (Hershey, 1902)

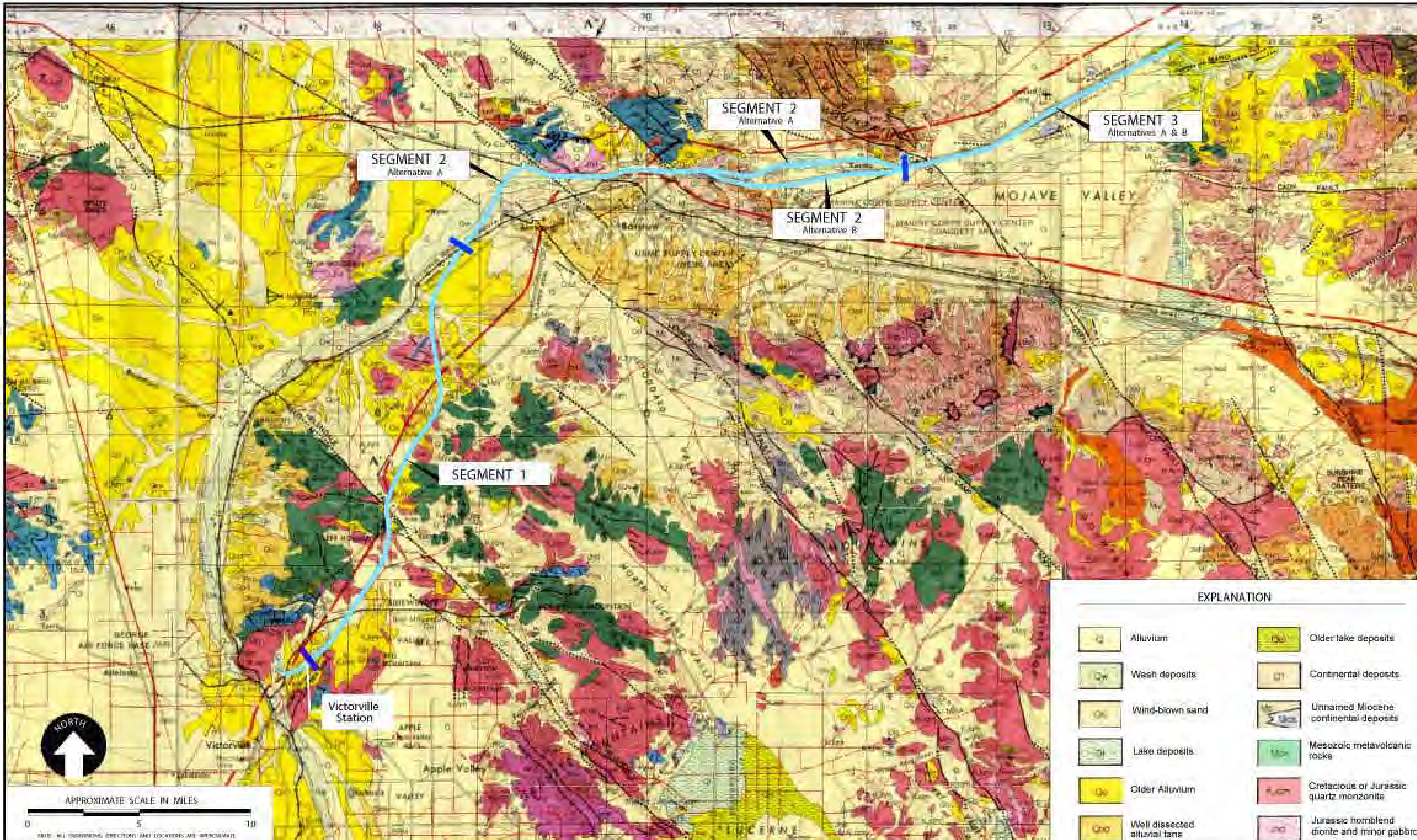
Source: Ninyo & Moore, 2007.

Segment 2

Segments 2A and 2B are the same until the west side of the small drainage valley east of Barstow. At this location, Segment 2A diverts approximately 0.75 miles to the north of Segment 2B; the two segments then run parallel to Yermo.

Three geologic units that underlie the westernmost portion of this: 1) Mojave River sediments along the southeast and north banks of the river, 2) an exposure of sedimentary and volcanic rocks east of Barstow, and 3) valley alluvium sediments in the small drainage valley west of Yermo.

[21] Borings at Stoddard Wells Road, the Riverside Cement Company overcrossing, and Hodge Road.



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Regional Geological Map

FIG 3.9-3

The southeast bank of the Mojave River and a small area of the north river bank at the planned bridge crossing are underlain by deposits of Aeolian sands (Qs). On the north side of the Mojave River, this segment is underlain by river sands (Qrs, Qw) and alluvial valley deposits (Q, Qa). At depth, this segment is underlain by older Mesozoic age granitic rocks (Jhd, qm, hd) and Paleozoic age metamorphic gneiss (wg) that are exposed within portions of this segment. East of the Mojave River, soils are composed of older alluvial valley sediments (Qof, Qoc, QT).

Just east of Barstow, Segments 2A/2B would cross an area of exposed Tertiary age, volcanic and sedimentary rocks (Mc, Mi, Tt, Tat, Tls, Td, Ts, Tsl). In the small drainage valley east of this rock exposure, Segments 2A/2B crosses alluvial deposits consisting of young fan and valley sediments (Q, Qa), and a clay unit deposited from a playa or small lake bed (Qc, Ql). Northeast of Yermo, soils are underlain by older alluvium (Qo, Qoa) and fan gravel (Qf) on the southeast flank of the Calico Mountains. This older alluvium and fan gravel mantles the formational Tertiary volcanic and sedimentary rock that comprises the Calico Mountains.

Per Caltrans LOTB sheets, two borings in this area (at the I-15/Old Highway 58 interchange) encountered sandy to clayey gravel, gravelly sand, and silt to depths ranging from 27 to 34 feet bgs. Sandy claystone to clayey siltstone was encountered in these borings between 27 and 58 feet bgs, and highly weathered rhyodacite rock (intrusive volcanic rock) was encountered at depths below 53 feet.

Further east, Segment 2B is underlain by a formation of volcanic and sedimentary rocks (Mc, Mi, Tt, Tat, Tls, Td, Ts, Tsl). East of the rock formation area in the small drainage valley, Segment 2B is underlain by young valley sediments (Q, Qa). It then crosses the east finger of a clay unit (Ql, Qc) that also underlies Segment 2A. Northeast of Yermo, Segment 2B is underlain by older fan gravel (Qf) on the southeast flank of the Calico Mountains. The older fan gravel unit mantles the formational Tertiary volcanic and sedimentary rock of the Calico Mountains.

Per Caltrans LOTB sheets, borings located along this segment (at Ghost Town Road, Calico Road, First Street, Yermo Ditch Bridge, and East Yermo) encountered alluvial sands and gravel of varying density, and some interbedded clay. Bedrock was not encountered in the 34 to 60 foot borings taken in the area of this segment. Table 3.9-6 lists geologic units, their age, and descriptions; these are illustrated in Figure 3-9.3.

Table 3.9-6 Geologic Units Segments 2A/2B

Segments	Geologic Unit (Symbol[s])	Geologic Age	Description
Common to Segments 2A and 2B	Younger alluvial river/wash Sediments (Qrs, Qw)	Holocene	Alluvial wash sediments and river sand; Mojave River sand.
	Younger alluvial valley/fan sediments (Q, Qa)	Holocene	Unconsolidated, poorly sorted alluvial silt, sand, and gravel sediments.
	Younger alluvial valley sediments (Ql, Qc)	Holocene	Lake deposits, clay of small playas.
	Younger alluvial fan sediments (Qf)	Holocene	Fan gravel.
Unique to	Aeolian Deposits (Qs)	Holocene	Wind-blown sand.

Table 3.9-6 Geologic Units Segments 2A/2B

Segments	Geologic Unit (Symbol[s])	Geologic Age	Description
Segment 2A	Older Alluvial Sediments (Qo, Qoa)	Pleistocene	Dissected alluvial fan material composed of gravel, sand, and some boulders.
	Older Alluvial Valley Sediments (Qof, Qoc, Qt)	Pleistocene	Fanglomerate and gravel (Qof); clay and marl (Qoc); continental deposits of gravel, sand, silt and clay (Qt).
	Granitic Rocks (Jhd, Qm, Hd)	Cretaceous - Late Jurassic	Intrusive igneous (granitic) hornblende diorite-gabbro; quartz monzonite.
	Metavolcanic Rocks (Mzv, Ql, Ap)	Mesozoic	Porphyritic volcanic and metavolcanic rocks, andesitic to latite porphyry.
	Granitic Gneiss (Wg)	Paleozoic	Waterman gneiss of Bowen, 1954: metamorphosed quartz diorite gneiss.

Source: Ninyo & Moore, 2007.

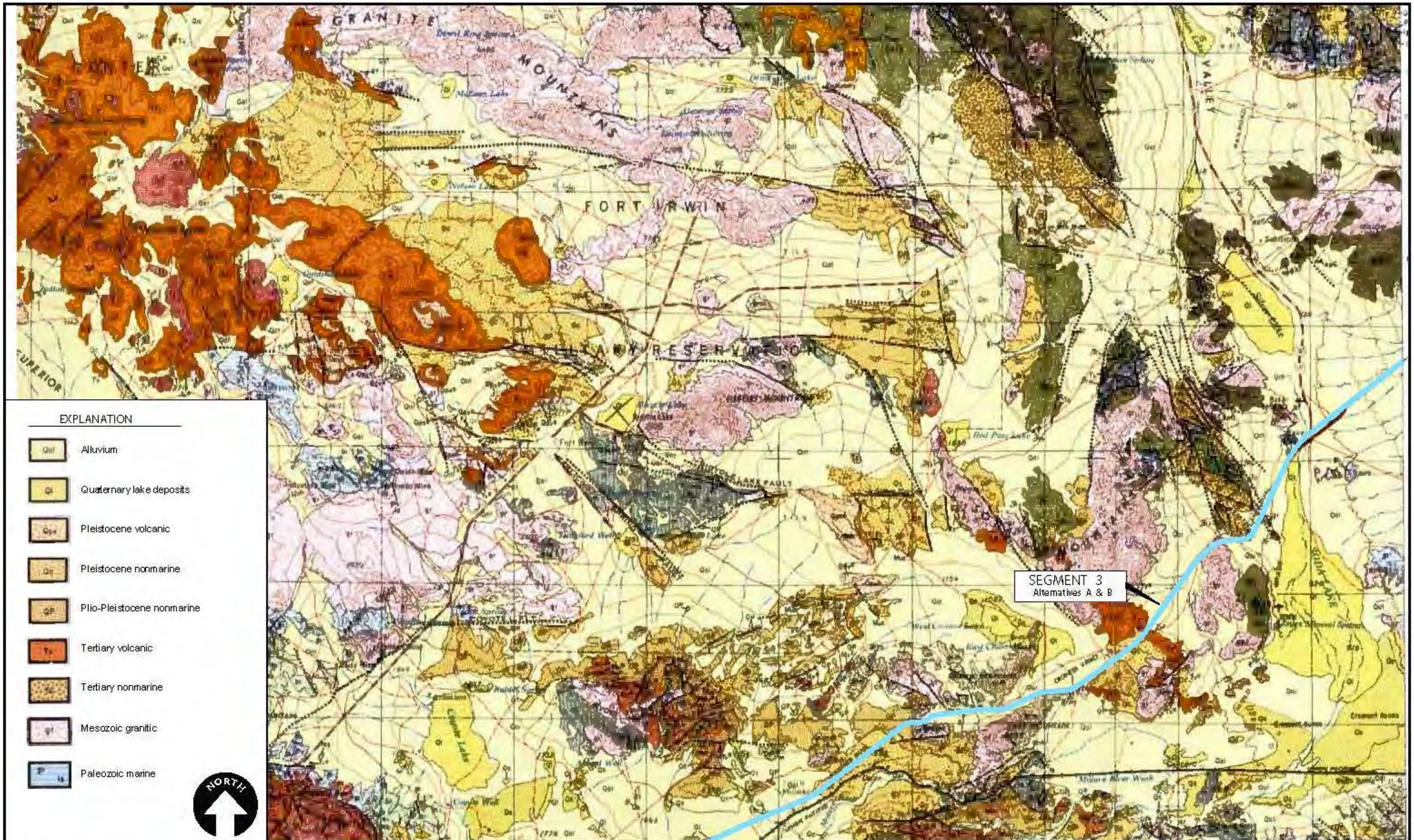
Segment 3

Segment 3A would be in the I-15 median; Segment 3B would run along the north side of the I-15 generally with the existing freeway right-of-way. As the two segments are in close proximity to each other (generally within 200 feet of each other), they are evaluated here as a single segment; but the segments are divided into several zones to facilitate analysis:

- Yermo to Baker
- Baker to Halloran Summit
- Halloran Summit to Mountain Pass
- Mountain Pass area

Figures 3-9.3 and 3-9.4 include geologic mapping of Segments 3A/3B.

Yermo to Baker: Southwest of Manix, soils are underlain primarily by younger alluvial valley and fan sediments (Q, Qa, Qal, Qf), and partially by older fanglomerate and gravel alluvium in (Qof, QT). Northeast of Manix, soils are underlain by Manix Lake sand and silt sediments (Qms, Qol), younger river sand (Qrs, Qw) from tributary channels of the Mojave River, and by an area of older alluvium. Further northeast, the alignment continues through the Mojave River Valley and is underlain by younger valley alluvial sediments (Qal) and lacustrine (lake) deposits (Ql).



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APPROXIMATE SCALE IN MILES
0 5 10
NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Regional Geological Map

FIG 3-9.4

Source: Ninyo & Moore, 2007

At the northeast end of the river valley, soils are underlain by older Pliocene-Pleistocene sediments of varying composition (Qc, QP). To the east, on the south side of the Cronese Mountains, soils are primarily underlain by younger alluvial sediments (Qal) and partially by exposures of Tertiary-Mesozoic age granitic rocks (gr, gr-m, TKq). A concealed, potentially active, unnamed fault is located skew to the alignment in the Cronese Valley.

In the Soda Mountains area between the Cronese Valley and Baker, soils are underlain by younger valley and alluvial fan deposits (Qal), older Pliocene-Pleistocene sediments of varying composition (Qc, QP), and by Tertiary age volcanic and sedimentary rocks (Tv, Tc). Exposures of Tertiary-Mesozoic age granitic rocks (gr, TKq) are found on the southeast side of the proposed alignment. The geologic maps indicate that the segment crosses the potentially active Baker fault on the east side of the Soda Mountains approximately 6 miles southwest of Baker. In Baker, the segment is underlain by younger lacustrine Soda Lake Bed sediments (Ql).

Per Caltrans LOTB sheets, borings in this portion of Segment 3 generally encountered alluvial and other soil deposits consisting of sands and gravel of varying density, and some interbedded clay and silt; some dune sands were also encountered. Dense sandstone and hard, calcareous mudstone was encountered at the Afton Road Overcrossing at a depth of 7 feet bgs. Granitic rock was encountered at the Basin Road Overcrossing at depths of 11 feet and 25 feet bgs.

Baker–Halloran Summit: From Baker, the segment ascends a broad, sloping alluvial fan that flanks the southwest side of the Halloran Summit. Between Baker and Halloran Springs, the segment is underlain by younger valley and alluvial fan deposits (Qal).

The Halloran Summit area is comprised of a large body of Tertiary-Mesozoic age granitic rock (gr, TKq) that is overlain by younger Pleistocene age volcanic basalt flows (Qpv, Qeb). The granitic rock body is intruded into an older, Precambrian metamorphic rock unit comprised of gneiss (ep€, p€g) on the west side of the Halloran Summit. The segment is underlain by the gneissic rock and younger alluvium (Qal) on the west side of the summit. Younger alluvium is mapped at the Halloran Summit pass but is underlain at relatively shallow depth by granitic and/or volcanic rock. The inactive Halloran fault runs parallel to I-15 in this area.

Per Caltrans LOTB sheets for this area, borings generally encountered alluvial and other soil deposits predominantly consisting of sands and gravel of varying density, and some interbedded clay and silt. Basalt and volcanic breccia were encountered at Dale Ditch at depths ranging from 5 to 20 feet bgs. Granitic rock was encountered in several borings at Kali Ditch Bridge at depths ranging from 5 to 23 feet bgs.

Halloran Summit – Mountain Pass: In the Shadow Valley between Halloran Summit and Mountain Pass, Segment 3 would be underlain by younger valley and fan alluvium (Qal). A small exposure of Paleozoic age dolomite (IP/ls, D€g, D€gb1) is on the southwest side of Shadow Valley, and younger lacustrine deposits (Ql) from the Valley Wells lake bed are on the valley bottom. Ascending from Shadow Valley up to Mountain Pass, the segment crosses Pliocene-Pleistocene non-marine sediments (Qc, Qoa) that are along the base of the Mescal Range and Clark Mountain Range that comprise the Mountain Pass area.

Borings in the Shadow Valley area (per Caltrans LOTB sheets) generally encountered alluvial and other soil deposits predominantly consisting of sands and gravel of varying density, and some interbedded clay and silt. Underlying the alluvium in Shadow Valley in the vicinity of Valley Wells, Caltrans borings encountered a sedimentary rock formation comprised of interbedded sandstone, conglomerate, siltstone, and claystone. This formation was encountered at Hot Wash Bridge at approximate depths ranging from 42 to 61 feet bgs, at West Valley Wells Ditch Bridge at approximate depths ranging from 78 to 83 feet bgs, at Valley Wells Ditch Bridge at approximate depths ranging from 10 to 53 feet bgs, at Windmill Station Ditch Bridge at approximate depths ranging from 15 to 22 feet bgs, and at Wells Ditch Bridge at approximate depths ranging from 4 to 12 feet bgs. A boring at Cima Road Overcrossing in the Valley Wells area encountered travertine (limestone) at a depth of approximately 7 feet bgs.

Mountain Pass Area: The Mountain Pass area of Segment 3 is comprised of a block of Precambrian age metamorphic rocks (epЄ, pЄg, pЄgr, pЄga, pЄgc, pЄgb) comprised chiefly of injection gneiss, granite gneiss, and granite augen gneiss.[22] This rock is bounded on the east by alluvium of the Ivanpah Valley and is separated from Mesozoic and Paleozoic age meta-sedimentary and metavolcanic rocks (IP/ls, CM, DЄg, DЄgu, Ds, Dsi) to the west by the inactive Clark Mountain fault. Inactive faults crossed by the alignment in the Mountain Pass area, as shown on the geologic maps, include the Mesquite Thrust fault, Clark Mountain fault, Middle fault, and North fault.

Segment 3 in the Mountain Pass area, is mostly underlain by younger alluvium (Qal) and older alluvial fan deposits (Qc, Qoa). Some rock units also underlie portions of Segment 3 at relatively shallow depths. West of the Clark Mountain fault, Segment 3 is underlain at depth by Paleozoic age dolomite and limestone with thin interbedded shale and sandstone (IP/ls, CM, DЄg, DЄgu, Ds, Dsi). East of the Clark Mountain fault, maps indicate that the segment is underlain by the metamorphic gneiss unit (epЄ, pЄg, pЄgr, pЄga, pЄgc, pЄgb).

Borings in the Mountain Pass portion of Segment 3 generally encountered alluvial and other soil deposits predominantly consisting of sands and gravel of varying density. Metamorphosed volcanic rock (meta-dacite and meta-basalt), gneiss, and schist were encountered in borings at Bailey Road Overcrossing at depths ranging from 7 to 8 feet bgs. Metamorphic igneous rock (gneiss) was found at two borings at Cenda Ditch Bridge at depths ranging from 3 to 8 feet bgs.

Table 3.9-7 lists the geologic unit, geologic age, and description of geologic unit found in Segment 3.

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[22] Olson, J.C., Shawe, D.R., Pray, L.C., Sharp, W.N., 1951, Rare-Earth Mineral Deposits of the Mountain Pass District San Bernardino County California, United States Geologic Survey Professional Paper 261: Page 1.

Table 3.9-7 Geologic Units Segments 3A/3B

Geologic Unit (Symbol[s])	Geologic Age	Description
Younger alluvial valley and fan sediments (Q, Qa, Qal)	Holocene	Unconsolidated valley alluvial deposits of silt, sand, and gravel; alluvial fan deposits.
Younger alluvial river/wash sediments (Qw, Qrs)	Holocene	Alluvial wash sediments and river sand.
Younger alluvial fan sediments (Qf)	Holocene	Fan gravel.
Younger lacustrine deposits (Ql)	Holocene	Lake and playa sediments including clay, silt, and fine sand; Soda Lake bed sediments.
Older alluvial valley sediments (Qof, Qt)	Pleistocene	Fanglomerate and gravel (Qof); continental deposits of gravel, sand, silt, and clay (Qt).
Older lacustrine deposits (Qms, Qol)	Pleistocene	Manix Lake bed sediments (silt and fine sand)
Volcanic rocks (Qpv, Qeb)	Pleistocene	Undifferentiated volcanic basalt flows.
Older alluvial deposits (Qc, Qp, Qo, Qoa, Qt)	Pleistocene And Plio-Pleistocene	Dissected alluvial gravel, sand, and silt; continental terrace deposits of gravel, sand, silt, and clay.
Volcanic and sedimentary rocks (Tv, Tc)	Tertiary	Undivided continental sedimentary rocks and volcanic rhyolite flows.
Granitic rocks (Gr, Tkq)	Tertiary/ Mesozoic	Intrusive igneous rock; includes teutonia quartz monzonite of Hewett, 1956.
Granitic and metamorphic rock (Gr-M)	Mesozoic	Granitic and metamorphic rock.
Marine sedimentary and meta-sedimentary rocks (Cm)	Paleozoic - Mississippian	Limestone and dolomite; includes Monte Cristo limestone of Hewett, 1956.
Marine sedimentary and meta-sedimentary rocks (Ds, Dsv, Dsi)	Paleozoic – Devonian	Sultan limestone of Hewett, 1956, including Valentine limestone and ironside Dolomite members.
Marine sedimentary and meta-sedimentary rocks (Ip/Ls, Dєg, Dєgu, Dєgb1)	Paleozoic – Cambrian And Devonian	Dolomite and Limestone with thin interbedded Shale and Sandstone; Goodsprings Dolomite and Carbonate Rocks including Breccia of Hewett, 1956.
Metamorphic rocks (Epє, Pєg, Pєga, Pєgc Pєgb)	Precambrian	Undifferentiated injection gneiss, schist, granitic gneiss, granite augen gneiss complex.
Granitic rocks (Pєgr)	Precambrian	Undivided syenite, shonkite, granite stocks, and dikes, including carbonate veins and irregular bodies in Mountain Pass area.

Source: Ninyo & Moore, 2007.

Segment 4

In the Mountain Pass area, Segment 4A is underlain by Precambrian age metamorphic rocks (epЄ, pЄg) comprised chiefly of injection gneisses and granitic gneisses and is also underlain by valley alluvium (Qal) and shallow wash alluvium from Wheaton Wash (Qal). In Ivanpah Valley, it is underlain by younger valley alluvium (Qal) and lake deposits from Ivanpah Dry Lake (Ql).

Segment 4B in the Mountain Pass area is underlain by Precambrian age metamorphic rocks comprised chiefly of injection gneisses and granitic gneisses (epЄ, pЄg). The maps show that this area consists of former mining prospects, but no mines are located on the maps in this area. The maps indicate that tunneling through this area would pass through the metamorphic gneiss unit and will cross the inactive North Fault in the Clark Mountains.

On the northeast flank of the Clark Mountains, Segment 4B descends over younger alluvial fan deposits (Qal) which are underlain at a relatively shallow depth by metamorphic rocks. In the Ivanpah Valley, Segment 4B is underlain by younger valley alluvium (Qal), lake deposits from Ivanpah Dry Lake (Ql), and a rocky outcrop of metamorphic gneiss (epЄ, pЄg).

Caltrans borings near Segment 4A generally encountered alluvial sands and gravel of varying density. Metamorphic gneiss and schist were encountered in borings at Wheaton Springs Wash Bridge at depths ranging from 6 to 29 feet bgs.

Table 3.9-8 lists geologic units of Segments 4A and 4B. Figure 3-9.5 shows the geology of these segments.

Table 3.9-8 Geologic Units Segments 4A/4B

Geologic Unit (Symbol[s])	Geologic Age	Description
Younger alluvial deposits (Qal)	Holocene	Unconsolidated valley alluvial deposits of silt, sand and gravel; alluvial stream/wash deposits.
Younger lacustrine deposits (Ql)	Holocene	Lake and playa sediments including clay, silt and fine sand; Ivanpah Lake bed sediments.
Metamorphic rocks (Epє, Pєg)	Precambrian	Undifferentiated injection gneiss, schist, granitic gneiss, granite augen gneiss complex.

Source: Ninyo & Moore, 2007.

Segment 5

Segments 5A in the median and 5B on the east and then west side of the I-15 are in close proximity to each other (generally within 200 feet of each other) and thus have similar geologic profiles. In the Ivanpah Valley between the state line and Jean Hills, soils are underlain by younger alluvial deposits. These deposits include younger Holocene wash sediments, alluvial fan deposits, and older early-Holocene to late-Pleistocene alluvial fan deposits (Qa, Qal, Qay, Qay2, Qay3, Qay1). Playa fringe deposits (Qpf) are along the west side of Roach Lake. Some areas of fill soil and other disturbed areas (Qx) are found here, primarily at highway onramp/off-ramp areas. An outcrop of Paleozoic-age dolomite (DЄg, MzPzs) is to the west of I-15 between Primm and Jean.

In the Jean Hills area and immediate northeast, soils are underlain by younger alluvium, older alluvium and rock formations. Younger Holocene alluvial sediments comprised of wash and alluvial fan deposits underlie portions of this area (Qa, Qal, Qay, Qay2, Qay3), and some areas are underlain by older, Pleistocene age alluvial fan deposits (Qay1, Qai). These older sediments are described on the geologic maps as moderately to strongly consolidated. Ancient Pleistocene to late-Miocene age alluvium (Qao, QTa) comprised primarily of gravel is also found in portions of this area. Rock formations that underlie this area include Tertiary age sedimentary rocks (Tao) comprised of fluvial gravel with minor sandstone and mudstone, Tertiary age volcanic rocks ranging in composition from basalt to rhyolite (Tv, Tsf), and a Paleozoic to Mesozoic era formation (Pbs, PPMb, MzPzs) of limestone and dolomite with interbedded shale, sandstone, and conglomerate.

Table 3.9-9 lists the geologic units in Segment 5; these are illustrated on Figure 3-9.6.

Table 3.9-9 Geologic Units Segments 5A/5B

Geologic Unit (Symbol[s])	Geologic Age	Description
Disturbed and modified areas (Qx)	Holocene	Areas of anthropogenic disturbance, artificial fill, commercial development areas, I-15 corridor.
Undivided young alluvial deposits (Qa, Qal, Qay)	Holocene	Undivided alluvial fan and wash deposits of gravel, sand, and minor silt.
Playa fringe deposits (Qpf)	Holocene	Deposits of silt, sand, and gravel along the perimeter of playa surfaces.
Youngest active alluvium (Qay3)	Late-Holocene	Active wash and alluvial fan deposits of gravel, sand, and minor silt.
Young active alluvium (Qay2)	Holocene	Alluvial fan and wash deposits of gravel, sand, and minor silt of intermittently active alluvial surfaces.
Oldest young alluvium (Qay1)	Early-Holocene	Alluvial fan and wash deposits of gravel, sand, and minor silt of inactive alluvial surfaces.
Intermediate Alluvium (Qai)	Pleistocene	Deposits of relict, inactive alluvial fans, moderately to strongly consolidated.
Older alluvial deposits (Qao, Qta)	Pleistocene to Late Miocene	Dissected alluvial fan deposits, primarily gravel with some sand and silt.
Sedimentary rocks (Tao)	Tertiary	Fluvial gravel beds with minor sandstone and mudstone.
Volcanic rocks (Tv, Tsf)	Tertiary	Volcanic rocks ranging in composition from basalt to rhyolite.
Marine sedimentary and meta-sedimentary Rocks (Pbs, Ppmb, Mzpzs)	Mesozoic to Paleozoic (Carboniferous)	Dolomite and limestone with interbedded shale, sandstone, and conglomerate; Bird Spring formation.
Marine sedimentary and meta-sedimentary rocks (Dєg, Mzpzs)	Paleozoic – Cambrian and Devonian	Dolomite and limestone with interbedded shale, sandstone, and conglomerate; Goodsprings dolomite and carbonate rocks of Hewett, 1956.

Source: Ninyo & Moore, 2007.

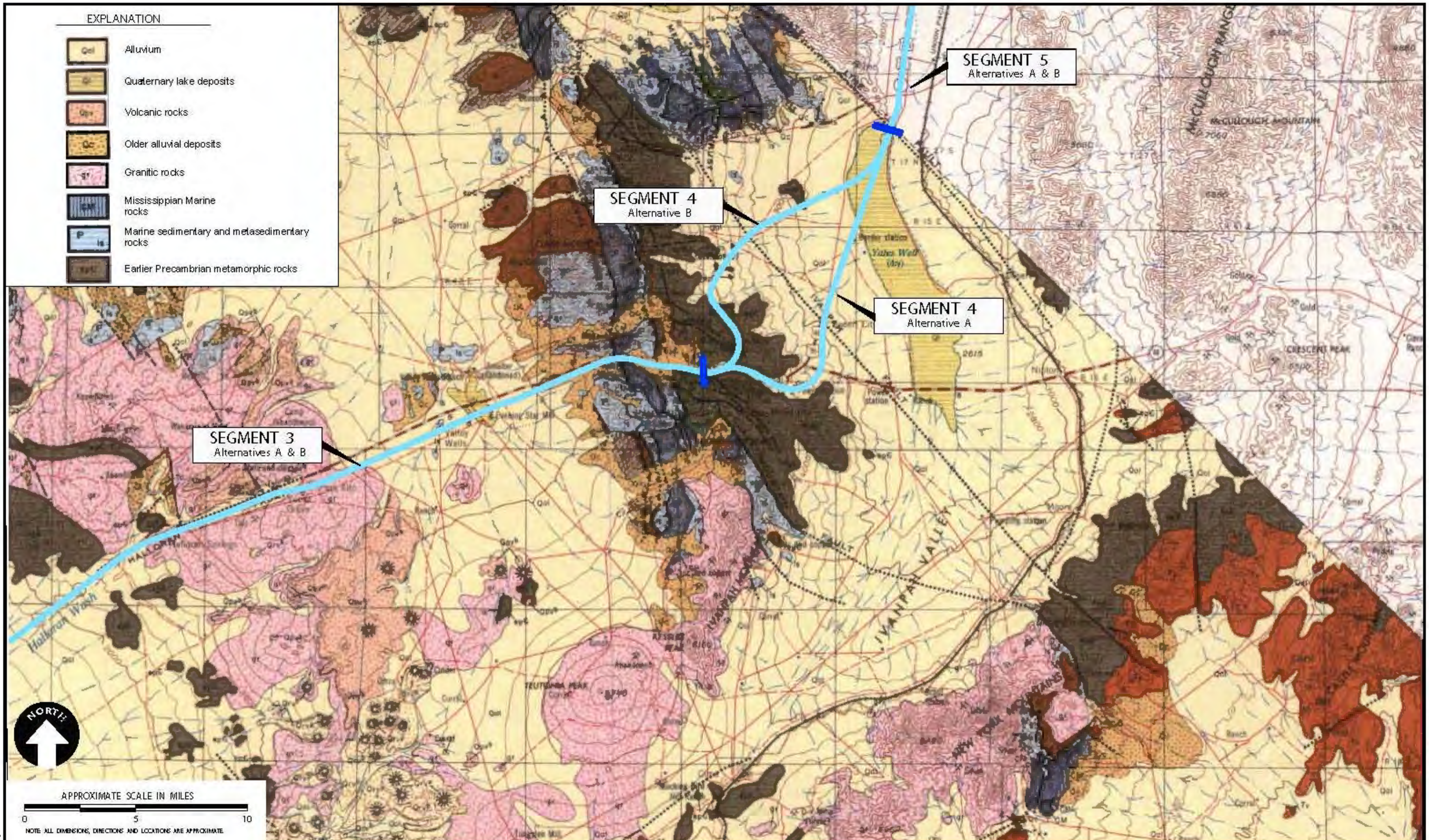

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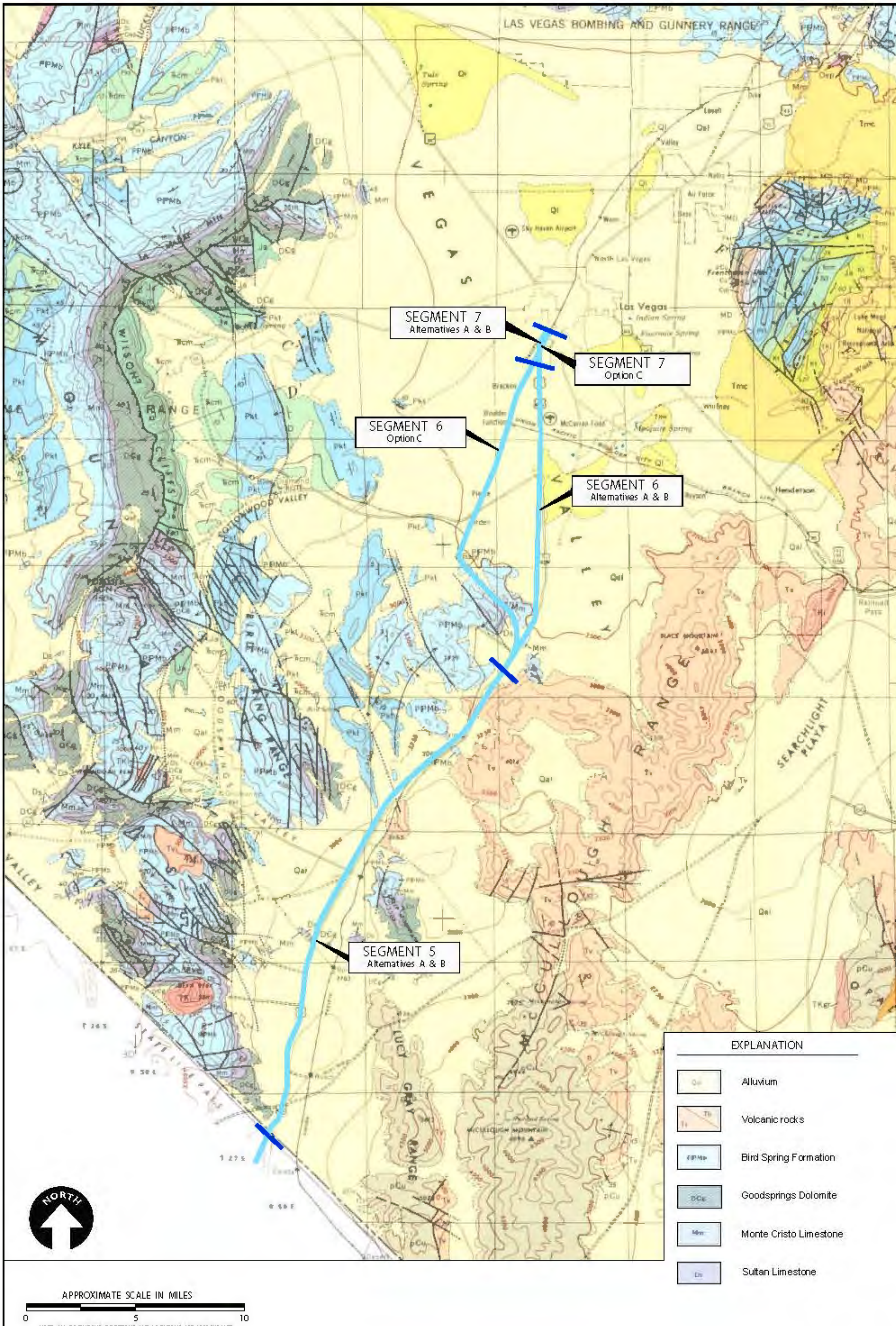
FIG 3-9.5

Source: Ninyo & Moore, 2007



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Regional Geological Map FIG 3-9.6

Source: Ninyo & Moore, 2007

Segments 6 and 7

Segments 6A/6B, as well as 7A/7B, are in close proximity to each other (generally with 200 feet of each other) and thus have similar geologic characteristics. A limestone formation (Mmc, Mm) mantled by younger alluvium underlies the southern end of the area. The majority of the area is underlain by alluvial deposits, including younger Holocene wash sediments and alluvial fan deposits (Qa, Qal, Qs), older Holocene/Pleistocene alluvial fan deposits (Qai, Qoa) that are moderately to well consolidated to cemented in places, and older Pliocene consolidated sediments (QTs) that are moderately to well consolidated to strongly cemented.

Younger Holocene alluvial wash and fan deposits (Qa) in this area may be cemented in places by petrocalcic carbonate. Older Pleistocene alluvium (Qoa) may contain a petrocalcic carbonate horizon approximately 6 feet thick near the surface. Older Plio-Pleistocene consolidated sediments in this area have moderately to well consolidated to strongly cemented layers of petrocalcic carbonate; surface exposures are capped in places by a resistant petrocalcic crust. Table 3.9-10 lists geologic units found in Segments 6 and 7; these are illustrated in Figure 3-9.6.

Table 3.9-10 Geologic Units Segments 6A/6B

Geologic Unit (Symbol[s])	Geologic Age	Description
Younger alluvial deposits (Qa, Qal, Qs)	Holocene	Active wash, alluvial fan and sheet wash deposits of gravel, sand, and minor silt; unconsolidated to locally calcic-cemented.
Intermediate alluvial deposits (Qai)	Holocene-Pleistocene	Deposits of sand and gravel on relict, inactive alluvial fans; slightly to moderately consolidated.
Older alluvial deposits (Qoa)	Pleistocene	Pebble and small cobble gravel with pebbly sand; moderately to well consolidated to locally cemented; caliche horizon approx. 6 feet thick occurs at or near surface.
Consolidated sediments (Qts)	Pliocene to Pleistocene	Fine sand interbedded with silt, pebbly sand, and gravel; moderately to well consolidated to strongly cemented. Common caliche layers and resistant caliche surface crust.
Marine sedimentary and meta-sedimentary rocks (Mmc, Mm)	Mesozoic to Paleozoic (Carboniferous)	Monte Cristo limestone (Mm).

Source: Ninyo & Moore, 2007.

Option C

Option C would follow the UPRR corridor in Segments 6 and 7. At the beginning of Option C, at the southern end of the Las Vegas Valley, geologic maps indicate that formations of limestone with interbedded shale, sandstone, and conglomerate (Ds, Pbs, PPMb) underlie the alignment in a hilly area west of I-15. This rock formation is mantled by younger alluvium (Qal). After passing though this hilly area, the alignment turns toward the northeast and descends into the Las Vegas Valley. The majority of Option C is underlain by alluvial deposits, including older deposits that are consolidated/cemented in a similar manner to the alluvial deposits in Segments 6 and 7 described above.

Table 3.9-11 lists the type of geologic units in Option C; these are illustrated in Figure 3-9.6.

Table 3.9-11 Geologic Units Option C

Geologic Unit (Symbol[s])	Geologic Age	Description
Younger alluvial deposits (Qa, Qal, Qs)	Late-Holocene	Active wash, alluvial fan and sheet wash deposits of gravel, sand, and minor silt; unconsolidated to locally calcic-cemented.
Intermediate alluvial deposits (Qai)	Pleistocene	Deposits of sand and gravel on relict, inactive alluvial fans; slightly to moderately consolidated.
Older alluvial deposits (Qoa)	Pleistocene	Pebble and small cobble gravel with pebbly sand; moderately to well-consolidated to locally cemented; caliche horizon about 6 feet thick occurs at or near surface.
Older alluvial (gravel) deposits (Qog)	Pleistocene	Alluvial fan clast-supported gravel deposits; consolidated to strongly cemented; capped by a matrix-supported caliche horizon greater than approximately 10 feet thick.
Consolidated sediments (Qts)	Pliocene to Pleistocene	Fine sand interbedded with silt, pebbly sand, and gravel; moderately to well consolidated to strongly cemented. Common caliche layers and resistant caliche surface crust.
Marine sedimentary and meta-sedimentary rocks (Pbs, Ppmb)	Mesozoic to Paleozoic	Dolomite and limestone with interbedded shale, sandstone and conglomerate; bird spring formation.
Marine sedimentary and meta-sedimentary rocks (Ds)	Paleozoic Devonian	Sultan limestone (Hewett, 1956).

Source: Ninyo & Moore, 2007.

3.9.4 Environmental Consequences

3.9.4.1 Summary of Environmental Consequences of Action Alternatives

Table 3.9-12 below provides a summary of potential geologic and seismic hazards affecting the action alternatives. The table uses a series of rating systems, ranging from 1 to 3:

"1" signifies the known presence or greatest likelihood of the selected hazard (shaded)

"2" signifies a moderate potential effect of the selected hazard.

"3" signifies minimal or no presence of the selected hazard.

Table 3.9-12 Relative Effects of Environmental Consequences

	Segments	Potential Geotechnical Consequences										
		Surface Fault Rupture[1]	Ground Shaking[2]	Liquefaction[3]	Dam Inundation[4]	Settlement(Natural & Fill Soils) 5	Corrosive Soils[6]	Expansive Soils[7]	Landslides[8]	Excavation[9]	Ground Fissures[10]	Shallow Groundwater[11]
Action Alternatives	1, Victorville Station and OMSF options	1	1	2	3	2	2	2	2	2	3	3
	2A	1	1	1	2	2	2	1	2	2	3	1
	2B	3	1	1	2	2	2	1	3	2	3	1
	3A and B (Yermo- Baker)	1	1 to 2	1 to 2	2 to 3	2	2	2	2	2	3	1 to 2
	3A and B (Baker – east)	3	2	1 to 2	3	2	2	2	2	2	3	1 to 3
	4A	3	1 to 2	3	3	2	2	2	2	2	3	3
	4B	3	1 to 2	3	3	2	2	2	1	1	3	
	5A/5B, Las Vegas MSF Option 1	3	1 to 3	3	3	2	2	2	2	2	2	3

	6A/6B, Las Vegas Station Southern & Central Options , MSF options 2 & 3	3	3	2	3	2	2	2	3	1	1	2
	7A/7B, Las Vegas Downtown Station Option	3	3	2	3	2	2	2	3	1	1	2
	Option C	3	3	2	3	2	2	2	2	1	1	2

[1]Rating 1 = Route crosses active fault or very close to an active fault; Rating 2 = Route crosses potentially active fault; Rating 3 = Route crosses inactive fault or does not cross any known fault.

[2]Rating 1 = Estimated peak horizontal ground acceleration (PGA) of 0.4g to 0.6g; Rating 2 = Estimated PGA of 0.2g to 0.4g; Rating 3 = Estimated PGA of 0.1g to 0.2g.

[3]Rating 1 = Areas of known, reported shallow groundwater and potentially liquefiable soils; Rating 2 = Areas of potentially shallow groundwater and potentially liquefiable soils; Rating 3 = Areas with no reported shallow groundwater and with potentially liquefiable soils.

[4]Rating 1 = Areas of reported dam inundation; Rating 2 = Areas near reported potential dam inundation; Rating 3 = Areas with no reported potential for dam inundation.

[5]Rating 1 = Areas of reported compressible/collapsible soils; Rating 2 = Areas with potential for compressible/collapsible soils; Rating 3 = Areas with no potential for compressible/collapsible soils.

[6]Rating 1 = Areas of reported corrosive soils; Rating 2 = Areas with potential for corrosive soils; Rating 3 = Areas with no potential for corrosive soils.

[7]Rating 1 = Areas of mapped clay units or known expansive soils; Rating 2 = Areas with potential for expansive soils; Rating 3 = Areas with no potential for expansive soils.

[8]Rating 1 = Areas of known steep terrain with relatively higher potential landslide hazard; Rating 2 = Areas of potential landslide hazard; Rating 3 = Areas of little potential landslide hazard.

[9]Rating 1 = Areas of reported hard rock or caliche with anticipated difficult excavation; Rating 2 = Areas of potentially difficult excavation; Rating 3 = Areas of no potential difficult excavations.

[10] Rating 1 = Areas of known, reported ground fissures in site vicinity; Rating 2 = Areas with potential for ground fissures; Rating 3 = Areas with no reported ground fissures.

[11]Rating 1 = Areas of known, reported shallow groundwater; Rating 2 = Areas of potentially shallow groundwater; Rating 3 = Areas with no reported shallow groundwater.

With few exceptions, the action alternatives face at least some risk of the identified geologic and seismic hazards. The 200-mile length of the DesertXpress project spans a seismically active region. As discussed in the mitigation section below, all potential effects can be controlled successfully through the application of standard engineering methods and practices.

Excepting Segment 4, where the alignment alternatives are at a distance from each other, the action alternatives face relatively similar geologic and seismic hazards.

Relative to Segment 4B, Segment 4A has lower risks related to landslides and excavation issues. Segment 4A has no risks at all associated with tunneling activities, as Segment 4B is the only segment with tunnels.

3.9.4.2 Summary of Environmental Consequences of No Action Alternative

Under the No Action Alternative, no privately-financed high speed passenger rail system would be constructed or operated in the study area. The geology and soils related adverse affects to the action alternatives would not be expected to occur.

Under the No Action Alternative, public agencies in California and/or Nevada are anticipated to move forward with physical and/or operational roadway improvements to increase the capacity of the I-15 corridor. These improvements would be located in the same vicinity as the action alternatives, and would thus contend with many of the same geologic and soils impacts described herein. Project-specific environmental review to be undertaken by the sponsoring lead agency would more precisely determine the environmental affects associated with such improvements. The No Action Alternative is not discussed further in this section.

3.9.4.3 Environmental Effects by Segment

Segment 1

An excerpt from Table 3.9-12 is below. A “1” rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category.

Segment	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
1,Victorville Station and OMSF options	1	1	2	3	2	2	2	2	2	3	3

Surface Fault Rupture: Segment 1 would cross the trace of the active Helendale-South Lockhart fault, zoned by the State of California as an Earthquake Fault Zone, several miles north of the Victorville station along the I-15 freeway (see Figure 3-9.1). The potential impact of surface fault rupture in this segment is high.

Ground Shaking: Segment 1 has a strong potential for strong ground motion to occur. Peak horizontal ground accelerations on the order of 0.4g to 0.6g could occur along this segment.

Liquefaction: Portions of Segment 1 may be underlain by soils that have a potential for liquefaction. Although shallow groundwater was not indicated in this segment in the information reviewed, areas of potentially shallow groundwater may exist. Due to these factors, Segment 1 has a moderate liquefaction potential.

Settlement: The surficial geology of this segment is highly variable; it includes Mesozoic and older crystalline basement rock and metavolcanic rock interfingered with younger and older alluvial deposits. The alluvium may contain compressible layers. Areas of previous development exist along this segment, and undocumented fill soils may exist. There is a moderate potential impact of settlement of the soils in Segment 1.

Corrosive Soils: Potentially corrosive soils may be present along Segment 1.

Expansive Soils: There is a moderate risk of encountering expansive soils in this segment.

Landslides: Segment 1 would traverse rolling terrain and previously undeveloped areas, where the landslide potential is moderate.

Ground Fissures: Ground fissures have not been identified in Segment 1.

Dam Inundation: Most of Segment 1 would be outside of any dam inundation zone and would be unlikely to experience adverse effects in the event of a dam break. The northern reaches of this segment would be closer to the Mojave River, where risks of dam inundation are higher.

Caliche/Hard Rock Excavation: Caliche layers have not been identified in Segment 1. Portions of this segment are underlain by crystalline bedrock, and other rock types that may be hard. There is a moderate risk of potential impacts related to excavation difficulties in this segment.

Shallow Groundwater: Most of Segment 1 would be distant from areas of shallow groundwater, except where it rejoins the Mojave River area near Lenwood.

Segment 2

An excerpt from Table 3.9-12 is below. A “1” rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category.

Segment	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
Combined 2A/2B	1	1	1	2	2	2	1	2	2	3	1
2A	3	1	1	2	2	2	1	3	2	3	1
2B	3	1	1	2	2	2	1	3	2	3	1

Surface Fault Rupture: Where Segments 2A/2B would run together for several miles through the City of Barstow, it would cross several active or potentially active faults, including the Lockhart-Lenwood fault, the concealed trace of the active Mt. General fault and the concealed trace of a potentially active portion of the Gravel Hills-Harper Lake fault. Due to the proximity of these active faults, there is high potential for surface fault rupture impacts.

Ground Shaking: Due to the proximity to nearby active faults, the potential for strong ground motions to occur along Segments 2A and 2B is significant. Peak horizontal ground accelerations on the order of 0.5g to 0.6g could be anticipated along Segments 2A/2B.

Liquefaction: Segments 2A/2B would be located in or near the Mojave River Valley, would cross the Mojave River, and would traverse areas with reported shallow groundwater. The potential for liquefaction in both segments is high.

Settlement (Natural Soils and Undocumented Fills): The soils underlying both Segment 2A and 2B have moderate potential for settlement.

Corrosive Soils: Corrosive soils have the potential to occur in both Segment 2A and 2B.

Expansive Soils: Potentially expansive soils may be present along both Segment 2A and 2B.

Landslides: Segments 2A and 2B would traverse across areas of relatively gentle to moderate topography, with a moderate degree of potential impact of landslides and surficial slope failures.

Ground Fissures: Ground fissures have not been identified in Segment 2A or 2B.

Dam Inundation: Both Segments 2A and 2B travel adjacent to the Mojave River, which is the projected course of inundation flow due to dam failure.

Caliche/Hard Rock Excavation: Caliche layers have not been identified in Segment 2A or 2B. Portions of both segments are underlain by crystalline bedrock, and other rock types that may be hard; excavation in these areas may be difficult.

Shallow Groundwater: Shallow groundwater may be anticipated along portions of Segments 2A/2B since this segment travels along the banks of the Mojave River.

Segment 3

An excerpt from Table 3.9-12 is below. A "1" rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category. As reflected below, geotechnical consequences differ between the Yermo to Baker and Baker to Mountain Pass portions.

Segment	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
3A/3B (Yermo-Baker)	1	1 to 2	1 to 2	2 to 3	2	2	2	2	2	3	1 to 2
3A/3B (Baker – east)	3	2	1 to 2	3	2	2	2	2	2	3	1 to 3

Surface Fault Rupture: Segments 3A/3B would cross the concealed trace of the active Calico-Hidalgo fault, an active portion of the Manix fault, an unnamed (Cronese Valley), concealed fault, and the potentially active Baker fault (see Figure 3-9.1 for the location of these faults in relation to Segment 3). Due to the proximity of these active and potentially active faults, there is high potential for surface fault rupture.

Ground Shaking: **T**he proximity to nearby active faults indicates a moderate to high potential for strong ground motions and potential impacts of ground shaking. Peak horizontal ground accelerations on the order of 0.5g to 0.6g could be anticipated along these segments southwest of Manix. Between Manix and Baker, peak horizontal ground accelerations on the order of 0.3g to 0.5g could be anticipated. Northeast of Baker, peak horizontal ground accelerations on the order of 0.2g to 0.3g could be anticipated.

Liquefaction: Segments 3A/3B would cross the Mojave River valley, Soda Lake, Valley Wells, and other areas with reported shallow groundwater and by soils that have a potential for liquefaction. There is a moderate to high potential for liquefaction impacts in these segments.

Settlement (Natural Soils and Undocumented Fills: The surficial geology of Segments 3A/3B is highly variable and includes Mesozoic and older crystalline basement rocks, metavolcanic rocks and Tertiary lithified volcanic and sedimentary rocks interfingered with younger and older alluvial deposits. The alluvium may contain compressible layers, including potentially compressible clays. Areas of previous development exist along this segment, and undocumented fill soils may exist. Due to the potential presence of compressible alluvium and undocumented fill along this segment, there is a moderate potential for settlement under the load of proposed improvements

Corrosive Soils: Potentially corrosive soils may be present along Segment 3A and 3B.

Expansive Soils: Potentially expansive soils may be present along Segment 3A and 3B.

Landslides: Much of Segments 3A/3B would traverse areas of relatively gentle to moderate topography. There is a moderate potential impact of landslides and surficial slope failures.

Ground Fissures: Ground fissures have not been identified in Segments 3A/3B on the geologic references reviewed for the project area.

Dam Inundation: The western portion of Segments 3A/3B would be adjacent to a projected dam inundation course; risks associated with dam inundation are moderate.

Caliche/Hard Rock Excavation: Caliche layers have not been identified in Segments 3A/3B on the geologic references reviewed for the project area. The preliminary geotechnical evaluation indicates that portions of Segments 3A/3B are underlain by crystalline and volcanic bedrock, and other rock types that may be hard; excavation may be difficult in these areas.

Shallow Groundwater: Shallow groundwater may be anticipated along portions of Segments 3A/3B where it would cross or be near the Mojave River, Soda Lake, and Valley Wells. In these areas, there is a high potential of encountering shallow groundwater.

<u>Segment 4</u>

An excerpt from Table 3.9-12 is below. A "1" rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category.

Segment	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
4A	3	1 to 2	3	3	2	2	2	2	2	3	3
4B	3	1 to 2	3	3	2	2	2	1	1	3	3

Surface Fault Rupture: Neither Segment 4A nor 4B would cross any active faults. There is low potential for surface fault rupture in both segments.

Ground Shaking: Due to proximate active faults, both Segment 4A and 4B have a moderate to high probability of experiencing strong ground shaking. Peak horizontal ground accelerations on the order of 0.3g to 0.4g could be anticipated along this segment near Mountain Pass and the MNP; accelerations of 0.4g to 0.6g could be anticipated in the Ivanpah Valley.

Liquefaction: Potentially shallow groundwater may exist near the Wheaton Wash and Ivanpah Lake areas of Segment 4A, but there is a low potential impact for liquefaction in this segment. Segment 4B would traverse areas with low risk of liquefaction.

Settlement: Both Segment 4A and 4B would traverse areas underlain by alluvium that may contain compressible layers. There is a moderate potential for settlement under the load of proposed improvements.

Corrosive Soils: Potentially corrosive soils may be present along both Segment 4A and 4B.

Expansive Soils: Potentially expansive soils may be present along both Segment 4A and 4B.

Landslides: Portions of Segment 4A would traverse areas of relatively gentle to moderate topography where there is moderate potential for landslides and surficial slope failures. Segment 4B would traverse portions of the Clark Range and cross areas of relatively steep topography, where there is a high risk of landslides and surficial slope failures.

Ground Fissures: Ground fissures have not been identified in Segment 4 A or 4B.

Dam Inundation: **T**he potential for dam inundation to affect Segment 4A or 4B is remote since the potential inundation area associated with the Mojave River ends at Soda Lake.

Caliche/Hard Rock Excavation: Caliche layers have not been identified in Segment 4A or 4B. However, portions of Segment 4A are underlain by crystalline bedrock; excavation may be difficult in such areas. Segment 4B would include tunnels through the east side of the Clark Range, where difficult excavation through metamorphic gneiss rock would be required.

Shallow Groundwater: There is a low potential for shallow groundwater to be encountered in Segment 4A. However, groundwater is more likely to be encountered during the tunneling of Segment 4B.

Segment 5

An excerpt from Table 3.9-12 is below. A “1” rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category. Because the action alternatives are in such close proximity they have identical geotechnical consequences.

Segment	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
5A/5B, Las Vegas MSF Option 1	3	1 to 3	3	3	2	2	2	2	2	2	3

Surface Fault Rupture: Based on geologic and seismic maps reviewed, Segments 5A/5B would cross no active faults (see Figure 3-9.2a).

Ground Shaking: Due to the proximity to nearby active faults, the potential for strong ground motions to occur along Segments 5A/5B is significant. The potential impact of ground shaking in ranges from low to high, with locations further south experiencing the greatest potential. Peak horizontal ground accelerations on the order of 0.2g to 0.6g could be anticipated in the Ivanpah Valley area; acceleration of 0.1 to 0.2 could occur in more northern reaches.

Liquefaction: The potential for liquefaction in Segment 5A and 5B is low.

Settlement: Segments 5A and 5B may be underlain by alluvium containing compressible layers. Risks associated with settlement are moderate.

Corrosive Soils: Potentially corrosive soils may be present along Segment 5A and 5B.

Expansive Soils: Potentially expansive soils may be present along Segment 5 A and 5B.

Landslides: Much of Segments 5A/5B would cross areas of gentle to moderate topography, with a moderate degree of potential impacts of landslides and surficial slope failures.

Ground Fissures: Ground fissures have not been identified in Segments 5A/5B. However, ground fissures may be present in this part of Nevada; there is a moderate potential of ground fissure impacts here.

Dam Inundation: The potential for dam inundation to affect Segment 5A or 5B is remote, as the Mojave River dam inundation area terminates many miles west and upslope of this segment.

Caliche/Hard Rock Excavation: Caliche layers may be present in Segment 5A and 5B. Additionally, the preliminary geotechnical evaluation indicates that portions of Segment 5 A/5B are underlain by limestone and volcanic bedrock, and other rock types that may be hard. Excavation will become more difficult as depth increases.

Shallow Groundwater: Although not reported in information reviewed, there is a low potential for shallow groundwater to be encountered along portions of Segment 5A and 5B.

Segment 6 and 7 and Option C

An excerpt from Table 3.9-12 is below. A "1" rating indicates the strongest likelihood of the selected hazard; scores of 3 indicate the least likelihood. See Table 3.9-12 above for detailed descriptions of scores for each category. Rail alignment alternatives A and B are in close proximity to each other through Segments 6 and 7 and thus have similar geotechnical consequences.

Segment Alternative	Potential Geotechnical Consequences										
	Surface Fault Rupture	Ground Shaking	Liquefaction	Dam Inundation	Settlement (Natural & Fill Soils)	Corrosive Soils	Expansive Soils	Landslides	Excavation	Ground Fissures	Shallow Groundwater
6A/6B, Las Vegas Station Southern & Central Options , MSF options 2 & 3	3	3	2	3	2	2	2	3	1	1	2
7A/7B, , Las Vegas Downtown Station Option	3	3	2	3	2	2	2	3	1	1	2
Option C	3	3	2	3	2	2	2	3	1	1	2

Surface Rupture: Based on geologic and seismic maps reviewed, Segment 6 and 7 and Option C cross no active faults (see Figures 3-9.2a and 3-9.2b). The risk of surface rupture is low.

Ground Shaking: There is a potential for low to moderately strong ground motions to occur along Segment 6 and 7 and Option C (0.1 to 0.2 g).

Liquefaction: Segment 6 and 7 and Option C would traverse the Las Vegas Valley, where there is moderate potential for shallow groundwater, particularly closer to the City of Las Vegas. There is a moderate liquefaction risk for these segments.

Settlement: Soils beneath Segment 6 and 7 and Option C may include compressible alluvium may contain compressible layers, as well as areas of undocumented fills. There is a moderate risk of settlement in these segments.

Corrosive Soils: Potentially corrosive soils may be present along Segment 6 and 7 and Option C.

Expansive Soils: Expansive soils may be present along Segment 6 and 7 and Option C.

Landslides: Much of Segment 6 and 7 and Option C would traverse areas of relatively gentle topography in the Las Vegas Valley. There is a moderate risk of impacts associated with landslides and surficial slope failures in this segment.

Ground Fissures: Ground fissures have been found in portions of the Las Vegas Valley in the vicinity of Segment 6 and 7 and Option C. There is a high potential of hazards associated with ground fissure risk here.

Dam Inundation: The potential for dam inundation to affect Segment 6 and 7 or Option C is remote, as the segments would not be in any dam inundation area.

Caliche/Hard Rock Excavation: Caliche layers may be present in Segment 6 and 7 and Option C. There is a high risk of potential impact for excavation difficulties due to caliche. Additionally, the southern portions of Segment 6 are underlain by limestone bedrock that may be hard. Depending on the depth of excavation into these materials, moderate to difficult excavation may be encountered.

Shallow Groundwater: Shallow groundwater may be anticipated along northern portions of Segment 6 and Option C and all portions of Segment 7. There is a moderate potential for risks associated with shallow groundwater.

3.9.5 Mitigation Measures

Mitigation measures have been developed to address and limit the adverse effects of the potential geologic and soils related impacts described above. Mitigation measures are classified by impact type and are further classified by their relationship to operational and construction periods.

Tables 3.9-13 and 3.9-14 below identify applicable mitigation measures by segment. These measures apply to any project features (stations, maintenance facilities, autotransformers, etc.) located adjacent to or within each segment. For example, any mitigation measures applicable to Segment 1 are applicable to the potential Victorville station and maintenance facility options. Mitigations related to Segment 6A or 6B would apply to the potential Las Vegas area station and maintenance facility site options.

Table 3.9-13 Operational Period Mitigation Measure Applicability

Segment	Mitigation GEO-1: Surface Fault Rupture	Mitigation GEO-2 Ground Shaking	Mitigation GEO 3: Liquefaction	Mitigation GEO-4: Dam Inundation	Mitigation GEO-5: Settlement	Mitigation GEO-6 Corrosive Soils	Mitigation GEO-7: Expansive Soils	Mitigation GEO-8: Landslides
1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2B	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3A/3B	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4A	NA	Yes	Yes	NA	Yes	Yes	Yes	Yes
4B	NA	Yes	Yes	NA	Yes	Yes	Yes	Yes
5A/B	NA	Yes	Yes	NA	Yes	Yes	Yes	Yes
6A/B	NA	Yes	Yes	NA	Yes	Yes	Yes	NA
Option C	NA	Yes	Yes	NA	Yes	Yes	Yes	NA
7A/B	NA	Yes	Yes	NA	Yes	Yes	Yes	NA

Table 3.9-14 Construction Period Mitigation Measure Applicability

Segment	Mitigation GEO-9: Caliche/Hard Rock Excavation	Mitigation GEO-10: Shallow Groundwater	Mitigation GEO-11: Tunneling	Mitigation GEO-12: Ground Fissures
1	Yes; hard rock	Yes	NA	NA
2A	Yes; hard rock	Yes	NA	NA
2B	Yes; hard rock	Yes	NA	NA
3A/3B	Yes; hard rock	Yes	NA	NA
4A	Yes; hard rock	Yes	NA	NA
4B	Yes; hard rock	Yes	Yes	NA
5A/B	Yes, caliche	Yes	NA	Yes
6A/B	Yes, caliche and hard rock	Yes	NA	Yes
Option C	Yes, caliche and hard rock	Yes	NA	Yes
7A/B	Yes; caliche	Yes	NA	Yes

3.9.5.1 Operational Period Mitigation Measures

Mitigation GEO-1: Surface Fault Rupture: A site specific, detailed evaluation, which includes surface reconnaissance and subsurface assessment, shall be performed by a qualified geologist. Recommendations of this evaluation shall be incorporated in final design documents. This evaluation shall be performed prior to construction so that, in the event a fault-rupture hazard exists, the recommendations of the geologist can be implemented in the final project design. (Applies to all facilities located within Segments 1, 2A, 3A, and 3B).

Mitigation GEO-2: Ground Shaking: Site-specific evaluation of the potential ground shaking hazard shall be performed by a qualified geologist. The evaluation shall be performed during design development and prior to construction so that appropriate structural design and mitigation techniques can be incorporated into the design of the project. Evaluation techniques shall include drilling of exploratory borings, laboratory testing of soils, computer software analysis to develop seismic design parameters for use by the project structural engineer. Recommendations of this evaluation that avoid or minimize impacts related to seismic ground shaking shall be incorporated into final design documents. Structural elements of the rail system shall be designed to resist or accommodate appropriate site-specific ground motions and to conform to the current seismic design standards. Implementation of an earthquake early warning system shall also be included as part of the project. (All segments, all facilities)

Mitigation GEO-3: Liquefaction: Site-specific evaluation of the potential liquefaction hazard shall be performed by a qualified geotechnical engineer during design development and prior to construction. This evaluation shall assess the liquefaction and dynamic settlement characteristics of the on-site soils and shall include drilling of exploratory borings, evaluation of groundwater depths, and laboratory testing of soils. Recommendations of this evaluation that avoid or minimize impacts related to liquefaction shall be incorporated into final design documents. (All segments, all facilities)

Mitigation GEO-4: **Dam Inundation:** A detailed hydrologic evaluation shall be performed during design development and prior to construction by a qualified hydrologist to assess the risks and potential effects of inundation on project improvements to the alignment. The hydrologic evaluation will identify potential dam inundation hazards at site-specific locations and identify corresponding design recommendations to be incorporated into the final design documents. (Applies to all facilities located within Segments 1, 2A, 2B, 3A, and 3B)

Mitigation GEO-5: Settlement: During the design phase of the project, site-specific geotechnical evaluations shall be performed by a qualified geologist to assess the settlement potential of the on-site natural soils and undocumented fill. Surface reconnaissance and subsurface evaluation shall be performed which addresses the potential settlement hazards. The evaluations shall include drilling of exploratory borings and laboratory testing of soils, in addition to surface reconnaissance to evaluate site conditions. Recommendations of the geotechnical evaluation shall be implemented prior to design and construction. (All segments, all facilities)

Mitigation GEO-6: Corrosive Soils: A subsurface evaluation shall be performed prior to design and construction. Evaluation of corrosive soil potential shall be accomplished by testing and analysis of soils at design depths. Laboratory tests shall be conducted on the soils prior to construction and the results shall be reviewed by a qualified corrosion engineer. The qualified corrosion engineer shall prepare an improvement plan which shall include corrosion protection measures suitable to the project elements. The improvement plan shall include corrosivity tests to evaluate the corrosivity of the subsurface soils. Recommendations of the improvement plan shall be implemented prior to design and construction. (All segments, all facilities)

Mitigation GEO-7: Expansive Soils: During the project design, a site-specific subsurface evaluation, including laboratory testing, shall be performed by a qualified geologist to evaluate the extent of which expansive soils are present along the alignment. Where expansive soil conditions are found and would be detrimental to proposed improvements, measures recommended by the geologist shall be implemented in project design. (All segments, all facilities)

Mitigation GEO-8: Landslides: To further evaluate the potential for landslides and surficial slope failures along the proposed segments, surface reconnaissance and subsurface evaluation shall be performed by a qualified geotechnical engineer during project design. Surface reconnaissance shall include visual observation of the earth units and geomorphology and review of geologic maps to evaluate the condition of slopes relative to the alignment. Subsurface exploration shall be performed as recommended by the qualified geotechnical engineer to evaluate the potential for landslides and surficial slope failures. If necessary, subsurface evaluation shall include the excavation and detailed logging of exploratory trenches, test pits and/or borings as recommended by the qualified geotechnical engineer. Slope stability computer analyses shall be performed to address the stability of slopes where recommended by the qualified geotechnical engineer. Measures recommended in the evaluation shall be implemented prior to project design and construction. (Applies to all facilities located within Segments 1, 2A, 2B, 3A, 3B, 4A, 4B, 5A, and 5B)

3.9.5.2 Construction Period Mitigation Measures

Mitigation GEO-9: Excavation: Surface reconnaissance and subsurface evaluation shall be performed by a qualified geotechnical engineer during project design to assess soil excavatibility. This evaluation shall include drilling of exploratory borings and/or test pits to evaluate ground conditions for excavation capability where recommended by the qualified geotechnical engineer. Measures recommended in the evaluation shall be incorporated into final design and construction plans. (All segments, all facilities)

Mitigation GEO-10: Shallow Groundwater: Prior to project design and construction, a qualified geotechnical engineer shall assess groundwater conditions in the project area. In the event shallow groundwater is detected or suspected, mitigation techniques shall be incorporated into final design documents. (All segments, all facilities)

Mitigation GEO-11: Tunneling: Excavations for underground structures shall be performed with care to reduce the potential for lateral deflection of excavation sidewalls and/or shoring, which could also cause differential movement of structures located near the excavation. To reduce the potential for damage to improvements and structures resulting from dewatering operations, the ground surface and/or structures around the excavation shall be monitored for movement with a variety of instrumentation. If during the course of construction, the instrumentation detects ground movement that exceeds a pre-specified value, work shall stop and the contractor's methods shall be reviewed by a qualified geotechnical engineer and appropriate changes shall be made, if recommended by the geotechnical engineer. Typical monitoring methods include installation of ground survey points around the outside of the excavation to monitor settlement, placing monitoring points on nearby structures to monitor performance of the structures, and installation of inclinometers along the sides of the excavation to monitor lateral deflection of sidewalls. (Applies to tunnel construction in Segment 4B)

Mitigation GEO-12: Ground Fissures: To further evaluate the potential for ground fissures, a qualified geologist shall conduct surface reconnaissance and prepare an evaluation during the design phase of the project. This evaluation shall include visual observation of the earth units, manmade features and geomorphology, and review of geologic maps to evaluate the surface conditions relative to project features. Recommendations of the evaluation shall be incorporated into final design and construction plans. (Applies to all facilities located within Segments 5A, 5B, 6A, 6B, 7A, and 7B and Option C).

3.10 HAZARDOUS MATERIALS

This section discusses hazardous materials existing in the DesertXpress study area, the potential impacts related to construction of the action alternatives and related mitigation measures to reduce potential adverse effects. The action alternatives would be constructed and operated on lands where the presence of hazardous materials may be anticipated within structures to be demolished as well as within soil and groundwater underlying project features.

Information in this section is based on a Hazardous Materials Assessment (HMA) prepared by Ninyo and Moore in February 2007, based on field research performed in July 2006.[1] The full report is included as Appendix I.

Impacts from hazardous waste or material sites are an important consideration in the planning and development of any major transportation improvement project. As remediation of contaminated soil and groundwater can dramatically increase the overall cost of a project, it is important to identify the location of contaminated sites during the early phase of environmental analysis. With such information, contaminated sites can be avoided during the project planning phase. Where contaminated sites cannot be avoided, early identification of these sites can help mitigate impacts that would have resulted in increased project costs, schedule delays, and public and worker safety issues.

Overall, the action alternatives differ little in potentially adverse effects related to hazardous materials. Option C would follow the UPRR corridor in Segments 6 and 7 where the historic use of herbicides and related hazardous materials has contributed to contaminated soil conditions. The action Alternatives would be constructed primarily within the I-15 right-of-way, where significant contamination is not known to exist.

The action alternatives would entail the use, storage, and transport of fuels, oils, solvents, paints, and other potentially hazardous materials in their construction and operation.

3.10.1 REGULATIONS AND STANDARDS

3.10.1.1 Federal Regulations

Hazardous materials and hazardous wastes are regulated by numerous Federal and state laws. The primary Federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA; 42 U.S.C. § 6901 et seq.), the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA; 42 U.S.C. § 9601 et seq.), and the Lead Based Paint Poisoning Prevention Act (42 U.S.C. Chapter 63).

[1] Ninyo and Moore, *Hazardous Materials Assessment, Proposed DesertXpress Rail Corridor, Victorville, California to Las Vegas, Nevada.* February 2007.

RCRA: RCRA governs the disposal of solid and hazardous waste. Congress passed RCRA in 1976 as an amendment to the Solid Waste Disposal Act of 1965. RCRA was intended to address the growing volume of municipal and industrial waste and set national goals for protecting human health and the environment from the potential hazards of waste disposal. RCRA sets forth measures to conserve energy and natural resources. RCRA Subtitle C establishes a hazardous waste program intended to regulate such wastes from their creation to their disposal – a framework sometimes called "cradle to grave." RCRA Subtitle I sets forth an underground storage tank (UST) program to regulate such storage of hazardous substances, including petroleum products. The Environmental Protection Agency (EPA) has primary responsibility for implementing RCRA, but some states, including California and Nevada, have received authorization to implement RCRA and issue permits.

CERCLA: CERCLA, also known as Superfund, was enacted in December 1980 and amended significantly in 1986. CERCLA provides a basis for taxing chemical and petroleum manufacturers and provides Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA sets forth requirements concerning closed and/or abandoned hazardous waste sites, provides for liability of persons responsible for releases of hazardous waste at these sites, and administers a trust fund using collected taxes to provide for cleanup when no responsible party can be identified.

Two types of response actions are authorized under CERCLA: short-term removal actions and long-term remedial response actions. Such actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

Enacted in 1971, the **Lead-Based Paint Poisoning Prevention Act** prohibits the use of lead-based paint. For projects involving construction of transportation corridors, contamination resulting from lead-based paint is a frequent hazardous waste issue and may be unknown until testing is performed. Lead was used historically as a pigment and drying agent in oil-based paint; structures built prior to the 1980s may still contain undercoats of lead-based paint. Additionally, weathering and routine maintenance of paint on buildings may contaminate nearby soils with lead.[2]

Other relevant Federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act (33 U.S.C. § 1251)
- Clean Air Act (42 U.S.C. § 7401 et seq.)
- Safe Drinking Water Act (Title 40 C.F.R)
- Occupational Safety & Health Act (OSHA) (Title 29 C.F.R)
- Atomic Energy Act (42 U.S.C. 2014 – 2282)

[2] Lead contamination may also result from historic use of leaded gasoline. Although the sale of leaded gasoline for regular automotive use was prohibited in the U.S., Canada, and Mexico in the 1980s and 1990s, leaded fuel had been widely available for sale throughout North America since the 1920s. The historic use of leaded fuels has resulted in the contamination of soils along roadways, such as Interstate 15. Surface and near-surface soils along heavily used roadways have the potential to contain elevated concentrations of lead of several hundred milligrams per kilogram.

- Toxic Substances Control Act (15 U.S.C. § 2601 et seq.)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. § 136 et seq.)

In addition to the acts listed above, Executive Order 12088 (Federal Compliance with Pollution Control) mandates that necessary actions be taken to prevent and control environmental pollution when Federal activities or Federal facilities are involved.

Hazardous waste management in California is regulated primarily under the authority of the California Health and Safety Code. Health and Safety Code §25100 to §25250.28 and Title 22 C.C.R., Div. 4.5 contains regulations adopted and administered by the California Environmental Protection Agency's (CalEPA's) Department of Toxic Substances Control (DTSC). Both the California Health and Safety Code and Title 22 C.C.R. require that hazardous waste be managed according to applicable regulations, which include worker operational safety procedures as identified in Title 8 C.C.R.; handling, storage, and exposure requirements; transportation and disposal requirements under a uniform hazardous waste manifest; and documentation procedures. In California, waste disposal facilities are classified in three categories: Class I, Class II, and Class III. A Class I disposal facility may accept Federal and state hazardous waste. Class II and Class III facilities are permitted only to accept non-hazardous waste at facility-specific acceptance threshold levels established by the Regional Water Quality Control Board (RWQCB), which is the permitting agency.

Hazardous waste management in Nevada is regulated primarily under Nevada Revised Statute (NRS) §459.400. The Nevada State Environmental Commission (SEC), an eleven member quasi-judicial and quasi- legislative board, acts on regulatory petitions proposed by the Nevada Division of Environmental Protection (NDEP). These Petitions (i.e., proposed regulations) are initiated to further define existing state law (Nevada Revised Statutes) and/or new laws enacted by the Nevada Legislature. The SEC also conducts rulemaking proceedings and hears appeals from orders of the Department of Conservation and Natural Resources ("DCNR") in the areas of air quality, water pollution, and solid and hazardous waste management.

As stated in Chapter 1, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB found the DesertXpress Project to be exempt from state and local land use and environmental requirements. Such laws include the California Environmental Quality Act (CEQA).[3] As a result of the declaratory order, no Environmental Impact Report (EIR) is required and thus has not been prepared for the DesertXpress project. Nevertheless, this EIS analyzes the proposed project's direct and indirect effects related to land use, taking into account the potential consistency with planned and existing land uses. Federal, state, and local land use plans and policies regarding hazards and hazardous materials are considered here.

3.10.1.2 California Regulations

California State Fire Marshal's (CSFM) Office

The California portion of the study area is under the jurisdiction of the California State Fire

[3] STB Finance Docket No. 34914, DesertXpress Enterprises, LLC – Petition for Declaratory Order

Marshal's office with regard to hazardous liquid pipelines. The CSFM participates in the Certified Unified Program Agency (CUPA), which consolidates and coordinates activities and programs related to hazardous wastes generators and treatments, storage tanks, hazardous material releases, and hazardous material management plans. The CSFM provides regulatory oversight, CUPA certifications, evaluations of the approved CUPAs, and training and education.[4]

Mojave Desert Air Quality Management District (MDAQMD)

The study area is within the jurisdictional area of the MDAQMD. The MDAQMD is a State of California agency responsible for regulating stationary sources of air pollution within its jurisdiction. The MDAQMD typically requires that all equipment with the potential to emit air pollutants (including air toxics and hazardous air pollutants) have a valid District permit prior to commencing construction and/or operation, but specifically excludes railroads from requiring such permits.[5]

Lahontan Regional Water Quality Control Board

The California portion of the study area is within the jurisdiction of the Lahontan Regional Water Quality Control Board. The Lahontan Board has oversight with regard to releases from USTs and other point, non-point, and regional sources within its jurisdiction.

San Bernardino County Fire Department (SBCFD)

The California portion of the study area is under the jurisdiction of the SBCFD with regard to the maintenance of records and files regarding permitted underground storage tanks, reported releases from underground storage tanks, and facilities that handle, store, and use hazardous materials and generate hazardous wastes. The SBCFD Hazardous Materials Division and Office of Emergency Services collaborate on emergency plans with local County jurisdictions.

San Bernardino County Solid Waste Management Division (SBCSWMD)

The SBCSWMD has local regulatory oversight responsibility for active and closed landfills in San Bernardino County, comprising the entire portion of the study area within California.

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[4] Office of the State Fire Marshal. <http://osfm.fire.ca.gov/cupa.html>

[5] Rule 219, MDAQMD Rule Book

3.10.1.3 Nevada Regulations

Nevada State Fire Marshal's (NSFM) Office

This NSFM is responsible for permitting and regulating the storage, use, and transportation of hazardous materials within the state of Nevada. Additional services provided by the NSFM are hazardous materials inspections per the Nevada Revised Statutes (NRS) and Nevada Administrative Codes (NAC), regulation of hazardous liquid pipelines, and providing training and education in fire protection methods and responsibilities.

Clark County Department of Air Quality and Environment Management

The Department of Air Quality and Environmental Management (DAQEM) has been delegated the authority under the provisions of Nevada Revised Statutes §445B.500 and by direction of the Clark County Board of County Commissioners to implement and enforce a countywide air pollution control program. DAQEM applies and enforces the Air Quality Regulations, which establish requirements for sources that emit or release air contaminants into the atmosphere. Among DAQEM regulations potentially applicable to the action alternatives are those related to dust control, storage of petroleum products, and the emission of visible air contaminants.

Clark County Fire Department (CCFD)

The CCFD maintains records and files regarding hazardous material use and storage within Clark County, comprising the entire Nevada portion of the study area.

Southern Nevada Health District, Environmental Health (SNHD)

Within the Nevada portion of the study area, SNHD maintains records and files regarding permitted USTs, reported releases from USTs, and facilities that handle, store, and use hazardous materials and generate hazardous waste. In addition, the SNHD also has local regulatory oversight responsibility for active and closed landfills.

3.10.2 Affected Environment

3.10.2.1 Environmental Database Review

The HMA included a review of the Federal, state, and local databases discussed below. The search examined properties located within the project study area for hazardous metals which constituted a 1/8-mile radius around proposed project features. The list of all properties identified in this database search can be found in Appendix I.

National Priorities List (NPL)

The U.S. Environmental Protection Agency (EPA) established the NPL as the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL lists sites that pose an immediate public health hazard, and where an immediate response to the hazard is necessary.

Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS)

The CERCLIS database list is a compilation of facilities reported to the US EPA that have been investigated or are under investigation for a release or potential release of hazardous materials. Within CERCLIS, some sites are identified as "No Further Remedial Action Planned" or NFRAP. NFRAP sites may be facilities where following an initial investigation, either no contamination was found, contamination was removed quickly without need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal superfund action or NPL consideration.

Resource Conversation and Recovery Act (RCRA)

The RCRA Generator database identifies facilities that generate hazardous waste as defined by RCRA. Inclusion on these lists is for permitting purposes and is not indicative of a release. RCRA governs the disposal of solid and hazardous waste and establishes a system for controlling hazardous waste from the time it is generated until its ultimate disposal. The EPA has primary responsibility for implementing RCRA, but individual states are encouraged to seek authorization to implement some or all RCRA provisions. California received authorization to implement RCRA in August 1992; Nevada in May 2004.

Emergency Response Notification System (ERNS)

The ERNS database lists emergency response actions and is provided by the EPA and National Response Center. ERNS also records and stores information on reported releases of oil and hazardous substances in the United States. Information for the ERNS database list is complied from the National Response Center, the EPA, the U.S. Coast Guard, and the Department of Transportation.[6]

Underground Storage Tanks (UST)

Each state compiles a database of USTs per Subtitle I of RCRA. The UST databases contain

[6] U.S. Environmental Protection Agency. 1992. < http://epa.gov/records/policy/schedule/sched/060.htm>

information on the site location, number of tanks, materials stored, date of installation, and other information for registered tanks. Inclusion on this list is for permitting purposes and is not indicative of a release. The database review generated a list of non-geocoded properties, which include properties that could not be mapped due to unknown or missing addresses or locations.

Leaking Underground Storage Tank (LUST)

LUST records contain an inventory of reported leaking underground storage tank incidents and, when possible, identify the type of material released and the affected media (i.e., air, soil, and water). Within California and Nevada, the LUST information system is maintained by the California Environmental Protection Agency and the Nevada Division of Environmental Protection, respectively.

Solid Waste Landfills (SWLF)

The SWLF databases identify open and closed solid waste disposal facilities and transfer stations. California and Nevada each maintain individual databases. California's database (SWIS) is maintained by the California Integrated Waste Management Board (CIWMB). In Nevada, this database is maintained by the Department of Environmental Protection (DEP).

California Environmental Protection Agency, Department of Toxic Substance Control State Priority List (CAL-SITES)

The CAL-SITES database was provided by the Department of Toxic Substances Control (DTSC) and identifies past confirmed or potential hazardous substances releases within California.[7]

California Hazardous Material Incident Report System (CHMIRS)

The CHMIRS database contains information on reported hazardous material incidents (i.e., accidental releases or spills) within California. The database is maintained by the California Office of Emergency Services (OES).

State of Nevada Environmental Protection Agency (NEV-STATE)

The NEV-STATE database is provided by the Bureau of Corrective Actions and includes potential or confirmed hazardous substance release properties in Nevada.

3.10.2.2 Review of Aerial Photography

Aerial photographs have been collected for the continental United States since the 1920s with variable coverage and frequency (generally based on an area's importance to national defense). Aerial photographs offer an opportunity for direct observation of site conditions across a period of time, including the locations of tank pits, drums, pits, ponds, lagoons, stained/stressed vegetation, or other site development features that can indicate potential contaminant sources.

Aerial photographs of the study area were obtained from Continental Aerial Photo, Inc., the United States Geological Survey (USGS), and Google™ Maps. Dates of aerial photographs reviewed were from 1950, 1955, 1968, 1969, 1973, 1975, 1976, 1977, 1978, 1986, 1997, 1999, and 2006. Photographs varied in scale and clarity, and were taken from a variety of altitudes. The

[7] In 2007, the DTSC renamed the Calsites database as the "EnviroStor" database.

aerial photograph review served to verify information gained from other sources, including database reviewing, and to provide additional information.

3.10.2.3 Field Reconnaissance

Following the environmental database and aerial photography reviews, field reconnaissance of the study area was conducted July 24 through 28, 2006 from public rights-of-way.

During the field reconnaissance, analysts searched for indicators of potential environmental concern, including significant staining or degraded pavement, underground storage tanks (USTs), aboveground storage tanks (ASTs), storage of significant quantities of hazardous materials and wastes, groundwater monitoring wells and remediation systems, dry cleaning facilities, transformers, pesticide use, industrial facilities, current or historic gasoline stations, distressed vegetation, and the presence of pits, ponds, or lagoons.

The field reconnaissance identified additional facilities of concern beyond those identified in the database search. Properties within or immediately adjacent to the study area were added if they displayed overt and obvious evidence of a subsurface assessment and/or contamination, such as an operating remediation system, or drums of soil cuttings from a subsurface investigation.

During the site reconnaissance, primary attention was paid to gasoline stations with documented releases (listed in the environmental database reports) within or in close proximity to the study area. All gasoline stations in the study area were evaluated for the potential presence of wells, drums, and/or remediation systems.

3.10.2.4 Ranking of Potential Effects

The purpose of the hazardous materials assessment (HMA) was to evaluate the likelihood that hazardous materials may be present in soil or groundwater beneath the study area as a result of on-site or off-site activities. The likelihood of contamination in specific portions of the study area was ranked as ***high***, ***moderate***, or ***low*** based on the following descriptions:

> ***High:*** This rank was given to property in the study area with known or probable contamination. An example of a property in this category would be a leaking underground storage tank (LUST) property where remediation had not been started or was not yet finished.
>
> ***Moderate:*** This rank was given to property with potential or suspected contamination. Examples of properties in this category would be LUST properties in the vicinity of the study area that are in final stages of remediation or in post-remediation monitoring. Any LUST properties adjacent to the site would be included in this category, regardless of case status (deed restrictions may exist for closed LUST cases).

Another example of a "moderate" ranking would be a property within or adjoining the study area with known use or storage of hazardous materials which had received violation notices from an inspecting agency or where visual evidence of inadequate chemical and storage practices (such as significant staining) were observed but where no environmental assessments had occurred.

Also included in the "moderate" category are facilities within or adjoining the study area where USTs are likely present, but that appeared to be abandoned by their former operators.

Low: This rank was given to property where use or storage of hazardous materials occurs but with no significant violations, known releases, or evidence of inadequate chemical-handling practices. Example properties would be active UST or dry cleaning facilities with no documented releases. Also included would be properties outside the immediate study area where remediation of previous releases had been completed.

The classification of each property was based on the type of operation (current or historical), proximity to the project alignments, hydrogeologic conditions, field observations, and regulatory information. If a property was given a High or Moderate ranking in the HMA, it is considered to have potential effects related to hazardous materials.

In addition, the HMA discussed the potential for operational effects related to use of hazardous materials at proposed maintenance facilities and elsewhere within the study area. Mitigation measures are identified for each adverse effect identified.

3.10.3 Regional Environment

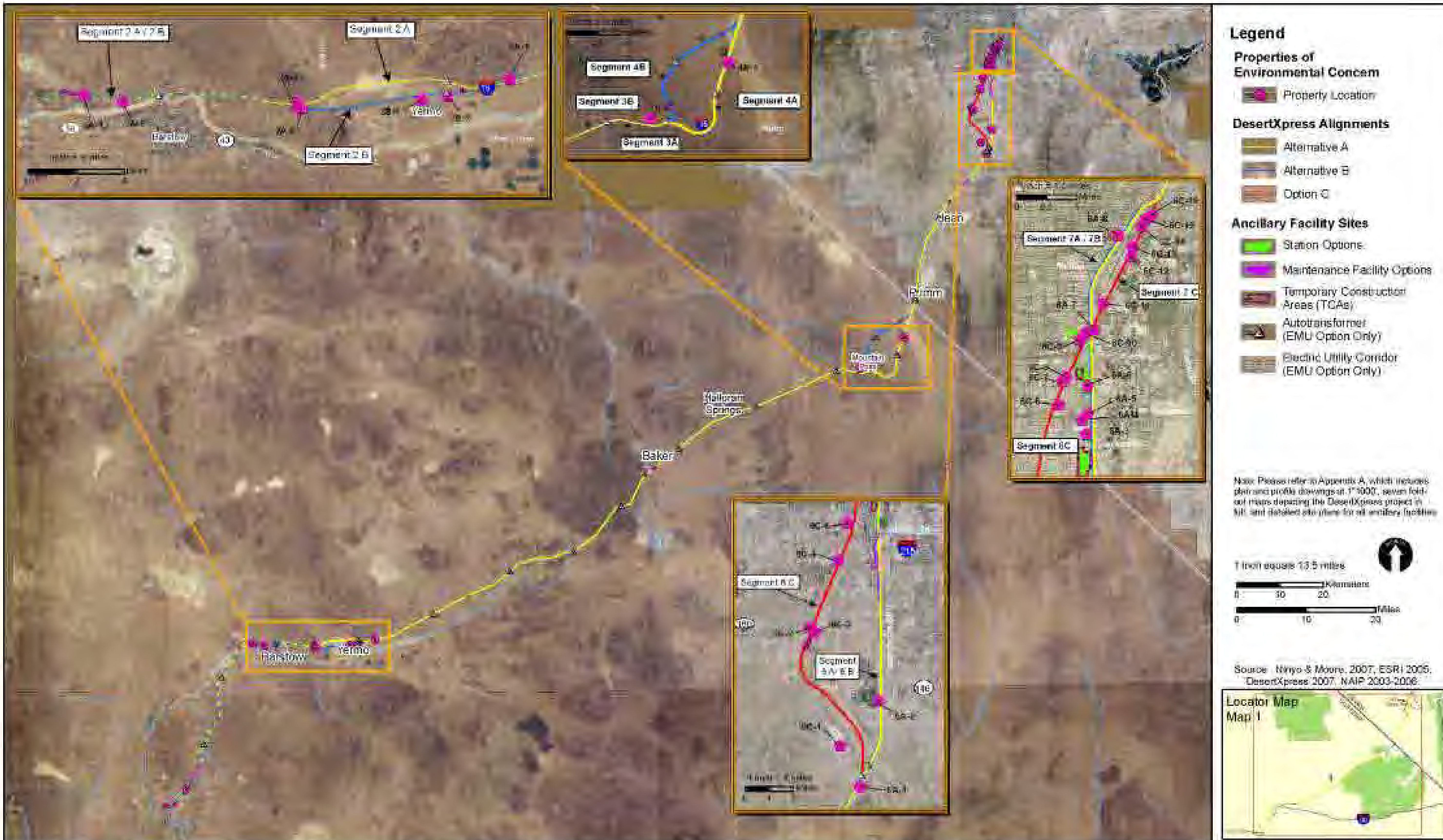
Within the 200-mile study area corridor between Victorville and Las Vegas are numerous locations, primarily in developed and urbanized areas, where hazardous materials releases are documented or suspected. Non-urbanized sites within the study area are also potential hazardous materials sites, including factories, military installations, landfills, railroad rights of way, and other remote point sources, such as gas stations.

Appendix I contains tables and maps showing all hazardous material sites identified in database searches and field reconnaissance.

Figure 3-10.1 shows the general locations of properties considered to be of moderate or high environmental concern in proximity to the action alternatives.

3.10.3.1 Hazardous Materials by Segment

The following sections describe the hazards materials identified within each segment based on information obtained from the database search reports, aerial photography, and field reconnaissance.



Federal Railroad Administration

DesertXpress Project EIS

Properties of Environmental Concern

FIG 3-10.1

Segment 1

Table 3.10-1 summarizes the Federal and state database listings for Segment 1 and shows the number of sites identified within each database consulted. Table 3.10-2 describes the review of available aerial photographs for Segment 1.

Table 3.10-1. Environmental Database Review – Segment 1

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLF	LUST	UST
1	0	0	3	0	NA	0	0	0	0

Source: Ninyo & Moore, 2007.

Table 3.10-2. Aerial Photograph Review, Segment 1

Aerial Photograph Date	Victorville to Barstow
1955	Segment 1 photography was available near Stoddard Wells Road. The remainder of Segment 1 and the vicinity was predominantly undeveloped land with some agricultural and residential uses.
1969	Same as previous, increasing number of residences.
1978-2006	Segment 1 and the vicinity appeared generally the same as it did during the site reconnaissance.

Source: Ninyo & Moore, 2007.

Based on the database and aerial photograph review, along with field reconnaissance, no sites were identified as having a moderate to high ranking of potential effect. Research did not reveal evidence of significant hazardous materials concerns within Segment 1.

Segment 2

Table 3.10-3 summarizes the Federal and state database listings for Segments 2A and 2B and shows the number of sites identified within each database consulted. Because of the close proximity of Segments 2A and 2B, a single database review was conducted. Table 3.10-4 describes the available aerial photographs for Segment 2.

Table 3.10-3. Environmental Database Review – Segment 2

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLFs	LUST	UST
2A/2B	1	0	0	0	NA	0	0	1	6

Source: Ninyo & Moore, 2007.

Table 3.10-4. Aerial Photographs, Segments 2A/2B

Aerial Photograph Date	Barstow to Yermo
1955	One aerial photograph was available from an area just north of Barstow. I-15 did not yet exist at the time of the photograph. Properties adjoining Segments 2A/2B were mostly undeveloped with some agricultural and residential uses.
1969	I-15 and an increase in residential and agricultural properties were apparent.
1978-2006	Segments 2A/2B and site vicinity appeared generally the same as it did during the site reconnaissance.

Source: Ninyo & Moore, 2007.

From the database and aerial photograph review, along with field reconnaissance, six sites were identified as having a moderate to high ranking of potential effect. These are listed in Table 3.10-5 below. Locations of these properties are shown on detailed maps within Appendix I as well as on Figure 3-10.1.

Table 3.10-5. Properties of Hazardous Materials Concern, Segment 2

Property/Location	Site Operations – Reason for Risk Class	Risk Class
Segments 2A/2B Monitoring Wells Community Blvd/Old Hwy 58, Barstow	Observed during site reconnaissance. Nature of investigation unknown.	Moderate
Segments 2A/2B Groundwater Monitoring Well, Ramirez Road & Waterman Road, Barstow	Observed during site reconnaissance; nature of investigation unknown.	Moderate
Segments 2A/2B Fort Irwin Disposal. Fort Irwin Road, Barstow	Listed on NPL database, indicated that no further action planned for this site. Exact location of landfill is unknown.	Moderate
Segments 2A/2B Abandoned Gas Station, Fort Irwin Road, Barstow	Observed during site reconnaissance; status of USTs unknown	Moderate

Segment 2B Abandoned Gas Station I-15 and Calico Road Yermo	Observed during site reconnaissance, status of USTs unknown	Moderate
Segment 2B Calico Truck Stop 37857 Calico Blvd Yermo	Listed on LUST database, release of diesel fuel, preliminary site assessment ongoing.	High

Source: Ninyo & Moore, 2007.

The Calico Truck Stop was identified as a LUST facility, as a leak from a diesel underground storage tank was discovered during a tank closure in 1990. Thus, this facility is considered to have a high environmental concern because of its close proximity to Segments 2A/2B and the ongoing remediation of this site.

All other identified properties were identified as posing moderate environmental concerns. These include several abandoned gas stations, but all of the gas stations are at least 200 feet from either proposed rail alignment.

Because Fort Irwin Road Disposal was not geocoded, its location relative to the proposed rail alignments cannot be determined with precision. As the solid waste disposal site was listed in the NFRAP list within the CERCLIS database, it is considered to be of moderate environmental concern.

The monitoring wells are considered a moderate environmental concern, as there is no indication of the type or extent of contamination being monitored.

Segment 3

Table 3.10-6 summarizes the federal and state database listings for Segments 3A and 3B, showing the number of sites identified within each database consulted. The rail alignments in Segement 3 are in close proximity for their entire length (generally within 200 feet of each other); as such, a single database search was performed.

Table 3.10-6. Environmental Database Review – Segment 3

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLF	LUST	UST
3A/B	0	1	1	0	NA	0	0	0	4

Source: Ninyo and Moore, 2007.

The properties listed on the RCRA Generator database were not considered environmental concerns as there are no indications of release associated with the listings. Additionally, the LUST properties, UST sites, and the facilities identified on the ERNS database are not considered an environmental concern to Segments 3A/3B based on the distance to the segment, the regulatory status, and/or the type of expected releases from these incidents to the study area.

Aerial photographs for Segment 3 did not yield significant new information. There is relatively sparse development even today in the Segment 3 area, with very limited exceptions.

From the database and aerial photograph review, along with field reconnaissance, two sites were identified as having a moderate ranking of potential effect. These sites are listed in Table 3.10-7 below. Both properties are located north of the I-15 freeway, but could affect Segment 3B, which would run along the northern/western side of I-15 as well as Segment 3A, which would run within the I-15 median. Locations of these properties are shown on detailed maps within Appendix I as well as on Figure 3.10-1.

Table 3.10-7. Properties of Hazardous Materials Concern – Segment 3

Property/Location	Site Operations – Reason for Risk Class	Risk Class
Segments 3A/B Abandoned Gas Station Sunrise Canyon Road, Yermo	Observed during field reconnaissance, status of USTs unknown	Moderate
Segments 3A/3B MolyCorp Mine & Landfill 67750 Bailey Road, Nipton	Listed on SWLF database, landfill closed in 1987. Status of mining operations unknown.	Moderate

Source: Ninyo and Moore, 2007.

The MolyCorp mine and landfill was identified as a facility of environmental concern on the SWLF databases. There were seven separate spills that occurred in July and August 1996 from a wastewater pipeline that ran from the mine to a landfill in Mountain Pass to and Ivanpah Dry Lake. The cleanup efforts were completed in the fall of 2000. Currently, plans are on-going for the removal of the wastewater pipeline. The facility is still operational and is currently regulated by the LRWQCB for several onsite ponds and discharge streams. Based on the adjacent location to Segments 3A/3B and the regulatory status of this site, this facility is considered a moderate environmental concern to Segments 3A/3B.

The abandoned gas station at Sunrise Canyon Road is also considered a moderate environmental concern, as the status of underground storage tanks is unknown.

Segment 4

Table 3.10-8 summarizes the Federal and state database listings for Segments 4A and 4B. As Segments 4A and 4B are in relatively close proximity and travel through an unpopulated area, a single database search was performed.

Table 3.10-8. Environmental Database Review – Segment 4

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLF	LUST	UST
4A/4B									

	0	0	0	0	NA	0	2	0	0

Source: Ninyo and Moore, 2007.

The two sites listed on the SWLF database were located well beyond the extent of Segments 4A/4B. Based on the distance from these facilities to the alignment, they are not considered environmental concerns to Segments 4A/4B. The review of aerial photographs for Segment 4 did not yield significant new information regarding potential hazardous materials; historic photos showed relatively similar undeveloped conditions as can be found today.

From the database and aerial photograph review, along with field reconnaissance, one site was identified as having a moderate ranking of potential effect, as shown in Table 3.10-9 below. The location of this property is shown on a detailed map within Appendix I as well as on Figure 3-10.1.

Table 3.10-9. Properties of Hazardous Materials Concern – Segment 4

Property	Site Operations – Reason for Risk Class	Risk Class
Segment 4A Abandoned gas station Yates Well Road, Nipton	Observed during site reconnaissance, status of USTs unknown.	Moderate

Source: Ninyo & Moore, 2007.

An abandoned building, believed to have been a former gas station, was identified as an environmental concern during the site reconnaissance. The status of the underground storage tanks on the property is unknown, thus this property is classified as having moderate environmental risk.

Segment 5

Table 3.10-10 summarizes the Federal and state database listings for Segments 5A and 5B. These segments are in close proximity to each other, so a single search was conducted.

Table 3.10-10. Environmental Database Review – Segment 5

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLFs	LUST	UST
5A/B	0	0	2	0	0	0	0	0	5

Source: Ninyo & Moore, 2007.

Two sites were listed on the ERNS database: Whiskey Pete's Texaco in Primm and Gold Strike Casino Mobil in Jean. However, based on the distance from these sites to Segments 5A/5B, as well as their regulatory status and the type of expected releases, these listings are not considered environmental concerns to the project study area.

The database search did not identify any properties in Segments 5A/5B with a moderate or high environmental risk. Neither the review of aerial photography nor the site reconnaissance identified any other properties exhibiting potential environmental concerns.

Segments 6 and 7

Table 3.10-11 summarizes the Federal and state database listings for Segments 6 and 7, excluding Option C. [8]

Table 3.10-11. Environmental Database Review – Segments 6 and 7

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLF	LUST	UST
6A/6B	2	21	33	NA	28	NA	0	18	40

Source: Ninyo & Moore, 2007.

Segments 6A and 6B traverse an urbanized area where relatively large numbers of potentially hazardous materials sites would be anticipated. These listings were screened for their proximity to the study area and potential environmental effect on the action alternatives. A review of historic photographs provided additional background information on growth and change in the area; findings from this review are summarized in Table 3.10-12. Locations of these properties are shown on detailed maps within Appendix I as well as on Figure 3-10.1.

Table 3.10-12. Aerial Photographs, Segments 6 and 7

Aerial Photograph Date	Jean to Las Vegas
1968	Properties adjoining Segments 6A/6B were mostly undeveloped with some agricultural and residential uses. Limited commercial development is observed in the northern portion of Las Vegas.
1976	Increases in commercial, residential, and agricultural properties were apparent in the metro Las Vegas area.
1986	Further increases in commercial and residential properties were apparent in the metro Las Vegas area.
1999	Segments 6A/6B and the vicinity appeared generally the same as it did during the site reconnaissance.

Source: Ninyo & Moore, 2007.

From the environmental database and aerial photograph reviews, along with field reconnaissance, a list of properties of moderate environmental concern was developed. These

[8] The database search was conducted in late 2006, prior to the division of "Segment 6" into Segment 6, Segment 7, and Option C. Although Option C information was disaggregated and is presented separately below, the raw results from the database search cannot distinguish between Segments 6 and 7. However, sites of potential environmental concern are identified separately for Segments 6 and 7. See Tables 3.10-13 and 3.10-15 below.

are listed in Table 3.10-13 below.[9] There were no properties of potentially high environmental concern located along Segment 6 or 7. Three properties are located at the proposed junction of Segment 6, Segment 7, and Option C.

Table 3.10-13. Properties of Hazardous Materials Concern – Segments 6 and 7

Property	Site Operations – Reason for Risk Class	Risk Class
Segments 6A/6B X-plex Las Vegas 15000 Las Vegas Blvd	Go-cart track. Surface staining observed throughout property.	Moderate
Segments 6A/6B Daisy Mae Land Holdings LLC 11978 Industrial Road	Nursery; observed AST during site visit	Moderate
Segments 6A/6B Action Machine and Parts 5115 South Industrial Road	Listed on Nevada State Site database, unknown release to groundwater, status of case unknown, small quantity generate of hazardous waste.	Moderate
Segments 6A/6B Chevron Station 9-2836 3201 Tropicana Avenue	Service Station: Listed on LUST database for leaking UST, status of case unknown. Site listed on UST database, no indication of UST removal are abandonment.	Moderate
Segments 6A/6B McCandless International Trucks 4800 South Industrial Road	Suspected location, actual address no longer exists. Site listed on LUST database, nature and status of case unknown. Site listed on UST database, no indication of UST removal or abandonment.	Moderate
Segments 6A/6B ANR Freight System 4471 South Industrial Road	Listed on LUST database, case closed in 1997. Site listed on UST database, indicated UST no longer active, no indication of UST removal or abandonment.	Moderate
Segment 6, 7, and Option C Commercial Drapery 3580 South Polaris Avenue	Suspected location of site, address no longer exists. Listed on National Priority List archive site, solvent case, date of closure unknown.	Moderate
Segment 6, 7, and Option C Rocky Mountain Bank Note Company 3815 South Highland	Suspected location of site, address no longer exists. Listed on National Priority List archive site, unidentified release, date of closure unknown.	Moderate
Segment 6, 7, and Option C Seven Up Bottling Company 3816 Cinder Lane	Suspected location of site, address no longer exists. Listed on LUST database, nature and status of case unknown.	Moderate
Segments 7A/7B Service Station 3715 South Industrial Road	Abandoned station site observed during field reconnaissance. Site listed on UST database, with no indication of UST removal or abandonment.	Moderate
Segments 7A/7B Sahara Rancho Office Complex 2300 South Rancho Drive	Observed during site reconnaissance; fenced in vacant area with drums and wells	Moderate

Source: Ninyo & Moore, 2007.

[9] All of the properties along Segment 6 and some in Segment 7 are located in unincorporated Clark County, outside the corporate boundaries of the City of Las Vegas. Notwithstanding, nearly all of these properties have a "Las Vegas" postal address.

Action Machine and Parts was listed for an unknown release to groundwater, with a case closure in 1992. Based on its immediate proximity to the alignment, this facility is considered a moderate environmental concern to Segments 6A/6B.

Several facilities identified on the LUST and UST databases are considered to be an environmental concern to Segments 6A/6B, including the Chevron Station, McCandless International Trucks, and ANR Freight System. There is no indication that the underground storage tanks located on these properties have been removed or abandoned, thus establishing these facilities as a moderate environmental concern to Segments 6A/6B.

Both the Commercial Drapery Cleaners and Rocky Mountain Bank Note Company were listed on the CERCLIS-NFRAP database. Notably, these properties are located on the potential Central Station site and are at the junction of Segments 6 and 7, and Option C. However, both addresses are currently part of a redevelopment area, and the site addresses no longer exist. In all, these facilities are considered moderate environmental concerns to Segments 6 and 7, and Option C.

The Seven Up Bottling Company property received case closure from regulatory agencies in 1992, but remains of moderate concern due to its listing on the LUST database.

Option C

Table 3.10-14 summarizes the federal and state database listings for Option C.

Table 3.10-14. Environmental Database Review – Option C

Segment	Regulatory Database								
	CERCLIS-NFRAP	RCRA	ERNS	CAL-SITES	NEV-STATE	CHMIRS	SWLF	LUST	UST
Option C	2	22	34	NA	24	NA		14	37

Source: Ninyo & Moore, 2007.

Option C has a relatively high number of environmental database listings. These listings were screened for their proximity to the study area. A review of historic photographs provided additional background information on growth and change in the area; findings from this review were similar to those for Segments 6 and 7, as shown in Table 3.10-12 above.

The list of properties in Table 3.10-15 was developed from the environmental database and aerial photograph reviews, along with field reconnaissance.[10] There were no properties of potentially high environmental concern located along Option C. Three properties are located at the proposed junction of Segment 6, Segment 7, and Option C; these are listed in Table 3.10-13 above and discussed with other properties in Segments 6 and 7. Locations of all of these properties are shown on detailed maps within Appendix I as well as on Figure 3-10.1.

[10] Properties along Option C have postal addresses in Enterprise or Las Vegas, but are actually located in unincorporated Clark County. Locations noted with an asterisk (*) are within the City of Las Vegas corporate limits.

Table 3.10-15. Properties of Hazardous Materials Concern – Option C

Property	Site Operations – Reason for Risk Class	Risk Class
ChemStar – Sloan Quarry Sloan Road and I-15 vicinity	Lime quarry: Listed on UST database, no indication of UST removal or abandonment.	Moderate
Ergon Asphalt Products 6400 West Richmar Avenue	Listed on Nevada State database, several "soil only" releases of emulsifiers, cases are closed.	Moderate
Las Vegas Paving Corporation 9325 South Jones Boulevard	Listed on UST database, no indication of UST removal or abandonment. Large pond visible in aerial photo.	Moderate
Clark County Dept. of Aviation 7227 Hauck Street	Listed on the Nevada State database, release to soil, status of case undetermined.	Moderate
Tropicana Detention Basin Arville & Oquendo Streets	Listed on Nevada State Site database, release of heavy metals to soil, case closed 1999.	Moderate
Mayflower Moving & Storage 4275 South Valley View	Listed on LUST database, release unknown, case closed in 1991. Listed on UST database, USTs no longer in use, no indication of UST removal or abandonment.	Moderate
United Rentals 4410 South Valley View	Listed on Nevada State database, release of automotive oil to soil, case closed in 2004.	Moderate
J.W. Costello Beverage Company 4370 South Valley View	Listed on LUST database, release unknown, case closed in 1994. Listed on UST database, USTs no longer in use, no indication of UST removal or abandonment.	Moderate
Shetakis Wholesalers Inc 3400 Western Avenue	Listed on LUST database, release unknown, case closed in 1994. Listed on UST database, USTs no longer in use, no indication of UST removal or abandonment.	Moderate
Bat Rentals 2771 South Industrial Road	Listed on LUST database, release unknown, case closed in 1994. Listed on UST database, USTs no longer in use, no indication of UST removal or abandonment.	Moderate
ACE Fire Systems* 2620 Western Avenue	Listed on Nevada State Site database, release of solvents to groundwater, case closed in 2002. Listed on UST database, no indication of UST removal or abandonment.	Moderate
ACE Truck Rental 2135 Western Avenue	Listed on LUST database, unknown release to soil, case closed in 1995. Listed on UST database, USTs no longer in use, no indication of UST removal or abandonment.	Moderate
1921 Western Avenue*	Observed during site reconnaissance: potential UST, vent pipes observed in the field	Moderate
1900 South Industrial Road	Observed during site reconnaissance: potential UST vent pipes observed in the field.	Moderate

Source: Ninyo & Moore, 2007.

The Ergon Asphalt, Clark County Department of Aviation, and Tropicana Detention Basin properties were listed as having moderate environmental concerns due to releases of hazardous materials into soils. Ergon Asphalt Products has four NEV-STATE site listings for four separate incidents of unauthorized release of emulsifiers to soil. Case closures were issued for the four cases by the regulatory agency. The Clark County Department of Aviation property was listed for an unknown release to soil. The Tropicana Detention Basin property was listed for a heavy metals release to soil, with a case closure by the regulatory agency in 1999.

Several properties were listed on both LUST and UST databases: Mayflower Moving & Storage, JW Costello Beverage, Shetakis Wholesalers, Bat Rentals, and ACE Truck Rental. Shetakis Wholesaler, Inc, Bat Rentals, and ACE Truck Rental received case closure from the regulatory agencies in 1994, 1997, and 1995, respectively. However, all of these properties are considered of moderate environmental concern to Option C based on their listings and their proximity to the proposed rail alignment. United Rentals and ACE Fire Systems are also considered moderate environmental concerns to Option C due to release of motor oil to soil and solvents to groundwater.

3.10.4 Environmental Consequences

3.10.4.1 No Action Alternative

Under the No Action Alternative, the proposed high speed passenger rail system would not be constructed or operated in the project area. Adverse effects of the action alternatives related to hazardous materials would not be expected to occur.

However, the No Action Alternative would involve planned and proposed improvements to the regional transportation systems. Many of these impacts would occur within some of the same area as the action alternatives. Capacity expansion projects that involve earth movement and/or construction in these areas would be at similar risks for adverse effects related to hazardous materials as the action alternatives. Any improvements under the No Action Alternative would, however, require project-specific environmental review by the project sponsors to determine the environmental impacts related to such expansions and/or improvements. The No Action Alternative is not discussed further in this section.

3.10.4.2 Action Alternatives

Construction Period

Construction of the action alternatives may require the removal of buildings, structures, soils, and/or paving materials to accommodate new construction. Due to the older age of some buildings along the proposed rail corridor, demolition activities may encounter lead-based paint and asbestos-containing building materials. These materials would have to be removed prior to demolition and transported to a proper disposal facility. Construction activities may also encounter contaminated soils and/or groundwater or other previously identified hazardous materials that must be removed, disposed of, and remediated.

Structures Built Prior to 1980: The construction of project features (stations, maintenance facilities, rail alignments) may require the demolition of structures built prior to 1980. Such demolition activities may involve the exposure of the public and/or the environment to hazardous materials, such as lead based paint and asbestos containing materials. Some of the potential sites for stations and maintenance facilities (in Segments 1, 6, and 7, and Option C) include structures built prior to 1980 and preparation of these sites may require demolition of the structures. Rail connections in the immediate areas of these sites may also require demolition of such structures. Construction of the rail alignment outside of immediate station and maintenance facility areas is not expected to entail the demolition of any structures.

Contaminated Soil and Groundwater: Contaminated soils and groundwater are anticipated to be found in the following locations in the project area:

1) On and/or near properties identified above as being of moderate to high environmental concern.

2) Within and/or near existing or abandoned railroad corridors, where herbicides, petroleum hydrocarbons, and metals may be found in soils and/or groundwater.

3) Within or near existing freeway corridors, where petroleum hydrocarbons and aerially deposited lead may be found in soils and/or groundwater.

Based on the environmental database review, review of field photography, and site reconnaissance, the following segments are located in proximity to these hazards:

- **Sites of moderate and/or high environmental concern:** All segments with the exceptions of 4B and 5A/5B.
- **Sites on/near existing or abandoned railways:** Segments 2A/2B, 6A/6B, 7A/7B, and Option C.
- **Sites in close proximity to freeway corridors:** All project segments, except portions of Segments 2A/2B, and 4A/4B.

Unidentified Hazardous Materials: In addition to the potential adverse effects associated with known or suspected areas of contaminated soil and/or groundwater, additional adverse effects may result if previously unidentified hazardous materials were encountered during construction of the action alternatives.

Hazardous Material Disposal: Any hazardous materials encountered during the construction process require safe handling and disposal to avoid a potential adverse environmental effect.

Operational Period: Operation of the action alternatives will include such activities as train operations, track maintenance, and equipment maintenance. Within maintenance facility sites, it is anticipated that some hazardous materials, including fuels, lubricants, solvents, paints, compressed gases, and associated waste products would be stored and/or staged in buildings and storage tanks (above and below ground). Equipment such as paint booths, sumps, clarifiers, and wastewater treatment units may also be used at the maintenance facilities. Project operations will require the safe handling, use, storage, and disposal of these materials to avoid a potentially adverse effect.

3.10.5 Mitigation Measures

To address the potential effects related to hazardous materials, the following mitigation measures have been developed.

Table 3.10-16 identifies the applicable mitigation measures by segment. These measures are also intended to apply to any project features (stations, maintenance facilities, etc.) located within each segment. For example, any mitigation measures applicable to Segment 1 are also applicable to the all Victorville station and maintenance facility sites.

Table 3.10-16. Mitigation Measure Applicability

Segment	Construction Period				Operational Period
	Mitigation HAZ-1: Structures Built Prior to 1980	Mitigation HAZ-2: Contaminated Soil/Groundwater	Mitigation HAZ-3: Previously Unidentified Hazardous Material	Mitigation HAZ-4: Hazardous Material Disposal	Mitigation HAZ-5: Operationally Generated Hazardous Materials
1	Yes	Yes	Yes	Yes	Yes
2A	No	Yes	Yes	Yes	N/A
2B	No	Yes	Yes	Yes	N/A
3A/B	No	Yes	Yes	Yes	N/A
4A	No	Yes	Yes	Yes	N/A
4B	No	Yes	Yes	Yes	N/A
5A/B	No	Yes	Yes	Yes	N/A

Segment	Construction Period				Operational Period
	Mitigation HAZ-1: Structures Built Prior to 1980	Mitigation HAZ-2: Contaminated Soil/Groundwater	Mitigation HAZ-3: Previously Unidentified Hazardous Material	Mitigation HAZ-4: Hazardous Material Disposal	Mitigation HAZ-5: Operationally Generated Hazardous Materials
6A/B	Yes	Yes	Yes	Yes	Yes
7A/B	Yes	Yes	Yes	Yes	Yes
Option C	Yes	Yes	Yes	Yes	Yes

3.10.5.1 Construction Period Mitigation Measures

Mitigation HAZ-1: Structures Built Prior to 1980: Prior to the start of construction activities, the applicant shall conduct an evaluation of all buildings to be demolished to determine the presence of asbestos containing materials and lead based paint. Remediation should be implemented in accordance with the recommendations of these evaluations.

Mitigation HAZ-2: Contaminated Soil and/or Groundwater: The applicant shall prepare a soil monitoring plan prior to the issuance of permits for demolition, grading, or construction and shall implement the plan during all phases of construction. Disturbed soils shall be monitored for visual evidence of contamination (e.g., staining or discoloration). Soil shall be monitored for the presence of VOCs using appropriate field instruments such as organic vapor measurement with photoionization detectors (PIDs) or flame ionization detectors. If the monitoring procedures indicate the possible presence of contaminated soil, a contaminated soil contingency plan shall be implemented that shall include procedures for segregation, sampling, and chemical analysis of soil. Contaminated soil shall be profiled for disposal and shall be transported with appropriate hazardous or non-hazardous waste manifests by a state-certified hazardous material hauler to a state-certified disposal or recycling facility licensed to accept and treat the type of waste indicated by the profiling process. The contaminated soil contingency plan shall be developed and in place during all construction activities. In the unlikely event that these processes generate any contaminated groundwater that must be disposed of outside of the dewatering/NPDES process, the groundwater shall be profiled, manifested, hauled, and disposed of in the same manner.

Where conditions warrant a Phase II Environmental Site Assessment (ESA), such ESAs shall include the following:

- A work plan that includes the numbers and locations of proposed soil borings/monitoring wells, sampling intervals, drilling and sampling methods, analytical methods, sampling rationale, site geohydrology, field screening methods, quality control/quality assurance, and reporting methods.
- A site-specific Health and Safety Plan (HSP) signed by a Certified Industrial Hygienist.

- Necessary permits for encroachment, boring completion, and well installation.
- A traffic safety plan.
- Sampling program (fieldwork) in accordance with the work plan and HSP. Fieldwork shall be completed under the supervision of a geologist registered in the State of California and/or Nevada, as appropriate.
- Hazardous materials testing through a laboratory certified by California and/or Nevada.
- Documentation to include field procedures, boring logs/well diagrams, tables of analytical results, cross-sections, an evaluation of the levels and extent of contaminants found, and conclusions and recommendation regarding the environmental condition of the site and the need for further assessment. Recommendations may include additional assessment or handling of the contaminants found though the contaminated soil contingency plan. If the contaminated soil contingency plan is inadequate for the contamination found, a remedial action plan shall be developed. Contaminated groundwater shall generally be handled though the NPDES/dewatering process.
- Disposal process including transport by a state-certified hazardous material hauler to a state-certified disposal /recycling facility licensed to accept/treat the identified waste.

Where contaminated groundwater is encountered, the project sponsor shall obtain a NPDES permit prior to the issuance of a permit to construct. The NPDES permit shall specify site-specific testing and monitoring requirements and discharge limitations.

Additionally, available agency files for moderate and high risk properties as discussed in this section and identified in Appendix I, shall be reviewed prior to demolition, grading, or construction. If the file review indicates a low likelihood of contaminants being present beneath or adjacent to a project feature (rail alignment, station, maintenance facility, etc.), additional assessment/mitigation may not be recommended and the property could be reclassified as low risk.

Mitigation HAZ-3: Previously Unidentified Hazardous Materials: Prior to the start of construction activities, the applicant shall prepare a hazardous materials contingency plan addressing the potential for discovery of unidentified underground storage tanks, hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes during construction. This contingency plan shall address underground storage tank decommissioning, field screening, and materials testing methods, mitigation and contaminant management requirements, and health and safety requirements.

Mitigation HAZ-4: Hazardous Material Disposal: Construction contractors shall dispose of all hazardous or solid wastes and debris encountered or generated during construction and demolition activities in accordance with all applicable Federal regulations.

3.10.5.2 Operational Period Mitigation Measures

Mitigation HAZ-5: Operational Generated Hazardous Materials: Desert Xpress shall prepare a Hazardous Materials Management Plan for all facilities that use, store, or dispose of hazardous materials. Facilities emitting toxic air emissions shall submit inventories and plans to the appropriate air quality management district and be subject to permitting and monitoring regulations of the district. Desert Xpress shall obtain all necessary local, state and federal permits for the installation and operation of any above or below ground chemical or fuel storage tanks prior to installing such tanks.

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3.11 AIR QUALITY AND GLOBAL CLIMATE CHANGE

This section provides a description of existing air quality conditions, including the regulatory framework for air quality management along the proposed DesertXpress rail corridor, and the potential effects the action alternatives would have on regional and localized air quality using the No Project condition for comparison. In addition this section analyzes the air quality implications of the two proposed propulsion technologies (i.e., diesel-electric multiple unit train [DEMU] and electric multiple unit train [EMU]).

3.11.1 REGULATORY REQUIREMENTS

A number of statutes, regulations, plans, and policies have been adopted that address air quality issues. The proposed project alignment and station areas are subject to air quality regulations developed and implemented at the federal and state levels. Those regulations, plans and policies that are relevant to the proposed project are discussed below.

3.11.1.1 Federal Regulations

Air quality is regulated at the federal level under the Clean Air Act (CAA) of 1970 and the Final Conformity Rule.[1] The CAA Amendments of 1990[2] direct the U.S. Environmental Protection Agency (EPA) to implement strong environmental policies and regulations that will ensure better air quality. According to Section 176(c) of the Clean Air Act Amendments:[3] "No federal agency may approve, accept, or fund any transportation plan, program, or project unless such plan, program or project has been found to conform to any applicable state implementation plan (SIP) in effect under this act." Section 176(c) defines *conformity* as follows: conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; such activities will not cause any of the following occurrences:

- Cause or contribute to any new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or any required interim emissions reductions or other milestones in any area.[4]

[1] 40 CFR Parts 51 and 93.

[2] Public Law [PL] 101–549, November 15, 1990.

[3] 42 USC § 7401 *et seq.*.

[4] 42 USC § 7506[c][1].

The federal CAA requires states to submit a SIP for areas designated as nonattainment for federal air quality standards. The SIP, which is reviewed and approved by EPA, must demonstrate how the federal standards will be achieved. Failing to submit a plan or secure approval could lead to denial of federal funding and permits. In cases where the SIP is submitted by the state but fails to demonstrate achievement of the standards, EPA is directed to prepare a federal implementation plan.

3.11.1.2 Transportation Conformity Rule

The concept of transportation conformity was introduced in the 1977 federal CAA, which includes a provision to ensure that federal transportation investments conform to the SIP for meeting the NAAQS. Conformity requirements were made substantially more rigorous in the federal CAA amendments of 1990, and the transportation conformity regulation that details implementation of the conformity requirements was first issued in November 1993, though the requirements have been amended many times. The most recent complete set of amendments to the Transportation Conformity Rule is found at 40 Code of Federal Regulations (CFR) parts 51 and 93 (August 15, 1997).

Since federal funding would not be used to construct or operate the proposed project, the project would not be subject to transportation conformity requirements. Instead, the project would be subject to general conformity requirements, which are described below.

3.11.1.3 General Conformity Rule

The General Conformity Rule was promulgated on November 30, 1993 in Volume 58 of the Federal Register (FR) page 63214 (58 FR 63214) to implement the conformity provision of Title I, section 176(c)(1) of the federal CAA. Section 176(c)(1) requires that the federal government not engage, support, or provide financial assistance for licensing or permitting, or approving any activity not conforming to an approved CAA implementation plan.

The General Conformity Rule is codified in Title 40 Code of Federal Regulations (CFR) Part 51, Subpart W and Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans. The General Conformity Rule applies to all federal actions except programs and projects requiring funding or approval from the U.S. Department of Transportation (DOT), the Federal Highway Administration, the Federal Transit Administration, or a Metropolitan Planning Organization. In lieu of a conformity analysis, these latter types of programs and projects must comply with the Transportation Conformity Rule promulgated by the DOT on November 24, 1993 (58 FR 62197).

Federal Climate Change Policy

According to the EPA, “the United States government has established a comprehensive policy to address climate change” that includes slowing the growth of emissions;

strengthening science, technology, and institutions; and enhancing international cooperation. To implement this policy, "the Federal government is using voluntary and incentive-based programs to reduce emissions and has established programs to promote climate technology and science." The federal government's goal is to reduce the greenhouse gas (GHG) intensity (a measurement of GHG emissions per unit of economic activity) of the American economy by 18 percent over the 10-year period from 2002 to 2012. In addition, the EPA administers multiple programs that encourage voluntary GHG reductions, including "ENERGY STAR," "Climate Leaders," and Methane Voluntary Programs. However, as of this writing, there are no adopted federal plans, policies, regulations, or laws directly regulating GHG emissions.[5]

On July 11, 2008, EPA issued an Advance Notice of Proposed Rulemaking (NPRM) requesting public comment on whether and how the Agency should regulate emissions of GHGs. The NPRM contains a wide-ranging discussion of the science of climate change, and the options for regulating GHG emissions under the CAA. It foreshadows how the agency might exercise its CAA authority to address climate change were it given the opportunity.

The NPRM is EPA's initial response to the U.S. Supreme Court's April 2007 Massachusetts v. EPA decision that GHGs are "air pollutants" under the CAA and the Court's subsequent directive that EPA determine whether GHGs emissions "endanger public health or welfare." Under the CAA, such an "endangerment finding" with respect to a pollutant triggers certain obligations for EPA to regulate sources of the pollutant. EPA's issuance of the NPRM marks an early step in the process of making a decision on endangerment. However, the NPRM does not make a proposal on the endangerment issue, nor does it make particular policy recommendations.

National Park Service Air Quality Management Policy

The National Park Service (NPS) has a responsibility to protect air quality under the federal CAA (National Park Service Management Policies, 2006). As such, NPS seeks to perpetuate the best possible air quality in parks to (1) preserve natural resources and systems; (2) preserve cultural resources; and (3) sustain visitor enjoyment, human health, and scenic vistas. The CAA gives the highest level of air quality protection to Class I areas; and establishes a national goal of preventing any future and remedying any existing human-made visibility impairment in Class I areas.[6]

With respect to the proposed project, a 1.55-mile segment would transverse the Mojave National Preserve. In addition, an approximately 55-mile segment would be located in close proximity to the Preserve (i.e., either within the I-15 median or along the I-15

[5] USEPA, 2008a.

[6] Class I areas are national parks over 6,000 acres and national wilderness areas over 5,000 acres that were in existence on August 7, 1977.

shoulder). While the Preserve, is not designated Class I under the CAA, the NPS will implement air quality management policies that will protect it as if it were designated Class I.

Because the current and future quality of Class I air resources depends heavily on the actions of others, the NPS will acquire the information needed to effectively participate in decision-making that affects air quality in Class I areas. Development approvals and/or permit applications for major new air pollution sources will be reviewed, and potential impacts to air quality will be assessed. If it is determined that any such new source might cause or contribute to an adverse impact on air quality-related values, NPS will recommend to the approval and/or permitting authority that the proposed project under consideration be denied or modified to eliminate adverse impacts.

3.11.1.4 California Regulations

Air quality is regulated at the state level by the California Air Resources Board (CARB), the agency designated to prepare the SIP required by the CAA under the California Clean Air Act of 1988 (Assembly Bill [AB] 2595) and other provisions of the California Health and Safety Code.[7] California's Clean Air Act (CCAA) requires all districts designated as nonattainment for any pollutant to "adopt and enforce rules and regulations to achieve and maintain the state and federal ambient air quality standards in all areas affected by emission sources under their jurisdiction."

The responsibility for controlling air pollution in California is shared by 35 local or regional air pollution control and air quality management districts, CARB, and EPA. The districts issue permits for industrial pollutant sources and adopt air quality management plans and rules. CARB establishes the state ambient air quality standards, adopts and enforces emission standards for mobile sources, adopts standards and suggested control measures for toxic air contaminants, provides technical support to the districts, oversees district compliance, approves local air quality plans, and prepares and submits the SIP to EPA. EPA establishes NAAQS, sets emission standards for certain mobile sources (airplanes and locomotives), oversees the state air programs, and reviews and approves the SIP. CARB inventories sources of air pollution in California's air basins and is required to update the inventory triennially, starting in 1998.[8] CARB also identifies air basins that are affected by transported air pollution. [9]

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. The goal of this Executive Order is to reduce California's GHG emissions to: 1) 2000 levels by

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[7] Health and Safety Code § 39000 *et seq.*

[8] Health and Safety Code §§ 39607 and 30607.3

[9] Health and Safety Code § 38500 et seq.

2010, 2) 1990 levels by the 2020, and 3) 80 percent below the 1990 levels by the year 2050.

In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006, signed into law in September 2006. AB 32 was intended to effectively end the scientific debate in California over the existence and consequences of global warming. Through AB 32, California is attempting to take on a leadership role in the abatement of climate change and offer a model for other states and countries to reduce GHG emissions. In general, AB 32 directed CARB to do the following:

- On or before June 30, 2007, CARB shall publicly make available a list of discrete early action GHG emission reduction measures that can be implemented prior to the adoption of the statewide GHG limit and the measures required to achieve compliance with the statewide limit;

- By January 1, 2008, determine the statewide levels of GHG emissions in 1990, and adopt a statewide GHG emissions limit that is equivalent to the 1990 level (an approximately 25 percent reduction in existing statewide GHG emissions);

- On or before January 1, 2010, adopt regulations to implement the early action GHG emission reduction measures;

- On or before January 1, 2011, adopt quantifiable, verifiable, and enforceable emission reduction measures by regulation that will achieve the statewide GHG emissions limit by 2020, to become operative on January 1, 2012, at the latest. The emission reduction measures may include direct emission reduction measures, alternative compliance mechanisms, and potential monetary and non-monetary incentives that reduce GHG emissions from any sources or categories of sources as the Air Resources Board finds necessary to achieve the statewide GHG emissions limit; and

- CARB shall monitor compliance with and enforce any emission reduction measure adopted pursuant to AB 32.

AB 32 also takes into account the relative contribution of each source or source category to protect adverse impacts on small businesses and others by requiring CARB to recommend a minimum threshold of GHG emissions below which emissions reduction requirements would not apply. AB 32 also allows the Governor to adjust the deadlines mentioned above for individual regulations or the entire state to the earliest feasible date in the event of extraordinary circumstances, catastrophic events, or threat of significant economic harm.

Governor's Low Carbon Fuel Standard (Executive Order #S-01-07): Executive Order #S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of a Low Carbon Fuel Standard. The Low Carbon Fuel Standard shall be incorporated into the State

Alternative Fuels Plan required by AB 1007 and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32.

Executive Order #S-3-05: Executive Order #S-3-05, signed by Governor Arnold Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions to below 1990 levels by 2050. Executive Order #S-3-05 also calls for the California Environmental Protection Agency (CalEPA) to prepare biennial science reports on the potential impact of continued global warming on certain sectors of the California economy. The first of these reports, *Scenarios of Climate Change in California: An Overview* (Climate Scenarios report), was published in February 2006 (California Climate Change Center 2006).

The Climate Scenarios report uses a range of emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) to project a series of potential warming ranges (i.e., temperature increases) that may occur in California during the 21st century: lower warming range (3.0-5.5oF); medium warming range (5.5-8.0oF); and higher warming range (8.0-10.5oF). The Climate Scenarios report then presents analysis of future climate in California under each warming range.

As shown above, each emissions scenario would result in substantial temperature increases for California. According to the report, substantial temperature increases would result in a variety of impacts to the people, economy, and environment of California associated with a projected increase in extreme conditions, with the severity of the impacts depending upon actual future emissions of GHGs and associated warming.

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation are projected to increase from 25 to 35 percent under the lower warming range, to 75 to 85 percent under the medium warming range. If global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Additionally, if GHG emissions are not significantly reduced, large wildfires could become up to 55 percent more frequent according to the Climate Scenarios report. An increase in wildfires could further compromise air quality, due to the fine particulate matter produced by fires, which can travel long distances depending on wind conditions.

In addition, under the higher warming scenario, there could be up to 100 more days per year with temperatures above 90^{o}F in Los Angeles and 95^{o}F in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures will increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

3.11.1.5 Nevada Regulations

Air quality in Nevada is regulated at the state level by the Bureau of Air Pollution Control (BAPC), part of the Nevada Division of Environmental Protection (NDEP). BAPC is responsible for fair and consistent implementation of state and federal air quality rules and regulations. The authority for BAPC to implement air pollution control requirements has been established in Nevada Revised Statutes (NRS) 445B.100 through 445B.825, inclusive, and NRS 486A.010 through 486A.180, inclusive. The BAPC has jurisdiction of air quality programs over all counties in the State except for Washoe and Clark Counties. These counties have their own distinct Air Quality jurisdictions with the BAPC retaining jurisdiction of (only) fossil fuel-fired units that generate steam for electrical production. The following rules and regulations of the State of Nevada regulate air quality emissions in the state.

Senate Bill (SB) 324. Current law regulates the sale of motor vehicle fuel and requires the State Board of Agriculture to adopt regulations setting forth the standards for motor vehicle fuel used in internal combustion engines. This bill requires the Board to adopt by regulation specifications for motor vehicle fuel:

1) Based upon scientific evidence that demonstrates that any motor vehicle fuel that is produced in accordance with the specifications is of sufficient quality to ensure appropriate performance when used in a motor vehicle in this State; or

2) Proposed by an air pollution control agency to attain or maintain national ambient air quality standards in any area of this State. The bill also requires the Board to adopt by regulation procedures for allowing variances from the specifications for motor vehicle fuel.

Nevada Greenhouse Gas Emission and Climate Change Regulations: In April 2007, Governor Gibbons formulated a Climate Change Advisory Committee. The Committee was tasked with proposing ways to reduce GHGs and use renewable energy and a final report and recommendations were submitted to the Governor in July 2008.[10]

On July 14, 2007, Governor Jim Gibbons signed Senate Bill 422, which creates a program to monitor the sources and amount of GHG released in the state. SB 422 establishes a registry for the tracking of greenhouse gasses from “affected units” and requires the creation and continued update of a state-wide emissions inventory. Affected power generating units must report emissions of the six Kyoto greenhouse gases to an official registry on an annual basis. Affected units are those units that produce electricity for sale, that have a maximum output design capacity of 5 megawatts or greater, and produce

[10] Clark County Air Quality Forum, 2008.

greenhouse gases. Units that utilize renewable energy sources are specifically exempted from the reporting requirement.[11]

Nevada has selected The Climate Registry as the official reporting registry. The Climate Registry is a collaborative effort among member states to develop a common greenhouse gas reporting system. Based in California, The Climate Registry aims to provide accurate, complete, consistent, transparent and verified greenhouse gas emissions data from reporters.[12]

The Nevada Department of Environmental Protection (NDEP) is also preparing a statewide emissions inventory of greenhouse gases released in the state. This inventory will include the origins, types, and amounts of greenhouse gases from all Nevada sources and an analysis of the information collected. NDEP will issue the inventory in a report format by December 31, 2008 and prepare updated inventories at least every four years thereafter.[13]

The State of Nevada also has an Observer Member within the Western Climate Initiative (WCI), a program launched by the Governors of Arizona, California, New Mexico, Oregon, and Washington as a regional effort to reduce global GHGs. WCI adopted a goal of an aggregate reduction of 15 percent below 2005 GHG levels by 2020.[14]

3.11.1.6 National and State Ambient Air Quality Standards

As required by the CAA Amendments of 1970 and the CAA Amendment of 1977 [15], EPA has established NAAQS for the following air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), particulates (PM_{10} and $PM_{2.5}$), oxides of sulfur (SO_X), and lead. CARB has also established standards for these pollutants for California. Recent legislation requires CARB to develop and adopt regulations to reduce greenhouse gases.[16] The federal and state governments have both adopted health-based standards for pollutants. For some pollutants, the national and state (California and Nevada) standards are very similar; for other pollutants, the California state standards are more health protective. The differences in the standards are generally the result of the different health effect studies considered during the standard-setting process and how these studies were interpreted.

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[11] NDEP, 2008a.

[12] Ibid.

[13] Ibid.

[14] Clark County Air Quality Forum, 2008.

[15] PL 91-064, December 31, 1970, PL 95-95, August 7, 1977

[16] AB 1493, 2002

Table 3.11-1 lists the federal and state standards. The federal primary standards are intended to protect the public health with an adequate margin of safety. The federal secondary standards are intended to protect the nation's welfare and account for air-pollutant impacts on soil, water, visibility, vegetation, and other aspects of the general welfare. Areas that violate these standards are designated nonattainment areas. Areas that once violated the standards but now meet the standards are classified as maintenance areas. Classification of each area under the federal standards is done by EPA based on state recommendations and after an extensive review of monitored data.

Table 3.11-1. National and State (California and Nevada) Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[a]		CAAQS[b]	NeAAQS[c]
		Primary	Secondary		
Ozone (O_3)	1-hour	--	--	0.09 ppm[d]	0.12ppm
	8-hour	0.075 ppm	0.075 ppm	0.07 ppm	--
Carbon Monoxide (CO)	1-hour	35 ppm	--	20 ppm	35 ppm
	8-hour	9 ppm	--	9.0 ppm	9 ppm
Nitrogen Dioxide (NO_2)	1-hour	--	--	0.18 ppm	--
	Annual	0.053 ppm	0.053 ppm	0.03 ppm	0.05 ppm
Sulfur Dioxide (SO_2)	1-hour	--	--	0.25 ppm	--
	3-hour	--	0.5 ppm	--	0.5 ppm
	24-hour	0.14 ppm	--	0.04 ppm	0.14 ppm
	Annual	0.03 ppm	--	--	0.03 ppm
Inhalable Particulate Matter (PM_{10})	24-hour	150 μg/m^3	150 μg/m^3	50 μg/m^3 [c]	150 μg/m^3
	Annual	--	--	20 μg/m^3	50 μg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24-hour	35 μg/m^3	35 μg/m^3		--
	Annual	15.0 μg/m^3	15.0 μg/m^3	12 μg/m^3	--
Sulfates	24-hour	--	--	25 μg/m^3	
Lead (Pb)	30-day	--	--	1.5 μg/m^3	--
	Calendar quarter	1.5 μg/m^3	1.5 μg/m^3	1.5 μg/m^3	1.5 μg/m^3
	Rolling 3-month average	--	0.15 μg/m^3	0.15 μg/m^3	
Hydrogen Sulfide	1-hour	--	--	0.03 ppm	0.08 ppm
Vinyl Chloride	24-hour	--	--	0.01 ppm	--

Notes:

[a] The National Ambient Air Quality Standards, other than O_3 and those based on annual averages, are not to be exceeded more than once a year. The O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

[b] The California Ambient Air Quality Standards (CAAQS) for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, PM_{10}, and $PM_{2.5}$ are values not to be exceeded. All other California standards shown are values not to be equaled or exceeded.

[c] The Nevada Ambient Air Quality Standards (NeAAQS) must not be exceeded in areas where the general public has access.

[d] ppm = parts per million by volume, μg/m^3 = micrograms per cubic meter

Source: CARB 2008b; NDEP 2008b.

Urban Air Toxics: In addition to NAAQS for criteria pollutants, the CAA has established a list of 188 urban air toxics, also known as toxic air contaminants (TAC). From this list, EPA identified a group of 21 as mobile-source air toxics (MSAT) in its final rule, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* (66 FR 17235) in February 2007. From this list of 21 MSATs, EPA identified six priority MSATs: benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene. To address emissions of MSATs, EPA has issued a number of regulations that are intended to significantly decrease MSATs through cleaner fuels and cleaner engines.

Most air toxics originate from human-generated sources, including road mobile sources (e.g., cars, trucks, buses), non-road mobile sources (e.g., airplanes, locomotives), stationary sources (e.g., factories, refineries, power plants) and indoor sources (e.g., building materials). Some are also released from natural sources such as volcanic eruptions and forest fires. Human health risks caused by exposure to urban air toxics at sufficiently high concentrations or extended durations include increased risk for cancer or other serious health effects, including damage to the immune system; and neurological, reproductive, developmental and respiratory problems.

In March 2001, EPA issued regulations for the producers of urban air toxics to decrease the amounts of these pollutants by target dates in 2007 and 2020. With these regulations, between 1990 and 2020, on-highway emissions of benzene, formaldehyde, 1.3-butadiene and acetaldehyde will be reduced by 67 percent to 76 percent and on-highway diesel particulate matter (DPM) emissions will be reduced by 90 percent. These reductions would result from the effects of the following national mobile source control programs:

- The reformulated gasoline program;
- A new threshold for the toxic content of gasoline;
- The national low-emission vehicle standards;
- The Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements; and
- The heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements.

These are net emission reductions, which will be experienced even after growth in vehicle miles traveled (VMT) is taken into account.

The EPA has not yet released guidance on how to evaluate the effect of future rail lines on ambient concentrations of urban air toxics in the context of NEPA. Furthermore, no Federal, California or Nevada ambient standards exist for mobile source air toxics. Tools that can determine the significance of localized concentrations on health, or of increases or decreases in emissions are lacking. Specifically, EPA has not established NAAQS or provided other project-level standards for hazardous air pollutants.

3.11.2 Methods of Evaluation of Impacts

3.11.2.1 Air Pollutant Emissions

Pollutants that can be traced principally to transportation sources and are thus relevant to the evaluation of the project alternatives are CO, O_3 precursors (NO_x and reactive organic compounds [ROC]), particulates (PM10 and PM2.5), and carbon dioxide (CO_2). Because high CO levels are mostly the result of congested traffic conditions combined with adverse meteorological conditions, high CO concentrations generally occur within 300 ft to 600 ft of heavily traveled roadways. Concentrations of CO on a regional and localized/microscale basis can be predicted.

As discussed below in the affected environment section, ROC and NO_x emissions from mobile sources are of concern primarily because of their role as precursors in the formation of O_3 and particulate matter. O_3 is formed through a series of reactions that occur in the atmosphere in the presence of sunlight over a period of hours. Because the reactions are slow and occur as the pollutants are diffusing downwind, elevated O_3 levels are often found many miles from sources of the precursor pollutants. The impacts of ROC and NO_x emissions are, therefore, generally examined on a regional level. CO_2 emission burdens, because of their global impact, are currently expressed only on the statewide level by CARB (California), NDEP (Nevada) and EPA. In this analysis, therefore, CO_2 impacts are discussed on a statewide level. It is appropriate to predict concentrations of PM10 and PM2.5 on a regional and localized basis.

Pollutant Burdens: The air quality analysis for the proposed project focuses on the potential regional and localized impacts on air quality. The regional pollutant burdens were estimated based on changes that would occur, including the following, under each of the alternatives:

- Highway VMT;
- Diesel fuel requirement under the proposed DEMU technology alternative; and
- Power requirement under the proposed EMU technology alternative.

Localized air quality impacts were estimated based on level of service information and intersection geometry for arterial roadways near proposed stations.

Localized air quality impacts were estimated based on level of service information and intersection geometry for arterial roadways near proposed stations.

For the purposes of this analysis, emission burdens were projected for opening year 2013 and horizon year 2030. CARB Emfac 2007 emissions factors were used to estimate California emissions; and EPA Mobile 6 emissions factors were used to estimate Nevada emissions. Changes in VMT for on-road mobile sources (vehicles) were estimated for each of the technology alternatives.

Pollutant burdens generated by on-road (vehicles), off-road (trains), and stationary (electric power generation) sources for the two technology options for the action alternatives were combined and compared to the No Action Alternative. Localized impacts for California were evaluated using CALINE4 and Emfac 2007 emissions factors; while such impacts for Nevada were evaluated using CAL3QHC and Mobile 6 emissions factors.

Greenhouse gas emissions of CO2, methane (CH_4) and nitrous oxide (N_2O) were calculated using the formulas provided in the *California Climate Action Registry, General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, version 2.2*. GHG emissions are reported in terms of CO_2 equivalent (CO_2e).[17]

3.11.2.2 Significance Criteria

Criteria Pollutant Emissions: This assessment is based on the total pollutant burden of emissions to occur in California and Nevada under the No Action Alternative and the change in emissions estimated under the action alternatives with the DEMU and EMU technology options. The following factors were used to rate the potential effects of each proposed project alternative:

- The threshold values provided in EPA's Conformity Rule (Table 3.11-2) that determine when a detailed conformity analysis is required for a proposed federal project located in a nonattainment or maintenance area; and
- The Conformity Rule's definition (40 CFR Part 55.852) of a regionally significant project, which is one that would increase emissions of an applicable pollutant in a nonattainment or maintenance area by 10 percent or more.

[17] Greenhouse gas emissions other than carbon dioxide are commonly converted into carbon dioxide equivalents, which takes into account the differing global warming potential (310) of different gases. For example, the IPCC finds that nitrous oxide has a GWP of 310 and methane has a GWP of 21. Thus emission of one ton of nitrous oxide and one ton of methane is represented as the emission of 310 tons of CO2e and 21 tons of CO2e, respectively. This allows for the summation of different greenhouse gas emissions into a single total.

Table 3.11-2. Threshold Values Used to Determine Impact Significance

Pollutant	Area's Attainment Status	Conformity Rule's Significant Impact Thresholds in Tons (Metric Tons)/Year
O_3 (VOCs or NO_x)	Nonattainment—serious	50 (45)
	Nonattainment—severe	25 (23)
	Nonattainment—extreme	10 (9)
	Nonattainment—outside an O_3 transport region	100 (91)
	Nonattainment—moderate/marginal inside an O_3 transport region	50/100 (45/91) (VOC/NO_x)
	NO_x maintenance	100 (91)
	VOC maintenance—outside O_3 transport region	100 (91)
	VOC maintenance—inside O_3 transport region	50 (45)
CO	Nonattainment—all	100 (91)
	Maintenance	100 (91)
PM10/PM2.5	Nonattainment—moderate	100 (91) / 100 (91)
	Nonattainment—serious	70 (64) / 100 (91)
	Maintenance	100 (91) / 100 (91)
Source: USEPA 40 CFR 51.853.		

Pursuant to the General Conformity Rule, the lead federal agency must make a General Conformity Determination for all federal actions in non-attainment or maintenance areas where the total of direct and indirect emissions of a non-attainment pollutant or its precursors exceeds levels established by the regulations.

Since the proposed project alignment is located within portions of the Mojave Desert Air Basin and the Clark County Area, which are both designated federal non-attainment areas for O3 and PM10, as well as CO for the Clark County Area, a General Conformity determination is required.

Greenhouse Gas Emissions: Changes in the amounts of CO_2 emissions as a result of the project alternatives were estimated on a statewide basis for both California and Nevada. These results are provided to indicate how changes in CO_2e emissions, as a result of the action alternatives with the DEMU and EMU technology options, may affect global warming. These estimates were based on the estimated changes in fuel use and electrical energy production associated with each technology option.

3.11.3 Affected Environment

3.11.3.1 Study Area Defined

The proposed DesertXpress project would be located within two air quality district jurisdictions: the Mojave Desert Air Quality Management District (MDAQMD) in California, and the Clark County Department of Air Quality and Environmental Management (DAQEM) in Nevada. This analysis has been structured to estimate the potential impacts on the two air basins directly affected by the action alternatives.

3.11.3.2 General Discussion of Air Quality Pollutants

Criteria Air Pollutants

Presented below is a description of each of the primary and secondary criteria air pollutants and their known health effects.

- CO is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation.

- Reactive Organic Compounds (ROC) are compounds made up primarily of atoms of hydrogen and carbon. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of ROC are emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. Adverse effects on human health are not caused directly by ROC but rather by reactions of ROC to form secondary pollutants such as ozone.

- NOx serves as an integral participant in the process of photochemical smog production. The two major forms of NOx are nitric oxide (NO) and nitrogen dioxide (NO_2). NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown irritating gas formed by the combination of NO and oxygen. NOx acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens.

- NO_2 is a by-product of fuel combustion. The principal form of NO_2 produced by combustion is NO, but NO reacts with oxygen to form NO_2, creating the mixture of NO and NO_2 commonly called NOx. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 parts per million (ppm). NO_2 absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO2 also contributes to the formation of PM_{10}. NOx are also precursors to the formation of both O_3 and $PM_{2.5}$.

- SO2 or sulfur dioxide is a colorless, pungent, irritating gas formed by the combustion of sulfurous fossil fuels. Fuel combustion is the primary source of SO2. At high concentrations SO2 may irritate the upper respiratory tract. At lower concentrations and when combined with particulates, SO2 may do greater harm by injuring lung tissue. A primary source of SO2 emissions is high sulfur content coal. Gasoline and natural gas have very low sulfur content and hence do not release significant quantities of SO2.

- Particulate Matter (PM) consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized. Inhalable course particles, or PM10, include the particulate matter with a diameter of 10 microns (10 millionths of a meter or 0.0004 inch) or less. Inhalable fine particles, or PM2.5, have a diameter of 2.5 microns (i.e., 2.5 millionths of a meter or 0.0001 inch) or less. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind on arid landscapes also contributes substantially to local particulate loading. Both PM10 and PM2.5 may adversely affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems.

- Fugitive dust primarily poses two public health and safety concerns. The first concern is that of respiratory problems attributable to the particulates suspended in the air. The second concern is that of motor vehicle accidents caused by reduced visibility during severe wind conditions. Fugitive dust may also cause significant property damage during strong windstorms by acting as an abrasive material agent (much like sandblasting).

- O3, or smog, is one of a number of substances called photochemical oxidants that are formed when ROC and NO_X (both by-products of the internal combustion engine) react with sunlight. O3 poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. Additionally, O3 has been tied to crop damage, typically in the form of stunted growth and premature death. O3 can also act as a corrosive, resulting in property damage such as the degradation of rubber products.

Greenhouse Gases

Greenhouse gases (GHG) include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases. Presented below is a description of each GHG and their known sources.

- CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, respiration, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Fluorinated gases are synthetic, strong greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases.
    - Chlorofluorocarbons (CFCs) are greenhouse gases covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are being replaced by other compounds that are greenhouse gases covered under the Kyoto Protocol.
    - Perfluorocarbons (PFCs) are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF_4] and perfluoroethane [C_2F_6]) were introduced as alternatives, along with HFCs, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are also used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they are strong greenhouse gases.
    - Sulfur Hexafluoride (SF_6) is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF_6 is a strong greenhouse gas used primarily in electrical transmission and distribution systems as a dielectric (i.e., an insulating medium between conductors).
    - Hydrochlorofluorocarbons (HCFCs) contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent than CFCs. They have been introduced as temporary replacements for CFCs and are also greenhouse gases.
    - Hydrofluorocarbons (HFCs) contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong greenhouse gases.

3.11.3.3 Air Resources by Basin

The air quality attainment designations for the applicable California and Nevada resource areas are provided in Table 3.13-3. As shown therein, both resource areas are designated a non-attainment for certain pollutants that are regulated under the Federal CAA.

Table 3.11-3. Federal Attainment Status for Mojave Desert Air Basin and Clark County

Pollutants	Mojave Desert Air Basin Federal Classification	Clark County Federal Classification
Ozone (O_3) - 8-hour standard	Nonattainment , Moderate	Nonattainment (Sub Part 1)
Inhalable Particulates (PM_{10})	Nonattainment, Moderate	Nonattainment, Serious
Fine Particulates ($PM_{2.5}$)	Attainment/Unclassified	Attainment
Carbon Monoxide (CO)	Attainment	Nonattainment, Serious
Nitrogen Dioxide (NO_2)	Attainment	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Source: USEPA 2008b..		

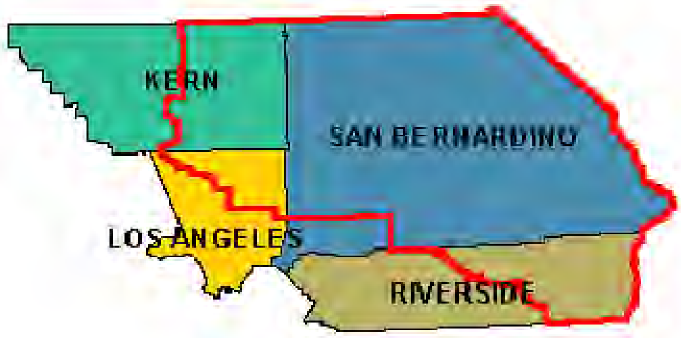
An air resource area is considered in attainment for a particular pollutant if it meets the standards set for that pollutant; and nonattainment for a particular pollutant if its pollutant concentration exceeds standards for that pollutant.

An area is considered “maintenance” for a pollutant if the standards were once violated but are now met; and a basin is considered unclassified if the area cannot be classified based on available information as meeting or not meeting the applicable standard.

Mojave Desert Air Basin

The Mojave Desert Air Basin, shown in Figure 3-11.1, is comprised of four air districts, the Kern County Air Pollution Control District, the Antelope Valley Air Quality Management District (AQMD), the MDAQMD, and the eastern portion of the South Coast AQMD. The MDAQMD has jurisdiction over the desert portion of San Bernardino County and the far eastern end of Riverside County. This region includes the incorporated communities of Adelanto, Apple Valley, Barstow, Blythe, Hesperia, Needles, Twentynine Palms, Victorville, and Yucca Valley; as well as the National Training Center at Fort Irwin, the Marine Corps Air Ground Combat Center, the Marine Corps Logistics Base, the eastern portion of Edwards Air Force Base, and a portion of the China Lake Naval Air Weapons Station. (MDAQMD 2007.)

Figure 3-11.1. Mojave Desert Air Basin



Source: CARB 2008c.

Under the Federal CAA, the EPA and CARB have designated portions of MDAQMD non-attainment for ozone (O3) and PM10. The MDAQMD has adopted state (California) and Federal attainment plans for the region within its jurisdiction. The most recent approved by EPA is the MDAQMD 2004 Ozone Attainment Plan that was adopted in 2004. MDAQMD has recently prepared a Draft State and Federal Ozone Attainment Plan for Western Mojave Desert non-attainment area. This document addresses all existing and forecast O3 precursor producing activities within the MDAQMD through the year 2020. The plan mainly targets reduction of NOx and VOC emissions.[18]

In 1995, the MDAQMD submitted a Federal Particulate Matter (PM10) Attainment Plan, which demonstrates how attainment of the Federal PM10 standard will be achieved by the earliest practicable date. The PM10 Attainment Plan outlines selected control measures that would be imposed to limit the amount of PM10 released into the atmosphere. Part of this plan requires Dust Control Plans for construction projects disturbing 100 or more acres.[19]

The MDAQMD has adopted rules and regulations to implement portions of the above-mentioned attainment plans. Several of these rules would apply to construction or operation of the proposed project. For example, MDAQMD Rule 403 requires suppression of fugitive dust emissions from construction activity such that no visible dust extends beyond the property line of the emissions source. A Dust Control Plan for

[18] MDAQMD, 2008.

[19] Ibid.

construction projects disturbing 100 or more acres is required by the MDAQMD Federal PM10 Plan.[20]

Clark County Nevada

The Clark County Department of Air Quality and Environmental Management (DAQEM) has been delegated the authority, under the provisions of Nevada Revised Statute 445B500 and by direction of the Clark County Board of County Commissioners, to implement and enforce an air pollution control program in Clark County, Nevada. Figure 3-11.2 shows Clark County and its metropolitan areas, including Las Vegas Valley and Ivanpah Valley. DAQEM applies and enforces the Air Quality Regulations, which establish requirements for sources who emit or release air contaminants into the atmosphere.[21]

Figure 3-11.2. Clark County and Metropolitan Areas

Source: DAQEM 2008b.

[20] Ibid.

[21] Clark County, DAEQM (DAEQM), 2008a.

Under the Federal CAA, the EPA has designated portions of Clark County non-attainment for O3, PM10 and CO. DAQEM has adopted State and Federal attainment plans for the region within its jurisdiction. The most recent approved by EPA is the DAEQM 2001 PM10 SIP, approved in 2004. DAEQM also has an adopted 2000 CO SIP (approved in 2004). The CO SIP includes description of control measures and technologies to bring the Las Vegas Valley into compliance with federal health-based standards for CO. The CO Attainment Plan was revised in October 2005 and approved by EPA in 2006 to include updated CO emissions budgets using the latest model approved by EPA for transportation conformity determinations. DAQEM has submitted a Carbon Monoxide Redesignation Request and Maintenance Plan in 2008 for approval by EPA (DAEQM 2008a.). Clark County has prepared an 8-Hour Ozone Early Progress Plan in 2008 to establish motor vehicle emission budgets for determining the transportation conformity of the Clark County non-attainment area. Early budget submittals do not need to demonstrate attainment, but must show some progress consistent with adopted control measures and projected emissions. Progress is demonstrated if projected emissions by the June 15, 2009 attainment date (2008 ozone season) are below emissions in the 2002 base year.[22]

Section 94 of Clark County Air Quality Guidelines regulates the emission of particulate matter into the ambient air from construction activities. DAEQM prepared a Construction Activities Dust Control Handbook that includes fugitive dust control measures to implement the guidelines. A Dust Control Permit for Construction Activities (Dust Control Permit) is required for most soil-disturbing projects. Each Dust Control Permit application must have a Dust Mitigation Plan outlining control measures to prevent fugitive dust. This Construction Activities Dust Control Handbook provides a guideline for obtaining a Dust Control Permit and developing a Dust Mitigation Plan. The Construction Activities Dust Control Handbook is included by reference in Section 94 of the Clark County Air Quality Regulations.[23]

3.11.3.4 Air Quality Setting

Existing Emissions from I-15 Trips along Project Limits

Under existing conditions (Year 2007), vehicle trips along the I-15 project corridor between Victorville and Las Vegas resulted in more than 10 million average daily VMT. The regional criteria pollutant and GHG emissions that resulted from existing vehicular travel along the I-15 project corridor is provided in Table 3.11-4.

[22] DAEQM, 2008a.

[23] Ibid.

Table 3.11-4. Year 2007 Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)[a]

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
Mojave Desert Air Basin	544	3,646	11,627	13	181	168	89,670
Clark County Nevada	933	1,286	18,861	10	41	21	40,877
Total Annual Emissions	1,477	4,932	30,488	23	222	189	130,547

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Ambient Air Monitoring Data

Victorville: *T*he nearest ambient air monitoring station to the Victorville station area is the MDAQMD Victorville Monitoring Station. All criteria pollutants (O3, CO, NO2, PM10 and PM2.5) are monitored at this station. Monitoring data summarized in Table 3.11-5 shows that both the 1-hour and 8-hour O3 concentrations often exceeded state (California) and Federal standards during this three-year reporting period. CO and NO2 concentrations are low, and recorded no exceedances during the three-year reporting period. Particulate (PM10 and PM2.5) concentrations are largely affected by meteorology and show some variability during the three-year reporting period. The state 24-hour PM10 standard was exceeded once in 2005, two times in 2006, and four times in 2007, while the national standard was exceeded just once, in 2007, during the three-year reporting period. The national PM2.5 standard was not exceeded during the three-year reporting period.

Table 3.11-5. Summary of Air Quality Data at Victorville, Park Avenue Station (CARB Site 36306)

Pollutant Standards	2005	2006	2007
Ozone (O_3)			
State Standard (1-hr avg 0.09 ppm; 8-hr avg 0.08 ppm)			
National Standard (8-hr avg 0.075 ppm)			
Maximum concentration 1-hr period (ppm)	0.131	0.136	0.107
Maximum concentration 8-hr period (ppm)	0.107	0.105	0.090
Days state 1-hr standard exceeded	16	9	7
Days national 8-hr standard exceeded	33	28	27
Days state/national 8-hr standard exceeded	53	47	45

Pollutant Standards	2005	2006	2007
Carbon Monoxide (CO)			
State Standard (8-hr avg 9 ppm)			
National Standard (8-hr avg 9 ppm)			
Maximum concentration 8-hr period (ppm)	1.63	1.56	1.61
Days state/national 8-hr standard exceeded	0	0	0
Nitrogen Dioxide (NO_2)			
State standard (1-hr avg 0.25 ppm; Annual arithmetic mean 0.030 ppm) *National standard (Annual arithmetic mean 0.053 ppm)*			
Maximum 1-hr concentration	0.077	0.079	0.071
Annual average	0.019	0.020	0.018
Days state standard exceeded [a]	0	0	0
Suspended Particulates (PM10)			
State standard (24-hr avg 50 µg/m^3)			
National standard (24-hr avg 150 µg/m^3)			
Maximum State 24-hr concentration	57.0	56.0	339.0
Maximum National 24-hr concentration	61.2	62.0	358.0
State annual average	26.1	30.5	36.0
National annual average	28.9	33.0	38.4
Days exceeding state standard	1	2	4
Days exceeding national standard	0	0	1
Suspended Particulates (PM2.5)			
National standard (24-hr avg 35 µg/m^3)			
Maximum 24-hr concentration	27.0	22.0	28.0
State annual average	--	10.3	9.7
National annual average	9.7	10.4	9.7
Days exceeding national standard [b]	0	0	0

Notes:

ppm = parts per million; µg/m3 = micrograms per cubic meter

a Number of exceedances based on CAAQMS applicable during period shown (0.25 ppm). Standard was changed to 0.18 ppm in February 2007, to be applied to 2007.

b Number of exceedances based on NAAQS applicable during period shown (65 µg/m3). Standard was changed to 35 µg/m3 in November 2006, to be applied to 2007.

Source: California Air Resources Board (2008a), compiled by ICF Jones & Stokes, September 2008.

Las Vegas: The nearest ambient air monitoring station to the proposed DesertXpress stations in the Las Vegas area is the Orr Monitoring Station (EPA site number: 32-003-1021), which is located within the City of Las Vegas. Criteria pollutants monitored at this station include O3, CO, and PM10. NO2 and PM2.5 monitoring data was compiled from the J.D. Smith (EPA site number: 32-003-2002) and Sunrise Acres (EPA site number: 32-003-0561) monitoring, respectively, which are also located within the City of Las Vegas. Monitoring data summarized in Table 3.11-6 shows that O3 concentrations have exceeded the federal standard nine times in 2006 and four times in 2007 during this three-year reporting period. CO and NO2 concentrations are low, and recorded no exceedances during the three-year reporting period. Particulate (PM10 and PM2.5) standards were not exceeded during the three-year reporting period as well.

Table 3.11-6. Summary of Air Quality Data at Clark County – Orr Monitoring Station, J.D. Smith Monitoring Station, and Sunrise Acres Monitoring Station

Pollutant Standards	**2005**	**2006**	**2007**
Ozone (O_3) [Orr, JD Smith][a]			
National standard (1-hr avg 0.125 ppm)			
National standard (8-hr avg 0.075 ppm)			
Maximum concentration 1-hr period (ppm)	0.113	0.109	0.112
Maximum concentration 8-hr period (ppm)	0.098	0.09	0.079
Days national 1-hr standard exceeded	0	0	0
Days national 8-hr standard exceeded	0	9	4
Carbon Monoxide (CO) [Orr]			
National standard (1-hr avg 35 ppm)			
National standard (8-hr avg 9 ppm)			
Maximum concentration 1-hr period (ppm)	5.1	4.8	4.5
Maximum concentration 8-hr period (ppm)	4.2	3.9	3.4
Days national 1-hr standard exceeded	0	0	0
Days national 8-hr standard exceeded	0	0	0
Nitrogen Dioxide (NO_2) [JD Smith]			
National standard (annual avg 0.053 ppm)			
Annual average concentration	0.075	0.072	0.224
Days national standard exceeded	0	0	0
Suspended Particulates (PM10) [Orr]			
National standard (24-hr avg 150 µg/m^3)			
Maximum national 24-hr concentration	75	94	103
Days national standard exceeded	0	0	0
Suspended Particulates (PM2.5) [Sunrise Acres]			

Pollutant Standards	2005	2006	2007
National standard (annual avg 15 µg/m^3)			
National standard (24-hr avg 35 µg/m^3)			
Annual average concentration	10.01	9.41	10.29
Maximum national 24-hr concentration	35	30.7	32.1
Days national standard exceeded	0	0	0

Notes:

[a] Orr station began monitoring O_3 during year 2006. Year 2005 concentration from JD Smith station. Years 2006 and 2007 concentrations from Orr station.

ppm = parts per million; µg/m3 = micrograms per cubic meter

Source: USEPA 2008c, compiled by ICF Jones & Stokes, September 2008.

Climate Data

Victorville: Data from the Western Regional Climate Center's Victorville climate monitoring station was used to characterize project vicinity climate conditions because it is nearest to the project site. The average project area summer (July) high and low temperatures are 98.2°F and 60.7°F, respectively, while the average winter (January) high and low temperatures are 58.6°F and 29.8°F, respectively. The average annual rainfall is 5.59 inches.[24]

Las Vegas: Data from the Western Regional Climate Center's Las Vegas climate monitoring station was used to characterize project vicinity climate conditions because it is nearest to the project site. The average project area summer (July) high and low temperatures are 102.3°F and 68.3°F, respectively, while the average winter (January) high and low temperatures are 58.5°F and 30.8°F, respectively. The average annual rainfall is 4.40 inches.[25]

[24] Western Regional Climate Center, 2008a.

[25] Western Regional Climate Center 2008b.

3.11.4 Environmental Consequences

3.11.4.1 No Action Alternative

The No Action Alternative is used to compare the relative impacts and benefits of the proposed project improvements. The No Action Alternative assumes that no new passenger rail system to divert vehicular travel between the southern California region and Las Vegas would be built. Under the No Action Alternative, public agencies in California and/or Nevada are anticipated to move forward with physical and/or operational roadway improvements to increase the capacity of the I-15 corridor. These improvements would be located in the same vicinity as the action alternatives and would be subject to their own environmental review processes.

Direct Effects

Regional Operations Effects: Vehicle trips along the I-15 project corridor between Victorville and Las Vegas resulted in more than 10 million average daily VMT during year 2007. Emissions occurring under existing conditions were provided earlier in Table 3.11-4. Under the No Action Alternative, VMT along this corridor is expected to grow to approximately 12.75 million average daily VMT by year 2013; and reach 20.38 million average daily VMT by year 2030. The regional criteria pollutant and GHG emissions that would result from vehicular travel along the I-15 project corridor under the No Action Alternative at year 2013 and year 2030 are provided in Table 3.11-7.

Table 3.11-7. No Action Alternative Year 2013 and Year 2030 Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)[a]

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
Year 2013							
Mojave Desert Air Basin	353	2,486	7,611	15	175	161	102,773
Clark County Nevada	930	1,348	18,990	18	61	31	72,068
Total Annual Emissions	1,283	3,834	26,601	33	236	192	174,841
Year 2030							
Mojave Desert Air Basin	203	971	4,021	21	182	167	83,728
Clark County Nevada	882	769	29,504	35	105	48	81,949
Total Annual Emissions	1,085	1,740	33,525	56	287	215	165,677

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Localized Operations Effects: The No Action Alternative would not result in any project-related changes to conditions (i.e., local roadway circulation patterns) that affect local air quality. As such, there would be little effect on local air quality.

Indirect Effects

Construction Effects: The No Action Alternative would not result in any construction activity, and related air pollutant emissions. As such, there would be no construction-period effects on air quality. This alternative, however, does not preclude the construction of future improvements that are unrelated to the proposed project. Such improvements would be subject to their own environmental review processes.

3.11.4.2 Action Alternatives

The action alternatives, as defined in Section 2.0, Alternatives, was analyzed for air quality effects under two potential technology options: a diesel-powered technology (DEMU) and an electric-powered technology (EMU).[26] In addition to these two technology options, there are two station options under consideration for the Victorville terminus, and four station options under consideration for the Las Vegas terminus.

Direct Effects

Regional Operations Effects: The action alternatives would result in both increases and decreases of project-related emissions. Emissions related to passenger rail propulsion, whether under the DEMU or EMU technology options, would represent an increase in both criteria pollutant and GHG emissions. However, passenger vehicles that would be diverted along I-15 between the southern California region and Las Vegas, and related VMT, would represent a decrease in criteria pollutant and GHG emissions.

It is important to note that the action alternatives would transverse two air quality resource areas – the Mojave Desert Air Basin (MDAB) in California and the Las Vegas Valley Area (Clark County) in Nevada. The distribution between resource areas is approximately 80.5 percent in the California MDAB and 19.5 percent in the Nevada Clark County area. As such, project-related rail activity and VMT and related regional emissions, would be split among the two air quality resource areas consistent with that same ratio. An evaluation of project-related emissions that would occur in both air quality resource areas is provided below.

Mojave Desert Air Basin Emissions – California: The regional criteria pollutant and GHG emissions that would result from implementation of either technology option at opening year 2013 and horizon year 2030 are provided in Table 3.11-8 and Table 3.11-9, respectively. As shown therein, O3 precursor emissions of NO_X under the DEMU

[26] The action alternatives were evaluated for EMU and DEMU technology. Alternative A and Alternative B would result in similar air quality effects with these technology options.

technology option would exceed general conformity thresholds during opening year 2013 and at horizon year 2030; and as such, would require the purchase of NO_X emissions offsets should the DEMU technology option be chosen to move forward. The purchase/acquisition of NO_X offsets for emissions occurring within the Mojave Desert Air Basin would be coordinated through the MDAQMD. All criteria pollutant emissions under the EMU technology option would remain below general conformity thresholds during opening year 2013 and at horizon year 2030.

Table 3.11-8. Opening Year 2013 Mojave Desert Air Basin Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)[a]

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	34	621	573	43	33	31	116,449
Mobile-source Emissions	(63)	(442)	(1,353)	(3)	(31)	(29)	(18,272)
Net Emissions	(29)	179	(780)	40	2	2	98,177
General Conformity Threshold	50	50	100	--	100	100	--
Exceed Threshold?	No	Yes	No	N/A	No	No	N/A
EMU Technology Option							
Railway Emissions	1	75	13	8	3	2	47,463
Mobile-source Emissions	(78)	(547)	(1,674)	(3)	(38)	(35)	(22,605)
Net Emissions	(77)	(472)	(1,661)	5	(35)	(33)	24,858
General Conformity Threshold	50	50	100	--	100	100	--
Exceed Threshold?	No	No	No	N/A	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Table 3.11-9. Horizon Year 2030 Mojave Desert Air Basin Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	56	1,007	928	70	54	49	188,728
Mobile-source Emissions	(62)	(298)	(1,234)	(6)	(56)	(51)	(25,691)
Net Emissions	(6)	709	(306)	64	(2)	(3)	162,947
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	Yes	No	No	No	No	N/A
EMU Technology Option							
Railway Emissions	1	118	21	12	4	4	75,122
Mobile-source Emissions	(79)	(378)	(1,565)	(8)	(71)	(65)	(32,594)
Net Emissions	(78)	(260)	(1,544)	4	(67)	(61)	42,528
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	No	No	No	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Clark County Emissions – Nevada: The regional criteria pollutant and GHG emissions that would result from implementation of either technology option at opening year 2013 and horizon year 2030 are provided in Table 3.11-10 and Table 3.11-11, respectively. As shown therein, O3 precursor emissions of NO_X under the DEMU technology option would exceed general conformity thresholds during opening year 2013 and at horizon year 2030; and as such, would require the purchase of NO_X emissions offsets should the DEMU technology option be chosen to move forward. The purchase/acquisition of NO_X offsets for emissions occurring within Clark County Nevada would be coordinated through the Clark County DAQEM. All criteria pollutant emissions under the EMU technology option would remain below general conformity thresholds during opening year 2013 and at horizon year 2030.

Table 3.11-10. Opening Year 2013 Clark County Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	27	482	86	11	17	16	28,195
Mobile-source Emissions	(91)	(132)	(1,853)	(2)	(6)	(3)	(7,034)
Net Emissions	(64)	350	(1,767)	9	11	13	21,161
General Conformity Threshold	50	50	100	--	100	100	--
Exceed Threshold?	No	Yes	No	N/A	No	No	N/A
EMU Technology Option							
Railway Emissions	<1	18	3	2	1	1	11,497
Mobile-source Emissions	(104)	(151)	(2,130)	(2)	(7)	(4)	(8,082)
Net Emissions	(104)	(133)	(2,127)	<1	(6)	(3)	3,415
General Conformity Threshold	50	50	100	--	100	100	--
Exceed Threshold?	No	No	No	N/A	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Table 3.11-11. Horizon Year 2030 Clark County Criteria Pollutant and Greenhouse Gas Emissions (tons per year)

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	35	612	137	17	21	19	45,695
Mobile-source Emissions	(67)	(58)	(2,231)	(3)	(8)	(4)	(6,197)
Net Emissions	(32)	554	(2,094)	14	13	15	39,498
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	Yes	No	No	No	No	N/A
EMU Technology Option							
Railway Emissions	<1	29	5	3	1	1	18,197
Mobile-source Emissions	(85)	(74)	(2,830)	(3)	(10)	(5)	(7,862)
Net Emissions	(85)	(45)	(2,825)	<1	(9)	(4)	10,335
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	No	No	No	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Operational Effects on Climate Change and Greenhouse Gas Emissions: Global climate change is a problem caused by combined worldwide greenhouse gas emissions, and mitigating global climate change will require worldwide solutions. GHGs play a critical role in the Earth's radiation budget by trapping infrared radiation emitted from the Earth's surface, which could have otherwise escaped to space. Prominent GHGs contributing to this process include water vapor, CO_2, N_2O, CH4, O_3, and certain hydro- and fluorocarbons. This phenomenon, known as the "greenhouse effect" keeps the Earth's atmosphere near the surface warmer than it would be otherwise and allows for successful habitation by humans and other forms of life. Increases in these gases lead to more absorption of radiation and warm the lower atmosphere further, thereby increasing evaporation rates and temperatures near the surface. Emissions of GHGs in excess of natural ambient concentrations are thought to be responsible for the enhancement of the greenhouse effect and to contribute to what is termed "global warming", a trend of unnatural warming of the Earth's natural climate. Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and TACs, which are pollutants of regional and local concern.

The proposed project's impact on GHG emissions was presented earlier in Tables 3.11-8 through 3.11-11. As shown therein, GHG emissions are predicted to increase under both technology options proposed for the project, when compared to no project, at buildout year 2013 and horizon year 2030. Because quantitative GHG guidelines, including thresholds, have not been developed by the USEPA, MDAQMD or Clark County DAQEM, these emissions are provided for information purposes only.

Localized Operational Effects: *W*ith respect to the proposed project, localized effects of primary concern are TAC emissions related to railway activity, and CO hotspot formation at congested intersection locations. An evaluation of each is provided below.

Evaluation of TAC Emissions: Under the EMU technology option, there would be no new TAC emissions sources. Electric power demands would be met using existing sources. As such, the EMU technology option would have no impacts with respect to TAC emissions.

With regard to the proposed DEMU technology option, EPA's current and proposed future regulations on diesel locomotives will reduce emissions, and related impacts, at all receptors near the action alternative right-of-way and station locations. Federal regulations (40 CFR, Parts 85, 89 and 92) provide standards and emission factors for diesel locomotives. DEMU engines are covered by 40 CFR, Part 89. Locomotive diesel engine cores are typically remanufactured every few years to replace worn parts. EPA standards apply at the time the locomotive is first manufactured and more stringent standards apply in the future when the engine core is remanufactured.

In addition, there are no residential dwelling units located in close proximity to any of the proposed station locations where idle emissions, which would represent the majority of localized project-related TAC emissions, would occur. With respect to land uses that are adjacent to the proposed alignment between stations, most consist of undeveloped open space; however, small clusters of residential uses do exist in Barstow (Segment 2), Baker (Segment 3), and Clark County (Segment 6) around the Robindale MSF and Wigwam MSF options.

The Baker residential uses that would be adjacent to the proposed railway alignment are currently adjacent to I-15. As such, increases in localized TAC emissions related to rail activity would be offset by decreases in TAC emissions related to the anticipated reduction in freeway trips. The same is true for the train movements that would occur in either MSF option in Clark County since both are located in close proximity to I-15. With respect to residential uses in Barstow, a small cluster of dwelling units are present adjacent to the proposed railway alignment, but several hundred dwelling units are currently located adjacent to I-15. Overall, Barstow residents would see a reduction in localized transportation-source TAC emissions, as increases in localized TAC emissions related to rail activity would be offset by decreases in TAC emissions related to the anticipated reduction in freeway trips. As such, no adverse impacts are anticipated relative to TAC emissions.

Evaluation of CO Hotspots: Within an urban setting, vehicle exhaust is the primary source of CO. Consequently, the highest CO concentrations are generally found close to congested intersections. Under typical meteorological conditions, CO concentrations tend to decrease as the distance from the emissions source (i.e., congested intersection) increases. For purposes of providing a conservative worst-case impact analysis, CO concentrations are typically analyzed at congested intersection locations. If impacts were less than significant close to congested intersections, impacts would also be less than significant at more distant sensitive-receptor locations.

Project-related traffic volumes associated with station ingress/egress would have the potential to create local area CO concentrations that exceed NAAQS (i.e., CO hotspots). To ascertain the proposed project's potential to generate localized air quality impacts, the 2008 traffic impact study prepared for the DesertXpress Project was reviewed to identify the most congested intersection locations that would operate at level of service (LOS) E and F.

For California intersection locations, local area CO concentrations were projected using the CALINE4 line source dispersion model developed by Caltrans, with Emfac 2007 emissions factors. Nevada intersection locations were evaluated using the CAL3QHC line source dispersion model developed by EPA and Mobile 6 emissions factors. The evaluation of congested intersection locations to ascertain the potential for localized CO hotspots is provided below.

***Victorville Intersection Locations – California*:** Two station options are proposed for the Victorville terminus, and as such, the potential for CO hotspots were evaluated under both station options. Projected CO concentrations during opening year 2013 for Victorville Site 1 Station and Victorville Site 2 Station are provided in Table 3.11-12 and Table 3.11-13, respectively, for both the DEMU and EMU technology options.[27] Predicted horizon year 2030 intersection CO concentrations are provided in Table 3.11-14 and Table 3.11-15.

As shown in Tables 3.11-12 through 3.11-15, concentrations at the most congested intersection locations would not violate NAAQS (i.e., result in a CO hot spot) at any intersection for either station option, at opening year 2013 or horizon year 2030.

***Las Vegas Intersection Locations – Nevada*:** Four station alternatives are proposed for the Las Vegas terminus (Las Vegas Southern Station, Las Vegas Central Station A, Las Vegas Central Station B, and Las Vegas Downtown Station), and as such, the potential for CO hotspots were evaluated under each of the four station alternatives. Projected CO concentrations during opening year 2013 for station alternatives are provided in Table 3.11-16 through Table 3.11-19, for both the DEMU and EMU technology options. Predicted horizon year 2030 intersection CO concentrations are provided in Table 3.11-20 through Table 3.11-23.

[27] Ridership differs for the DEMU and EMU options which would affect traffic around stations.

As shown in Tables 3.11-16 through 3.11-23, CO concentrations at the most congested intersection locations would not violate NAAQS (i.e., result in a CO hot spot) at any intersection for either station alternative, at opening year 2013 or horizon year 2030.

Table 3.11-12. Year 2013 Local Area CO Hotspot Analysis – Victorville Site 1 Station Option

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Outer Highway and I-15 NB Ramps	DEMU	4.0	4.8	No	2.6	3.1	No
	EMU	4.0	5.1	No	2.6	3.4	No
Outer Highway and Stoddard Wells Rd	DEMU	3.8	4.6	No	2.4	3.0	No
	EMU	3.8	4.9	No	2.4	3.2	No
Stoddard Wells Rd and I-15 SB On-Ramps	DEMU	3.3	4.9	No	2.1	3.2	No
	EMU	3.3	5.4	No	2.1	3.6	No
Stoddard Wells Rd and I-15 SB Off-Ramps	DEMU	3.2	4.1	No	2.0	2.7	No
	EMU	3.2	4.5	No	2.0	2.9	No
Stoddard Wells Rd and Station Access #1	DEMU	3.2	4.1	No	2.0	2.7	No
	EMU	3.2	4.7	No	2.0	3.1	No

Notes:

CALINE4 dispersion model output sheets and Emfac 2007 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 2.6 ppm.
[c] The state standard for the 1-hour average CO concentration is 20 ppm.
[d] Includes 8-hour ambient background concentration of 1.6 ppm.
[e] The state standard for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-13. Year 2013 Local Area CO Hotspot Analysis – Victorville Site 2 Station Option

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Stoddard Wells Rd and I-15 NB - Ramps	DEMU	3.1	4.2	No	2.0	2.7	No
	EMU	3.1	4.5	No	2.0	2.9	No
Quarry Rd and Stoddard Wells Rd	DEMU	3.2	4.0	No	2.0	2.6	No
	EMU	3.2	4.3	No	2.0	2.8	No
Quarry Rd and I-15 SB -Ramps	DEMU	3.1	3.7	No	2.0	2.4	No
	EMU	3.1	3.9	No	2.0	2.5	No
Quarry Rd and Station Access #1	DEMU	2.6	2.9	No	1.6	1.8	No
	EMU	2.6	3.0	No	1.6	1.9	No
Stoddard Wells Rd and Station Access #2	DEMU	2.6	3.7	No	1.6	2.4	No
	EMU	2.6	4.1	No	1.6	2.7	No

Notes:

CALINE4 dispersion model output sheets and Emfac 2007 emissions factors are provided in Appendix J.

DEMU=Diesel-electric multiple unit train

EMU=Electric multiple unit train

ppm = parts per million

[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.

[b] Includes 1-hour background concentration of 2.6 ppm.

[c] The state standard for the 1-hour average CO concentration is 20 ppm.

[d] Includes 8-hour ambient background concentration of 1.6 ppm.

[e] The state standard for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-14. Year 2030 Local Area CO Hotspot Analysis – Victorville Site 1Station Option

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Stoddard Wells Rd and Station Access #1	DEMU	3.7	3.9	No	2.4	2.5	No
	EMU	3.7	3.7	No	2.4	2.4	No
Stoddard Wells Rd and I-15 SB - Ramps	DEMU	3.6	3.6	No	2.3	2.3	No
	EMU	4.0	4.2	No	2.6	2.7	No
Stoddard Wells Rd and I-15 NB - Ramps	DEMU	4.0	4.1	No	2.6	2.7	No
	EMU	4.0	4.2	No	2.6	2.7	No

Notes:

CALINE4 dispersion model output sheets and Emfac 2007 emissions factors are provided in Appendix J.

DEMU=Diesel-electric multiple unit train

EMU=Electric multiple unit train

ppm = parts per million

[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.

[b] Includes 1-hour background concentration of 2.6 ppm.

[c] The state standard for the 1-hour average CO concentration is 20 ppm.

[d] Includes 8-hour ambient background concentration of 1.6 ppm.

[e] The state standard for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-15. Year 2030 Local Area CO Hotspot Analysis – Victorville Site 2 Station Option

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Stoddard Wells Rd and I-15 NB - Ramps	DEMU	3.2	3.3	No	2.0	2.1	No
	EMU	3.2	3.4	No	2.0	2.2	No
Quarry Rd and I-15 SB -Ramps	DEMU	3.6	3.6	No	2.3	2.3	No
	EMU	4.0	4.2	No	2.6	2.7	No

Notes:

CALINE4 dispersion model output sheets and Emfac 2007 emissions factors are provided in Appendix J.

DEMU=Diesel-electric multiple unit train

EMU=Electric multiple unit train

ppm = parts per million

[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.

[b] Includes 1-hour background concentration of 2.6 ppm.

[c] The state standard for the 1-hour average CO concentration is 20 ppm.

[d] Includes 8-hour ambient background concentration of 1.6 ppm.

[e] The state standard for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-16. Year 2013 Local Area CO Hotspot Analysis – Las Vegas Southern Station Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Valley View Bl and Tropicana Av	DEMU	8.6	8.6	No	5.3	5.3	No
	EMU	8.6	8.6	No	5.3	5.3	No
Dean Martin Dr and Tropicana Av	DEMU	8.5	8.5	No	5.2	5.3	No
	EMU	8.5	8.6	No	5.2	5.4	No
Aldebaran Dr and Hacienda Av	DEMU	7.9	8.1	No	4.9	5.0	No
	EMU	7.9	8.2	No	4.9	5.1	No
Polaris Av and Hacienda Av	DEMU	7.9	8.2	No	4.8	5.2	No
	EMU	7.9	8.4	No	4.8	5.4	No
Polaris Av and Russell Rd	DEMU	8.4	9.0	No	5.0	5.9	No
	EMU	8.4	9.0	No	5.0	5.8	No
I-15 SB Ramps and Russell Rd	DEMU	9.4	7.5	No	6.0	6.1	No
	EMU	9.4	9.5	No	6.0	6.1	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-17. Year 2013 Local Area CO Hotspot Analysis – Las Vegas Central Station "A" Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Twain Ave and Valley View Bl	DEMU	7.7	7.8	No	4.7	4.8	No
	EMU	7.7	7.8	No	4.7	4.8	No
Twain Ave and Dean Martin Dr-Industrial Rd	DEMU	9.2	8.3	No	5.9	5.3	No
	EMU	9.2	8.3	No	5.9	5.3	No
Dean Martin Dr-Industrial Rd and Frank Sinatra Dr	DEMU	7.5	9.4	No	4.6	6.0	No
	EMU	7.5	9.4	No	4.6	6.0	No
Flamingo Rd and I-15 NB On/Off Ramps	DEMU	8.5	8.7	No	5.5	5.7	No
	EMU	8.5	8.7	No	5.5	5.7	No
Flamingo Rd and Hotel Rio Dr	DEMU	8.7	8.8	No	5.4	5.5	No
	EMU	8.7	10.6	No	5.4	6.7	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-18. Year 2013 Local Area CO Hotspot Analysis – Las Vegas Central Station "B" Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Flamingo Rd and Hotel Rio Dr	DEMU	8.5	10.5	No	5.4	6.6	No
	EMU	8.1	11.1	No	5.0	7.0	No
Dean Martin Dr and Hotel Dr	DEMU	7.6	7.9	No	4.7	4.9	No
	EMU	7.6	8.5	No	4.7	5.4	No
Dean Martin Dr and Tropicana Av	DEMU	8.4	8.6	No	5.2	5.3	No
	EMU	8.4	8.8	No	5.2	5.4	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm..
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.
Source: ICF Jones & Stokes, September 2008.

Table 3.11-19. Year 2013 Local Area CO Hotspot Analysis – Las Vegas Downtown Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2013 Base Concentration (ppm)[b]	Maximum 1-Hour 2013 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2013 Base Concentration (ppm)[d]	Maximum 8-Hour 2013 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Main St and Bonneville Ave	DEMU	7.8	7.9	No	4.8	4.8	No
	EMU	7.8	7.9	No	4.8	4.9	No
Martin Luther King Bl and Bonneville Ave	DEMU	7.5	7.7	No	4.7	4.8	No
	EMU	7.5	7.7	No	4.7	4.7	No
Charleston Bl and Martin Luther King Bl	DEMU	8.0	8.9	No	5.0	5.6	No
	EMU	8.0	8.2	No	5.0	5.1	No
Grand Central Pkwy and Charleston Bl	DEMU	11.2	11.6	No	7.1	7.3	No
	EMU	11.2	11.7	No	7.1	7.5	No
Main St and Charleston Bl	DEMU	8.2	9.8	No	5.1	6.2	No
	EMU	8.2	7.6	No	5.1	4.6	No
I-15 On Ramps and Martin Luther King Bl	DEMU	7.5	7.8	No	4.6	4.7	No
	EMU	7.5	7.8	No	4.6	4.8	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.
Source: ICF Jones & Stokes, September 2008.

Table 3.11-20. Year 2030 Local Area CO Hotspot Analysis – Las Vegas Southern Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Valley View Bl and Tropicana Av	DEMU	9.0	9.0	No	5.7	5.7	No
	EMU	9.0	9.0	No	5.7	5.7	No
Dean Martin Dr and Tropicana Av	DEMU	8.3	8.3	No	5.1	5.1	No
	EMU	8.3	8.3	No	5.1	5.2	No
I-15 NB Ramps and Tropicana Av	DEMU	10.1	10.2	No	6.7	6.7	No
	EMU	10.1	10.2	No	6.7	6.7	No
Aldebaran Dr and Hacienda Av	DEMU	8.0	8.0	No	5.0	5.0	No
	EMU	8.0	8.1	No	5.0	5.1	No
Polaris Av and Hacienda Av	DEMU	7.9	8.2	No	4.9	5.0	No
	EMU	7.9	8.3	No	4.9	5.1	No
Valley View Bl and Hacienda Av	DEMU	10.8	10.8	No	6.9	6.9	No
	EMU	10.8	10.8	No	6.9	6.9	No
Polaris Av and Russell Rd	DEMU	8.8	8.7	No	5.5	5.6	No
	EMU	8.8	8.7	No	5.5	5.6	No
I-15 SB Ramps and Russell Rd	DEMU	9.1	9.3	No	5.9	6.0	No
	EMU	9.1	9.4	No	5.9	6.0	No
I-15 NB Ramps and Russell Rd	DMU	9.6	9.9	No	5.9	6.3	No
	EMU	9.6	9.2	No	5.9	6.4	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.
Source: ICF Jones & Stokes, September 2008.

Table 3.11-21. Year 2030 Local Area CO Hotspot Analysis – Las Vegas Central Station "A" Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Twain Ave and Valley View Bl	DEMU	7.8	7.8	No	4.9	4.9	No
	EMU	7.8	8.0	No	4.9	5.0	No
Twain Ave and Dean Martin Dr-Industrial Rd	DEMU	7.8	8.4	No	4.8	5.2	No
	EMU	7.8	8.5	No	4.9	5.4	No
Dean Martin Dr-Industrial Rd and Frank Sinatra Dr	DEMU	8.8	8.9	No	5.6	5.6	No
	EMU	8.8	8.9	No	5.6	5.7	No
Flamingo Rd and I-15 NB On/Off Ramps	DEMU	8.0	8.6	No	5.1	5.6	No
	EMU	8.0	8.8	No	5.1	5.6	No
Flamingo Rd and Valley View Bl	DEMU	8.2	8.2	No	5.0	5.0	No
	EMU	8.2	8.5	No	5.0	5.2	No
Flamingo Rd and Hotel Rio Dr	DEMU	8.4	9.1	No	5.2	6.0	No
	EMU	8.4	9.8	No	5.2	6.1	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.

Source: ICF Jones & Stokes, September 2008.

Table 3.11-22. Year 2030 Local Area CO Hotspot Analysis – Las Vegas Central Station "B" Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Flamingo Rd and Hotel Rio Dr	DEMU	5.3	7.0	No	2.6	8.6	No
	EMU	5.3	7.4	No	2.6	8.6	No
Flamingo Rd and I-15 NB On/Off Ramps	DEMU	5.7	5.9	No	2.7	8.6	No
	EMU	5.7	6.0	No	2.7	8.6	No
Dean Martin Dr and Hotel Dr	DEMU	4.8	5.0	No	2.0	8.6	No
	EMU	4.8	5.5	No	2.0	8.6	No
Dean Martin Dr and Tropicana Av	DEMU	5.5	5.7	No	2.5	8.6	No
	EMU	5.5	5.8	No	2.5	8.6	No
Tropicana Ave and I-15 NB Ramps	DEMU	6.9	7.0	No	3.7	8.6	No
	EMU	6.9	6.2	No	3.7	8.6	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.
Source: ICF Jones & Stokes, September 2008.

Table 3.11-23. Year 2030 Local Area CO Hotspot Analysis – Las Vegas Downtown Alternative

Intersection	Technology Option[a]	Maximum 1-Hour 2030 Base Concentration (ppm)[b]	Maximum 1-Hour 2030 With-Project Concentration (ppm)[b]	Significant 1-Hour Concentration Impact?[c]	Maximum 8-Hour 2030 Base Concentration (ppm)[d]	Maximum 8-Hour 2030 With-Project Concentration (ppm)[d]	Significant 8-Hour Concentration Impact?[e]
Main St and Bonneville Ave	DEMU	8.9	9.1	No	5.6	5.7	No
	EMU	8.9	9.1	No	5.6	5.7	No
Martin Luther King Bl and Bonneville Ave	DEMU	7.9	7.8	No	4.8	4.9	No
	EMU	7.9	7.7	No	4.8	4.8	No
Grand Central Pkwy and Charleston Bl	DEMU	10.1	9.9	No	6.5	6.2	No
	EMU	10.1	9.9	No	6.5	6.2	No
Main St and Charleston Bl	DEMU	9.9	9.1	No	6.1	5.8	No
	EMU	9.9	9.6	No	6.1	6.0	No
SPUI and Charleston Bl	DEMU	8.0	8.1	No	5.0	5.0	No
	EMU	8.0	8.1	No	5.0	5.0	No

Notes:

CAL3QHC dispersion model output sheets and Mobile 6 emissions factors are provided in Appendix J.
DEMU=Diesel-electric multiple unit train
EMU=Electric multiple unit train
ppm = parts per million
[a] Peak hour traffic volumes are based on the Traffic Impact Analysis prepared for the project by DMJM Harris/AECOM, August 2008.
[b] Includes 1-hour background concentration of 7.0 ppm.
[c] The NAAQS for the 1-hour average CO concentration is 35 ppm.
[d] Includes 8-hour ambient background concentration of 4.2 ppm.
[e] The NAAQS for the 8-hour average CO concentration is 9 ppm.
Source: ICF Jones & Stokes, September 2008.

Indirect Effects

***Construction Effects*:** Construction of the action alternatives would temporarily generate emissions of fugitive dust, construction equipment tailpipe emissions, and evaporative volatile organic compound (VOC) emissions from paving and painting operations. In addition to the temporary nature of construction-period emissions, impacts would be localized to the areas adjacent to the construction activity.

Mass daily combustion emissions, fugitive PM10 and PM2.5, and off-gassing emissions were compiled using URBEMIS 2007, which is an emissions estimation/evaluation model developed by CARB. The URBEMIS model separates the construction process into multiple phases that account for everything from structure demolition and site clearing to asphalt paving and the application of architectural coatings. For example, demolition-period emissions would include fugitive dust emissions from structure demolition, as well as combustion exhaust emissions from onsite construction equipment, haul truck trips, and worker commute trips. Site preparation emissions (e.g., grading and excavation) would include fugitive dust emissions from soil disturbance activity, as well as combustion exhaust emissions from onsite construction equipment, haul truck trips, and worker commute trips. Structure erection and finishing emissions would include combustion exhaust emissions from onsite construction equipment, haul truck trips, and worker commute trips, as well as fugitive off-gassing emissions from the application of architectural coatings and asphalt paving (at station and OMSF sites).

With respect to the action alternatives, construction is anticipated to have a duration of approximately 24 to 30 months. Construction activities are anticipated to begin sometime in 2010 and be completed no later than 2013. The total amount of construction (i.e., magnitude), the duration of construction, and the intensity of construction activity would have a substantial effect upon the amount of construction emissions occurring at any one time. As such, the emission forecasts provided herein reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction is occurring in a relatively intensive manner. Because of this conservative assumption, actual emissions could be less than those forecasted. If construction is delayed or occurs over a longer time period, emissions could be reduced because of (1) a more modern and cleaner burning construction equipment fleet mix, and/or (2) a less intensive buildout schedule (i.e., fewer daily emissions occurring over a longer time interval). The conservative estimate of project construction emissions is provided in Table 3.11-24. As shown therein, proposed project emissions would not exceed general conformity *de minimis* thresholds.

Table 3.11-24. Estimate of Construction Emissions (tons per year)

	ROG	NO_X	CO	SO_X	PM_{10}[a]	$PM_{2.5}$[a]
Victorville Station, OMSF, and CA Track Installation Emissions						
MDAB Emissions	5	37	7	<1	6	2
de minimis Thresholds[b]	50	50	100	100	100	100
Adverse Effect?	No	No	No	No	No	No
Las Vegas Station, MSF, and NV Track Installation Emissions						
Clark County Emissions	3	13	5	<1	5	1
de minimis Thresholds[b]	50	50	100	100	70	70
Adverse Effect?	No	No	No	No	No	No

Notes:

[a] Baseline calculation assumes compliance with the laws for fugitive PM10 and PM2.5 emissions These fugitive dust control measures are prescribed by law and included as Measures to Minimize Harm.

[b] *de minimis* threshold levels for conformity applicability analysis.

ROG = Reactive Organic Gases; NO_X = Nitrogen Oxides

CO = Carbon Monoxide; SO_X = Sulfur Oxides

PM_{10} = Particulate Matter <10 microns; $PM_{2.5}$ = Particulate Matter <2.5 microns

URBEMIS outputs are provided in Appendix J.

Emissions estimate assume the concurrent construction of both terminus stations and track installation. In addition, fugitive PM10 and PM2.5 emissions estimates take into account compliance with MDAQMD Rule 403.2 and Section 94 of the Clark County Air Quality Guidelines, which mandate the implementation of fugitive dust control measures during construction. These measures are described below under *Measures to Minimize Harm*. A complete listing of the construction equipment by phase, construction phase duration assumptions, and changes to modeling default values used in this analysis is included within the URBEMIS 2007 printout sheets that are provided in Appendix J.

3.11.5 Measures to Minimize Harm

The following measures are prescribed to ensure compliance with fugitive dust control requirements mandated by the MDAQMD for construction activities occurring within the Mojave Desert Air Basin, and the Clark County DAQEM for construction projects occurring within Clark County Nevada.

3.11.5.1 California Project Area Measures

Mitigation Measure AQ-1: Fugitive Dust Control Plan during Construction to Meet MDAQMD Rule 403.2 Requirements

Consistent with the MDAQMD Rule 403.2 (Fugitive Dust Control for the Mojave Desert Planning Area), the following control measures will be implemented by the project sponsor:

1. Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions. Use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes shall be considered sufficient to maintain compliance;
2. Take actions sufficient to prevent project-related trackout onto paved surfaces;
3. Cover loaded haul vehicles while operating on publicly maintained paved surfaces;
4. Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such a delay is due to precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;
5. Clean up project-related trackout or spills on publicly maintained paved surfaces within 24 hours; and
6. Reduce nonessential earth-moving activity under high wind conditions. A reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance.

Mitigation Measure AQ-2: Purchase/Acquisition of NO_X Emissions Offset Credits Coordinated through MDAQMD for DEMU Technology Option Should the DEMU technology option be chosen to move forward as the Build Alternative, the project sponsor will coordinate with the MDAQMD for the purchase/acquisition of NO_X offset emissions credits necessary to meet compliance with General Conformity Rule for emissions occurring within the Mojave Desert Air Basin.

3.11.5.2 Nevada Project Area Measures

Mitigation Measure AQ-3: Fugitive Dust Control Plan during Construction to Meet Clark County DAQEM Requirements

Consistent with Section 94 of Clark County Air Quality Guidelines, the project sponsor will compile a Dust Mitigation Plan that is consistent with measures identified in the DAQEM Construction Activities Dust Control Handbook (included by reference in Section 94 of the Clark County Air Quality Regulations) and Desert Tortoise protective measures, and a Dust Control Permit shall be secured from the DAEQM. The Dust Control Plan may include the following measures, among other measures:

1. Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions;
2. Take actions sufficient to prevent project-related trackout onto paved surfaces;
3. Cover loaded haul vehicles while operating on publicly maintained paved surfaces;
4. Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such a delay is due to precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions;
5. Clean up project-related trackout or spills on publicly maintained paved surfaces within 24 hours; and
6. Reduce nonessential earth-moving activity under high wind conditions.

Mitigation Measure AQ-4: Purchase/Acquisition of NO_X Emissions Offset Credits Coordinated through Clark County DAQEM for DEMU Technology Option

Should the DEMU technology option be chosen to move forward as the Build Alternative, the project sponsor will coordinate with the Clark County DAQEM for the purchase/acquisition of NO_X offset emissions credits necessary to meet compliance with General Conformity Rule for emissions occurring within Clark County, Nevada.

3.12 NOISE AND VIBRATION

This section describes the methodology used to characterize the existing noise and vibration conditions along the proposed DesertXpress rail alignment, provides background information on airborne noise and ground-borne vibration issues related to the proposed high-speed rail project, discusses the criteria and models used for assessing noise and vibration impact, and presents the impact analysis, along with mitigation recommendations, where appropriate.

3.12.1 NOISE BACKGROUND

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human response are (1) intensity or level, (2) frequency content and (3) variation with time. The first parameter is determined by how greatly the sound pressure fluctuates above and below the atmospheric pressure, and is expressed on a compressed scale in units of decibels. By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 decibels. On a relative basis, a 3-decibel change in sound level generally represents a barely-noticeable change outside the laboratory, whereas a 10-decibel change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

The frequency content of noise is related to the tone or pitch of the sound, and is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz and abbreviated as Hz). The human ear can detect a wide range of frequencies from about 20 Hz to 17,000 Hz. However, because the sensitivity of human hearing varies with frequency, the A-weighting system is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called "A-weighted" sound levels, and are expressed in decibel notation as "dBA." The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise. Typical A-weighted sound levels for high-speed ground transportation and other sources are shown in Figure 3.12-1.

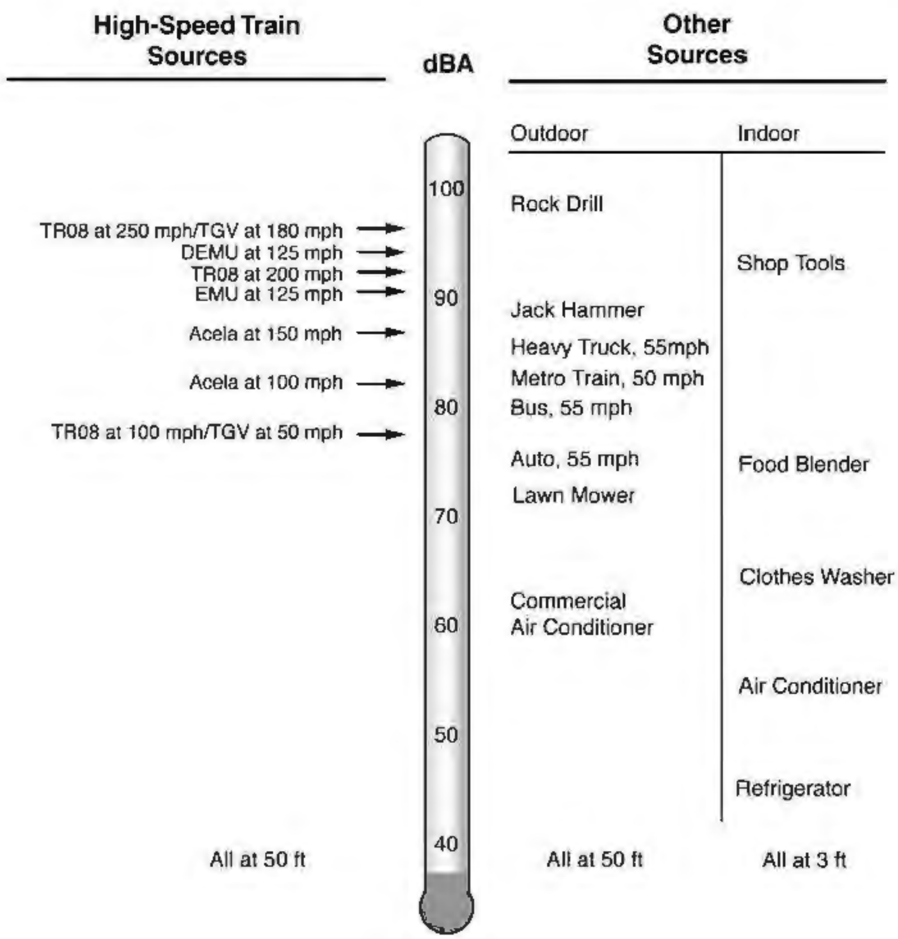


Figure 3.12-1 Typical A-Weighted Sound Levels[1]

An important characteristic of the noise from high-speed rail systems is the onset rate of the sound signature. Onset rate is the average rate of change of increasing sound pressure level in decibels per second (dB/sec) during a single noise event. The rapid approach of a high-speed train is accompanied by a sudden increase in noise for a receiver near the tracks. Sounds that have faster onset rates can cause more annoyance than sounds with slower variation or steady noise with the same noise level. The relationship between speed and distance defines locations where the onset rate for high-speed train operations may cause surprise or startle. The onset rate of 30 dB/sec is used as the basis for establishing distances within which startle is likely to occur; this is shown in Figure 3.12-2 and serves as added information in the impact assessment. For the most part, the potential for increased annoyance is confined to an area very close to the tracks. For example, Figure 3.12-2 shows that 125 mph high-speed train operations would have the potential for surprise within 27 feet of the track centerline. Any noise-sensitive land use within the

[1] TR08 is the German Maglev high-speed vehicle, TGV is the French high-speed rail train. Acela is Amtrak's high-speed train operating in the Northeast Corridor (Washington to Boston).

distances shown in Figure 3.12-2 will be considered to have the potential for increased annoyance.

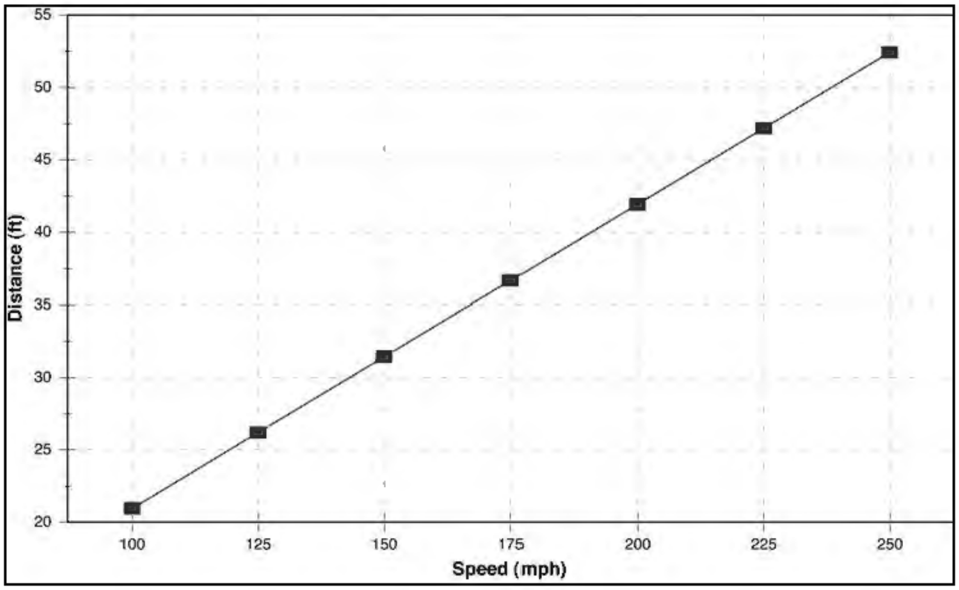


Figure 3.12-2 Distance within which Surprise Can Occur for High Speed Trains

Because environmental noise fluctuates from moment to moment, it is common practice to condense all of this information into a single number, called the "equivalent" sound level (Leq). Leq can be thought of as the steady sound level that represents the same sound energy as the varying sound levels over a specified time period (typically 1 hour or 24 hours). Often the Leq values over a 24-hour period are used to calculate cumulative noise exposure in terms of the Day-Night Sound Level (Ldn). Ldn is the A-weighed Leq for a 24-hour period with an added 10-decibel penalty imposed on noise that occurs during the nighttime hours (between 10 P.M. and 7 A.M.). Many surveys have shown that Ldn is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. Figure 3.12-3 provides examples of typical noise environments and criteria in terms of Ldn. While the extremes of Ldn are shown to range from 35 dBA in a wilderness environment to 85 dBA in noisy urban environments, Ldn is generally found to range between 55 dBA and 75 dBA in most communities. As shown in Figure 3.12-3, this spans the range between an "ideal" residential environment and the threshold for an unacceptable residential environment according to U.S. Federal agency criteria.

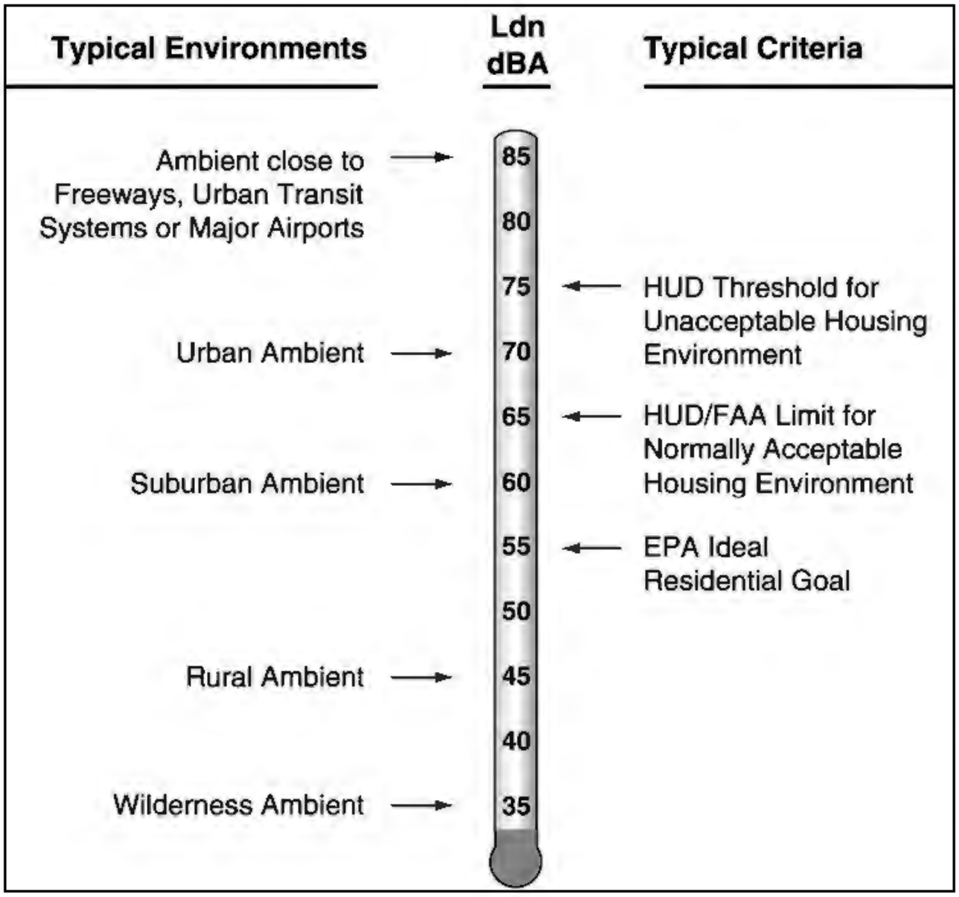


Figure 3.12-3 Examples of Typical Outdoor Noise Exposure[2]

3.12.2 VIBRATION BACKGROUND

Ground-borne vibration is the oscillatory motion of the ground about some equilibrium position that can be described in terms of displacement, velocity or acceleration. Because sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low-frequency range of most concern for environmental vibration (roughly 5-100 Hz), velocity is the preferred measure for evaluating ground-borne vibration from surface transportation projects.

The most common measure used to quantify vibration amplitude is the peak particle velocity (PPV), defined as the maximum instantaneous peak of the vibratory motion. PPV is typically used in monitoring blasting and other types of construction-generated vibration, since it is related to the stresses experienced by building components. Although PPV is appropriate for evaluating building damage, it is less suitable for evaluating human

[2] HUD – U.S. Housing and Urban Development, FAA – Federal Aviation Administration, EPA- U.S. Environmental Protection Agency.

response, which is better related to the average vibration amplitude. Thus, ground-borne vibration from high-speed trains is usually characterized in terms of the "smoothed" root mean square (rms) vibration velocity level, in decibels (VdB), with a reference quantity of one micro-inch per second. VdB is used in place of dB to avoid confusing vibration decibels with sound decibels.

Figure 3.12-4 illustrates typical ground-borne vibration levels for common sources as well as criteria for human and structural response to ground-borne vibration. As shown, the range of interest is from approximately 50 to 100 VdB, from imperceptible background vibration to the threshold of damage. Although the approximate threshold of human perception to vibration is 65 VdB, annoyance is usually not significant unless the vibration exceeds 70 VdB.

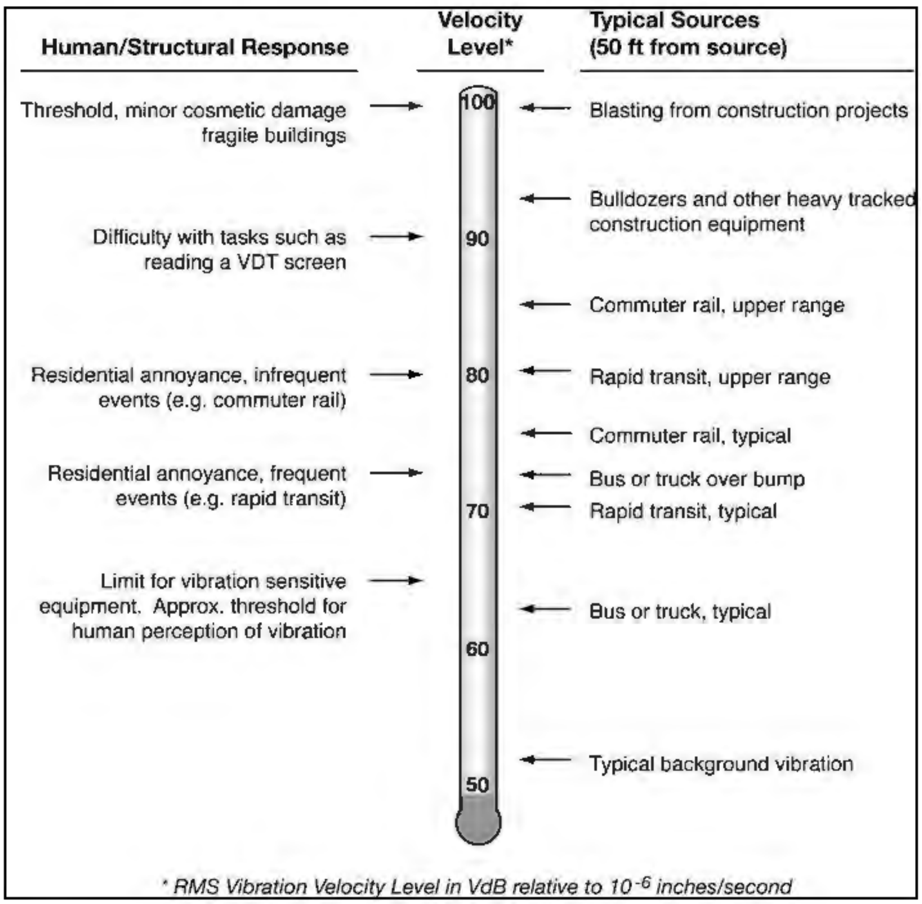


Figure 3.12-4 Typical Ground-Borne Vibration Levels and Criteria[3]

[3] VDT – Video Display Terminal.

3.12.3 Regulatory Requirements

Noise and vibration impacts for this project are based on the criteria as defined in the U. S. Federal Railroad Administration (FRA) High-Speed Ground Transportation Noise and Vibration Impact Assessment (October 2005) guidance manual. The criteria contained in this document are applicable for both NEPA and CEQA documentation.[4] In addition, noise generated by the proposed project has been assessed for the Mojave National Preserve in light of the National Park Service (NPS) mission to preserve the natural quiet of the park, particularly in areas within the Preserve designated as wilderness, as shown in Figure 3.1-15 and 3.6-8. While there are no specific noise standards established by the NPS for the Preserve, the assessment for the Preserve is focused on audibility of the proposed project, and the intrusion into the natural quiet of the park.

3.12.3.1 Noise Criteria

The FRA noise impact criteria are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. Although higher levels of train noise are allowed in neighborhoods with high levels of existing noise, smaller increases in total noise exposure are allowed with increasing levels of existing noise. The criteria apply to high-speed train operations as well as to fixed facilities such as storage and maintenance yards, passenger stations and terminals, parking facilities, and substations.

Table 3.12-1 Land Use Categories and Metrics for High Speed Train Noise Impact Criteria

Land Use Category	Noise Metric* (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)^{**}$	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)^{**}$	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Buildings with interior spaces where

[4] As stated in Chapter 1.0, Purpose and Need, the Surface Transportation Board (STB) issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB declared the DesertXpress Project to be exempt from state and local land use and environmental requirements. Laws and policies regarding noise impacts are considered to fall within the category of "land use and environmental" requirements as broadly defined by STB.

		quiet is important, such as medical offices, conference rooms, recording studios and concert halls fall into this category, as well as places for meditation or study associated with cemeteries, monuments and museums. Certain historical sites, parks and recreational facilities are also included.

* Onset-rate adjusted sound levels (L_{eq}, L_{dn}) are to be used where applicable.

** L_{eq} for the noisiest hour of train-related activity during hours of noise sensitivity.

Source: Federal Railroad Administration, 2005

The FRA Noise Impact Criteria group noise sensitive land uses into three categories as described in Table 3.12-1. Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise sensitive land uses such as parks and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used.

There are two levels of impact included in the FRA criteria. The interpretation of these two levels of impact is summarized below:

- Severe: Severe noise impacts identify locations where a significant percentage of people would be highly annoyed by noise from the project. FRA particularly encourages noise abatement on high-speed train projects where such impacts are identified.

- Impact: In this range of noise impact, the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels and the types and numbers of noise-sensitive land uses affected.

The noise impact criteria are summarized in Figure 3.12-5. The plot shows the relationship between the existing noise exposure and the project noise exposure that would cause moderate impact and severe impact. FRA strongly encourages noise abatement on high-speed train projects, especially where severe noise impacts are identified.

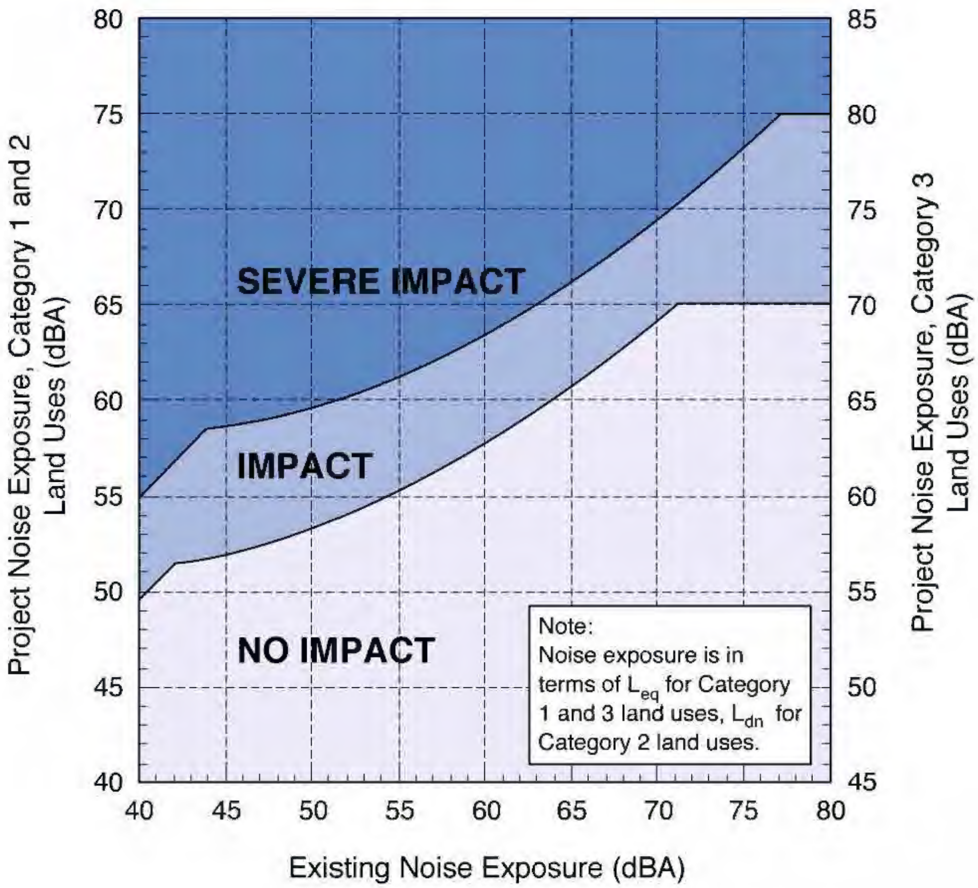


Figure 3.12-5 Noise Impact Criteria for High-Speed Rail Projects

Noise effects on livestock and wildlife are also considered. Although there are no established criteria relating high-speed train noise and animal behavior, some characteristics of high-speed train noise are similar to those from aircraft overflights and researchers generally agree that such noise can have a disturbing effect on both domestic livestock and wildlife. Some animals get used to noise exposure, while some do not; documented effects range from simply taking notice and changing body position to taking flight in panic. Whether these responses represent a threat to survival of animals remains unclear, although panic flight may result in injuries to animals in rough terrain or in predation of unprotected eggs of birds.

In lieu of established criteria, a limited amount of quantitative noise data relating actual aircraft overflight noise levels to effects provides enough information to develop a screening procedure to identify areas where noise from high speed train operations could affect domestic and wild animals. While a noise descriptor for noise effects on animals has not been universally adopted, recent research indicates the sound exposure level (SEL) is the most useful predictor of responses; this metric represents the sound energy at a receiver location from a single noise event. The criteria used to screen where animals may be affected by high-speed trains are shown in Table 3.12-2.

Table 3.12-2 Interim Criteria for High-Speed Train Noise Effects on Animals

Animal Category	Class	Noise Metric	Noise Level (dBA)
Domestic	Mammals (Livestock)	SEL	100
	Birds (Poultry)	SEL	100
Wild	Mammals	SEL	100
	Birds	SEL	100

Source: Federal Railroad Administration, 2005

In addition, the noise impact at stations will be assessed using the Federal Transit Administration (FTA) guidance manual, "Transit Noise and Vibration Impact Assessment," Report No. FTA-VA-90-1003-06, May 2006. This manual contains methods for combining transit/rail noise sources with traffic and bus noise sources at stations using both FTA criteria (which are identical to the FRA criteria) and FHWA criteria.

3.12.3.2 Vibration Criteria

The FRA ground-borne vibration and noise impact criteria are based on land use and train frequency, as shown in Table 3.12-3. There are some buildings, such as concert halls, recording studios and theaters that can be very sensitive to vibration and noise but do not fit into any of the three categories listed in Table 3.12-3. Due to the sensitivity of these buildings, they usually warrant special attention during the environmental assessment of a high-speed rail project. Table 3.12-4 gives criteria for acceptable levels of ground-borne vibration and noise for various types of special buildings.

It should be noted that there are separate FRA criteria for ground-borne noise: the "rumble" that can be radiated from the motion of room surfaces in buildings due to ground-borne vibration. Although expressed in dBA, which emphasizes the more audible middle and high frequencies, the criteria are set significantly lower than for airborne noise to account for the annoying low-frequency character of ground-borne noise. Because airborne noise tends to mask ground-borne noise for above ground (i.e., at-grade or elevated) rail systems, ground-borne noise criteria are primarily applied to subway operations where airborne noise is not a factor. For the above ground high-speed rail system planned along the proposed rail alignment, ground-borne noise criteria are applied only to buildings that have sensitive interior spaces that are well insulated from exterior noise.

Table 3.12-3 Ground-Borne Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne Vibration Impact (VdB re 1 micro-inch/sec)		Ground-Borne Noise Impact (dB re 20 micro-Pascals)	
	Frequent[1] Events	**Infrequent[2] Events**	**Frequent[1] Events**	**Infrequent[2] Events**
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[3]	65 VdB[3]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40dBA	48 dBA

1. "Frequent Events" is defined as more than 70 vibration events per day.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Vibration-sensitive equipment is not sensitive to ground-borne noise.

Source: Federal Railroad Administration, 2005.

Table 3.12-4 Ground-Borne Vibration and Noise Impact Criteria for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact (VdB re 1 micro-inch/sec)		Ground-Borne Noise Impact (dB re 20 micro-Pascals)	
	Frequent[1] Events	**Infrequent[2] Events**	**Frequent[1] Events**	**Infrequent[2] Events**
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA

1. "Frequent Events" is defined as more than 70 vibration events per day.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day.

Source: Federal Railroad Administration, 2005.

3.12.3.3 Construction Noise Criteria

Construction noise criteria are based on the guidelines provided in the FRA Guidance Manual. These criteria, summarized in Table 3.12-5 below, are based on land use and time of day and are given in terms of Leq for an eight-hour work shift.

Table 3.12-5 FRA Construction Noise Criteria

Land Use	Noise Limit, 8-Hour Leq (dBA)	
	Daytime	Nighttime
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: Federal Railroad Administration 2005

3.12.4 Methods of Evaluation of Impacts

This section summarizes the models used to project future noise and vibration levels for potential sources of community impact related to the Desert Xpress project. The projection models for both noise and vibration are described below.

3.12.4.1 High Speed Rail Noise

The primary component of wayside noise from high-speed train operations for the EMU and DEMU vehicles is wheel/rail noise, which results from the steel wheels rolling on steel rails. Secondary sources, such as vehicle air-conditioning and other ancillary equipment, will sometimes be audible, but are not expected to be significant factors. The projection of wayside noise from high-speed train operations was carried out using the model specified in the FRA Guidance Manual, with the following assumptions:

- Based on information provided by the vehicle manufacturers, the predictions assume that a 10-car EMU train operating at a reference speed of 125 mph on ballast and tie track with continuous welded rail (CWR) generates a maximum noise level of 85 dBA at a distance of 100 feet from the track centerline, and that a 10-car DEMU train operating under the same reference conditions generates a maximum noise level of 88 dBA at a distance of 100 feet from the track centerline. These reference levels assume that the vehicles have been designed to limit noise generated by all sources.

- The operating times for the proposed service would be between 6 AM and midnight. The operating plan for high-speed rail service specifies mid-day headways of 20 minutes, morning and evening headways of 30 minutes and early morning and late night headways of one hour. Ten-car trains would operate throughout the day.

- The analysis assumes that the vehicles travel at the maximum operating speed (125 mph for the DEMU and 150 mph for the EMU) for the entire length of the proposed corridor, even though speeds will be lower where there are curves or steep inclines where full speed is not achievable. This assumption ensures a more conservative estimate of the noise impacts from high-speed rail operations.

- The entire project is proposed to be grade-separated and therefore there would be no noise from horns or bells at grade-crossings.

- The potential for surprise effects for humans would be limited to areas within 27 feet of the track centerline, and startle effects for wildlife would be limited to areas within 40 feet of the track centerline.

3.12.4.2 Traffic Noise

In addition to noise from high-speed rail operations, noise impact was assessed for changes in traffic volume, primarily near stations. The majority of the roadways in the project corridor, including I-15 and major arterials in Las Vegas have significant volumes of traffic, and any changes due to the project would be minor and would have no effect on the noise levels.

However, for locations immediately adjacent to the proposed station locations, both in Victorville and Las Vegas, there is the potential for changes in traffic volumes to affect the noise levels. In order to determine locations where there would be the potential for noise impact from traffic, the following methodology was used:

- Traffic growth factors for all intersections near each of the stations, based on data from the DMJM traffic analysis (included in this EIS as Appendix E), were used to assess locations where the change in traffic volume from 2007 to 2030 would result in an increase in noise of 3 dB or higher, which represents a noticeable increase in noise level on an Ldn basis. A 3 dB increase in noise is equal to a 100 percent increase in traffic volume.

- At locations where the growth factors were 2 or greater (a 3 dB increase in noise), an analysis was conducted to determine what portion of the increase in traffic volume was related to the project, again using the data from the traffic appendix.

- At locations where the increase in traffic volume due to the project was significant, a screening process was applied to determine if any noise sensitive receptors were located near the affected roadways. At such locations, a traffic noise analysis was conducted.

3.12.4.3 Vibration

The potential vibration impact from high-speed rail operations was assessed on an absolute basis using the FRA criteria. The following factors were used in determining potential vibration impacts along the proposed rail alignment:

- Vibration propagation tests were conducted at four sites along the corridor near sensitive receptors. These tests measured the response of the ground to an input force. The results of these tests were combined with available vibration source data for the X2000 high-speed rail vehicle (which was deemed to be the most similar vehicle to the EMU and DEMU in the available literature, due to their similar configurations and maximum speeds) to project vibration levels from vehicles operating on the project corridor.

- The analysis assumes that the vehicles travel at the maximum operating speed (125 mph) for the entire length of the proposed corridor. This ensures a conservative estimate of the vibration impacts from high-speed rail operations.

- The assumed vehicle vibration characteristics were combined with the ground vibration propagation test results to project vibration levels as a function of distance for the project corridor. The rail corridor was divided into four regions for the purposes of vibration projection, defined as follows:

- Region A – Segment 1 (Represented by Test Site V-1)
- Region B – Segments 2, 3 and 4 (Represented by Test Site V-2)
- Region C – Segment 5 and the southern portions of Segment 6 (Represented by Test Site V-3)
- Region D – The northern portions of Segment 6 and Segment 7 (Represented by Test Site V-4)

The resulting projections of maximum ground vibration levels from high-speed rail operations at 125 mph for each region are provided in Figure 3.12-6. Each of the curves has a different level vs. distance characteristic, which determines the impact distance in each of the regions.

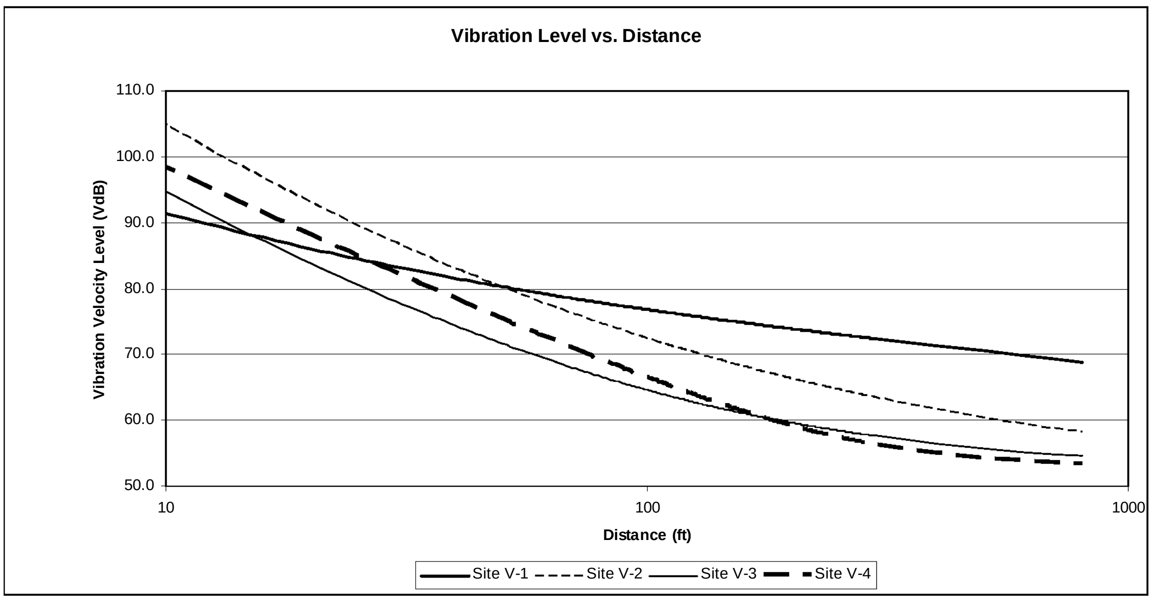


Figure 3.12-6 Vibration Level vs. Distance for High-Speed Rail Operations

3.12.4.4 Construction

Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. This is particularly true of engines without sufficient muffling. For special activities such as impact pile driving and pavement breaking, noise generated by the actual process dominates.

Projecting construction noise requires a construction scenario of the equipment likely to be used and the average utilization factors or duty cycles (i.e., the percentage of time during operating hours that the equipment operates under full power during each phase). Using the typical sound emission characteristics, it is then possible to estimate Leq or Ldn at various distances from the construction site. The noise impact assessment for a construction site is based on:

- An estimate of the type of equipment that will be used during each phase of the construction and the average daily duty cycle for each category of equipment,
- Typical noise emission levels for each category of equipment, and
- An estimate of noise attenuation as a function of distance from the construction site.

Construction noise estimates are always approximate because of the lack of specific information available at the time of the environmental assessment. Project designers usually try to minimize constraints on how the construction will be performed and what equipment will be used so that contractors can perform construction in the most cost effective manner. Mitigation has been included that incorporates effective, best-practice noise control measures during construction.

Based on a typical construction scenario for ballast-and-tie track construction, an 8-hour Leq of 88 dBA should be expected at a distance of 50 feet from the geometric center of the work site. With at-grade track construction, the duration of the activities at a specific location along the alignment will be relatively limited, usually a matter of several weeks. As a result, even when there may be noise impacts, the limited duration of the construction can mean that some forms of mitigation are not cost effective.

3.12.5 Affected Environment

3.12.5.1 Regional Environment

Noise

Existing ambient noise levels in the project area were characterized through direct measurements at selected sites along the proposed alignment during the period from July 24 through July 27, 2006 and May 6, 2008. Estimating existing noise exposure is an important step in the noise impact assessment since, as indicated above, the thresholds for noise impact are based on the existing levels of noise exposure. The measurements consisted of long-term (24-hour) monitoring of the A-weighted sound level at representative noise-sensitive locations.

All of the measurement sites were located in noise-sensitive areas, and were selected to represent a range of existing noise conditions along the corridor. Figures 3.12-7 through 3.12-10 show the general location of the ten long-term monitoring sites (LT-1 through LT-10) and one short-term measurement site (ST-1). At each site, the measurement microphone was positioned to characterize the exposure of the site to the dominant noise sources in the area. For example, microphones were located at the approximate setback lines of the receptors from adjacent roads or rail lines, and were positioned to avoid acoustic shielding by landscaping, fences or other obstructions.

The results of the existing ambient noise measurements, summarized in Table 3.12-6, serve as the basis for determining the existing noise conditions at all noise-sensitive receptors along the proposed rail alignment. The results at each site are described below. The majority of the land use along the corridor is Category 2, which includes all residential land use, along with hotels and other land use with nighttime sensitivity. There are scattered Category 3 land uses, including primarily churches and schools and one Category 1 land use, the Clark County Amphitheater.

The existing ambient noise measurements indicate that the existing noise contour to 65 dBA from the centerline of I-15 varies depending on location. For the majority of the I-15 freeway corridor, the 65 dBA noise contour extends approximately 100 to 150 feet in either direction from the centerline of I-15. For example, existing noise levels from I-15 are approximately 65 dBA in the Mojave National Preserve and designated wilderness areas at a distance of about 150 feet from the centerline of I-15. As noise attenuates with distance, the noise level at distances greater than 150 feet from the I-15 centerline would be less than 65 dBA. However, due to a louder existing noise environment in the Las Vegas area, the noise contour to 65 dBA surrounding the portions of I-15 in the Las Vegas area extends approximately 250 feet in either direction from the centerline of I-15.

Table 3.12-6 Summary of Existing Ambient Noise Measurement Results

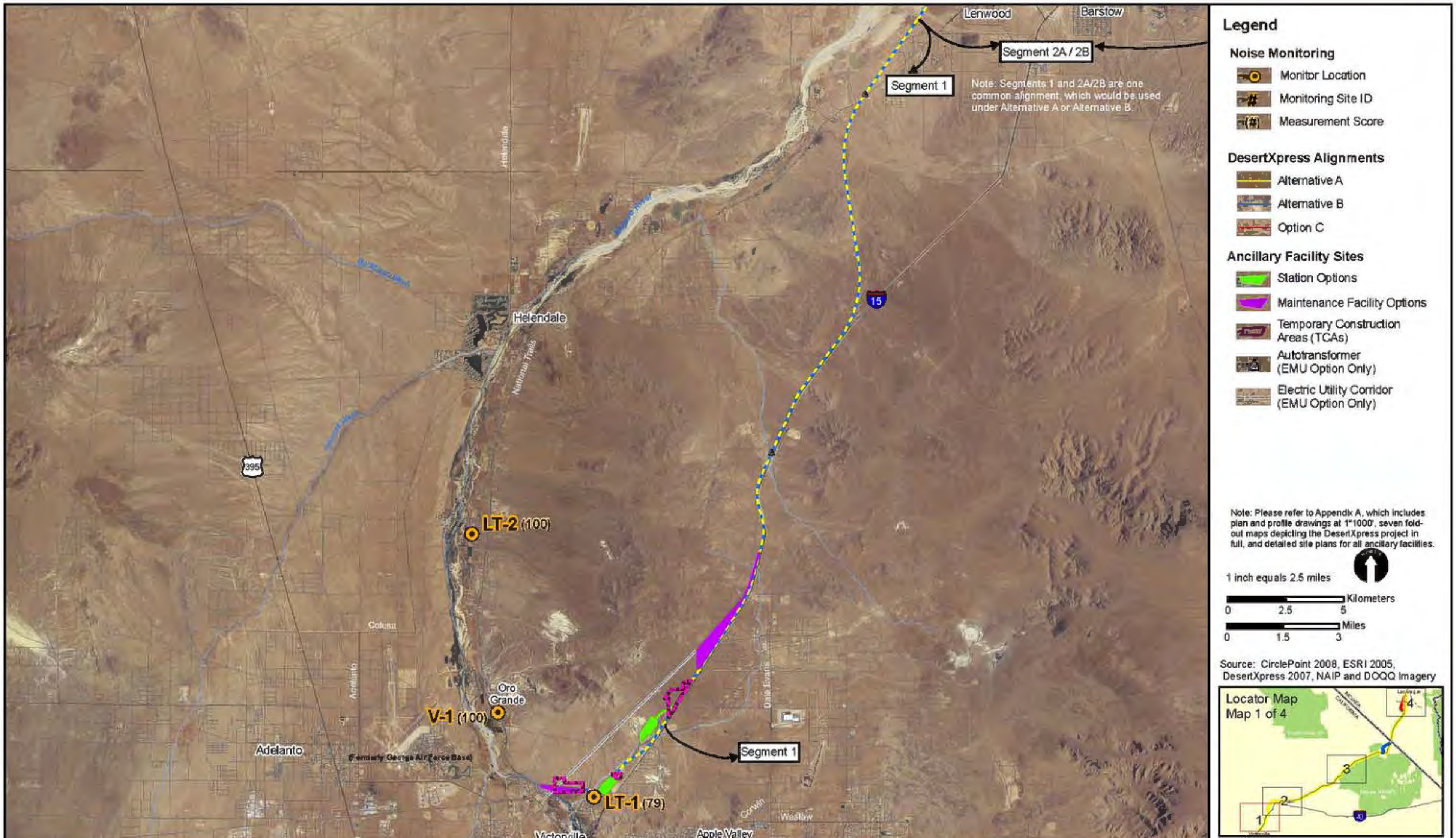
Site No.	Seg.	Measurement Location Description	Start of Measurement		Meas. Time (hrs)	Noise Exposure Ldn (dBA)
			Date	Time		
LT-1	1	17430 Jupiter Ave, Victorville, CA	7-24-06	10:00	24	59
LT-2	1	22859 Bryman Rd, Oro Grande, CA[1]	7-24-06	11:00	24	72
LT-3	2	36155 Ramirez Rd, Barstow, CA	7-24-06	13:00	24	53
LT-4	2	31141 Balsa Ave, Barstow, CA	7-24-06	15:00	24	53
LT-5	2	38748 East Williams St, Yermo, CA	7-25-06	13:00	24	63
LT-6	3	Bun Boy Hotel, Baker, CA	7-25-06	14:00	24	65
LT-7	6	3075 Haleh St, Las Vegas, NV	7-25-06	19:00	24	66
LT-8	6	7592 Thistle Poppy St, Las Vegas, NV	7-25-06	20:00	24	71
LT-9	6	4205 W. Tropicana Ave, Las Vegas, NV	7-26-06	16:00	24	70
LT-10	7	1732 S Loch Lomond Way, Las Vegas, NV	7-26-06	17:00	24	69
ST-1	7	Clark County Amphitheater	5-6-08	18:00	1	53

1. This measurement location was along Segment 1A, which was subsequently removed from consideration in the EIS. The measurements from this location were not used in this analysis.

Source: HMMH 2008.

Vibration

Significant sources of existing vibration along the proposed rail alignment are limited to freight trains that operate along certain segments of the alignment. However, to best predict ground vibration levels from the proposed high-speed train operations, the vibration measurements for this project focused on characterizing the vibration propagation properties of the soil at representative locations along the corridor. Four vibration testing sites, at the locations shown in Figures 3.12-7 through 3.12-10, were selected to represent the range of soil conditions in areas along the corridor that include a significant number of vibration-sensitive receptors. At each of these sites, ground-borne vibration propagation tests (as described above) were conducted by impacting the ground and measuring the input force and corresponding ground vibration response at various distances. The resulting force-response transfer function was combined with the known input force characteristics of the X-2000 high-speed rail vehicle to predict future vibration levels at locations along the project corridor.



U.S. Department of Transportation Federal Railroad Administration

DesertXpress Project EIS

Noise Monitoring (1) FIG 3-12.7

Source: Geografika Consulting 02.02.09

U.S. Department of Transportation
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Noise Monitoring (2) FIG 3-12.8

Source: Geografika Consulting 02.02.09

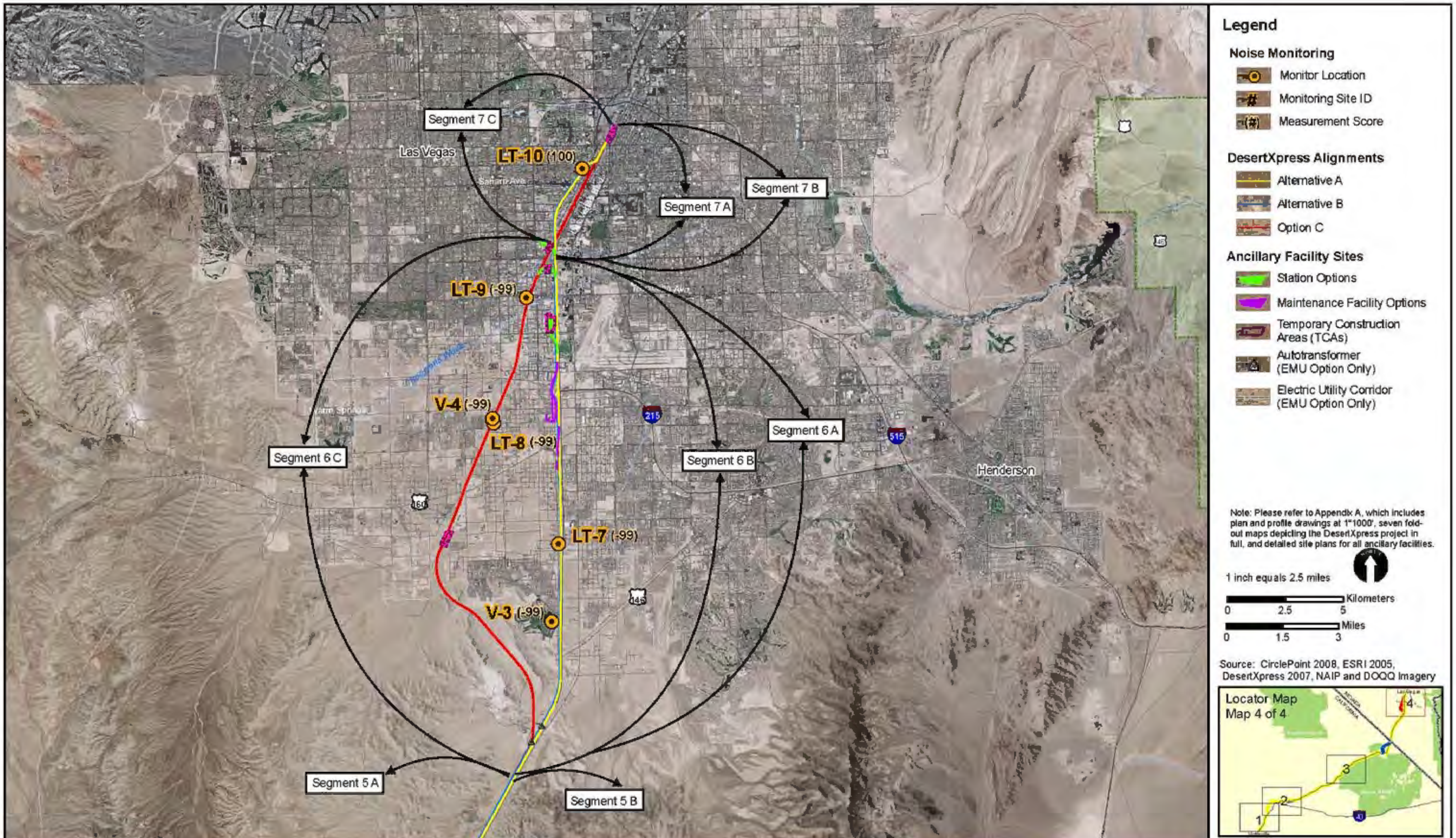
U.S. Department of Transportation Federal Railroad Administration

DesertXpress Project EIS

Noise Monitoring (3)

FIG 3-12.9

Source: Geografika Consulting 02.02.09



U.S. Department of Transportation
Federal Railroad Administration

DesertXpress
Project EIS

Noise Monitoring (4)

FIG 3-12.10

Source: Geografika Consulting 02.02.09

3.12.5.2 Resources by Segment

Noise-sensitive land uses along the project corridor were identified from aerial photographs and visual surveys. The descriptions of noise-sensitive land uses and existing noise sources along the project corridor from southwest to northeast, are as follows:

Segment 1

Victorville, CA: In Victorville, the closest noise-sensitive land use to the alignment consists of a single-family residential area on the north side of town that backs up to Stoddard Wells Road. The Christian Methodist Episcopal Church and Grady Trammel Park are also located along this road, further away from the alignment. The dominant existing noise source in this area is traffic on Stoddard Wells Road, including heavy trucks that use this road to access a nearby landfill site.

Site LT-1: 17430 Jupiter Avenue - Victorville, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 59 dBA. The dominant source of noise at this site was traffic on Stoddard Wells Road, including heavy trucks that use this road to access a nearby landfill.

Site LT-2: 22859 Bryman Road - Oro Grande, CA. The Ldn measured over a 24-hour period in the front yard of this single-family residence was 72 dBA. The dominant source of noise at this location was BNSF freight train operations; however, because this site was more than a half mile from the nearest grade crossing, the noise from train horns was not a significant factor. Military aircraft, as well as roadway traffic and local activities, also contributed to the noise exposure at this site. This measurement site was located in Segment 1A, which was subsequently dropped from further analysis.

Segment 2

Barstow, CA: There are a number of single-family residential areas located adjacent to the alignment along this segment of the corridor, which roughly parallels Old Highway 58. Residential areas are located in the vicinity of Carbine Drive, Waterman Road, Radio Road, Leona Avenue and Hawthorne Drive. In all of these areas, existing noise sources include local traffic, occasional aircraft overflights and neighborhood activity. Other noise sources affecting the background noise levels at some of the residential areas include distant traffic on the I-15 freeway and operations at the BNSF Barstow railroad yard.

Site LT-3: 36155 Ramirez Road - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 53 dBA. Local roadway traffic as well as distant BNSF railroad yard operations contributed to the noise environment at this location.

Site LT-4: 31141 Balsa Avenue - Barstow, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 53 dBA. Distant traffic on the I-15 freeway as well as occasional aircraft and local activity contributed to the noise environment at this location.

Yermo, CA: This area includes some single family residential development, primarily on the south side of the I-15 freeway off of East Yermo Road. The existing noise sources in this area include freeway traffic and distant UPRR freight train operations.

Site LT-5: 38748 East Williams Street - Yermo, CA. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 63 dBA. Contributors to the noise environment at this site included freeway traffic on I-15 as well as occasional UPRR freight trains.

Segment 3

Baker, CA: Noise sensitive land use along the alignment in this area includes a motel as well as some distant residences. In addition, the Mojave National Preserve is located to the south of the I-15 freeway. The existing noise environment is dominated by highway traffic on the I-15 freeway.

Site LT-6: Bun Boy Hotel - Baker, CA. The Ldn measured over a 24-hour period at this hotel was 65 dBA. The dominant source of noise was freeway traffic on I-15, and some noise also resulted from occasional traffic in the hotel parking lot.

Segment 4

The Mojave National Preserve is located on both sides of the I-15 freeway in this segment. In the vicinity of the freeway, the existing noise environment is dominated by highway traffic. For the northern portion of the preserve, at locations away from the highway, the existing noise levels are governed by natural sounds.

There are no inhabited noise or vibration sensitive receptors in Segment 4.

Segment 5

Primm and Jean NV: These areas are both near the California-Nevada border directly adjacent to the I-15 freeway, which is the dominant noise source. Noise-sensitive land use includes a number of resort hotel/casino properties; however, the hotel units are set back considerably from the alignment in these areas.

Segment 6

Las Vegas, NV: In the Las Vegas area there are two alignment alternatives and one option; Alternatives A and B which follow the I-15 freeway and Option C which follows the UPRR tracks. The land use areas along these alignments are described separately below.

Alternatives A and B: Noise-sensitive land use along this alignment includes residential areas on the west side of I-15, primarily off of Dean Martin Drive.

Option C: This alignment departs from I-15 at Sloan Road and follows the UPRR right of way through industrial and commercial areas as well as a number of rapidly developing residential areas. These residential areas are located on both sides of the alignment, primarily along the segment extending from just south of Blue Diamond Road to the I-215 freeway. North of I-215, there are two multi-family residential developments on the west side of the alignment including the Budget Suites, a three-story residential hotel to the south of Tropicana Boulevard, and the Southwest Trails apartment complex to the south of Flamingo Road. Noise sources at locations along Option B include UPRR train operations, aircraft, street traffic and local activities.

Site LT-7: 3075 Haleh Street - Las Vegas, NV. The Ldn measured over a 24-hour period in the back yard of this single-family residence was 66 dBA. The dominant source of noise at this location was freeway traffic on I-15. Other noise sources included insects and local activity.

Site LT-8: 7592 Thistle Poppy Street - Las Vegas, NV. The Ldn measured over a 24-hour period in front of this single-family residence was 71 dBA. The major source of noise at this location was nearby UPRR freight train operations. Other contributors to the noise exposure at this site included aircraft and local roadway traffic.

Site LT-9: 4205 W. Tropicana Ave, Las Vegas, NV. The Ldn measured over a 24-hour period from a third-floor balcony behind this residential hotel was 70 dBA. Nearby freight train operations as well as local and distant traffic were the major sources of noise.

Segment 7

Las Vegas, NV: In the Las Vegas area there are two alignment alternatives and one option; Alternatives A and B which follow the I-15 freeway and Option C which follows the UPRR tracks. The land use areas along these alignments are described separately below.

Alternatives A and B: Noise sensitive land use along these alternatives consists of a residential area along Loch Lomond Drive south of Oakey Boulevard. In addition, the Clark County Amphitheater is located near the proposed downtown station. Traffic on I-15 is by far the dominant noise source in these areas.

Option C: Noise sensitive land use along this option includes some of the resort casino hotels along the Las Vegas Strip, which are located some distance from the proposed alignment. In addition, the Clark County Amphitheater is located near the proposed downtown station.

Site LT-10: 1732 S. Loch Lomond Way - Las Vegas, NV. The Ldn measured over a 24-hour period in the front yard of this single-family residence was 69 dBA. Traffic noise from the I-15 freeway was the major source of noise at this location. Noise from helicopters, street traffic, insects and local activity also contributed to the noise environment at this site.

Site ST-1: Clark County Amphitheater – Las Vegas, NV. The one-hour Leq measured at this location was 53 dBA. Traffic noise from I-15 and local roads was the major source of noise at this location. In addition, freight train noise contributed to the noise environment at this site.

Vibration: Descriptions of the vibration propagation test sites are as follows:

Segment 1

Site V-1 was located at the intersection of Olive Street and First Street in Oro Grande, CA. The vibration measurements at this location are representative of the areas in Victorville, Oro Grande and Helendale. While this site was located in Segment 1A, which has been withdrawn from further consideration in the EIS[5], it was used to assess the vibration impacts in Victorville in Segment 1.

Segment 2

Site V-2 was located at the intersection of Fern Street and Balsa Avenue in Barstow, CA. The vibration measurements at this location are representative of the areas in Barstow, Yermo and Baker (although Baker is located in Segment 3).

Segments 3-5

No vibration propagation measurements were conducted in these segments.

Segment 6

Site V-3 was located just north of Alpine Lilly Drive in Las Vegas, NV in a new housing development. The vibration measurements in this area are representative of the areas in Las Vegas to the south of Blue Diamond Road.

Site V-4 was located at the intersection of Valencia Ridge Street and El Dorado Lane in Las Vegas, NV. The vibration measurements in this area are representative of the areas in Las Vegas to the north of Blue Diamond Road.

Segment 7

No vibration propagation measurements were conducted in this segment.

[5] See Chapter 2.0, Alternatives Considered but Rejected, for additional information on the disposition of Segment 1A.

3.12.6 Environmental Consequences

3.12.6.1 Regional Effects

A noise and vibration impact assessment was performed based on the FRA criteria and on the projections described above. The assessment methods and results for the various project sources are described below.

High-Speed Rail Noise

The assessment of noise impact from high-speed rail operations is based on a comparison of existing and projected future noise exposure for different land use categories. The following steps were performed to assess train noise impact:

- A detailed land-use survey was conducted along the project corridor to identify and classify all noise-sensitive receptors according to the categories defined above. The majority of these receptors are single- and multi-family residences, falling under FRA Category 2. The remainder are institutional sites falling under FRA Category 3, along with a Category 1 site in Las Vegas near the downtown station option.

- The receptors were clustered based on distance to the tracks, acoustical shielding between the receptors and the tracks, and other operational parameters.

- The existing noise exposure at each cluster of receptors was estimated based on the ambient noise measurements discussed above, and was used to determine the thresholds for impact and severe impact using the FRA criteria.

- Projections of future high-speed rail noise at each cluster of receptors were developed based on distance from the tracks; train schedule and train speed using the methods described above.

- In areas where the projections showed either degree of impact, mitigation options were evaluated and new projections were developed assuming implementation of mitigation measures.

For the high-speed rail project, detailed comparisons of the existing and future noise levels are presented in tables below for each segment where noise impacts are projected to occur. In addition to the location and distance to the near track, each table includes the existing noise level, the projected noise level from high-speed rail operations and the impact criteria for each receptor or receptor group. Based on a comparison of the predicted project noise level with the impact criteria, the impact category is listed, along with the predicted total noise level and projected noise increase due to the introduction of high-speed rail service. Each table also includes an inventory of the number of impacts and severe impacts at each sensitive receptor location. Because the DEMU and EMU vehicles have different reference noise levels, the analysis is presented for each vehicle.

The operation of high-speed rail would also alter the existing 65 dBA noise contour, as measured from the centerline of I-15. The largest increase in distance to the 65 dBA noise contour as a result of operation of the DesertXpress high-speed rail would be in the undeveloped, unpopulated areas or of the 200-mile corridor. In these undeveloped areas, the 65 dBA noise contour with high-speed rail operation would be extended an additional 30 feet from the existing 65 dBA noise contour. Thus, the 65dBA noise contour under all action alternatives would extend approximately 130 to 180 feet from the centerline of I-15 in these undeveloped areas. In the Las Vegas areas, implementation of the action alternatives would extend the 65 dBA contour an additional 20 feet, establishing a total distance of 270 feet from the centerline of I-15 for the 65dBA noise contour with project operation.

Traffic Noise

Traffic noise was assessed for locations near the proposed station locations, in both Victorville and Las Vegas, using the methodology discussed above.

In Victorville, there are a number of intersections associated with both station alternatives that have a growth factor above 2, with most of the increase in traffic due to the project. However, there are no noise sensitive receptors within 1,000 feet of any of the roadways near the proposed station locations. Therefore, there would be no noise impact associated with increases in traffic volume in Victorville related to the action alternatives.

In Las Vegas, there are only four intersections for all four station alternatives combined that have a growth factor above 2. However, at all four intersections, the increase in traffic due to the action alternatives is only a small percentage of the projected increase and therefore there is no noise impact associated with increases in traffic volume in Las Vegas due to the project.

Vibration

The potential vibration impact from high-speed rail operations was assessed on an absolute basis using the FRA criteria. The approach used for assessing vibration impact generally follows the approach used for the noise impact, except that existing vibration is not considered when evaluating impact. For the action alternatives, the estimated root mean square (RMS) velocity levels (VdB re 1 micro-in./sec.) for sensitive receptors at representative distances are presented in tables below for each segment where vibration impacts are projected to occur. These tables summarize the results of the analysis in terms of anticipated exceedances of the FRA criteria for “infrequent events” (defined as less than 70 events per day). The criteria are discussed in more detail in above.

Each table lists the locations, the distance to the near track, and the projected speed at each location. In addition, the predicted project vibration level and the impact criterion level are indicated along with the number of impacts projected for each receptor or receptor group. The project vibration level listed in each table is the highest vibration level for that grouping of sensitive receptors. In many cases, the vibration levels for other impacted receptors are much lower than the reported value. Because the report assumes the same vehicle vibration characteristics, the vibration analysis is the same for both the DEMU and EMU vehicles.

Construction

Based on the criteria and methodology discussed above, and assuming that construction noise is reduced by 6 decibels for each doubling of distance from the center of the site, screening distances for potential construction noise impact can be estimated. These estimates suggest that the potential for construction noise impact will be minimal for commercial and industrial land use, with impact screening distances of 70 feet and 40 feet, respectively. Even for residential land use, the potential for temporary construction noise impact would be limited to locations within about 125 feet of the corridor. However, the potential for noise impact from nighttime construction could extend to residences as far as 400 feet. Potential construction noise impacts will be further evaluated and mitigated during final design.

3.12.6.2 Effects by Segment

Segment 1

Operational Period Noise: A summary of the projected noise impacts for Segment 1 is shown in Tables 3.12-7 and 3.12-8 for the EMU and DEMU technology options, respectively. A brief discussion of each area projected to have noise impact follows the tables.

Table 3.12-7 Noise Impacts for Segment 1 – EMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Main St, Lenwood	NB	140-240	53	56-59	54	60	Impact	57-60	4.6-7.3	3	0
Total:										3	0

Notes:

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact. Pred – Predicted Noise Levels, Imp – Impact, Sev – Severe Impact.

2. The reported noise levels represent the range of predicted noise levels for each location.

Source: HMMH, 2008.

Table 3.12-8 Noise Impacts for Segment 1 – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Main St, Lenwood	NB	140-240	53	54-62	54	60	Impact/ Severe	57-62	3.7-9.3	4	1
Total:										4	1

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Main Street, Lenwood – There are several scattered single-family residences on the south side of the alignment near Main Street in Lenwood. Noise impacts at this location are due to the low existing noise levels and the close proximity of the residences to the alignment.

Vibration: There are no vibration impacts projected for Segment 1.

Segment 2, Alternative A

Operational Period Noise: A summary of the projected noise impacts for Segment 2, Alternative A is shown in Tables 3.12-9 and 3.12-10 for the EMU and DEMU vehicles, respectively. A brief discussion of each area projected to have noise impact follows the tables. All impacts in Tables 3.12-9 and 3.12-10 are located in Barstow.

Table 3.12-9 Noise Impacts for Segment 2, Alternative A – EMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Lenwood Rd	SB	240	53	56	54	60	Impact	57	4.6	1	0
Rt-58	NB	170-260	53	55-58	54	60	Impact	57-59	4.2-6.3	5	0
Rt-58	SB	170-290	53	54-58	54	60	Impact	57-59	3.8-6.3	6	0
Waterman Rd	NB	290	53	54	54	60	Impact	57	3.8	6	0
Waterman Rd	SB	70-290	53	54-64	54	60	Impact/ Severe	57-64	3.8-11.3	20	6
Radio Rd	SB	100-220	53	56-62	54	60	Impact/ Severe	58-62	5-9.2	7	1
Poplar St	SB	120	53	60	54	60	Severe	61	8.2	0	1
Soapmine Rd	NB	90	53	62	54	60	Severe	63	9.8	0	2

Soapmine Rd	SB	100-180	53	55-62	54	60	Impact/ Severe	57-62	3.9-9.2	2	2
Balsa Ave	SB	20-170	53	55-71	54	60	Impact/ Severe	57-71	3.9-17.9	10	19
Total:										57	31

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Table 3.12-10 Noise Impacts for Segment 2, Alternative A – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Agate Rd	NB	350	53	55	54	60	Impact	57	4.4	5	0
Lenwood Rd	SB	240-420	53	54-58	54	60	Impact	57-59	3.6-6.3	5	0
Rt-58	NB	170-360	53	55-60	54	60	Impact/ Severe	57-61	4.3-8.2	4	3
Rt-58	SB	170-290	53	57-60	54	60	Impact/ Severe	58-61	5.3-8.2	3	3
Waterman Rd	NB	290-420	53	54-57	54	60	Impact	57-58	3.6-5.3	14	0
Waterman Rd	SB	70-420	53	54-66	54	60	Impact/ Severe	57-66	3.6-13.6	20	8
Radio Rd	SB	100-370	53	55-64	54	60	Impact/ Severe	57-64	4.2-11.4	10	3
Poplar St	SB	120-360	53	55-63	54	60	Impact/ Severe	57-63	4.3-10.3	1	1
Soapmine Rd	NB	90-370	53	55-65	54	60	Impact/ Severe	57-65	4.2-12	3	2
Soapmine Rd	SB	100-180	53	55-64	54	60	Impact/ Severe	57-64	4.2-11.4	2	2
Balsa Ave	SB	20-170	53	55-74	54	60	Impact/ Severe	57-74	4.2-20.3	10	19
Total:										77	41

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Agate Road - There are a few scattered single family residences on Agate Road, south of the Mojave River. The noise impacts are due to the low existing noise levels and the higher noise levels generated by the DEMU vehicle.

Lenwood Road - There are a few scattered single family residences on Lenwood Road, north of the Mojave River. The noise impacts are due to the low existing noise levels.

Route 58 -There are several scattered single-family residences near Route 58 on the south side of the alignment near Carbine Road, and on the north side of the alignment on Old CA 58. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Waterman Road – There is a single-family residential community on both the north and south sides of the proposed alignment along Waterman Road. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Radio Road - There is a single-family residential community on the north side of the proposed alignment along Radio Road. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Poplar Street - There are several scattered single-family residences to the north of the alignment along Poplar Street. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Soapmine Road - There are a number of single-family residences near Soapmine Road on both the north and south sides of the alignment. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Balsa Avenue - There is a single-family residential neighborhood on the north side of the alignment on Balsa Ave. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences. Because the distance from the proposed alignment to these residences is less than 27 feet, there is also the potential for surprise effects from high-speed rail activities.

Operational Period Vibration: A summary of the projected vibration impacts for Segment 2, Alternative A is shown in Table 3.12-11. A brief discussion of each area projected to have vibration impact follows the table.

Table 3.12-11 Vibration Impacts for Segment 2, Alternative A

Location	Side of Track	Dist to Near Track	Project Vibration Level[1]	Vibration Impact Criterion	# of Impacts
Balsa Ave	SB	20	97	80	19
Total:					19

Notes:

1. Vibration levels are measured in VdB referenced to 1 μin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: HMMH, 2008.

Balsa Avenue, Barstow – There is a single-family residential community on the north side of the proposed alignment. The vibration impacts at this location are due to the very close proximity of the residences to the alignment.

Segment 2, Alternative B

Operational Period Noise: A summary of the projected noise impacts for Segment 2, Alternative A is shown in Tables 3.12-12 and 3.12-13 for the EMU and DEMU vehicles, respectively. A brief discussion of each area projected to have noise impact follows the tables. Except where noted, all impacts in Tables 3.12-12 and 3.12-13 are located in Barstow.

Table 3.12-12 Noise Impacts for Segment 2, Alternative B – EMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Lenwood Rd	SB	240	53	56	54	60	Impact	57	4.6	1	0
Rt-58	NB	170-260	53	55-58	54	60	Impact	57-59	4.2-6.3	5	0
Rt-58	SB	170-290	53	54-58	54	60	Impact	57-59	3.8-6.3	6	0
Waterman Rd	NB	290	53	54	54	60	Impact	57	3.8	6	0
Waterman Rd	SB	70-290	53	54-64	54	60	Impact/ Severe	57-64	3.8-11.3	20	6
Radio Rd	SB	100-220	53	56-62	54	60	Impact/ Severe	58-62	5-9.2	7	1
Poplar St	SB	120	53	60	54	60	Severe	61	8.2	0	1
Soapmine Rd	NB	90	53	62	54	60	Severe	63	9.8	0	2
Soapmine Rd	SB	100-180	53	55-62	54	60	Impact/ Severe	57-62	3.9-9.2	2	2
Balsa Ave	SB	20-170	53	55-71	54	60	Impact/ Severe	57-71	3.9-17.9	10	19
I-15, Yermo	SB	15-130	63	60-72	60	65	Impact/ Severe	65-73	1.7-9.7	3	4
Total:										60	35

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Table 3.12-13 Noise Impacts for Segment 2, Alternative B – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Agate Rd	NB	350	53	55	54	60	Impact	57	4.4	5	0
Lenwood Rd	SB	240-420	53	54-58	54	60	Impact	57-59	3.6-6.3	5	0
Rt-58	NB	170-360	53	55-60	54	60	Impact/ Severe	57-61	4.3-8.2	4	3
Rt-58	SB	170-290	53	57-60	54	60	Impact/ Severe	58-61	5.3-8.2	3	3
Waterman Rd	NB	290-420	53	54-57	54	60	Impact	57-58	3.6-5.3	14	0
Waterman Rd	SB	70-420	53	54-66	54	60	Impact/ Severe	57-66	3.6-13.6	20	8
Radio Rd	SB	100-370	53	55-64	54	60	Impact/ Severe	57-64	4.2-11.4	10	3
Poplar St	SB	120-360	53	55-63	54	60	Impact/ Severe	57-63	4.3-10.3	1	1
Soapmine Rd	NB	90-370	53	55-65	54	60	Impact/ Severe	57-65	4.2-12	3	2
Soapmine Rd	SB	100-180	53	55-64	54	60	Impact/ Severe	57-64	4.2-11.4	2	2
Balsa Ave	SB	20-170	53	55-74	54	60	Impact/ Severe	57-74	4.2-20.3	10	19
I-15, Yermo	SB	15-150	63	61-75	60	65	Impact/ Severe	65-75	2.2-11.9	6	5
Total:										83	46

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Agate Road - There are a few scattered single family residences on Agate Road, south of the Mojave River. The noise impacts are due to the low existing noise levels and the higher noise levels generated by the DEMU vehicle..

Lenwood Road - There are a few scattered single family residences on Lenwood Road, north of the Mojave River. The noise impacts are due to the low existing noise levels.

Route 58 -There are several scattered single-family residences near Route 58 on the south side of the alignment near Carbine Road, and on the north side of the alignment on Old

CA 58. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Waterman Road – There is a single-family residential community on both the north and south sides of the proposed alignment along Waterman Road. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Radio Road - There is a single-family residential community on the north side of the proposed alignment along Radio Road. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Poplar Street - There are several scattered single-family residences to the north of the alignment along Poplar Street. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Soapmine Road - There are a number of single-family residences near Soapmine Road on both the north and south sides of the alignment. The noise impacts are due to the low existing noise levels and the proximity of the alignment to the residences.

Balsa Avenue - There is a single-family residential neighborhood on the north side of the alignment on Balsa Ave. The noise impacts are due to the low existing noise levels and the close proximity of the alignment to the residences. Because the distance from the proposed alignment to these residences is less than 27 feet, there is also the potential for surprise effects from high-speed rail activities.

I-15, Yermo - There are scattered single-family residences to the north of the alignment along I-15. The noise impacts are due to the close proximity of the alignment to the residences. Because the distance from the proposed alignment to these residences is less than 27 feet, there is also the potential for surprise effects from high-speed rail activities.

Operational Period Vibration: A summary of the projected vibration impacts for Segment 2, Alternative B is shown in Table 3.12-14. A brief discussion of each area projected to have vibration impact follows the table.

Table 3.12-14 Vibration Impacts for Segment 2, Alternative B

Location	Side of Track	Dist to Near Track	Project Vibration Level[1]	Vibration Impact Criterion	# of Impacts
Balsa Ave, Barstow	SB	20	97	80	19
I-15, Yermo	SB	15-50	81-103	80	4
Total:					23

For an explanation of the notes, refer to Table 3.12-11.

Source: HMMH, 2008.

Balsa Avenue, Barstow – There is a single-family residential community on the north side of the proposed alignment. The vibration impacts at this location are due to the very close proximity of the residences to the alignment.

I-15, Yermo – There are several scattered single-family residences to the north of I-15 and the proposed alignment Yermo between Fort Irwin Rd. and Ghost Town Rd. The vibration impacts are due to the close proximity of the residences to the alignment.

Segment 3

Between Zzyzx Road and Nipton Road, the Mojave National Preserve is located to the south of the I-15 freeway. In addition, between Cima Road and Mountain Pass, the Clark Mountain area of the Preserve is located approximately one half-mile to the north of the freeway. The noise generated by both technology options would be comparable to that of a semi truck traveling at full speed on the highway. The additional audible noise in the Preserve to the south of the I-15 would be comparable to adding approximately 60 total daily trucks to existing highway traffic (comparable to just over two additional trucks per hour). The noise generated by the high speed rail would affect approximately the same area of the Preserve as the highway along this section.

Segment 4

Along Segment 4A, which would encroach into the Preserve for a distance of 1.55 miles, the additional audible noise in the Preserve would also be comparable to adding approximately 60 total daily trucks to existing highway traffic (comparable to just over two additional trucks per hour). The noise generated by the high speed rail would affect approximately the same area of the Preserve as the highway along this section.

Segment 4B would diverge to the north of the freeway through the Clark Mountains and would pass within approximately ½ mile of the edge of the Preserve. Depending on the ambient noise levels in the Preserve (assuming that they are very low) and the terrain, the high speed trains may be audible up to ½ mile into the Preserve for approximately 60 events per day. The noise from the high speed trains would be significantly lower in level and shorter in duration than the UP trains in the portion of the preserve south of the I-15 freeway, as they are significantly shorter and moving at much higher rates of speed.

Segment 5

There are no noise or vibration impacts projected for this segment.

Segment 6, Alternative A

Operational Period Noise: A summary of the projected noise impacts for Segment 6, Alternative A is shown in Table 3.12-15 for the DEMU vehicle. There are no noise impacts projected for Segment 6, Alternative A for the EMU vehicle. A brief discussion of each area projected to have noise impact follows the tables.

Table 3.12-15 Noise Impacts for Segment 6, Alternative A – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Saffredi Ln	SB	150	66	61	61	66	Impact	67	1.3	5	0
Deluna St	SB	140	66	62	61	66	Impact	67	1.5	12	0
Total:										17	0

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Saffredi Lane – There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment and the higher noise levels generated by the DEMU vehicle.

Deluna Street - There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment and the higher noise levels generated by the DEMU vehicle.

Operational Period Vibration: There are no vibration impacts projected for Segment 6, Alternative A.

Segment 6, Alternative B

Operational Period Noise: A summary of the projected noise impacts for Segment 6, Alternative B is shown in Tables 3.12-16 and 3.12-17 for the EMU and DEMU vehicles, respectively. A brief discussion of each area projected to have noise impact follows the tables.

Table 3.12-16 Noise Impacts for Segment 6, Alternative B – EMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Saffredi Ln	SB	50-70	66	64-66	61	66	Impact	68-69	2.2-3.2	11	0
Deluna St	SB	40-60	66	65-67	61	66	Impact/ Severe	68-70	2.6-4	11	12
Total:										22	12

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Table 3.12-17 Noise Impacts for Segment 6, Alternative B – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Saffredi Ln	SB	50-70	66	66-68	61	66	Severe	69-70	3.3-4.6	0	11
Deluna St	SB	40-60	66	67-70	61	66	Severe	70-71	3.9-5.5	0	23
Tremezzo Bay St	SB	120	66	63	61	66	Impact	67	1.8	6	0
Dean Martin Dr/W. Ali Baba Ln	SB	120	66	63	61	66	Impact	67	1.8	1	0
Total:										7	34

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Saffredi Lane – There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment.

Deluna Street - There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment.

Tremezzo Bay Street - There is a single-family residential development to the west of I-15 in this area. The noise impacts at this location are due to the close proximity of the residences to the proposed alignment and the higher noise levels generated by the DEMU vehicle.

Dean Martin Drive/West Ali Baba Lane - There a hotel located at the corner of this intersection. The noise impact at this location is due to the close proximity of the hotel to the proposed alignment and the higher noise levels generated by the DEMU vehicle.

Operational Period Vibration*:* There are no vibration impacts projected for Segment 6, Alternative B.

Segment 6, Option C

There are no noise or vibration impacts projected for Segment 6, Option C.

Segment 7, Alternative A

There are no noise or vibration impacts projected for Segment 7, Alternative A.

Segment 7, Alternative B

Operational Period Noise: A summary of the projected noise impacts for Segment 7, Alternative B is shown in Tables 3.12-18 and 3.12-19 for the EMU and DEMU vehicles, respectively. A brief discussion of each area projected to have noise impact follows the tables.

Table 3.12-18 Noise Impacts for Segment 7, Alternative B – EMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Loch Lomond Way	SB	20-40	69	67-70	64	69	Impact/ Severe	71-73	2.2-3.5	2	19
Total:										2	19

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Table 3.12-19 Noise Impacts for Segment 7, Alternative B – DEMU

Location	Side of Track	Dist to Near Track	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Increase in Noise Level[1]	# of Impacts	
				Pred. [2]	Impact Criteria						
					Imp	Sev				Imp	Sev
Loch Lomond Way	SB	20-90	69	65-73	64	69	Impact/ Severe	71-74	1.3-5	1	21
Total:										1	21

For an explanation of the notes, refer to Table 3.12-7.

Source: HMMH, 2008.

Loch Lomond Way – There is a single-family residential community to the west of I-15 and the proposed alignment in this area. The noise impacts are due to the very close proximity of the residences to the proposed alignment. Because the distance from the proposed alignment to these residences is less than 27 feet, there is also the potential for surprise effects from high-speed rail activities.

Operational Period Vibration: A summary of the projected vibration impacts for Segment 7, Alternative B is shown in Table 3.12-20. A brief discussion of each area projected to have vibration impact follows the table.

Table 3.12-20 Vibration Impacts for Segment 7, Alternative B

Location	Side of Track	Dist to Near Track	Project Vibration Level[1]	Vibration Impact Criterion	# of Impacts
Loch Lomond Way	SB	20	88	80	19
Total:					19

For an explanation of the notes, refer to Table 3.12-11.

Source: HMMH, 2008.

Loch Lomond Way – There is a single-family residential community to the west of I-15 and the proposed alignment in this area. The vibration impacts are due to the very close proximity of the residences to the proposed alignment.

Segment 7, Option C

There are no noise or vibration impacts projected for Segment 7, Option C.

3.12.7 Mitigation Measures

3.12.7.1 Noise

Potential mitigation measures for reducing noise impacts from high-speed rail operations are described below.

- Noise Barriers - This is a common approach to reducing noise impacts from surface transportation sources. The primary requirements for an effective noise barrier are that (1) the barrier must be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) the barrier must be of an impervious material with a minimum surface density of 4 lb/sq. ft. and (3) the barrier must not have any gaps or holes between the panels or at the bottom. Because numerous materials meet these requirements, the selection of materials for noise barriers is usually dictated by aesthetics, durability, cost and maintenance considerations. Depending on the proximity of the barrier to the tracks and on the track elevation, noise barriers typically range in height from between four and ten feet.

- Relocation of Crossovers or Special Trackwork at Crossovers - Because the impacts of wheels over rail gaps at track crossover locations, or turn-outs for passing tracks, increases vibration by about 6 dBA, crossovers are a major source of vibration noise impact when they are located in sensitive areas. If crossovers cannot be relocated away from residential areas, another approach is to use spring-rail or moveable point frogs in place of standard rigid frogs at turnouts. These devices allow the flangeway gap to remain closed in the main traffic direction for revenue service trains.

- Building Sound Insulation - Sound insulation to improve the outdoor-to-indoor noise reduction has been widely applied around airports and has seen limited application for rail projects. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where noise barriers are not feasible or desirable, and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can often be achieved by adding an extra layer of glazing to the windows, by sealing any holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air-conditioning so that windows do not need to be opened.

- Property Acquisitions or Easements – Additional options for avoiding noise impacts are for the agency to purchase residences likely to be impacted by train operations or to acquire easements for such residences by paying the homeowners to accept the future train noise conditions. These approaches are usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

As discussed above, FRA requires that severe impacts be mitigated unless there are no practical means to do so. While mitigation is encouraged at the impact level, the implementation of such mitigation will depend on other project-specific factors. These other factors can include the projected increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-to-indoor sound insulation and the cost-effectiveness of mitigating noise to more acceptable levels.

Based on the results of the noise assessment, potential mitigation locations have been identified based on the FRA noise criteria. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. However, in many of the locations along the corridor, especially in the Barstow area, the residences with noise impact are scattered, and mitigation by noise barriers would be impractical. At these locations, sound insulation or property acquisitions or easements would be the only ways to mitigate the noise impacts.

Table 3.12-21 indicates the approximate locations and side of track for noise mitigation, as well as the civil stations and the length of mitigation required for the DEMU vehicle. Table 3.12-22 provides the same information for the EMU vehicle. The noise mitigation locations in Tables 3.12-21 and 3.12-22 are preliminary only, and will be refined based on a more complete noise analysis with more detailed engineering information. The locations in Tables 3.12-21 and 3.12-22 represent areas where noise barriers would be effective at mitigating noise from high-speed rail operations. Figures 3.12-11 and 3.12-12 show the approximate locations of the noise mitigation measures identified in Tables 3.12-21 and 3.12-22.

Table 3.12-21 Potential Noise Mitigation Locations, DEMU

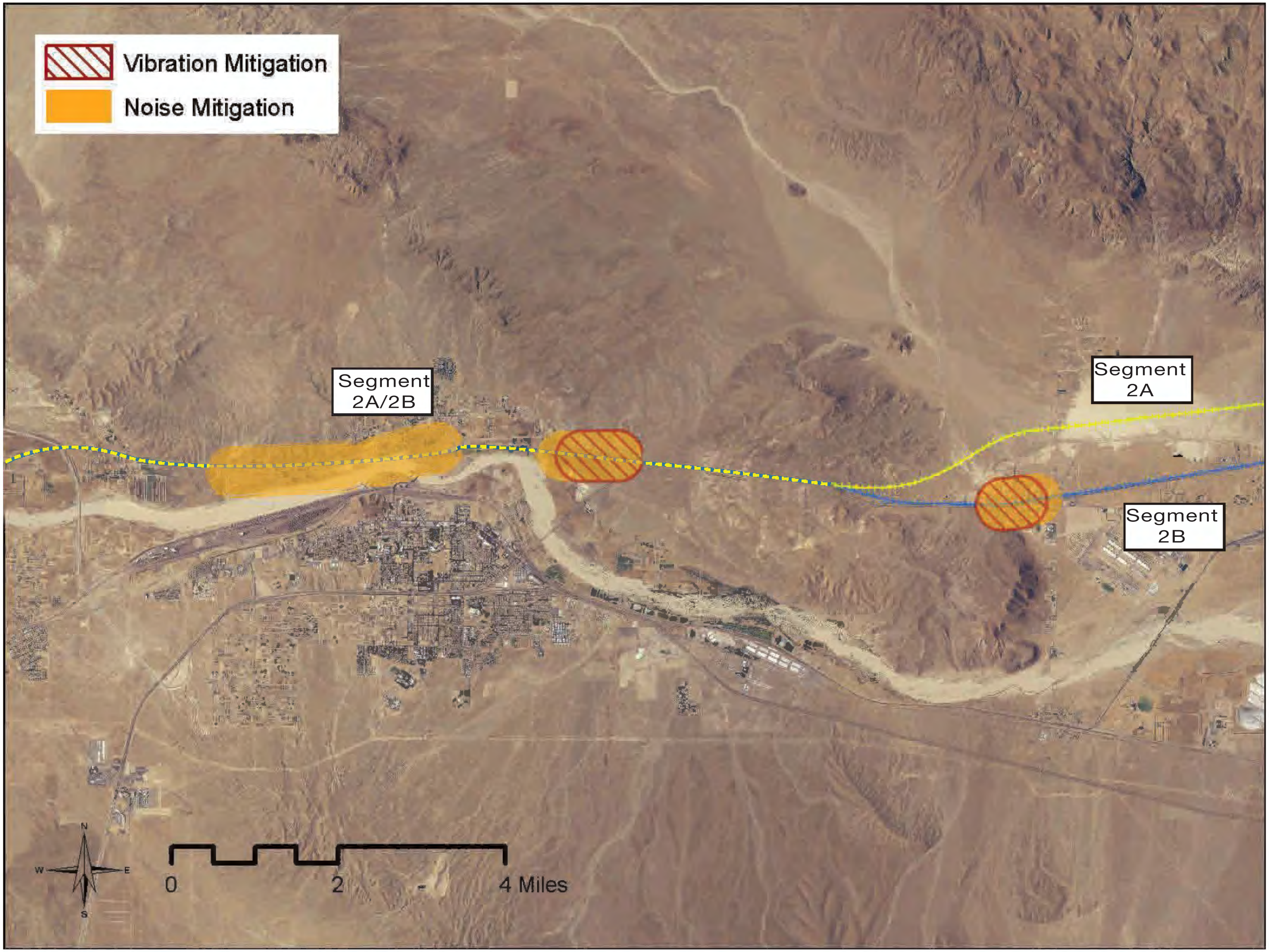
Location	Side of Track	Align Alt	Civil Station	Length (ft)
Waterman Road	SB	2A,2B	1882 – 1952	7,000
Waterman Road	NB	2A,2B	1897 – 1943	4,600
Radio Road	SB	2A,2B	1973 – 2012	3,900
Soapmine Road/Balsa Ave	NB	2A,2B	2093 – 2105	1,300
Soapmine Road/Balsa Ave	SB	2A,2B	2093 – 2125	3,200
I-15 Yermo	SB	2B	2374 – 2395	2,100
Saffredi Ln/Deluna St	SB	6A	9469 – 9531	6,200
Saffredi Ln/Deluna St/Tremezzo Bay St	SB	6B	9469 – 9548	7,900
Loch Lomond Way	SB	7B	10106 - 10131	2,500

Source: HMMH 2008

Table 3.12-22 Potential Noise Mitigation Locations, EMU

Location	**Side of Track**	**Align Alt**	**Civil Station**	**Length (ft)**
Waterman Road	SB	2A,2B	1882 – 1952	7,000
Waterman Road	NB	2A,2B	1897 – 1911	1,400
Radio Road	SB	2A,2B	1985 – 2012	2,700
Soapmine Road/Balsa Ave	NB	2A,2B	2096 – 2105	900
Soapmine Road/Balsa Ave	SB	2A,2B	2093 – 2125	3,200
I-15 Yermo	SB	2B	2374 – 2395	2,100
Saffredi Ln/Deluna St	SB	6B	9469 – 9531	6,200
Loch Lomond Way	SB	7B	10106 - 10131	2,500

Source: HMMH 2008



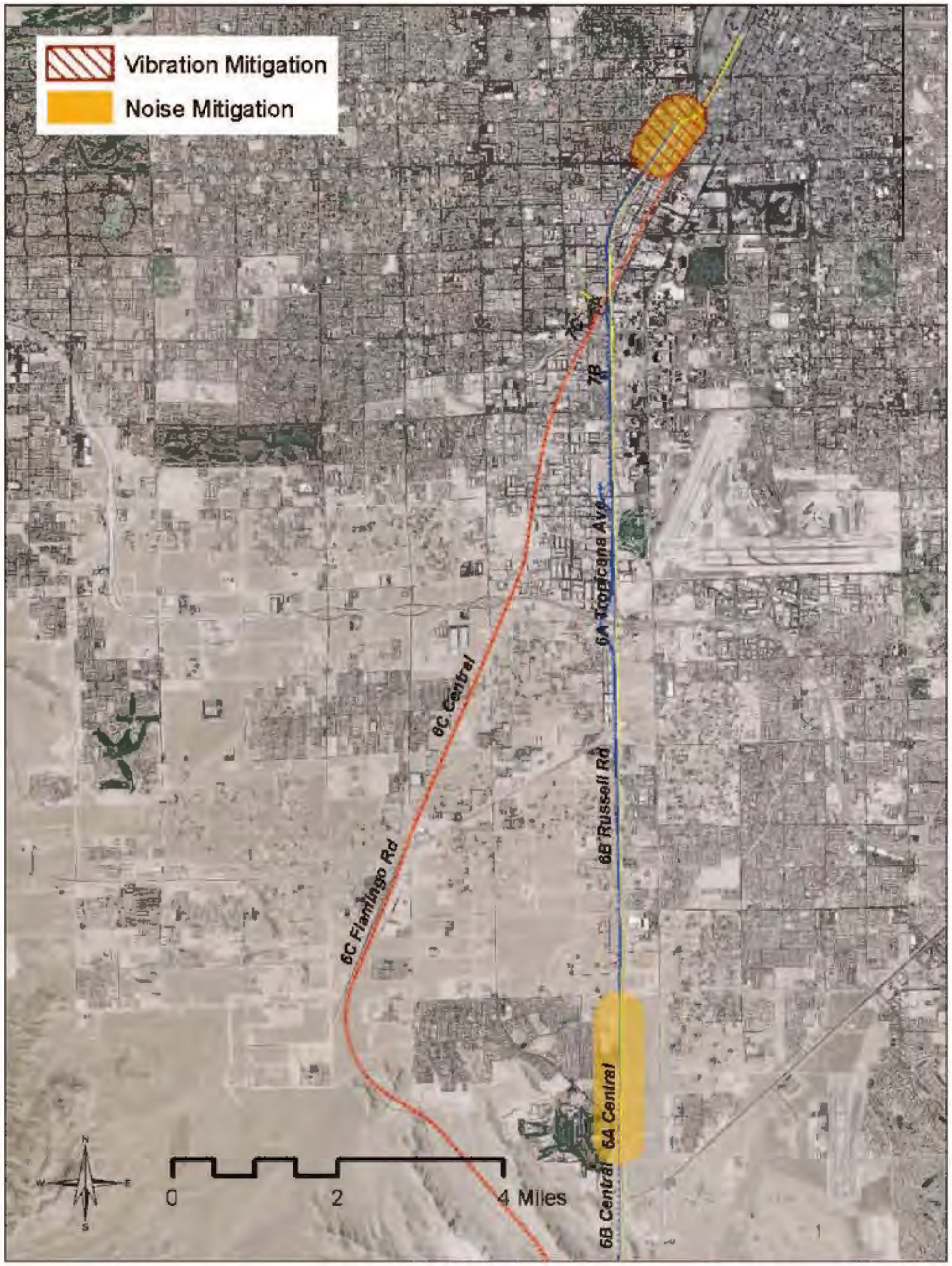
U.S. Department of Transportation
Federal Railroad Administration

DesertXpress Project EIS

Noise and Vibration Mitigation Locations, Barstow Area

FIG 3-12.11

Source: HMMH, 2008.



U.S. Department of Transportation
Federal Railroad Administration

DesertXpress Project EIS

Noise and Vibration Mitigation Locations, Las Vegas Area

FIG 3-12.12

Source: HMMH, 2008.

3.12.7.2 Vibration

The assessment assumes that the vehicle wheels and track are maintained in good condition with regular wheel truing and rail grinding. Beyond this, there are several approaches to reduce ground-borne vibration from high-speed rail operations, as described below.

- Ballast Mats - A ballast mat consists of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties and rail on top. The reduction in ground-borne vibration provided by a ballast mat is strongly dependent on the frequency content of the vibration and design and support of the mat.

- Resilient Rail Fasteners – Resilient fasteners can be used to provide vibration isolation between rails and concrete slabs for direct fixation track on aerial structures or in tunnels. These fasteners include a soft, resilient element to provide greater vibration isolation than standard rail fasteners in the vertical direction.

- Relocation of Crossovers or Special Trackwork - Because the impacts of wheels over rail gaps at track crossover locations, or turn-outs for passing tracks, increases vibration by about 10 dBA, crossovers are a major source of vibration impact when they are located in sensitive areas. If crossovers cannot be relocated away from residential areas, another approach is to use spring-rail or moveable point frogs in place of standard rigid frogs at turnouts. These devices allow the flangeway gap to remain closed in the main traffic direction for revenue service trains.

- Floating Slabs - Floating slabs consist of thick concrete slabs supported by resilient pads on a concrete foundation; the tracks are mounted on top of the floating slab. Most successful floating slab installations are in subways, and their use for at-grade track is rare. Although floating slabs are designed to provide vibration reduction at lower frequencies than ballast mats, they are extremely expensive.

- Property Acquisitions or Easements – Additional options for avoiding vibration impacts are for the agency to purchase residences likely to be impacted by train operations or to acquire easements for such residences by paying the homeowners to accept the future train vibration conditions. These approaches are usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

Vibration impacts that exceed FRA criteria are considered to be significant and to warrant mitigation, if reasonable and feasible. Table 3.12-23 indicates the locations along the corridor where mitigation has been recommended to reduce the vibration levels.

At a minimum, mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FRA vibration impact criterion. Vibration mitigation will be addressed in more detail during final design. The vibration mitigation locations in Table 3.12-23 are preliminary only, and will be refined based on a more complete vibration analysis with more detailed engineering information. Figures 3.12-11 and 3.12-12 show the approximate locations of the vibration mitigation measures identified in Table 3.12-23.

Table 3.12-23 Potential Vibration Mitigation Locations

Location	Alignment Alternative	Side of Track	Civil Station	Length (ft)
Balsa Avenue	2A,2B	SB	2105 – 2125	2,000
I-15, Yermo	2B	SB	2374 – 2386	1,200
Loch Lomond Way	7B	SB	10106 - 10131	2,500

Source: HMMH 2008

3.12.7.3 Construction

Temporary noise during construction of the new tracks and the stations has the potential of being intrusive to residents near the construction sites. Most of the construction would consist of site preparation and laying new track, and would only occur during daytime hours.

Construction activities will be carried out in compliance with all applicable local noise regulations. In addition, specific residential property line noise limits will be developed during final design and included in the construction specifications for the project, and noise monitoring will be performed during construction to verify compliance with the limits. This approach allows the contractor flexibility to meet the noise limits in the most efficient and cost-effective manner. Noise control measures that will be applied as needed to meet the noise limits include the following:

- Avoiding nighttime construction in residential neighborhoods.
- Using specially quieted equipment with enclosed engines and/or high-performance mufflers.
- Locating stationary construction equipment as far as possible from noise-sensitive sites.
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.
- Re-routing construction-related truck traffic along roadways that will cause the least disturbance to residents.
- Avoiding impact pile driving near noise-sensitive areas, where possible. Drilled piles or the use of a sonic or vibratory pile driver are quieter alternatives where the geological conditions permit their use. If impact pile drivers must be used, their use will be limited to the periods between 8:00 AM and 5:00 PM on weekdays.

With the incorporation of the appropriate noise mitigation measures, impacts from construction-generated noise should not be significant. To provide added assurance, a complaint resolution procedure should also be put in place to rapidly address any noise problems that may develop during construction.

Construction activities that could cause intrusive vibration include vibratory compaction, jackhammers, and use of tracked vehicles such as bulldozers. The most serious sources of construction vibration are blasting and pile driving. There will be no blasting for this project and only limited, if any, pile driving. Avoiding vibration impacts during construction can be achieved through numeric limits in the construction specifications.

3.13 ENERGY

This section analyzes the potential impact of the action alternatives on energy resources, both on an overall energy budget basis, as well as, on an electricity resources basis. In addition, this section analyzes the energy implications of the two proposed propulsion technologies (i.e., diesel-electric multiple unit train (DEMU) and electric multiple unit train (EMU)).

3.13.1 REGULATIONS AND STANDARDS

3.13.1.1 Federal Regulations

Executive Order 12185

Enacted in 1979 by President Carter, Executive Order 12185 encourages additional conservation of petroleum and natural gas by recipients of Federal financial assistance, such as through the Federal Railroad Administration (FRA). While the DesertXpress project would not require Federal financial assistance, the FRA is the lead Federal agency for the National Environmental Protection Act (NEPA).

3.13.1.2 California Regulations

California Code of Regulations, Title 24, Part 6, Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations, Energy Efficiency Standards, promotes efficient energy use in new buildings constructed in California. The standards regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The standards are enforced through the local building permit process. These standards would apply to structures, such as the Victorville Station, that would be built in California, as part of the action alternative.

California Renewables Portfolio Standard (RPS) Program

Originally established by California Senate Bill 1078, and accelerated by Senate Bill 107, the California Renewables Portfolio Standard (RPS) Program requires that each electrical corporation procure at least 20 percent of its retail sales energy requirement from eligible renewable energy resources by 2010. The California RPS Program could have a positive influence on the future energy consumption of electricity supplied in California for the EMU technology option.

Assembly Bill 1585

Assembly Bill 1585 directed the California Energy Commission (CEC) to prepare an evaluation of the impacts of the 33 percent goal. The Governor, the CEC, and the California Public Utilities Commission (CPUC) have endorsed an enhanced target of 33 percent renewables by 2020.[1] This goal would further the renewable resources available to DesertXpress in the future for the EMU technology option.

3.13.1.3 Nevada Regulations

Nevada Renewable Portfolio Standard (Assembly Bill 03)

Assembly Bill 03 requires 20 percent of sales be from renewable energy sources by 2015. Similar to the California program, this standard would further reduce any non-renewable energy consumption for electricity supplied in Nevada to the EMU technology option.

3.13.2 METHODS OF EVALUATION OF IMPACTS

This evaluation of energy supply and demand compares potential energy use for passenger travel related to the action alternatives and No Action Alternative. The evaluation is framed by the NEPA criteria provided by FRA and STB, and are listed below.

The Energy Section is divided into discussions of the No Action Alternative and the action alternatives, respectively. We include three topics in each discussion: 1) overall energy consumption, 2) peak-period electricity demand (if applicable), and 3) construction-related energy consumption. The topics are divided into direct effects (overall energy consumption and electricity demand) and indirect effects (construction-related energy consumption). Construction-related energy consumption is an irretrievable commitment of energy resources. As there are two technology alternatives for train propulsion under consideration (DEMU and EMU), two separate analyses of overall energy consumption were conducted. A calculation of peak-period electricity demand was only conducted for EMU since it is the only technology alternative that requires electricity.

Whereas, other sections in this document discuss environmental consequences on a segment-by-segment basis, any discussion of energy consequences does not lend itself to such a format. Therefore, the environmental consequences and mitigation measures are discussed on a project-wide basis.

3.13.2.1 Impact Criteria and Agency Guidance

Federal Railroad Administration

FRA's NEPA guidance requires the Environmental Impact Statement (EIS) to assess irreversible or irretrievable commitments of energy resources likely to be involved in each alternative and any potential energy conservation, especially those alternatives likely to reduce the use of petroleum or natural gas, consistent with the policy outlined in

[1] CEC, 2007.

Executive Order 12185.[2]

Surface Transportation Board

STB's NEPA guidance requires the EIS to 1) describe the effect of the action alternatives on transportation of energy resources; 2) describe the effect of the action alternatives on recyclable commodities; 3) state whether the action alternatives will result in an increase or decrease in overall energy efficiency and explain why; 4) if the action alternatives will cause diversions from rail to motor carriage of more than: a) 1,000 rail carloads a year; or b) an average of 50 rail carloads per mile per year for any part of the affected line, quantify the resulting net change in energy consumption and show the data and methodology used to arrive at the figure given.[3] Item 3 is applicable to DesertXpress and is discussed below.

3.13.2.2 Direct Energy

Direct energy use is the energy consumed in the actual propulsion of a vehicle using the facility. Direct energy usage accounts for more than half of the total energy used when analyzed in terms of the life of a project.

The analysis of transportation energy focuses on two aspects of energy consumption. The first is the overall energy consumption differences between the No Action Alternative and the action alternatives, considering the sum of direct fossil fuel consumption and electricity. The analysis identifies if the action alternatives will consume more or less energy, regardless of the source, compared to the no action.[4]

The second operational analysis will focus specifically on electricity consumption by the EMU. Electricity consumption gets special attention because of the special nature of electricity, specifically its nonstorability.

Overall Operational Energy Consumption

Overall operational energy consumption by the alternatives involves potential energy use by the operation of vehicles (automobiles and trains). The potential direct impact on overall transportation-related energy supply was evaluated both quantitatively and qualitatively.

The quantitative analysis focused on the direct relationship between projected vehicle miles traveled (VMT) and the intensity of energy use by each passenger transportation mode in order to estimate the magnitude and direction of the potential change in total energy consumption between the No Action Alternative and the action alternatives with

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[2] USDOT, 1999a.

[3] USDOT, 2003.

[4] Alternative A, Alternative B, and Option C would result in the same energy consumption.

DEMU and EMU technology. Automobile traffic data prepared by DMJM/Aecom in 2008 was used for existing and future VMT.[5] Train VMT and operations were provided by the applicant in 2007 and supplemented in 2008.[6] These data sources are included in Appendices C and E respectively. The VMT fuel consumption method was used as outlined in Federal Transit Administration (FTA) Technical Guidance, Section 5309, New Starts Criteria, to estimate energy consumption by relevant mode for the existing environment and each alternative (future No Action Alternative and action alternatives).[7] The method involves estimating VMT and multiplying the estimate by energy consumption factors.

The energy consumption factors for autos were obtained from the *Transportation Energy Data Book: Edition 27*, which bases its estimates on national averages for road, traffic, and weather conditions and are intended for general comparisons.[8] The energy consumption factors for the propulsion technology alternatives (DEMU and EMU) are based on information supplied by the project sponsor from the train manufacturers. The DEMU option is powered by a diesel engine, the EMU option by electricity. The electricity consumption, itself, is the quantity of electricity—measured in watt-hours (Wh)[9], a unit of energy consumption—that the option uses per year, which is translated into British Thermal Units (BTUs)[10] and barrels of oil for the purposes of comparing the overall energy use in the corridor with and without the action alternatives.

[5] See Appendix E, Traffic Study, DMJM 2008.

[6] DesertXpress 2007 and 2008.

[7] USDOT, 1999b.

[8] USDOE, 2008c.

[9] There are 1,000 Wh in a kWh; 1,000,000 Wh in a MWh.

[10] The quantity of heat required to raise the temperature of one pound of water one degree of Fahrenheit at or near 39.2 degrees Fahrenheit (U.S. EPA 2000). BTUs are the standard units used by industry and government literature for such comparisons.

Table 3.13-1: Direct Energy Consumption Factors

Mode	Factor[c]
Passenger vehicles[a]	5,514 BTUs/VMT
DEMU[b]	408,779 BTUs/TMT
EMU[b]	569,163 BTUs/TMT

Source: Jones and Stokes, 2008.

BTUs = British thermal units.

TMT = Train-mile traveled.

Notes:

a USDOT 2008c.

b The values in this table are on a per-train-mile basis, converted from the annual energy consumption values that this source provided using the planned mileage in the planned operating schedule. The values were also adjusted to reflect the planned 2030 operating schedule (from the planned 2027 operating schedule, as provided by the source (DesertXpress 2007).

c The conversion from diesel fuel consumption to heat content (BTUs) is 130,500 BTUs/gallon (bioenergy.ornl.gov/papers/misc/energy_conv.html). The conversion from electricity consumption (kWh) to heat content (BTU) for EMU is 10,812 BTUs/ kWh, accounts for generation, transmission and distribution losses. Calculated from generation loss factor of 9,919 BTUs/kWh for petroleum generation and a T&D loss factor of 1.07 (USDOE 2008c).

Overall direct energy, measured in BTUs, was converted to equivalent barrels of crude oil to represent potential energy impact and/or savings. Annual direct-energy consumption values were calculated for existing conditions (2007), the No Action Alternative, and action alternatives or both DEMU and EMU propulsion options.

The impact that the changes in level of service would have on the overall direct energy consumption were assessed qualitatively; congestion and travel speeds have a substantial impact on fuel efficiency and, therefore, energy use.

Electricity Demand

Electricity demand—measured in watts [11], a unit of power (energy used per unit of time)—is the rate of electricity consumption, which varies with time and is usually integrated over 1 hour. A single megawatt (MW) is enough power to meet the expected electricity needs of 1,000 typical California homes [12]; in Nevada, where average temperatures are more extreme, on average, than in California, 1 MW can serve 650 houses.[13] Peak demand on an electricity system denotes the highest rate of electricity use, which in the desert southwest typically occurs on a weekday in August between 3 p.m. and 5 p.m. High temperatures lead to increased use of air conditioning, which in combination with industrial loads,

[11] 1 megawatt (MW) = 1,000 kilowatts (kW) = 1,000,000 watts (W)

[12] California Energy Commission, 2003.

[13] Sierra Pacific Power Company, 2004.

commercial lighting, office equipment, and residential refrigeration, comprise the major consumers of electricity consumption in the peak-demand period.[14]

Peak-period electricity demand was determined using the annual EMU energy consumption and the operation plan developed as part of this EIS process by the project sponsor. The estimated EMU energy demand was compared to current estimates supply capacity within the relevant North American Electric Reliability Council Regions, which in this case are the 1) Rocky Mountain Power area, Arizona, New Mexico and Southern Nevada region and 2) the California region (see below).

3.13.2.3 Indirect Energy

Indirect energy is the energy needed to construct, operate and maintain a facility, manufacture and maintain vehicles using the facility. The primary indirect energy consumption for this analysis is the energy that would be used to construct the action alternative. Projected construction-related energy consumption refers to energy used for the construction of trackway and stations including the equipment used to construct trackway and stations. This method uses construction energy intensity factors[15] to calculate indirect energy, based on the number of trackmiles at- and above-grade (elevated), in addition to the number of stations. These estimates are appropriate for comparison purpose

Table 3.13-2: Construction-Related Energy Consumption Factors

Type of Facility	Rural Compared to Urban[g]	Factor (billions of BTUs)
Highway - At grade	Rural[a]	17.07/one-way lane mi
	Urban[b]	26.28/one-way lane mi
Highway - Elevated	Rural[a]	130.38/one-way lane mi
	Urban[b]	327.31/one-way lane mi
Railway - At grade	Rural[c]	12.29/one-way trackway mile
	Urban[d]	19.11/one-way trackway mile
Railway - Elevated	Rural[c]	55.46/one-way trackway mile
	Urban[d]	55.63/one-way trackway mile
Railway - Station	NA[e]	78[f]/station

[14] CEC, 2000.

[15] U.S. Congress, Budget Office 1977; U.S. Congress, Budget Office 1982

Source: U.S. Congress, Budget Office 1977; U.S. Congress, Budget Office 1982; and California State Department of Transportation 1983.

a Estimates reflect average roadway construction energy consumption.

b Estimates reflect range maximum for roadway construction energy consumption.

c Estimates reflect typical rail system construction energy consumption.

d Estimates reflect energy consumption for BART system construction as surrogate for DesertXpress construction through urban area.

e Discreet (i.e., non-alignment-related facilities) are not differentiated between rural or urban because the data used to develop the respective values were not differentiated as such. Some difference between the actual values might be expected.

f Value for construction of freight terminal. Used as proxy for DesertXpress station consumption factors.

g Differences between the construction-related energy consumption factors for urban and rural settings reflect differences in construction methods, demolition requirements, utility accommodation, etc.

Indirect Energy Payback

The indirect energy payback period measures the number of years that would be required to pay back the energy used in construction with operational energy consumption savings. The payback period is calculated by dividing the estimate of construction energy by the amount of energy that would later be saved by the action alternatives compared to the No Action Alternative condition. It is assumed that the amount of energy saved in the study year (2030) would remain constant throughout the payback period.

3.13.3 AFFECTED ENVIRONMENT

3.13.3.1 Regional Environment

Among U.S. states, California is ranked second in total energy consumption, behind Texas.[16] On a per-capita basis, however, California's energy consumption ranks 49th, nationally.[17] Of the overall energy consumed in the state, the transportation sector represents the largest proportion at 39 percent, followed by the industrial, commercial and residential sectors, at 24 percent, 19 percent, and 18 percent, respectively.[18]

Nevada's total energy consumption ranks 37th in the United States in terms of overall energy consumption,[19] and 38th on a per-capita basis.[20] Thirty three percent of Nevada's energy consumption is spent on transportation, followed by the industrial, residential, and commercial sectors, at 27 percent, 23 percent, and 17 percent, respectively.[21]

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[16] USDOE, 2005a.

[17] USDOE, 2005b.

[18] Calculated from USDOE, 2005a.

[19] USDOE 2005a

[20] USDOE 2005b

[21] Calculated from USDOE 2005a

Transportation Energy Consumption

In general, demand for transportation services (and, therefore, transportation-related energy use) mirrors growth in population and economic output. In California, the CEC uses historical trends coupled with current population and economic growth and gasoline price projections to estimate that on-road miles traveled will increase by 41 percent between 2003 and 2025—from 314 billion to 446 billion. Notwithstanding this large increase, the CEC predicts that in-state road transportation fuel gasoline usage is anticipated to remain steady at about 15 billion gallons of gasoline (315 million barrels of oil-equivalent) per year, as a result of the introduction of more fuel-efficient cars.[22] In-state Nevada gasoline fuel usage is much smaller, presently estimated to be just more than 1 billion gallons (25 million barrels of oil-equivalent). [23]

Automobile transportation in 2007 on I-15 within the limits of the project study area accounted for approximately 3.67 billion VMT and required 177,441,000 gallons of gasoline (3.7 million barrels of oil-equivalent) and noted in Table 3.13-4, below.

Automobiles are most efficient when operating at steady speeds of 35 to 45 mph with no stops.[24] Fuel consumption increases by about 30 percent when average speeds drop from 30 to 20 mph, while a drop from 30 mph to 10 mph results in a 100 percent increase in fuel use with conventional automobile engines. Studies estimate that approximately 10 percent of all on-road fuel consumed is a result of congestion.[25]

Electricity Demand

The California portion of the action alternatives is located in the 50,000 square-mile service area of Southern California Edison (SCE), a large publicly-owned utility (POU) that serves 13 million people at a peak demand of 23,303 MW in 2007.[26] In addition to operating its own electricity generation plants, SCE procures energy from energy wholesalers through the CAISO. The Nevada portion of the action alternatives is located in the 4,500 square-mile service area of Nevada Power, also a POU, which serves 807,000 customers[27] at a peak load of 5,866 MW in 2007. Both utilities buy electricity on the market; in other words, neither generates its entire electricity load, itself. For example, Nevada Power purchased 37 percent of its total system energy need from the wholesale

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22 CEC 2005a

23 Calculated based on Nevada per-capita gasoline production from data from U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (USDOE 2008e) and Nevada's 2006 population count (U.S. Census Bureau 2000)

24 U.S. Department of Energy, 2006.

25 CEC 1990

26 SCE, 2008a, b.

27 Nevada Power, 2008.

market in 2007.[28]

Because the action alternatives would cross service area boundaries in addition to state borders, it is more appropriate to analyze the DesertXpress project's anticipated energy in relation to total existing and forecasted regional electricity generating capacity, rather than to restrict the analysis to the specific utility generating resources, themselves.

The National Energy Modeling System

The National Energy Modeling System (NEMS) is a computer-based, energy-economy modeling system of U.S. energy markets for the midterm period through 2025. Developed by the U.S. Department of Energy's Energy Information Administration (EIA), NEMS is used to project the production, imports, conversion, consumption, and prices of energy, subject to assumptions on macroeconomic and financial factors, world energy markets, resource availability and costs, behavioral and technological choice criteria, cost and performance characteristics of energy technologies, and demographics.

NEMS balances energy supply and demand, accounting for economic competition among the various energy fuels and sources. The time horizon of NEMS is the long-term period through 2030, approximately 25 years into the future. In order to represent regional differences in energy markets, the component modules of NEMS function at the regional level. For electricity the component modules are the regions and subregions used by the North American Electric Reliability Council regions electricity. Figure 3-13.1 illustrates these regions, called Electricity Market Modular (EMM) Regions: Southern Nevada is part of Region 12 (Rocky Mountain Power area, Arizona, New Mexico and Southern Nevada (RMPA-NMSN), and California is a region unto itself (Region 13).

Table 3.13-3 provides electricity supply and demand data and projections for selected years regarding EMM Regions 12 and 13.

Table 3.13-3: EMM Regional Data and Projections, Regions 12 and 13

Total Capacity (GW)[a]	2005	2010	2013	2020	2030
Region 12	49.30	56.92	58.96	64.39	77.81
Region 13	63.46	67.98	68.65	74.19	85.94

Source: USDOE 2008b.

[a] Net summer capacity is the steady hourly output that generating equipment is expected to supply to system load as demonstrated by tests during summer peak load. Includes small power producers and exempt wholesale generators.

[28] Sierra Pacific Resources, 2008.

1. East Central Area Reliability Coordination Agreement (ECAR)
2. Electric Reliability council of Texas (ERCOT)
3. Mid-Atlantic Area Council (MAAC)
4. Mid-America Interconnected Network (MAPP)
6. New York (NY)
7. New England (NE)
8. Florida Reliability Coordinating Council (FL)
9. Southeastern Electric Reliability Council (SERC)
10. Southwest Power Pool (SPP)
11. Northwest Power Pool (NPP)
12. Rocky Mountain Power Area, Arizona, New Mexico, and Southern Nevada (RA)
13. California (CA)

U.S. Department of Transportation
Federal Railroad Administration

DesertXpress
Project EIS

Electricity Market Modular Regions

FIG 3.13-1

Source: Energy Information Administration. Office of Integrated Analysis and Forecasting.

3.13.4 Environmental Consequences

3.13.4.1 No Action Alternative

Direct Effects

Overall Operational Energy Consumption: Passenger trips taken in the I-15 project corridor between Victorville and Las Vegas resulted in approximately 3.67 billion automobile VMT in 2007. As indicated in Table 3.13-4, these trips used about 20,246,000 million BTUs (MMBTUs), or about 3.7 million barrels of oil. By 2030, under No Action conditions, passenger trips in the study corridor would consume about 41,000,000 MMBTUs, or the equivalent of about 7.5 million barrels of oil. This is an increase of about 20,754,000 MMBTUs, or 3.8 million barrels of oil, over 2007 conditions. This is a conservative estimate because, as noted in Affected Environment, above, automobile fuel efficiency decreases considerably as travel speed decreases below 30 mph and stop-and-go traffic increases. Since congestion levels under the No Action Alternative would be higher than they are under existing conditions, the increase in direct energy used in 2030 could be higher than the 3.8 million-barrel increase. Because congestion levels under the No Action Alternative would likely be higher than they are under existing conditions, the increase in direct energy used in 2030 would have congestion-related cause to be higher than the estimated 3.8 million barrels.

Peak-Period Electricity Demand: The No Action Alternative would have no effect on electricity demand resources.

Indirect Effects

Construction-Related Energy Consumption: VMT under the No Action Alternative is projected to increase in the I-15 project corridor by approximately 3.77 billion miles between 2007 and 2030. This increase would likely result in additional widening of I-15 and local roadways beyond what is already planned. As shown in Table 3.13-2, the energy consumption factors for constructing a one-way lane mile of traffic is considerably higher than for rail. Because the No Action Alternative would not result in an operational energy savings as noted above, the construction of new traffic lanes would result in an irretrievable commitment of energy resources.

3.13.4.2 Action Alternatives

Direct Effects

Overall Operational Energy Consumption: As can be seen in Table 3.13-4, below, the action alternatives, with either DEMU or EMU, would result in lower operational energy consumption compared to the No Action Alternative in 2030. The shift from automobiles in the No Action Alternative to train in the action alternatives would result in a reduction in annual automobile travel on I-15 by 733 million VMT with DEMU and 931 million VMT with EMU technology. The difference between the two propulsion technologies is related to expected higher top speed and higher ridership levels for the EMU. See Appendix K.

The action alternatives with DEMU technology operating up to 125 mph would result in an annual reduction of 193,000 barrels of oil compared to the No Action Alternative. The action alternatives with EMU technology operating up to 150 mph would result in an annual reduction of 449,370 barrels of oil compared to the No Action Alternative. Comparing the two propulsion technologies shows that the EMU, operating at a higher speed, would result in more than twice the energy savings benefit than the DEMU.

The project sponsor has considered placement of OMSF and MSF facilities within close proximity to passenger stations; this would act to minimize energy consumption during operation.

FRA's NEPA guidance requires that the EIS assess energy conservation, especially those alternatives likely to reduce the use of petroleum or natural gas, consistent with the policy outline in Executive Order 12185. STB's NEPA guidance requires the determination of whether the action alternatives would increase or decrease overall energy efficiency. The action alternatives with either propulsion technology reduces overall energy consumption, relative to the No Action Alternative, which clearly indicates that the efficiency of the transportation system between Los Angeles and Las Vegas would improve substantially with the implementation of the action alternatives, regardless of the option chosen. This indicates that the project impact on overall energy resources would be net positive, given the energy impact criteria stipulated by both FRA and STB.

Table 3.13-4: Annual Overall Operational Energy Consumption[29]

	2007	2030		
	Existing	**No Action Alternative**	**Action Alternatives: DEMU**	**Action Alternatives: EMU**
Annual VMT (billions), Auto[a]	3.67	7.44	6.70	6.51
Action Alternatives VMT[b]	NA	NA	7.33	5.12
Annual Auto Energy Consumption[c] (MMBTUs)	20,246,000	41,000,000	37,000,000	35,900,000
Action Alternatives Energy Consumption [c] (MMBTUs)	0	0	2,995,000	2,691,000
TOTAL ENERGY CONSUMPTION (MMBTUs)	20,246,000	41,000,000	39,961,000	38,568,000
Change in Total Energy from Existing (MMBTUs)	NA	20,754,000	19,715,000	18,322,000
Change in Total Energy from No Action (MMBTUs)	NA	NA	-1,039,000	-2,432,000
TOTAL ENERGY CONSUMPTION (Barrels of Oil[d])	3,727,170	7,549,600	7,356,600	7,100,200
Change in Total Energy from Existing (Barrels of Oil[d])	NA	3,822,430	3,629,430	3,373,060
Change in Total Energy from No Action (Barrels of Oil[d])	NA	NA	-193,000	-449,370

Source: Jones and Stokes, 2008.

[a] DMJM 2008.

[b] DesertXpress 2007 and 2008.

[c] Calculated using the direct energy consumption factors from Table3.13-1.

[d] One barrel of crude oil is equal to 5.8 MMBTUs.

Regardless of the net direct energy benefit that would occur with the adoption of either propulsive technology, adoption of the EMU alternative would further reduce consumption of non-renewable resources that the DEMU would not. This is because the DEMU alternative would (by definition) be powered by petroleum and would offer no change to shift at least some petroleum-powered transportation to renewable-powered transportation.

There are numerous state legislation and programs that promote the use of renewable resources and reduction of petroleum dependence. For example, in California, Assembly

[29] Values rounded.

Bill 2076 directs recommendations for a strategy to reduce petroleum dependence, while Senate Bills 1078 and 107 set 2010 as the year when California will provide 20 percent of its retail electricity sales from renewable energy through its Renewable Portfolio Standards. Additionally, in 2005, California's Assembly passed Assembly Bill 1585, which directed its energy commission to prepare an evaluation of the impacts of a 33 percent renewable energy goal; Governor Arnold Schwarzenegger, the CEC, and the CPUC have endorsed an enhanced target of 33 percent by 2020. As such, there is reason to assume that further reductions to the action alternative's consumption of non-renewable energy are possible with the EMU.

Nevada also has a Renewable Portfolio Standard (20 percent by 2015), and Nevada Governor Jim Gibbons has issued three executive orders that promote renewable energy projects and request recommendations for improved access for renewables to the transmission grid. The two renewable energy standards alone would require that 20 percent of the electricity sold to the project sponsor for use by the EMU option would be generated from renewable resources.

Beyond the desirable characteristic of the EMU alternative to reduce non-renewable energy use, additional steps could be taken to further reduce non-renewable energy consumption if the project sponsor were to purchase Renewable Energy Credits (RECs) for 20 percent of its yearly load. Together with California and Nevada's 20 percent Renewable Portfolio Standard, this would guarantee that a full 40 percent of the action alternative's operational energy requirement would be from renewable, non-petroleum-based energy sources.

Peak-Period Electricity Demand: Table 3.13-5 presents the estimated electricity demand at the EMU's peak headway rate. It was assumed that the EMU's peak operations would be coincident with peak regional electricity demand.

Table 3.13-5: EMU Peak-Period Electricity Demand (MW)

Jurisdiction	Friday	Saturday	Sunday	Monday-Thursday
California	53 MW	49 MW	65 MW	32 MW
Nevada	14 MW	13 MW	17 MW	8 MW
Project Corridor	67 MW	62 MW	82 MW	40 MW

Source: Jones and Stokes, 2008.

Note:

Peak demand calculated per [average demand per trainset] X [number of trainsets on track coincidentally during peak-period], where [average demand per trainset] = [18,314 kWh per train roundtrip X 60 minutes per hour / 203 minutes per train roundtrip / 1,000 kW per MW] = 5.41 MW per train. Trainset consumption (i.e., 18,314 kWh per train roundtrip was obtained from DesertXpress 10/21/08 (EMU at 150 mph).

As shown in Table 13.3-5, the EMU option would place the most load on the electrical system on Sundays, 65 MW on the California system (EMM Region 13) and 17 MW on the region containing Nevada (EMM Region 12), and 82 MW along the entire corridor. However, regional coincident peak loads generally occur on weekdays when commerce and industry are using energy in addition to domestic users. Therefore, the Friday demand estimates are the relevant values. Comparing these Friday peak-operating demand estimates to the 2030 EMM regional estimates of supply capacity provides the appropriate benchmark.

As shown in Table 3.13-3 in the National Energy Modeling System description, above, the USDOE expects EMM Region 12 (containing Nevada) and EMM Region 13 (all of California) to have production capacity values on the order of 77.8 GW and 85.9 GW, respectively. The electricity demand stemming from the Nevada and California portions of the EMU option would be 0.02 percent and 0.08 percent, respectively. The load from the EMU option on regional electricity resources is minimal and would not result in an impact.

Indirect Effects

Construction-Related Energy Consumption: The action alternatives would require the commitment of energy resources for construction, the primary consumption of indirect energy. Table 3.13-6 provides total anticipated energy consumption for the construction of the action alternatives. Total commitment would be about 5.8 million MMBTUs. However, this is not an unrecoverable commitment of energy resources because the action alternatives (both with the DEMU and EMU alternatives) would be a net reducer of the overall operational energy requirement. With a reduction over the No Action Alternative of 1,039,000 MMBTUs and 2,432,000 MMBTUs per year by the DEMU and EMU alternatives, respectively, the payback would be 5.5 years for the DEMU alternative and 2.4 years for the EMU alternative. The action alternatives' construction-related energy consumption would not be anticipated to result in an impact.

It is reasonable to assume that secondary facilities, such as those used in the production of cement, steel, and so on, would employ all reasonable energy conservation practices in the interest of minimizing the cost of doing business. Therefore, it can reasonably be assumed that construction-related energy consumption by secondary facilities would not consume nonrenewable energy resources in a wasteful, inefficient, or unnecessary manner.

Table 3.13-6: Construction-related Energy Consumption

Grade/Station	Rural vs. Urban	Facility Quantity (trackway miles & number of stations)	Energy Consumption (MMBTUS; rounded)
At-grade	Rural	104 trackway miles	1,278,000
	Urban	0 trackway mile	0
Above-grade	Rural	68 trackway miles	3,771,000
	Urban	11 trackway miles	612,000
Station	N/A	2 stations	156,000
Total			5,817,000

Source: Jones and Stokes, 2008.

The project sponsor has included TCAs along the action alternatives to limit construction equipment hauling and provide locations for material storage that would minimize energy consumption during construction.

3.13.5 Mitigation Measures

The action alternatives, using either technology option would result in an overall reduction in total energy consumption (electric power demand and petroleum-based consumption). As a result, no mitigation would be necessary.

Construction of the any of the action alternatives would result in one-time non-recoverable energy consumption costs. The following measures should be applied to further conserve energy resources during construction:

- Develop and implement a construction energy conservation plan.
- Use energy efficient construction equipment and vehicles.
- Develop and implement a program encouraging construction workers to carpool for travel to and from construction sites.

3.14 BIOLOGICAL RESOURCES

This section discusses the existing biological resources within the project study area, environmental consequences of implementing the proposed project related to biological resources, and appropriate mitigation measures. Regulatory requirements and methods of evaluation are also discussed.

The project study area for biological resources comprises the footprint of the project alternatives, including rail alignments, stations, and maintenance and ancillary facilities, utility corridors, and temporary construction workspace. In addition, the biological resources in the vicinity project area were evaluated and considered in order to better understand issues that may be encountered during construction and operation.

The action alternatives would be constructed and operated in areas with many biological resources. These areas include habitats that support special-status plant and wildlife species, ephemeral drainages, and public lands administered by the Bureau of Land Management and National Park Service for, among other purposes, the protection of biological resources. Recognizing this, the Federal Railroad Administration (FRA) has consulted with each agency during the Environmental Impact Statement (EIS) process in a variety of ways, including involvement during the EIS scoping phase and separate interagency meetings, described in more detail under agency coordination.

3.14.1 REGULATIONS AND STANDARDS

This section describes the Federal, state, and local regulations relevant to biological resources in the project study area. The discussion includes NEPA analysis requirements, standards, and thresholds pursuant to the regulations. The following list identifies the regulatory agencies with the authority to review design plans and consultant reports for conformance with biologically related issues of applicable guidelines, codes, and legislative acts, as well as conservation plans that the project design must conform with:

- U.S. Fish and Wildlife Service (USFWS) – Ventura and Las Vegas Offices
- U.S. Army Corps of Engineers (USACE) – Los Angeles and Sacramento Districts
- U.S. Department of Interior, Bureau of Land Management (BLM)
- National Park Service (NPS)
- California Department of Fish and Game (CDFG)
- Nevada Department of Wildlife (NDOW)
- California Department of Transportation (Caltrans)
- Nevada Department of Transportation (NDOT)
- Clark County, Nevada – Multiple Species Habitat Conservation Plan (MSHCP)
- West Mojave Habitat Conservation Plan (WMHCP)
- Northern and Eastern Mojave Desert Plan Amendment (NEMO)
- San Bernardino County, California and Clark County, Nevada

- Incorporated cities: Victorville and Barstow, California and Las Vegas, Nevada
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries Service)

These agencies have authority to review the proposed project and inspect various aspects of the project construction including ground disturbing activities such as vegetation removal, ground leveling, and materials staging areas.

3.14.1.1 Federal Regulations

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) of 1973 and subsequent amendments provide for the conservation of listed species or candidates for listing as endangered or threatened species and the ecosystems on which they depend. The USFWS has jurisdiction over Federally listed plants, wildlife, and resident fish, and the NOAA Fisheries Service has jurisdiction over anadromous fish and marine fish and mammals.

***Endangered Species Act Authorization Process for Federal Actions*:** Section 7 of the ESA provides a means for authorizing take of threatened and endangered species by Federal agencies. It applies to actions that are conducted, permitted, or funded by a Federal agency. Under ESA Section 7, the lead Federal agency conducting, funding, or permitting an action must consult with USFWS or NOAA Fisheries, as appropriate, to ensure that the project will not jeopardize the continued existence of an endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment (BA) evaluating the nature and severity of the expected effect. In response, USFWS or NOAA Fisheries issues a biological opinion (BO), with a determination that the action either:

- may jeopardize the continued existence of one or more listed species (*jeopardy finding*) or result in the destruction or adverse modification of critical habitat (*adverse modification finding*), or
- will not jeopardize the continued existence of any listed species (*no jeopardy finding*) or result in adverse modification of critical habitat (*no adverse modification finding*).

The BO issued by USFWS or NOAA Fisheries Service may stipulate discretionary "reasonable and prudent" conservation measures. If it is determined the project would not jeopardize the continued existence of a listed species, USFWS or NOAA Fisheries Service would issue an incidental take statement to authorize the proposed activity.

***Endangered Species Act Prohibitions*:** Section 9 of ESA prohibits the "take" of any fish or wildlife species listed under ESA as endangered. Take, as defined by ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harm is defined as "any act that kills or injures the species, including significant habitat modification." Take of threatened species also is prohibited under Section 9 unless otherwise authorized by Federal regulations.[1] Additionally, Section 9 prohibits removing, cutting, and maliciously damaging or destroying Federally listed plants on sites under Federal jurisdiction.

***Critical Habitat*:** Critical habitat is defined in ESA Section 3 (5) (A) as, "specific areas within the geographic area occupied by the species on which are found those physical or biological features essential to the conservation of the species and which may require specific management considerations or protection." Critical habitat is also defined as "specific areas outside the geographical area occupied by the species at the time it is listed but a determination has been made that such areas are essential for the conservation of the species."

The designation of critical habitat for a listed species helps focus conservation activities by identifying areas that contain essential habitat features regardless of whether or not they are currently occupied by the listed species.

On June 28, 1994, the Service approved the final Desert Tortoise (Mojave Population) Recovery Plan (Recovery Plan). The Recovery Plan divides the range of the desert tortoise into six recovery units and recommends establishment of 14 desert wildlife management areas (DWMAs) throughout the recovery units. Within each DWMA, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Recovery Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises. The DWMAs/areas of critical environmental concern (ACECs) have been designated by BLM through development or modification of their land-use plans in Nevada and parts of California.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) Title 16, United States Code (USC), Part 703 enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union (Russia) and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes hunting seasons and capture limits for game species and protects migratory birds, their occupied nests, and their eggs.[2]

Executive Order 13186 (January 10, 2001) directs each Federal agency taking actions that have or may have a negative impact on migratory bird populations to work with USFWS to develop a memorandum of understanding (MOU) that will promote the conservation of migratory bird populations. Protocols developed under the MOU must include the following agency responsibilities:

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[1] In some cases, exceptions may be made for threatened species under ESA Section 4[d]; in such cases, USFWS or NOAA Fisheries Service issues a "4[d] rule" describing protections for the threatened species and specifying the circumstances under which take is allowed.

[2] Title 16 USC 703, 50 CFR 21, 50 CFR 10

- Avoid and minimize, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.
- Restore and enhance migratory bird habitats, as practicable.
- Prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

The executive order is designed to assist Federal agencies in their efforts to comply with the MBTA, and does not constitute any legal authorization to "take" migratory birds.

Clean Water Act

The Federal Clean Water Act (CWA) was enacted as an amendment to the Federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the United States (U.S.). The CWA now serves as the primary Federal law protecting the quality of the nation's surface waters, including wetlands.

Permits for Fill Placement in Wetlands and other Waters of the U.S.: Under the CWA Section 404, the USACE and the EPA regulate the discharge of dredged and fill materials into waters of the U.S. Waters of the U.S. refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including any or all of the following:

- Areas within the ordinary high water mark (OHWM) of a stream, including non-perennial streams with a defined bed and bank, and any stream channel that conveys natural runoff, even if it has been realigned.
- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."[3]

Project sponsors must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the U.S., including wetlands, before proceeding with a proposed activity. As stated by the Counsel for EPA January 19, 2001, determination in response to the *Solid Waste Agency of Northern Cook County* vs. *United States Army Corps of Engineers* ruling, non-navigable, isolated waters may not be regulated by the USACE. Generally, isolated wetlands are considered hydrologically isolated from other water bodies.

In 2006, the Supreme Court addressed the jurisdictional scope of Section 404 of the CWA, specifically the term "the waters of the U.S.," in *Rapanos v. U.S.* and in *Carabell v. U.S.* (hereafter referred to as Rapanos). The Rapanos decision provides two new analytical standards for determining whether water bodies that are not traditionally navigable waters (TNWs), including wetlands adjacent to those non-TNWs, are subject to CWA jurisdiction: (1) if the water body is relatively permanent, or if the water body is a wetland that directly abuts a

[3] 33 CFR 328.3, 40 CFR 230.3.

relatively permanent water body, or (2) if a water body, in combination with all wetlands adjacent to that water body, has a significant nexus with TNWs. As a result of this decision, the EPA and the USACE developed guidance requiring the application of the two standards described above, as well as a greater level of documentation, to support an agency jurisdictional determination for a particular water body. A "significant nexus" evaluation must determine if the water body, itself or in combination with the functions performed by any wetlands adjacent to the water body, would have more than an insubstantial or speculative effect on the chemical, physical, and/or biological integrity of TNWs.

The USACE may issue either an individual permit evaluated on a case-by-case basis or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide Permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met in order for the NWP to apply to a particular project. Waters of the U.S. in the project area are under the jurisdiction of the Sacramento District of the USACE.

Compliance with CWA Section 404 requires compliance with several other environmental laws and regulations. The USACE cannot issue an individual permit or verify the use of a general permit until the requirements of NEPA, ESA, and the National Historic Preservation Act have been met. Additionally, the USACE cannot issue or verify any permit until a water quality certification, or waiver of certification, has been issued pursuant to CWA Section 401. Section 404 permits may be issued only for the least environmentally damaging practicable alternative. That is, authorization of a proposed discharge is prohibited if there is a practicable alternative that would have less adverse impacts and lacks other significant adverse consequences.

Refer to Section 3.8, Hydrology and Water Resources, for further discussion of stormwater discharge and water quality certification processes under the CWA.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires consultation with USFWS and the State fish and wildlife agencies where the waters of any stream or other body of water are proposed, authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified under a Federal permit or license.[4] Consultation is undertaken for the purpose of preventing loss of and damage to wildlife resources.

Executive Order 13112, Invasive Species

Executive Order (EO) 13112, Invasive Species, directs all Federal agencies to prevent and control introductions of invasive nonnative species, and to minimize the economic, ecological, and human health impacts caused by invasive species infestations. It requires the NEPA process include determinations of the likelihood of introducing or spreading invasive species, and a description of measures being taken to minimize their potential harm.

[4] 16 USC 661-667[e].

Bureau of Land Management Areas of Critical Environmental Concern

An Area of Critical Environmental Concern (ACEC) is a BLM designation that identifies areas where special management attention is needed to protect and prevent irreparable damage to cultural, scenic, or biological resources, or other natural systems or processes. ACECs may also be designated to protect human life and safety from natural hazards. The designation is a record of significant value that must be accommodated when BLM considers future management actions and land use proposals. The ACEC designation indicates to the public that the BLM recognizes that an area has significant values and has established special management measures to protect those values.

To be considered a potential ACEC, an area must meet criteria of both relevance and importance. These criteria are described in BLM Manual 1613, Areas of Critical Environmental Concern, Section 1613.1.11, and are summarized below.

An area meets the relevance criteria if it contains one or more of the following:

1. A significant historic, cultural, or scenic value.
2. A unique fish or wildlife resource.
3. A unique natural process or system (including but not limited to areas supporting rare, endemic, relic, or endangered plant species, or rare geological features).
4. Natural hazards (areas of avalanche, unstable soils, rock fall, etc.).

An area meets the importance criteria if it is characterized by one or more of the following:

1. Has more than locally significant qualities.
2. Has qualities or circumstances that make it fragile, sensitive, irreplaceable, rare, unique, etc.
3. Has been recognized as warranting protection to satisfy national priority concerns or to carry out the mandates of the Federal Land Policy and Management Act.
4. Has qualities which warrant concern about safety and public welfare.
5. Poses a significant threat to human life and safety, or to property.

Northern and Eastern Mojave Desert Management Plan (NEMO), an amendment of the 1980 Bureau of Land Management California Desert Conservation Area (CDCA) Plan

The Northern and Eastern Mojave Desert Management Plan area is a largely undeveloped region stretching from north and northwest of Death Valley National Park to Interstate 40 on the south, and from the Nevada state line on the east to beyond the western boundary of the Mojave National Preserve on the southwest. The plan encompasses over 2.7 million acres of BLM-managed public land. The Northern and Eastern Mojave Desert Management Plan addresses the recovery of the desert tortoise (Mojave population) and management of additional sensitive species on public lands. The NEMO addresses only BLM programs.

National Park Service Organic Act of August 25, 1916, PL 64-235, 16 USC §1 et seq. As amended.

On August 15, 1916, Congress created the National Park Service with the National Park Service Organic Act. This act, as reaffirmed and amended in 1970 and 1978, establishes a broad framework of policy for the administration of national parks:

> "The Service thus established shall promote and regulate the use of the Federal areas known as National Parks, Monuments, and Reservations... by such means and measures as to conform to the fundamental purpose of the said Parks, Monuments, and Reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

California Desert Protection Act

The California Desert Protection Act (16 U.S.C. 410aaa-410aaa-83), approved on October 31, 1994, created the Mojave National Preserve and redesignated the Death Valley and Joshua Tree National Monuments as the Death Valley and Joshua Tree National Parks

Wilderness Act

The Wilderness Act of 1964 (16 U.S.C. 1131-1136, 78 Stat. 890) -- Public Law 88-577, approved on September 3, 1964, directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System.

The Act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on a designated area. It authorizes the acceptance of gifts, bequests and contributions in furtherance of the purposes of the Act and requires an annual report at the opening of each session of Congress on the status of the wilderness system.

Under authority of this Act over 25 million acres of land and water in the National Wildlife Refuge System were reviewed. Some 7 million acres in 92 units were found suitable for designation. From these recommendations, as of December 1998, over 6,832,800 acres in 65 units have been established as part of the National Wilderness Preservation System by special Acts of Congress.

Specific wilderness areas, acreages, and establishing legislation are listed in the "Annual Report of Lands under Control of the U.S. Fish and Wildlife Service" available from the Division of Realty, USFWS.

3.14.1.2 California Regulations

California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code Section 2050 et seq.) establishes state policy to conserve, protect, restore, and enhance threatened or endangered species and their habitats. CESA mandates that state agencies should not approve projects that jeopardize the continued existence of threatened or endangered species if reasonable and prudent alternatives are available that would avoid a jeopardy finding. There are no state agency consultation procedures under CESA. For projects that would affect a species that is Federally and state-listed, compliance with the Federal ESA satisfies CESA if CDFG determines that the Federal incidental take authorization is consistent with CESA under California Fish and Game Code Section 2080.1. For projects that would result in take of a species that is state listed only, the project sponsor must apply for a take permit under CESA Section 2081(b).

California Native Plant Protection Act

The California Native Plant Protection Act of 1977 prohibits importation of rare and endangered plants into California, take of native rare and endangered plants, and sale of such plants. The CESA defers to the California Native Plant Protection Act, which ensures that state-listed plant species are protected.

California Fish and Game Code Section 1602

This section requires project sponsors to notify CDFG before any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Preliminary notification and project review generally occur during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, CDFG is required to propose reasonable changes to the project to protect the resources. These modifications are formalized in a Streambed Alteration Agreement that becomes part of the plans, specifications, and bid documents for the proposed project.

Natural vegetation communities and habitats that are unique, of global and/or regionally limited occurrence, or of particularly valuable to wildlife are considered to be sensitive by CDFG. The determination of the sensitive status of vegetation communities is based on the rankings in the 2008 California Natural Diversity Database (CNDDB). Each vegetation community is assigned a rank based on number of occurrences and areal extent, and on threats to conservation.

West Mojave Habitat Conservation Plan

The West Mojave Habitat Conservation Plan (WMHCP) is a comprehensive strategy to conserve and protect the Federally-listed desert tortoise (Mojave population), the California state listed Mohave ground squirrel, and nearly 100 additional sensitive plant and wildlife species and their natural habitats that occur in the west Mojave Desert. The WMHCP also provides a streamlined program for complying with the requirements of the California and Federal Endangered Species Acts. The WMHCP was prepared through the collaboration efforts of local cities, counties, state, and Federal agencies having jurisdiction over lands within the WMHCP area.

The West Mojave Plan includes an area encompassing 9.3 million acres in Inyo, Kern, Los Angeles, and San Bernardino counties, including 3.3 million acres of public lands administered by BLM, 3.0 million acres of private lands, 102,000 acres administered by the State of California, and the balance of military lands administered by the Department of Defense.[5]

San Bernardino County General Plan

The Mojave Desert comprises approximately 93 percent of San Bernardino County's land area. The desert region contains a diverse biological community and fragile ecosystem. The dominant habitat in the desert region is desert scrub, but discrete areas of other habitat types occur in this region. San Bernardino County has developed goals to preserve the unique environmental features and natural resources of the desert region, including native wildlife, vegetation, and water. Policies to achieve these goals include:

- Require the retention of existing native vegetation for new development projects, particularly Joshua trees, Mojave yuccas, and creosote bushes, and other plant species protected by the Development Code and other regulations.
- Encourage the retention of specimen sized Joshua trees. Specimen sized trees are defined as trees with a circumference equal to or greater than 50 inches measured 4 feet above grade, trees with a total tree height of 15 feet or greater, trees possessing a bark-like trunk, or a cluster of 10 or more individual trees, of any size, growing in close proximity to each other.
- Developments requiring Tract Maps or Conditional Use Permits within the County Biological Resource Overlay for desert tortoise (Mojave population) shall prepare and submit a focused biological resources survey and a desert tortoise protocol survey per the USFWS requirements.

3.14.1.3 Nevada Regulations

The State of Nevada maintains a list of species experiencing population declines in all or portions of their range within the state. Nevada state-listed species are native species or subspecies of wildlife or plants that are regarded as threatened with extinction. Nevada state-listed species are protected under the authority of Nevada Revised Statutes (NRS) 501.100 – 503.104 (wildlife) or Nevada Administrative Code (NAC) 527 (plants).

NDOW is the state agency responsible for the management, protection, and restoration of fish and wildlife resources, and the Nevada Division of Forestry (NDF) manages all forestry, nursery, and endangered plant species on certain public and private lands. State regulations require a permit from NDOW to take any protected wildlife species and a special permit from NDF before engaging in an activity that may result in removal, destruction, or transportation of any protected plant.

[5] Bureau of Land Management, 2005.

Clark County Multiple Species Habitat Conservation Plan (MSHCP)

Clark County, Nevada; the cities of Las Vegas, North Las Vegas, Boulder City, Mesquite, and Henderson; and the Nevada Department of Transportation prepared the MSHCP pursuant to Section 10 of the ESA. The purpose of the MSHCP is to allow for the "take" of Federally listed threatened and endangered species on non-Federal properties in Clark County while allowing for the orderly use of land in order to promote the economy, health, well being, custom, and culture of the growing population of Clark County.

3.14.1.4 Special-Status Species

Special-status plant and wildlife species are those that federal and state agencies are responsible for resource management and protection. These agencies require special monitoring for, consideration of, and/or management for these species because the species' population numbers have declined due to human-induced and natural factors. This analysis addresses the special-status species identified in the regulations and plans described above.

Federally Listed Threatened or Endangered; Proposed for Listing as Threatened or Endangered; and Candidate Species

Federally listed endangered species are plant and wildlife species that are in danger of extinction throughout all or a significant portion of their range. Threatened species are those that are likely to become endangered in the foreseeable future. Once a species is listed, all protective measures authorized by the Federal ESA apply to the species and its habitat. Proposed species are those that are proposed in the Federal Register to be listed under the Federal ESA. Candidate species are those for which the USFWS has sufficient information to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Proposed and Candidate species do not receive statutory protection under the ESA, however, conservation measures are encouraged by the USFWS.

California Listed Threatened or Endangered and Candidate Species

Endangered species, as defined under CESA, are native plant and wildlife species that are in serious danger of becoming extinct throughout all, or a significant portion of their range due to one or more causes. Threatened species are those that are not currently in danger of becoming extinct, but are likely to become endangered in the foreseeable future in the absence of special protection and management efforts. Candidate species under CESA are species that are under review for addition to the list of endangered or threatened species, of for which a notice of proposed regulation for addition to either list has been published.

California Species of Special Concern

California species of special concern, as identified by CDFG, applies to plant and wildlife species not listed under Federal ESA or CESA, but which are declining at a rate that could result in listing, or historically occurred in low numbers and known threats to persistence currently exist. The goal of designating species as special-concern is to halt or reverse their population decline by calling attention to their plight and addressing the issue of concern early enough to secure their long-term viability. This designation is also intended to result in special consideration for these species and to focus attention to these species to help avert the need for listing under either Federal ESA or CESA. This designation is also intended to stimulate collection of additional information on the biology, distribution, and status of poorly known, at-risk species, and to focus research and management attention on them.

California Native Plant Society List 1B and List 2

The California Native Plan Society (CNPS) is a California statewide non-profit organization dedicated to the preservation of California's native flora. The society has created and maintains an Inventory of *The Rare and Endangered Plants of California*.[6] The CNPS inventory contains five lists that categorize plants according to the degree of concern. List 1B plants are those that are rare, threatened, or endangered in California and List 2 plants are those that are rare, threatened, or endangered in California, but more common elsewhere.

Nevada Fully Protected Species

Nevada protected species are species or subspecies of native plants, fish, wildlife and other fauna that are regarded as threatened with extinction. The Nevada Board of Wildlife Commission (Commission) establishes policies and regulations necessary to the preservation, protection, management, and restoration of wildlife and habitat. The Commission can designate a fully protected species when, after consultation with competent authorities, it determines that a species existence is endangered and its survival requires assistance because of overexploitation, disease or other factors, or its habitat is threatened with destruction, drastic modification or severe curtailment. Any animal declared to be threatened with extinction must be placed on the list of fully protected species, and no member of its kind may be captured, removed, or destroyed at any time by any means except under special permit issued by the Nevada Department of Wildlife.

West Mojave Habitat Conservation Plan Covered Species

The West Mojave Habitat Conservation Plan covers 9.3 million acres of land, and is the largest habitat conservation plan (HCP) established in the United States. The plan was implemented by the BLM, San Bernardino County, and the city of Barstow. The West Mojave Plan is an amendment to the California Desert Conservation Area (CDCA) plan implemented in 1980, and its main goal is protecting and managing over 100 listed or sensitive species. The plan focuses mainly on the desert tortoise (Mojave population) and the Mohave ground squirrel. In addition, the plan offers a streamlined process for public agencies and private entities in dealing with both Federal and state endangered species act requirements. In total, 11 cities, four counties, BLM, USFWS, CDFG, Caltrans, and many non-governmental organizations participated in the planning and implementation process.

The West Mojave Plan is the last of five regional amendments to the 1980 CDCA Plan that will

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[6] California Native Plant Society, 2007.

provide comprehensive management not only for the protection and recovery of the desert tortoise and other listed species, but for hundreds of other sensitive plant and animal species to reduce the need for future listings. The West Mojave Plan, in conjunction with the other four plan amendments (Northern and Eastern Colorado Desert, Northern and Eastern Mojave, Coachella Valley, and Western Colorado Desert) also completes route designation throughout the California Desert Conservation Area, as required in the 1980 CDCA Plan.

Clark County MSHCP-covered Species

Species covered under the Clark County MSHCP are defined as:

- Those for which sufficient information is known and for which adequate existing management prescriptions exist or can be easily defined and implemented sufficient to support an application for a Section 10 (a) Permit.
- Those species for which a great deal of information may not be available, but which are definitively known to share habitat with other covered species. For those species, it is believed that the management prescription (existing or easily defined) for other covered species would benefit sufficiently to support a Section 10 (a) Permit.
- Those species whose listing appears imminent unless conservation measures are instituted to assure survival and recovery of such species in the wild.

BLM Sensitive Species

The BLM maintains a list of sensitive species defined as those species that are under status review by the USFWS; species whose population numbers are declining so rapidly that Federal listing may become necessary; species with typically small and widely dispersed populations; or, species inhabiting ecologically specialized habitats. Two conditions must exist for a species to be considered a BLM sensitive species: a significant population must occur on BLM administered lands and the potential must exist for improvement of the species' condition through BLM management.

3.14.2 Methods of Evaluation of Impacts

This section addresses how the baseline conditions analysis was conducted for the project study area, including biological data collection, agency coordination, review of aerial photography, and field survey results.

3.14.2.1 Information Sources

Information was derived from numerous sources to identify special-status plants and wildlife species and sensitive natural communities that have potential to occur within the project study area. The following information sources were reviewed to prepare the biological resources section of this chapter:

- USFWS Ventura Ecological Services Office list of Listed, Proposed, and Candidate Species Which May Occur in San Bernardino County, California, [7]
- USFWS Nevada Ecological Services Office list of Listed, Proposed, and Candidate Species Which May Occur in Clark County, Nevada[8]
- CDFG California Natural Diversity Data Base[9]
- CDFG Special Animals and Special Plant lists[10]
- CNPS (2007) Inventory of Rare and Endangered Vascular Plants of California,
- Nevada Natural Heritage Program sensitive species list for Clark County,[11]
- BLM list of Sensitive Plant Species that occur in California,[12]
- BLM list of Sensitive Wildlife Species that occur in California,[13]
- Supplemental Final EIS for the Proposed Addition of Maneuver Training Land at Fort Irwin, California,[14]
- Tortoise Recovery Plan[15],
- West Mojave Habitat Conservation Plan,[16]
- Northern and Eastern Mojave Desert Management Plan Amendment to the California Desert Conservation Area Plan and Final Environmental Impact

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[7] Ventura U.S. Fish and Wildlife Service. <http://www.fws.gov/ventura/esprograms/listing_ch/>. July 2008.

[8] Nevada U.S. Fish and Wildlife Service Nevada Ecological Office. <http://www.fws.gov/nevada/es/esa/index_esa.html>. April 2007.

[9] California Department of Fish and Game, 2008.

[10] California Department of Fish and Game, 2007a.

[11] Nevada Natural Heritage Program. <http://ndep.state.nv.us/>. July 2008.

[12] Bureau of Land Management. <http://www.blm.gov/wo/st/en.html>. November 2007.

[13] Ibid.

[14] U.S. Department of the Army. 2005.

[15] U.S. Fish and Wildlife Service. 1994.

[16] Bureau of Land Management. 2005.

Statement,[17]

- Clark County Multi Species Habitat Conservation Plan,[18]
- Results of 2007 desert tortoise field surveys in California,
- Results of habitat assessment for Mohave ground squirrel,[19]
- Results of 2007 protocol-level field surveys for southwestern willow flycatcher and least Bell's vireo, and a habitat assessment for western yellow-billed cuckoo, and
- Results of 2006 vegetation mapping for sensitive botanicals in Nevada.

Additional information is presented in Appendices L through O. Appendix L presents the USFWS list of Listed, Proposed, and Candidate Species in Nevada and Southern California. Appendix M lists the special-status plant and wildlife species occurring within the project study area in both California and Nevada. Appendix N includes the Habitat Assessment for Mojave Ground Squirrel, and Appendix O provides the Vegetation Mapping Surveys for Sensitive Plants in Nevada.

3.14.2.2 Agency Coordination

To date, four interagency coordination meetings have been convened for the project as described below.

July 31, 2006: A meeting was held with the USFWS, BLM, CDFG, and FRA's EIS consultants to discuss potential biological resource constraints and biological survey requirements for the proposed project.

December 19, 2006: A meeting was held with USFWS Ventura, California and Las Vegas, Nevada Offices; FRA, BLM Barstow, California and Las Vegas, Nevada Field Offices; CDFG; NPS; FRA's EIS consultants to discuss potential biological resource constraints and biological survey requirements for the proposed project.

September 25, 2007: A meeting was held with USFWS Ventura, California and Las Vegas, Nevada Offices; BLM Barstow, California and Las Vegas, Nevada Field Offices; CDFG; NPS; FRA's EIS consultants to discuss potential biological resource constraints and biological survey requirements for the proposed project.

The agencies identified the following biological concerns during the coordination meetings and subsequent personal communications:

- Potential impacts to bighorn sheep movement corridors and lambing areas within the Mountain Pass area.[20]
- Potential disruption of springs used by wildlife species including big horn sheep, in

[17] Bureau of Land Management. 2002.

[18] U.S. Fish and Wildlife Service. 2000.

[19] Leitner. 2007.

[20] Bureau of Land Management.

the Mountain Pass area.[21]

- Potential impacts to sensitive vernal pool species within Ivanpah Lake located south of Primm, Nevada.

The BLM and USFWS expressed concern over potential project-related changes to existing terrain which could alter surface water flows and create water ponding conditions adjacent to the proposed ROW. Ponding has the potential to modify habitat by changing the soil and vegetation profile of an area. The USFWS expressed concern about changes to culverted crossings of the I-15 corridor since many of these crossings are used by wildlife to safely cross under the I-15.

Friday November 30, 2007: A meeting was held with the U.S. Army Corp of Engineers, Los Angeles District and FRA's EIS consultant to discuss the jurisdictional delineation and 404b(1) analysis for the project.

3.14.2.3 Field Surveys

Vegetation Mapping

Reconnaissance-level pedestrian and windshield surveys were conducted in December 2006 to assess and map the vegetation types in a 600-foot wide corridor (400-foot-wide limit of disturbance plus a 200-foot buffer) of the project alignment alternatives, including ancillary facilities. Vegetation was identified and classified following the scheme used in the Mojave Desert Ecosystem Program,[22] which is based on the U.S. National Vegetation Classification (NVC).[23]

ArcGIS 9.0 software was used to create a GIS dataset of vegetation communities and other land-cover types, based on true color digital ortho-rectified aerial photography. The aerial photographs were taken in 2005 (California) and 2006 (Nevada) with one meter resolution (i.e., each cell represents an area on the ground of approximately 1 square meter). Vegetation was mapped using a combination of field mapping onto the aerial photography and digitizing polygons on a computer screen (a process known as heads-up digitizing). Lines were drawn to delineate land-cover polygons following visible differences in color tone and texture on the photographs. Minimum mapping units (the smallest area that was distinguished and mapped) range from 0.25 acre for wetland, riparian, and sensitive vegetation types.

Wetlands

Reconnaissance-level pedestrian and windshield surveys were conducted in April through May 2007 and March through May 2008 to assess and map the surface water and wetlands in the 400-foot wide corridor of the project alignment alternatives. The project alignments were projected onto USGS 7.5 minute quadrangle maps using ArcGIS 9.0 software to create a GIS dataset of surface water features. In addition, the project alignments were also projected onto

[21] Jones & Stokes, Personal Communication, September 25, 2007.

[22] USGS, 2004.

[23] Grossman et al. 1998.

true color digital ortho-rectified aerial photography to help identify potential surface water features not identified as a blue line on the USGS quadrangle maps. The aerial photographs were taken in 2005 (California) and 2006 (Nevada) with one meter resolution. The surface water features were mapped using a combination of field mapping onto the aerial photography and digitizing polygons on a computer screen.

Special-Status Plants

Floristic surveys were conducted in the Nevada portion of the alignment in Spring 2006. A report documenting survey results is provided in Appendix O.

A survey targeting potentially occurring special-status plants was not conducted in the California portion of the alignment in 2007 because the recorded precipitation measurement was below the annual average and the lack of adequate rainfall inhibits plant growth. Reference populations of Mojave monkeyflower (*Mimulus mojavensis*) were surveyed in April 2007. Four known populations tracked in CNDDB (2008) were visited during the typical flowering season; no Mojave monkeyflower plants were found, and few annual plants were present. The survey result maps are provided in Appendix N.

Special-Status Wildlife

The agencies reviewed preliminary maps of the proposed alignment and provided guidance and recommendations on special-status species surveys and habitat assessments during the agency coordination meetings. Following agency guidance, biologists conducted a reconnaissance-level survey of the project area to field verify the areas that USFWS had identified as needing surveys or habitat assessments for the Mojave population of desert tortoise (December 2007), southwestern willow flycatcher, least Bell's vireo, western yellow-billed cuckoo (April 2007), and Mohave ground squirrel (May 2007). Based on the results of the reconnaissance surveys, biologists conducted focused field surveys for desert tortoise, southwestern willow flycatcher, and least Bell's vireo in areas of suitable habitat. For purposes of this analysis, the term suitable habitat refers to those areas where the alignment alternatives traverse relatively undeveloped lands away from the I- 15 ROW and undeveloped areas in the vicinity of the Mojave River. A habitat assessment for Mohave ground squirrel was also conducted. Details on species survey methods are provided below.

Desert Tortoise Survey Methods: Biologists initially identified approximately 50 miles of suitable habitat for desert tortoise in the project study area in California and Nevada. Based on coordination with USFWS Ventura Office and CDFG, it was determined that select areas within California would be surveyed for desert tortoise. These areas were selected in order to estimate desert tortoise density and surveys were conducted in from May 1 through 3, 2007 in areas of suitable habitat and where property access was granted. Based on coordination with the USFWS Nevada Ecological Services Office, it was determined that desert tortoise surveys were not necessary in Nevada. It was determined through coordination with the USFWS that all areas outside the existing I-15 right-of-way and outside urbanized development in Primm, Jean and the Las Vegas Metropolitan Area were occupied desert tortoise habitat. No desert tortoise surveys would be required in Nevada as part of the EIS and ESA Section 7 process.

Desert tortoise surveys were conducted on portions of Segments 1, 2, 4A, 4B. Surveys were conducted by two biologists walking meandering transects within a 300-foot wide corridor from the centerline of the segment alignment alternative. In areas where the corridor extends beyond railroad tracks, the survey area only included the area between the centerline of the alignment and the railroad tracks.

The USFWS did not recommend conducting tortoise surveys along the portions of the project that are within the I-15 ROW because I-15 is assumed to have a substantial negative impact on tortoise population numbers. However, they requested that tortoise surveys be conducted in a representative number of drainage crossings along I-15 that may allow tortoise movement between habitat on either side of I-15. Tortoise surveys were conducted at 29 drainage crossings in the project study area. The drainage bed and banks at these crossings were surveyed using 30-foot wide pedestrian transects at distances of 500 feet upstream and downstream on either side of I-15 (a total of 1,000 feet per drainage) for a total of 21,000 feet (approximately 4 miles).

All observed tortoises and tortoise sign (e.g., suitable burrows, pallets, scat, tracks, eggshells, and carcasses) were recorded on survey forms and location coordinates were collected using a Global Positioning System (GPS) unit.

Southwestern Willow Flycatcher, Least Bell's Vireo, and Western Yellow-Billed Cuckoo Survey Methods: Biologists conducted a habitat assessment in April 2007 to evaluate habitat characteristics and suitability for special-status bird species in the project study area. Based on the habitat assessment, it was determined that suitable habitat for western yellow-billed cuckoo does not exist in the project study area and no further survey effort was necessary. Suitable habitat was present for southwestern willow flycatcher and marginally suitable habitat was present for least Bell's vireo and protocol-level surveys were conducted for both species during the 2007 breeding season. The goals of the surveys were to document the breeding status of southwestern willow flycatcher and least Bell's vireo in the project study area and identify the extent of suitable habitat.

Following USFWS survey protocol, biologists conducted five surveys during the 2007 southwestern willow flycatcher breeding season on May 15, June 4, June 15, June 26, and July 10. The first survey of the season was timed to occur about 2 weeks after the arrival of the first nesting southwestern willow flycatchers in mid-May 2007. Surveys for least Bell's vireos were conducted in appropriate habitats concurrently with southwestern willow flycatcher surveys from May 15 through July 10 when the 2 survey protocol periods overlap. The eight surveys for least Bell's vireos were conducted during the 2007 breeding season on April 10, April 20, May 1, May 15, June 4, June 15, June 26, and July 10.

Biologists recorded field notes of all species detected by sight or vocalization during the surveys and, in particular, listened for the characteristic calls and songs of least Bell's vireos and willow flycatchers.

Mohave Ground Squirrel Survey Methods: Habitat suitability for the Mohave ground squirrel in the project study area was evaluated by biologist, Dr. Phil Leitner. The assessment was performed from May 25 to May 30, 2007 within a 300-foot corridor, 150 feet on either side of each alternative alignment centerline, between Victorville and Yermo. The habitat assessment was conducted by walking and driving the survey area, observing and recording habitat characteristics such as land use, topography, soil type, and vegetation, as well as connectivity of adjacent areas. The survey report is provided in Appendix N. Dr. Leitner also provided the results of trapping surveys previously conducted in the region and prepared a database of all records of Mohave ground squirrel occurrence within 10 miles of the eastern edge of the species known geographic range between Victorville and Yermo (Appendix N). On November 19, 2008, Dr. Leitner also assessed the corridor for the proposed utility corridor near Victorville using aerial photographs. Dr. Leitner did not believe that a field assessment was necessary because of the close proximity of the utility corridor to a previously assessed rail alignment. Dr. Leitner's findings for the utility corridor is also included in Appendix N.

3.14.3 Affected environment

This section addresses the regional biological resources including sensitive vegetation communities and special-status plant and wildlife species within the project study area.

3.14.3.1 Regional Environment

With limited exceptions, the action alternatives are within broadly similar habitat types, as described below. Documented occurrences of special status species and sensitive plant communities are identified in Figures 3-14.1 through 3-14.7.

Vegetation Community Types

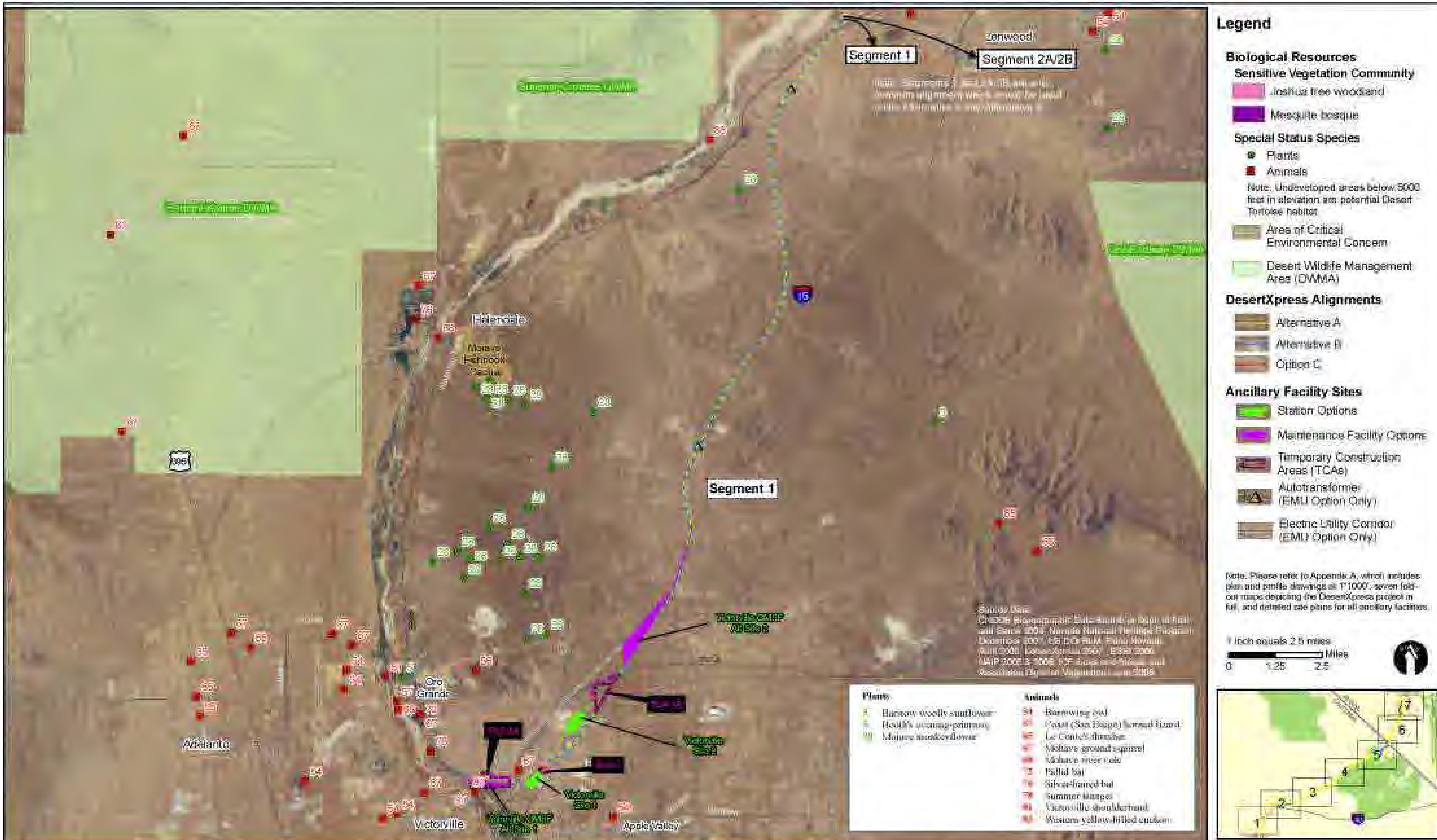
Using reconnaissance-level surveys, ten vegetation communities were identified and mapped in the study area, following the Central Mojave Vegetation Database classification. This list is based on reconnaissance-level surveys. Table 3.14-1 summarizes the characteristic features of these vegetation types and their acreage in the project study area.

Table 3.14-1 Summary of Vegetation Communities and Other Land Use Types in the Project Study Area

Vegetation Community Type	Sensitive Community	Acreage in Project Study Area	Associated Species	Description	Occurrence in Project Study Area
Shrub-dominated communities					
Creosote Bush Shrubland	No	6962.10	A group of alliances: creosote bush may be the only shrub, other alliances are characterized by shared dominance with white bursage and/or brittlebush; also desert holly, saltbush species, and many other shrubs may be present in low densities	Various substrates and settings, including: sandy substrates, alluvial fans, bajadas; may occur on disturbed sites; 0-1,700 meters	Very common throughout project study area
Desert Holly Shrubland	No	12.98	Creosote bush, other saltbush species, white bursage, brittlebush	The most drought-tolerant scrub, occurring on rocky slopes, bajadas, and playa edges; -75 – 1,400 meters	Uncommon in the project study area
Joshua tree Wooded	Yes	339.86	Variety of shrubs:big sagebrush, creosote bush,	Alluvial fans, flat to gently sloping areas	Occurs between Baker and

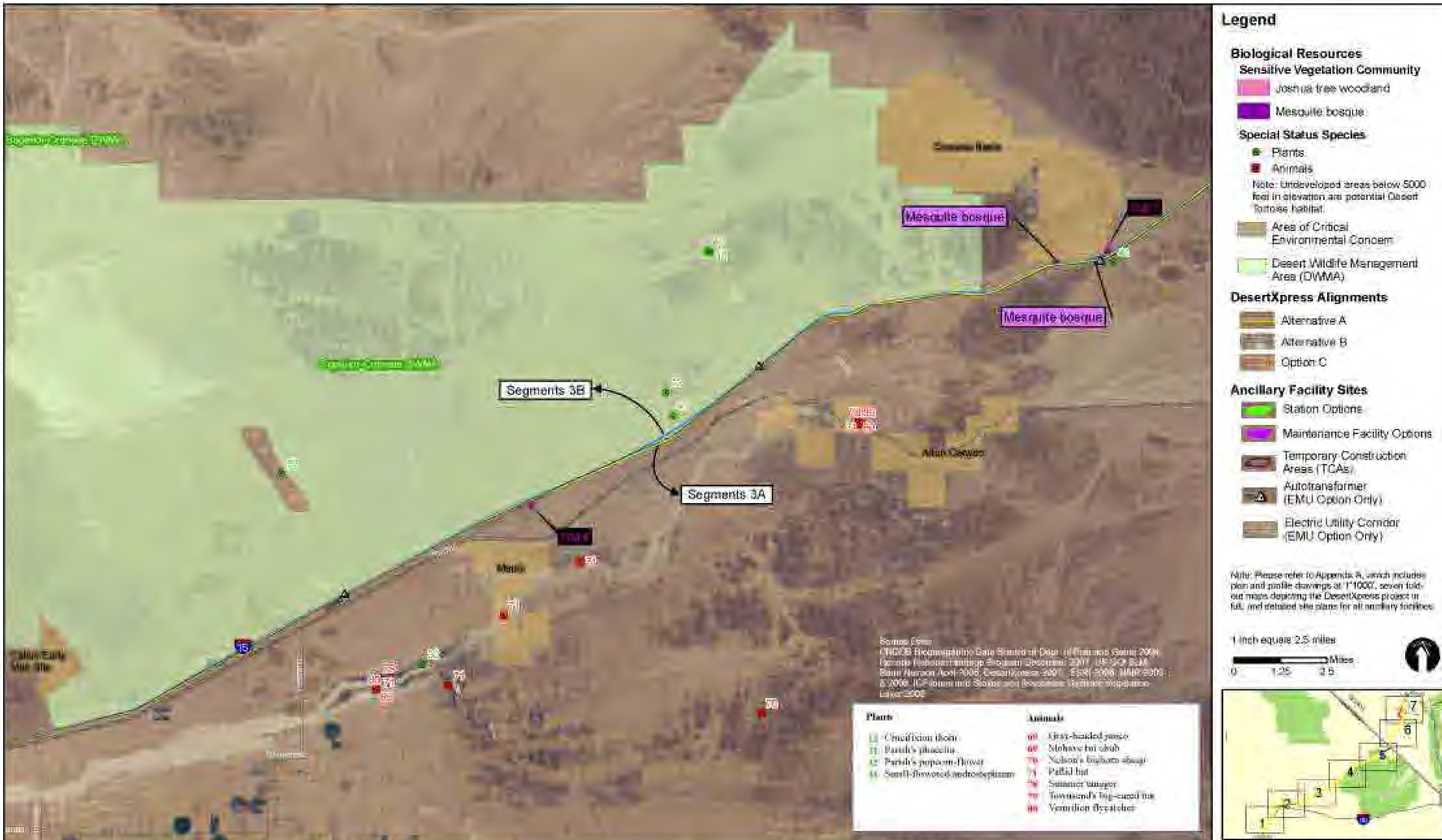
Vegetation Community Type	Sensitive Community	Acreage in Project Study Area	Associated Species	Description	Occurrence in Project Study Area
Shrubland			California buckwheat, brittlebush, blackbrush		Mountain Pass
Saltbush Complex	No	767.72	Other saltbush species, creosote bush, white bursage, rabbitbrush	Includes several alliances dominated by different saltbush species; many substrates and settings: sandy soils, washes, playas, playa edges, often alkaline sites; -75 – 1,400 meters	Very common throughout project study area
Blackbrush Shrubland	No	103.77	California buckwheat, shadscale, white bursage, Ephedra sp., and a variety of other desert shrubs	Alluvial slopes, rocky slopes, bajadas; 1,200-1.800 meters	Occurs only in the Mountain Pass area
Mesquite Shrubland (Intermittently Flooded)	Yes	18.74	Saltbush species, sandbar willow, iodinebush	Rarely flooded edges of washes, floodplains, playa edges; up to 1,100 meters	Rare; occurs at a few sites west of Mountain Pass
Other Land Cover Types					
Barren (Disturbed, graded)	No	22.25	May have sparse growth of mostly non-native species, especially invasive annual grasses	Various substrates and settings	Common along the median and shoulders of Interstate 15 roadway
Agriculture (alfalfa, grazing)	No	141.97	Alfalfa, a variety of pasture grasses	Generally flat alluvial areas	Occurs at the western end of the alignment east of Victorville
Rural development	No	154.59	N/A	Usually flat to gently sloping sites, valley floors	Predominantly at the western end of the alignment east of Victorville
Urban	No	3865.30	N/A	Usually flat to gently sloping sites, valley floors	Cities of Victorville, Baker, Barstow, Primm, and Las Vegas, including urbanized areas adjacent to these communities

Source: Jones and Stokes, 2008.


Legend
Biological Resources
Sensitive Vegetation Community
Joshua tree woodland
Mesquite bosque
Special Status Species
Plants
Animals
Note: Undeveloped areas below 5000 feet in elevation are potential Desert Tortoise habitat
Area of Critical Environmental Concern
Desert Wildlife Management Area (DWMA)
DesertXpress Alignments
Alternative A
Alternative B
Option C
Ancillary Facility Sites
Station Options
Maintenance Facility Options
Temporary Construction Areas (TCAs)
Autotransformer (EMU Option Only)
Electric Utility Corridor (EMU Option Only)
Note: Please refer to Appendix A, which includes plan and profile drawings at 1"1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.
1 inch equals 2.5 miles
0 1.25 2.5 Miles
Segment 1
Segment 2A/2B
Lenwood
Helendale
Oro Grande
Adelanto
Victorville
Apple Valley
395
15
Plants
Barstow woolly sunflower
Booth's evening-primrose
Mojave monkeyflower
Animals
Burrowing owl
Coast (San Diego) horned lizard
Le Conte's thrasher
Mohave ground squirrel
Mohave river vole
Pallid bat
Silver-haired bat
Summer tanager
Victorville shoulderband
Western yellow-billed cuckoo
1
2
3
4
5
6
7

DesertXpress Project EIS

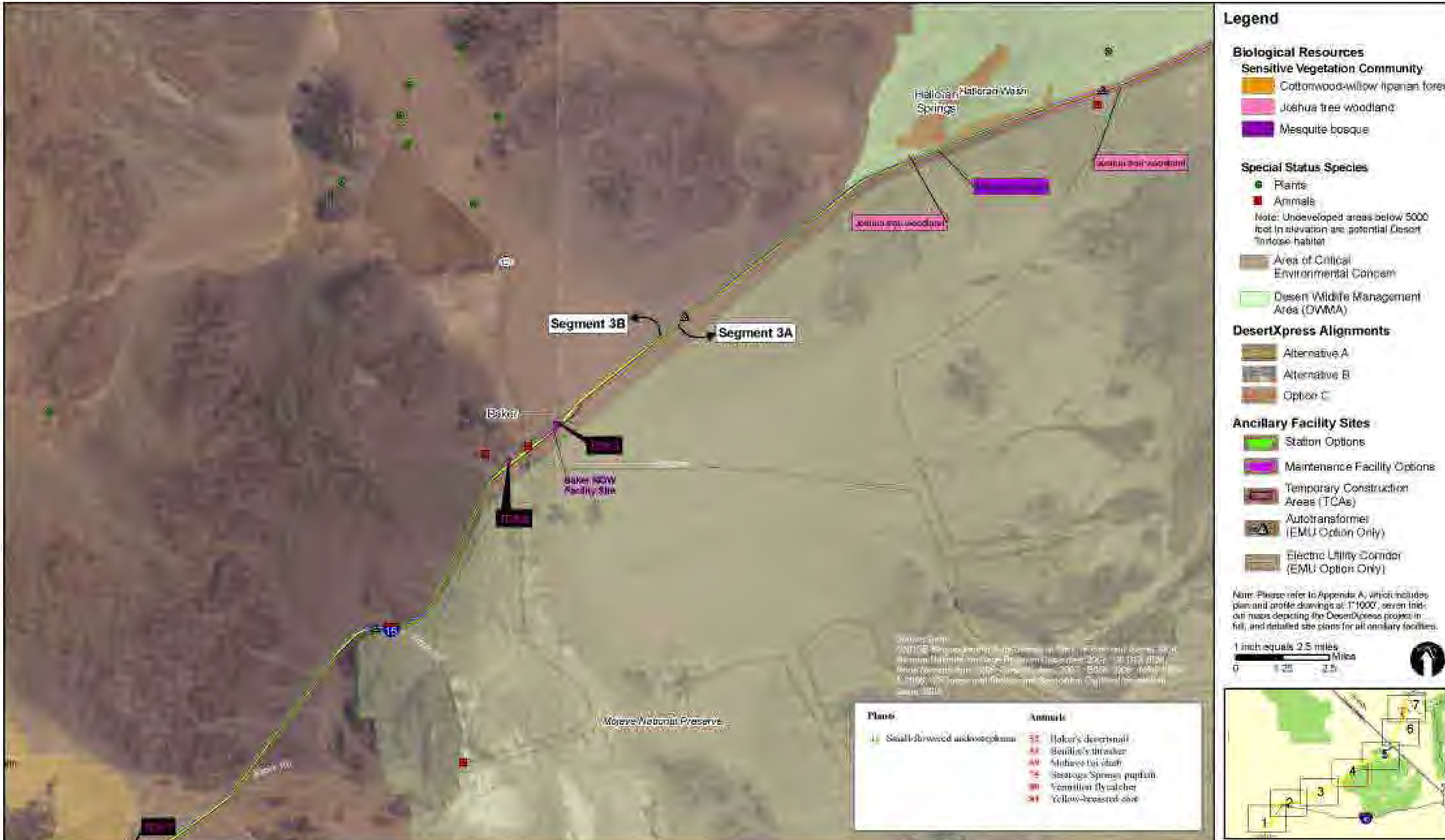
Biological Resources (2) FIG 3-14.2



DesertXpress Project EIS

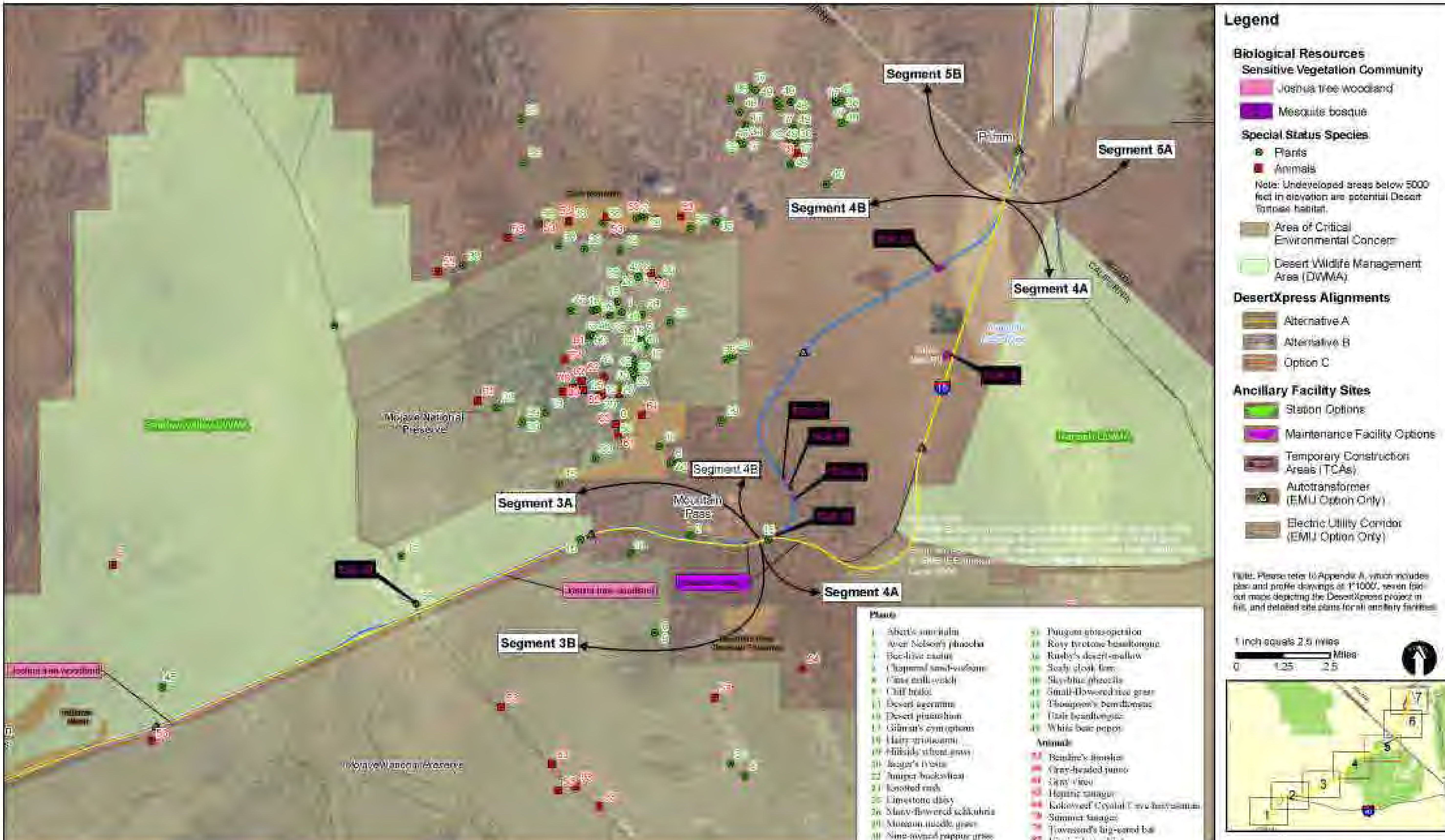
Biological Resources (3)

FIG 3-14.3



DesertXpress Project EIS

Biological Resources (4) FIG 3-14.4



DesertXpress Project EIS

Biological Resources (5)

FIG 3-14.5


Segment 6B/6C
Segment 6A
Segment 5B
Segment 5A
Las Vegas MBF Site Option 1 - Sloan
Large Scale Translocation Site (Desert Tortoise)
Jean
15
NEVADA
CALIFORNIA
Segment 5A
Segment 5B
Primm
Legend
Biological Resources
Sensitive Vegetation Community
Joshua tree woodland
Mesquite bosque
Special Status Species
Plants
Animals
Note: Undeveloped areas below 5000 feet in elevation are potential Desert Tortoise habitat.
Area of Critical Environmental Concern
Desert Wildlife Management Area (DWMA)
DesertXpress Alignments
Alternative A
Alternative B
Option C
Ancillary Facility Sites
Station Options
Maintenance Facility Options
Temporary Construction Areas (TCAs)
Autotransformer (EMU Option Only)
Electric Utility Corridor (EMU Option Only)
Note: Please refer to Appendix A, which includes plan and profile drawings at 1"1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.
1 inch equals 2.5 miles
Miles
0 1.25 2.5
Plants
Rosy twotone beardtongue
Yellow twotone beardtongue
1
2
3
4
5
6
7


Legend
Biological Resources
Sensitive Vegetation Community
Joshua tree woodland
Mesquite bosque
Special Status Species
Plants
Animals
Note: Undeveloped areas below 5000 feet in elevation are potential Desert Tortoise habitat.
Area of Critical Environmental Concern
Desert Wildlife Management Areas (DWMA)
DesertXpress Alignments
Alternative A
Alternative B
Option C
Ancillary Facility Sites
Station Options
Maintenance Facility Options
Temporary Construction Areas (TCAs)
Autotransformer (EMU Option Only)
Electric Utility Corridor (EMU Option Only)
1 inch equals 2.5 miles
Miles
0
1.25
2.5
Las Vegas
Segment 7C
Segment 7A/7B
Las Vegas Central Station B
Las Vegas Valley MSF Site Option 1 - Robindale Ave.
Las Vegas Valley MSF Site Option 2 - Wigwam Ave.
Segment 6C
Segment 6A/6B
Henderson
Segment 5A
Segment 5A
Plants
Las Vegas bearpoppy
Las Vegas buckwheat
Las Vegas catseye
Animals
Spotted Bat
1
2
3
4
5
6
7

Wetlands

The data collected as part of the field surveys is currently being used to complete the significant nexus criteria as defined by the recent USACE jurisdictional determination guidance. Many of the washes in the study area do not meet the USACE definition of a water of the United States. As of August 2008, the USACE is currently deliberating on the jurisdictional status of the Mojave River, which terminates in a playa north of Barstow, California. Drainages within the study area that have been determined to be jurisdictional by the USACE include Duck Creek, Tropicana Wash, and Flamingo Wash, which drain into the Las Vegas Wash and into Lake Mead.

Invasive Plant Species

A project area comprehensive survey was not completed for invasive plant species. A review of the existing literature in addition to observations made by resource specialist during general project site visits have identified a number of noxious weed species known to occur in the study area. These include saltcedar (*Tamarix ramosissima*), halogeton (*Halogeton glomeratus*), white horsenettle (*Solanum elaeagnifolium*), yellow starthistle (*Centaurea solstitialis*), Dalmatian toadflax (*Linaria dalmatica*), Russian thistle (*Salsola tragus*), puncture vine (*Tribulus terrestris*), camelthorn (*Alhagi camelorum*), giant reed (*Arundo donax*), Sahara mustard (*Brassica tournefortii*), red brome (*Bromus madritensis*), fountain grass (*Pennisetum setaceum*), and tree-of-heaven (*Ailanthus altissima*). [24]

Invasive species known to occur throughout the study area in both uplands habitats and near ephemeral and perennial drainages and include Sahara mustard, red brome, and Russian thistle. Species known to only occur within and immediately adjacent to perennial drainages include saltcedar, halogeton, white horsenettle, yellow starthistle, Dalmatian toadflax, Russian thistle, puncture vine, camelthorn, giant reed (Arundo donax), fountain grass (Pennisetum setaceum), and tree-of-heaven (Ailanthus altissima). Sahara mustard and Russian thistle are commonly found within the project area within the right-of-way of I-15 and areas where surface disturbing activities have occurred.

Special-Status Plants

California: Information sources, identified previously in this section, indicated 158 special status plant species that could occur in the California section of the project study area including species known to occur within 10 miles of the project study area and all plant species covered under habitat conservation plans crossed by the alignment.[25] Of these species, it was determined that 98 had no potential to occur because the project study area is outside their geographic or elevation range, or their habitats (e.g., pinyon-juniper woodland) are not present in the project study area. An additional 12 species were considered unlikely to occur. Based on current distribution information and the presence of suitable habitat conditions in the project study area, it was determined that 48 special status plant species could occur in the project study area in California. The listing status, geographic range, preferred habitat, and likelihood

[24] Mojave Weed Management Area, 2007.

[25] CNDDB, 2008.

for occurrence in the project study area are provided in Table 3.14-3.

Nevada: Information sources, identified previously in this section, indicated 48 special status plant species could occur within the region crossed by the Nevada section of the project (Table 3.14-4). This total includes species known to occur within 2 miles of the project study area and all plant species covered under the Clark County MSHCP.26 Of these species, it was determined that 37 had no potential to occur because the project study area is outside their geographic or elevation range, or their habitats (e.g., pinyon-juniper woodland) are not present in the project study area. An additional 4 species were considered unlikely to occur. Based on current distribution information and the presence of suitable habitat conditions, it was determined that five special status plant species could occur in the project study area in Nevada. The listing status, geographic range, preferred habitat, and likelihood for occurrence in the project study area are provided in Table 3.14-4.

Special-Status Wildlife

California: Information sources, identified previously in this section, indicated that 1 invertebrate, 5 fish, 3 amphibian, 6 reptile, 38 bird, and 22 mammal special status species could occur in the California section of the project (Table 3.14-5). After the reconnaissance-level and protocol surveys it was determined that 2 fish, 5 reptile, 20 bird, and 10 mammal special status species could occur in the project study area in California.

Nevada: Information sources, identified previously in this section, indicated that 10 invertebrate, 2 amphibian, 16 reptile, 9 bird species, and 4 mammal special status species could occur within the area crossed by the Nevada section of the project (Table 3.14-6). After further study, it was determined that 15 reptile, 3 bird, and 1 mammal special status species could occur in the project study area in Nevada.

State or Federally listed threatened or endangered species known or having potential to occur in the project study area will be described in the Biological Assessment (BA). The BA will be prepared with the Final EIS and will reflect the Agency's preferred alternative. See Tables 3.14-5 and 3.14-6 for information on these special-status species including their regulatory status, distribution and habitat preferences, and occurrence in the project study area.

3.14.3.2 Biological Resources by Segment

This section provides a detailed description of habitat types and sensitive biological resources within each segment of the project study area. For most discussions, the project study area will be defined as the right-of-way and immediately adjacent parcels, but may differ for resources with broader study areas such as sensitive communities (e.g., riparian habitat) and special-status wildlife (e.g., desert tortoise).

For each segment, a table lists each sensitive resource, special-status species occurrence and/or potential habitat, and acreages of sensitive communities and mapped within each segment. Sensitive biological resources are identified on Figures 3-14.1 to 3-14.7.

Segment 1 - California

Segment 1 would parallel I- 15 between Victorville and Stoddard Mountain Road, where it then would angle northward away from I-15 and cross relatively undisturbed creosote bush scrub and saltbush scrub. The alignment would then angle northwesterly near the junction of National Trails Highway and Hinkley Road. Table 3.14-2 lists the sensitive biological resources with potential to occur in Segment 1. Figure 3-14.1 shows the Segment 1 alignment and the locations and distributions of these resources in and near the segments.

Table 3.14-2 Sensitive Biological Resources Known or with Potential to Occur in Segment 1

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 1 Alternatives
Sensitive Plant Communities & Wetlands			
Waters of the United States including Wetlands		Coordination regarding jurisdiction of surface water resources within the project study area is currently underway with the USACE. The drainages within the study area are ephemeral. The principal drainage in this area is the Mojave River.	Yes
Special-Status Plant Species			
Mojave monkeyflower	–/–/S/–	Approximately 20 occurrences between the alternatives A and B north of Victorville, of which nine occurrences are less than 3 miles from the project study area	Yes
Special-Status Wildlife Species			
Desert tortoise	T/T/--/W, NE	CNDDB identified suitable habitat in the project study area and several tortoises were observed near project study area during 2007 surveys. Suitable habitat occurs in desert scrub habitats.	Yes
Mojave fringe-toed lizard	--/SSC/S/W, NE	No CNDDB occurrences in project study area. Suitable habitat occurs in sandy habitat along the northern areas of Segment 1B.	Yes
Cooper's hawk	--/SSC/--/W, NE	No suitable nesting habitat within project study area..	No
Least Bell's vireo	E/E/--/W, NE	One CNDDB occurrence within 4 miles of project study area. No suitable nesting habitat within project study area. .	No
Le Conte's thrasher	--/SSC/--/W, NE	Several CNDDB occurrences within	Yes

[26] Nevada Natural Heritage Program Database, 2007.

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 1 Alternatives
		10 miles of project study area. Suitable habitat in desert scrub communities.	
Loggerhead shrike	--/SSC/--/W	Observed during 2007 desert tortoise surveys. Suitable habitat occurs throughout project study area.	Yes
Southwestern willow flycatcher	E/E/--/W, NE	No suitable nesting habitat within project study area.	No
Prairie falcon	--/SSC/--/NE	No CNDDB occurrences within 10 miles of project study area. May occur in cliff area at southern end of alignment near Victorville.	Yes
Summer tanager	--/SSC/--/W, NE	No suitable habitat within project study area.	No
Swainson's hawk		No suitable nesting habitat within project study area.	No
Western burrowing owl	--/T/--/W, NE	Several occurrences within 10 miles of project study area and one owl pellet observed during desert tortoise surveys in 2007, though no owls observed. Suitable habitat occurs throughout project study area in desert scrub habitats.	Yes
Western yellow-billed cuckoo	C/E/--/W, NE	No suitable nesting habitat within project study area.	No
Vermillion flycatcher	--/SSC/--/ W, NE	No suitable nesting habitat within project study area.	No
Yellow warbler	--/SSC/--/W, NE	No suitable nesting habitat within project study area.	No
Yellow breasted chat	--/SSC/--/W, NE	No suitable nesting habitat within project study area.	No
Pallid bat	--/SSC/S/W, NE	No CNDDB occurrence within 10 miles of project study area; may occur in cliff area at southern end of alignment near Victorville	Yes
Townsend's big-eared bat	--/SSC/S/W, NE	No CNDDB occurrences within 10 miles of project study area; may occur in cliff area at southern end of alignment near Victorville	Yes
Greater western mastiff bat	--/SSC/--/W, NE	No CNDDB occurrences within 10 miles of project study area; may occur in cliff area at southern end of alignment near Victorville	Yes
Spotted bat	--/SSC/S/W, NE	No CNDDB occurrences within 10 miles of project study area; may occur in cliff area at southern end	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 1 Alternatives
		of alignment near Victorville.	
Silver-haired bat	--/SSC/--/--	One CNDDB occurrence along Mojave River within 10 miles of project study area. No suitable roosting habitat within project study area.	No
Mojave River vole	--/SSC/--/W	No suitable habitat within project study area.	No
Mohave ground squirrel	--/T/--/W, NE	Several CNDDB occurrences within 10 miles of the project study area. Habitat assessment indicates suitable habitat occurs in project study area.	Yes

Source: Jones & Stokes, 2008.

Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
PE = proposed for federal listing as endangered under the federal Endangered Species Act.
PT = proposed for federal listing as threatened under the federal Endangered Species Act.
C = species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded.
FS = U.S. Forest Service sensitive species (Region).
-- = no listing.

State

E = listed as endangered under the California Endangered Species Act.
T = listed as threatened under the California Endangered Species Act.
FP = fully protected under the California Fish and Game Code.
SSC = species of special concern in California.
-- = no listing.

BLM

S = listed as sensitive by the Bureau of Land Management.
-- = no listing.

HCP

W = species covered by the West Mojave Habitat Conservation Plan.
NE = species covered by the Northern and Eastern Mojave Plan-- = no listing.

Segment 2 - California

The western end of Segment 2 would cross the Mojave River as well as a mosaic of agricultural and rural residential land uses along the valley floor. Segment 2A/2B would follow the same alignment until the west side of the small drainage valley east of Barstow. At this location, Segment 2A would divert approximately 0.75 miles to the north of Segment 2B, where the two segments would then parallel one another to Yermo. Segment 2B would parallel I-15 and traverse disturbed and rural-residential habitats. Segment 2A would cross relatively undisturbed creosote bush and saltbush scrub habitats and a dry lakebed. Table 3.14-3 lists sensitive biological resources known or with potential to occur in Segment 2. Figure 3-14.2 shows Segments 2A/2B and the distributions of these resources in and near the segments.

Table 3.14-3 Sensitive Biological Resources with Potential to Occur in Segment 2

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 2 Alternatives
Special-Status Plant Species			
Barstow woolly sunflower	–/–/–/W	One CNDDB occurrence approximately 2 miles south of project study area west of Barstow.	Yes
Creamy blazing star	–/–/–/–	One CNDDB occurrence approximately 2.5 miles south of project study area at Yermo.	Yes
Crucifixion thorn	–/–/–/NE, W	One CNDDB occurrence approximately 2.5 miles south of project study area at Yermo.	Yes
Parish's phacelia	–/–/–/W	One CNDDB occurrence approximately 2.5 miles south of project study area at Yermo.	Yes
Mojave monkeyflower	–/–/S/–	One CNDDB occurrence approximately 3 miles north of project study area at Yermo; others located further from project study area south of Barstow and Yermo.	Yes
Special-Status Wildlife Species			
Desert tortoise	T/T/--/W, NE	Desert tortoises observed during 2007 surveys. Suitable habitat occurs throughout project study area.	Yes
Mojave fringe-toed lizard	--/SSC/S/W, NE	No CNDDB occurrences in project study area. Suitable habitat occurs in sandy habitat south of Mojave River crossing.	Yes
Western burrowing owl	--/SSC/S/W, NE	No CNDDB occurrences within 10 miles of project study area. Suitable habitat occurs throughout project study area in desert scrub and agricultural habitats.	Yes
Le Conte's thrasher	--/SSC/--/W, NE	Several CNDDB occurrences within 10 miles of project study area. Suitable habitat throughout project study area in desert scrub communities.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 2 Alternatives
Loggerhead shrike	--/SSC/--/W	Observed in 2007 desert tortoise surveys. Suitable habitat occurs throughout project study area.	Yes
Western snowy plover	--/SSC/--/W, NE	No CNDDB occurrences within 10 miles of project study area. Potential nesting habitat in portion of project study area that crosses dry lakebed.	2A only
Desert bighorn sheep	--/ FP/S/W, NE	CNDDB records indicate suitable habitat within 10 miles of project study area. Suitable habitat does not occur within project study area.	No
Mohave ground squirrel	--/T/--/W, NE	Several CNDDB occurrences within 10 miles of project study area. Habitat assessment indicates suitable habitat in areas with desert scrub.	Yes
Townsend's big-eared bat	--/SSC/S/W, NE	One CNDDB occurrence within 10 miles of project study area. No suitable roosting habitat in project study area.	No
Special Management Lands			
Desert Tortoise Critical Habitat		Superior-Cronese Unit	Yes

Source: Jones & Stokes, 2008.

Segment 3 - California

Segment 3A would be located in the median of I-15 and Segment 3B would be adjacent to and within the I-15 corridor. As the segments are in close proximity to each other, they are evaluated here as a single segment. Both alternatives would be within generally disturbed areas alongside I-15. To facilitate analysis of this 90 mile segment, Segment 3 is divided into four south to north oriented zones:

- Yermo to Baker
- Baker to Halloran Summit
- Halloran Summit to Mountain Pass
- Mountain Pass area

***Yermo to Baker*:** The alignments would cross disturbed habitats, creosote bush scrub, and saltbush scrub. Just south of Baker, the alignment would pass adjacent to Soda Dry Lake.

***Baker to Halloran Summit*:** From Baker, the segment would ascend a broad, sloping alluvial fan that flanks the southwest side of the Halloran Summit, and would cross disturbed habitats, creosote bush scrub, and saltbush scrub.

***Halloran Summit to Mountain Pass*:** In the Shadow Valley between Halloran Summit and Mountain Pass, Segment 3 crosses disturbed habitats, creosote bush scrub, saltbush scrub, and Joshua tree woodland.

***Mountain Pass Area*:** The Mountain Pass area is characterized by extensive areas of blackbrush shrubland.

Table 3.14-4 lists the sensitive biological resources known or with potential to occur in Segment 3. Figures 3-14.2 through 3-14.5 show Segment 3A and 3B alignments and the locations and distributions of these resources in and near the segments.

Table 3.14-4 Sensitive Biological Resources with Potential to Occur in Segment 3

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 3 Alternatives
Sensitive Plant Communities & Wetlands			
Mesquite bosque	–/S/–/–	Three occurrences mapped in the Mojave River Wash at Cronese Valley; one occurrence mapped at east end of alignment in Wheaton Wash on east side of Mountain Pass.	Yes
Special-Status Plant Species			
Parish's phacelia	–/–/–/W	Two occurrences mapped: one northwest of Yermo approximately 2 miles from the alignment, and one north of Harvard approximately 4 miles from the alignment	Yes
Parish's popcornflower	–/–/–/–	One CNDDB occurrence in Mojave River wash 2.5 miles south or project study area east of Harvard Road.	Yes
Small-flower androstephium	–/–/–/W	Two CNDDB occurrences, one within 3 miles project study area northwest of Afton Canyon, one adjacent to alignment at Cronese Valley.	Yes
Crucifixion thorn	–/–/–/NE, W	One CNDDB occurrence one mile north of project study area east of Afton Canyon.	Yes
Thorny milkwort	–/–/–/–	One CNDDB occurrence approximately 1 miles north of project study area at Halloran springs.	Yes
Rusby's desert-mallow	–/–/S/NE	One CNDDB occurrence 1.5 miles north of project study area at Kingston Wash.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 3 Alternatives
Desert pincushion	–/–/–/–	CNDDB occurrences adjacent to alignment at Kingston Wash and at west end of Mountain Pass.	Yes
Hairy erioneuron	–/–/–/–	One CNDDB occurrence approximately one mile south of project study area at west end of Mountain Pass.	Yes
Aven Nelson's phacelia	–/–/–/–	One CNDDB occurrence adjacent to alignment at Mountain Pass.	Yes
Scaly cloak fern	–/–/–/NE	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Mormon needle grass	–/–/–/–	CNDDB occurrences on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Nine-awned pappus grass	–/–/–/NE	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Wright's bedstraw	–/–/S/NE	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Clark Mountain spurge	–/–/–/–	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Gilman's cymopterus	–/–/–/NE	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Sky-blue phacelia	–/–/–/–	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Chamber's physaria	–/–/–/–	One CNDDB occurrence on southern edge of Clark Mountain north of alignment at Mountain Pass.	Yes
Special-Status Wildlife Species			
Arroyo chub	--/SSC/--/--	Known to occur in the Mojave River. Though not directly in the project study area. Drainages flowing under I-15 could carry sediments and contaminants into the Mojave River.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 3 Alternatives
Mojave tui chub	E/E/--/W	Known to occur in the Mojave River. Though not directly in the project study area, drainages flowing under I-15 could carry sediments and contaminants into the Mojave River.	Yes
Saratoga Springs pupfish	--/SSC/--/--	CNDDB occurrence within 10 miles of project study area. No suitable habitat in project study area.	No
Banded Gila Monster	--/SSC/S/W, NE	No CNDDB occurrences within 10 miles of project study area. Suitable habitat occurs in rocky habitat	Yes
Desert tortoise	T/T/--/W, NE	Desert tortoises observed during 2007 surveys. Suitable habitat occurs in washes crossed by I-15.	Yes
Western pond turtle	--/SSC/S/W	Known to occur in the Mojave River. Though not directly in the project study area, drainages flowing under I-15 could carry sediments and contaminants into the Mojave River.	Yes
Bendire's thrasher	--/SSC/S/W, NE	Several CNDDB occurrences in project study area. Suitable habitat in Joshua tree woodland.	Yes
Crissal thrasher	--/SSC/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable habitat in larger washes.	Yes
Golden Eagle	PR/SSC,FP/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable nesting habitat in rocky habitat	Yes
Gray vireo	--/SSC/S/W, NE	Several CNDDB occurrences within 10 miles of project study area along Mojave River. No suitable habitat within project study area.	No
Le Conte's thrasher	--/SSC/--/W, NE	No CNDDB occurrences within project study area. Suitable habitat throughout project study area in desert scrub communities.	Yes
Prairie falcon	--/SSC/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable nesting habitat in rocky habitat.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 3 Alternatives
Summer tanager	--/SSC/--/W, NE	Several CNDDB occurrences within 10 miles of project study area along Mojave River. No suitable habitat within project study area.	No
Vermillion flycatcher	--/SSC/--/ W, NE	CNDDB occurrence within 10 miles of project study area along Mojave River and at Baker wastewater treatment plant. No suitable habitat within project study area.	No
Western burrowing owl	--/SSC/S/W, NE	No occurrences within 10 miles of project study area. Suitable habitat occurs throughout project study area in desert scrub and agricultural habitats.	Yes
Western snowy plover	--/SSC/--/W, NE	No CNDDB occurrences within 10 miles of project study area. Potential nesting habitat in portion of project study area that passes near Soda Dry Lake.	Yes
Yellow-breasted chat	--/SSC/--/W, NE	CNDDB occurrence near project study area at Baker wastewater treatment plant.	Yes
Desert bighorn sheep	--/ FP/S/W, NE	CNDDB records indicate suitable habitat within 10 miles of project study area. Suitable habitat does occur within project study area.	Yes
Hoary bat	--/SSC/--/--	One CNDDB occurrence within 10 miles of project study area. No suitable roosting habitat n project study area.	No
Pallid bat	--/SSC/S/W, NE	CNDDB occurrences within 10 miles of project study area along Mojave River. No suitable roosting habitat in project study area.	No
Townsend's big-eared bat	--/SSC/S/W, NE	One CNDDB occurrence within 10 miles of project study area. Suitable roosting habitat in project study area.	Yes
Special Management Lands			
BLM Area of Critical Environmental Concern		Cronese Basin	3B only
BLM Area of Critical Environmental Concern		Halloran Wash	3B only
Desert Tortoise Critical Habitat		Ivanpah Unit	3B only

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 3 Alternatives
Desert Tortoise Critical Habitat		Superior-Cronese Unit	3B only

Source: Jones & Stokes, 2008.

Segment 4 - California

In the Mountain Pass area, Segment 4 is dominated by blackbrush shrubland. Just east of Mountain Pass, the alternatives would diverge.

Segment 4B would cross the northeast flank of the Clark Mountains through steep rocky, sparsely vegetated shrubland, before descending into creosote bush scrub around Wheaton Wash. There is potential for springs to be present which could provide an important water source for wildlife including desert bighorn sheep and a variety of bird species.

Segment 4A would follow I-15 and Ivanpah Road through the MNP, generally within disturbed habitats, and would then cross the dry bed of Ivanpah Lake. Table 3.14-5 lists the sensitive biological resources known or with potential to occur in Segment 4. Figure 3-14.5 shows Segment 4A and 4B alignments and the locations and distributions of these resources in and near the segments.

Table 3.14-5 Sensitive Biological Resources with Potential to Occur in Segment 4

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 4 Alternatives
Sensitive Plant Communities & Wetlands			
Mesquite bosque	–/S/–/–	Three occurrence mapped in Wheaton Wash on east side of Mountain Pass	Yes
Special-Status Plant Species			
Mormon needle grass	–/–/–/–	One CNDDB occurrence approximately 1 mile west of alignment at Mountain Pass	4B only
Rusby's desert-mallow	–/–/S/NE	One CNDDB occurrence approximately 1.5 miles west of alignment at Mountain Pass	4B only
Viviparous foxtail cactus	–/–/–/–	One CNDDB occurrence approximately 1.5 miles west of alignment at Mountain Pass	4B only
Special-Status Wildlife Species			

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 4 Alternatives
Desert tortoise	T/T/--/W, NE	Desert tortoises observed during 2007 surveys. Suitable habitat occurs throughout project study area in desert scrub habitats.	Yes
Banded Gila monster	--/SSC/S/W, NE	No CNDDB occurrences within 10 miles of project study area. Suitable habitat occurs in rocky habitat	4B only
Bendire's thrasher	--/SSC/S/W, NE	No occurrences in project study area. Potential nesting habitat in Joshua tree woodland.	Yes
Crissal thrasher	--/SSC/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable habitat in larger washes.	Yes
Golden eagle	PR/SSC,FP/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable nesting habitat occurs in rocky habitat	4B only
Le Conte's thrasher	--/SSC/--/W, NE	No occurrences within project study area. Suitable habitat in desert scrub communities.	Yes
Prairie falcon	--/SSC/--/NE	No CNDDB occurrences within 10 miles of project study area. Suitable nesting habitat occurs in rocky habitat	4B only
Western burrowing owl	--/SSC/S/W, NE	No occurrences within 10 miles of project study area. Suitable habitat occurs in desert scrub habitat.	Yes
Western snowy plover	--/SSC/--/W, NE	No CNDDB occurrences within 10 miles of project study area. Potential nesting habitat on Ivanpah Dry Lake.	Yes
California leaf-nosed bat	SC/SSC/S	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Desert bighorn sheep	--/ FP/S/W, NE	CNDDB records indicate suitable habitat within 10 miles of project study area. Suitable habitat does occur within project study area. Bighorn sheep maybe especially dependent on springs as a water source in the Clark Mountains	4B only
Greater western mastiff bat	--/SSC/--/W, NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 4 Alternatives
Hoary bat	--/SSC/--/--	One CNDDB occurrence within 10 miles of project study area. No suitable roosting habitat n project study area.	No
Long-legged myotis	--/--/S/NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Pallid bat	--/SSC/S/W, NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Townsend's big-eared bat	--/SSC/S/W, NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Spotted bat	--/SSC/S/W, NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Western small-footed myotis	--/--/S/NE	No CNDDB occurrences in 10 miles of project study area. Potential to roost in caves located in project study area.	4B only
Special Management Lands			
National Park Service		Mojave National Preserve	4A only
Desert Tortoise Critical Habitat		Ivanpah Unit	4A only

Source: Jones & Stokes, 2008.

Segment 5 - Nevada

Segments 5A and 5B would be in close proximity to each other, in the median and east or west sides of I-15, respectively, and thus have similar habitats and vegetation. In the Ivanpah Valley, between the state line and North McCullough Mountains, the Segment 5 area is relatively flat; the alignments would traverse creosote bush scrub habitat.

In the North McCullough Mountains, the segments would cross through steep, rocky, sparsely vegetated shrubland before descending into the southern end of the Las Vegas Valley.

Table 3.14-6 lists the sensitive biological resources known or with potential to occur in Segment 5. Figures 3-14.5 and 3-14.6 show Segment 5A and 5B alignments and the locations and distributions of these resources in and near the segments.

Table 3.14-6 Biological Resources with Potential to Occur in Segment 5

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 5 Alternatives
Special-Status Plant Species			
Rosy two-tone beardtongue	--/--/S/C	Three NNHP occurrences within the project study area northeast of Jean. Species is known to occur within proposed alignments.	Yes
Yellow two-tone beardtongue	--/--/S/E	Two NNHP occurrence less than 0.25 miles from project study area, one northeast of Jean and one north of Primm.	Yes
Special-Status Wildlife Species			
Banded gecko	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Great Basin collard lizard	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Desert iguana	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Large-spotted leopard lizard	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Desert tortoise	T/T/--/W, NE	Nevada Natural Heritage Program occurrence in project study area just north of Jean. Suitable habitat occurs	Yes
Banded Gila monster	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes
Western chuckwalla	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 5 Alternatives
Sidewinder	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Speckled rattlesnake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Mojave green rattlesnake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Glossy snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Common king snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Western leaf-nosed snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Western long-nosed snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs throughout the project study area.	Yes
Sonoran lyre snake	--/P/S/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes
American peregrine falcon	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable nesting habitat occurs where project study area crosses through the l North McCullough Mountain pass.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segment 5 Alternatives
Blue grosbeak	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in larger washes that are crossed by the project.	Yes
Phainopepla	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in larger washes that are crossed by the project.	Yes
Special Management Lands			
Large Scale Translocation Site (LSTS) - Desert Tortoise Relocation Area		Along west side of I-15 from just north of Primm to Jean.	5B only

Source: Jones & Stokes, 2008.

Status explanations:

Federal

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
-- = no listing.

State

P = protected by the state of Nevada.
SS = special status species by the state of Nevada.
-- = no listing.

BLM

S = listed as sensitive by the Bureau of Land Management.
-- = no listing.

HCP

C = species listed as a "Covered" species by the Clark County Multiple Species Habitat Conservation Plan
E = species listed as an "Evaluation" species by the Clark County Multiple Species Habitat Conservation Plan
W = species listed as a "Watch List" species by the Clark County Multiple Species Habitat Conservation Plan
-- = no listing.

Segments 6 and 7 - Nevada

Segments 6A and 6B, as well as 7A and 7B, would be in close proximity to each other, in the median and side of I-15, respectively, and thus would have similar habitats and vegetation. The western portions of segments 6A and 6B would cross through the North McCullough Mountains through steep, rocky, sparsely vegetated shrubland creosote bush scrub habitat. The segments would then descend to the southern end of the Las Vegas Valley through creosote bush scrub habitat. Once segments 6A and 6B enter Las Vegas, they cross through disturbed creosote bush scrub habitat, rural developments, and urban areas.

Segments 7A, 7B, and 7C would be located in Las Vegas and thus would occur in an urban environment that provides little to no habitat for sensitive species.

Segment 6C would bypass Segments 6A and 6B in favor of an alignment near or within the corridor of the UPRR. The western end of the segment curves to the northwest through the North McCullough Mountains. This portion of the segment crosses through steep, rocky areas with sparse vegetation. The corridor then curves to the north and descends into the southwest end of Las Vegas Valley. This portion of the segment crosses through creosote bush scrub habitat and rural developments. The segment then enters Las Vegas where it crosses through urban areas.

Table 3.14-7 lists the sensitive biological resources with potential to occur in Segments 6 and 7. Figures 3-14.6 and 3-14.7 show Segments 6 and 7 alignments and the locations and distributions of these resources in and near the segments.

Table 3.14-7 Sensitive Biological Resources with Potential to Occur in Segments 6 and 7

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segments 6 and 7 Alternatives
Sensitive Plant Communities & Wetlands			
Sensitive plant communities		None present in segment	No
Special-Status Plant Species			
Las Vegas bearpoppy	--/SS/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area.	6C only
Las Vegas catseye	--/SS/--/E	No Nevada Natural Heritage Program occurrences in vicinity of project study area.	No
Las Vegas buckwheat	--/--/S/--	Suitable habitat known to occur within the rail alignment.	6C only
Yellow two-tone beardtongue	--/--/S/E	Suitable habitat known to occur within the existing rail and roadway alignment.	Yes
Special-Status Wildlife Species			
Banded gecko	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Great Basin collard lizard	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Desert iguana	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Large-spotted leopard lizard	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Desert tortoise	T/T/--/W, NE	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segments 6 and 7 Alternatives
Western chuckwalla	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes
Sidewinder	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Speckled rattlesnake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Mojave green rattlesnake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Glossy snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Common king snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Western leaf-nosed snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Western long-nosed snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in relatively undisturbed habitat outside of urban areas.	Yes
Sonoran lyre snake	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes

Biological Resource	Status Federal/State/BLM/HCP	Description	Potential for Occurrence in Segments 6 and 7 Alternatives
American peregrine falcon	--/P/S/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs where project study area crosses through the North McCullough Mountain pass.	Yes
Blue grosbeak	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in larger washes that are crossed by the project.	Yes
Phainopepla	--/--/--/C	No Nevada Natural Heritage Program occurrences in vicinity of project study area. Suitable habitat occurs in larger washes that are crossed by the project.	Yes

Source: Jones & Stokes, 2008.

3.14.4 Environmental Consequences

This section discloses potential direct, indirect, and cumulative effects to biological resources. The action alternatives would have effects on vegetation and wildlife through the loss of individual members of populations and communities, the loss of food and water resources, the disruption of movement and travel corridors, and disruption of potential breeding and nesting areas for wildlife.

3.14.4.1 Thresholds

Effects on vegetation and wildlife would be considered adverse if any of the following impacts were to occur:

- Loss of individuals or populations of a Federal or state-listed threatened or endangered species or their habitat;
- Loss of critical habitat for Federally listed threatened or endangered species;
- Loss of habitat that is sensitive or rare in the region, such as mesquite shrubland, Joshua tree wooded shrubland, wetlands, cliff face formations, and surface water sources;
- Substantial loss of populations or habitat of a species that is a Federal candidate, is Federally proposed for listing, is a BLM sensitive species, is a California species of special concern, is on the CNPS Inventory 1B or 2, is identified as a covered species in the Clark County MSHCP, is regionally rare, or is otherwise so sensitive as to jeopardized the continued existence of the species in the region;
- Loss or long-term disruption of wildlife movement corridor;
- Substantial permanent loss of natural vegetation;
- Substantial loss of diversity of species or natural communities and wildlife habitat; and
- Incompatibility with local, state, or Federal land management plans.

3.14.4.2 Methodology

This analysis assumes the action alternatives will result in direct and indirect effects on biological resources within the study area. In assessing the magnitude of potential direct and indirect effects, the following assumptions were made regarding the action alternatives:

- The project limit of disturbance consists of a 400-foot-wide corridor which includes, as appropriate, the DesertXpress alignment and associated right-of-way in areas where the alignment is outside of the immediate I-15 right-of-way. Where the alignment parallels and is adjacent to I-15 the project limit of disturbance extends 200 feet from the centerline away from the I-15 right-of-way and to the I-15 paved shoulder. Where the project is in the median of I-15, the project limit of disturbance will be the width of the existing roadway median. The project also includes associated rail stations, operation and maintenance facilities, autotransformers, and temporary construction easements.

- All vegetation in the project permanent footprint will be removed and permanently lost. Wildlife in these areas would be permanently displaced or destroyed and their natural movement corridors will be disrupted. Vegetation within the limit of disturbance but outside the permanent footprint would be temporarily disturbed during construction activities. A vegetation and topsoil removal and restoration plan would be developed and implemented to reduce temporary impacts to biological resources.
- Project activities that cause adverse impacts to sensitive biological communities, including mesquite shrubland, and Joshua tree wooded shrubland, would cause a localized decrease in these communities.

Direct effects would include, but are not be limited to, grubbing, grading, and other construction and operation activities that disturb vegetation and soil resources and disrupt the biological or hydrologic function of surface water features. Permanent direct effects would result from the placement of fill material for the railway bed and associated stations, operation and maintenance facilities thus converting the area for its current condition to a transportation facility. Temporary direct effects would result from soil compaction, construction dust, water and contaminant run-off from the construction area, and construction-related noise and vibrations from construction equipment.

Indirect effects include, but are not limited to, the modification of habitat functions resulting from wind-blown dust, erosion of sediments, noxious weed invasion, or hydrologic modifications.

3.14.4.3 No Action Alternative

Under the No Action Alternative, no privately-financed high speed passenger rail system would be constructed or operated in the study area. Adverse effects to biological resources associated with the Alternatives A and B would not be expected to occur.

3.14.4.4 Alternatives A and B

Table 3.14-8 includes the sensitive biological resources affected by the Alternatives A and B, including the approximate acres of sensitive plant and wildlife habitats and acres of sensitive biological land use areas.

Table 3.14-8 Biological Resources Affected by Action Alternatives

Resource/Type of Impact		Alternative A	Alternative B	Option C
Biological Resource	Sensitive Plant Community – Permanent Impact		Joshua tree Wooded Shrubland: 83.8 acres Mesquite Shrubland: 1.9 acres	--
	Sensitive Plant Community – Temporary Impact	Mesquite Shrubland: 4.6 acres	Joshua tree Wooded Shrubland: 194.4 acres Mesquite Shrubland: 13.4 acres	--
	Desert Tortoise Habitat – Permanent Impact	611.9 acres to 747.1 acres[1]	1,473.6 acres to 1,604.6 acres [2]	40.2 acres
	Desert Tortoise Habitat – Temporary Impact	2,108.6 acres	4,558.4 acres	232.4 acres
	Mohave Ground Squirrel Habitat – Permanent Impact	329.6 acres to 666.8 acres [3]	346.7 acres to 683.9 acres [4]	--
	Mohave Ground Squirrel Habitat – Temporary Impact	1,745.4 acres	1,184.2 acres	--
Special Management Lands	Desert Tortoise Critical Habitat – Permanent Impact	60.9 acres	555.0 acres	--
	Desert Tortoise Critical Habitat – Temporary Impact	264.0 acres	1,598.9 acres	--
	Superior-Cronese DWMA – Permanent Impact	28.0 acres	274.2 acres	--
	Superior-Cronese DWMA – Temporary Impact	121.11 acres	855.5 acres	--
	Shadow Valley DWMA – Permanent Impact	--	183.4 acres	--
	Shadow Valley DWMA– Temporary Impact	--	447.4 acres	--
	Ivanpah DWMA – Permanent Impact	13.8 acres	--	--
	Ivanpah DWMA– Temporary Impact	59.7 acres	--	--
	ACEC Cronese Basin – Permanent Impact	--	3.6 acres	--
	ACEC Cronese Basin – Temporary Impact	--	16.6 acres	--

	ACEC Halloran Basin – Temporary Impact	--	25.5 acres	--
	NPS Mojave National Preserve – Permanent Impact	13.8 acres	--	--
	NPS Mojave National Preserve – Temporary Impact	59.9 acres	--	--

Source: Jones & Stokes, 2008.

[1] Alternative A totals range from 611.9 acres (Victorville Station 1 and OMSF 1) with the Wigwam Avenue MSF to 747.1 acres (Victorville Station 2 and OMSF 2) with the Sloan Road MSF.

[2] Alternative B totals range from 1,473.6 acres (Victorville Station 1 and OMSF 1) with the Wigwam Avenue MSF to 1,604.6 acres (Victorville Station 1 and OMSF 2) with the Sloan Road MSF.

[3] Alternative A totals range from 329.6 acres with Victorville Station 1 and OMSF 1 to 666.8 acres with Victorville Station 2 and OMSF 2.

4 Alternative B totals range from 346.7 acres with Victorville Station 1 and OMSF 1 to 683.9 acres with Victorville Station 2 and OMSF 2.

Table 3.14-9 identifies the number of separate special status species potentially impacted by the Alternative A, Alternative B, and Option C.

Table 3.14-9 Special Status Species Affected by Action Alternatives

Biological Resource	Alternative A	Alternative B	Option C
Special-Status Plants	22	23	2
Special-Status Fish	2	2	--
Special-Status Reptiles	17	17	--
Special-Status Birds	12	12	--
Special-Status Mammals	7	12	--

3.14.4.5 Resource-Specific Effects

Potential Introduction or Spread of Noxious Weeds into Natural Vegetation Communities

Construction activities associated with the action alternatives have the potential to introduce or spread noxious weeds. Ground disturbing activities and seed dispersal via construction equipment or wind-blown deposits have the potential to adversely impact the natural vegetation communities within the project area. Noxious weeds typically displace native plant populations, degrade sensitive natural communities, and reduce habitat quality for special-status wildlife. In the Mojave Desert, noxious weed infestation often alters the wildland fire frequency and intensity by increasing the fuel load. The Mojave Desert natural vegetation communities are not fire-adapted.

Loss of or Damage to Native Vegetation Communities

Construction-related activities will result in the loss of native vegetation in areas that are cleared for temporary construction easements, staging areas, and equipment access routes. Desert vegetation communities are slow to recover after disturbance and disturbed communities are vulnerable to the introduction of non-native invasive species. Construction-related activities could result in impacts and loss of natural communities, including sensitive vegetation communities and habitat for special-status species, within the project area and within the immediate vicinity the construction area. The operation and maintenance infrastructure of the proposed facility would convert native vegetation communities to transportation use and permanently removed these communities. Damage to or loss of these communities would be considered an adverse effect.

Loss of Sensitive Vegetation Communities

Construction activities associated with the action alternatives would result in the loss of sensitive vegetation communities. This impact could result in long-term degradation of a sensitive plant community. The operation and maintenance infrastructure of the proposed facility would convert sensitive vegetation communities to transportation use and permanently removed these communities.

Segment 2: Segment 2A/2B would temporarily affect 4.6 acres of Mesquite Shrubland.

Segment 3: Alternative B would temporarily affect 13.4 acres of Mesquite Shrubland and 194.4 acres of Joshua Tree Wooded Shrubland. Alternative B would permanently impact 1.9 acres of Mesquite Shrubland and 83.8 acres of Joshua Tree Wooded Shrubland.

Segment 4: Alternative A would affect 0.003 acre of Mesquite Shrubland.

Mesquite Shrubland and Joshua Tree Wooded Shrubland are considered sensitive by state (CDFG) and local (San Bernardino County) authorities. Under the San Bernardino County Development Code (April 2007), regulated desert native plants and regulated riparian plants shall not be removed except under a Tree or Plant Removal Permit in compliance with Section 88.01.050 (Tree or Plant Removal Permits). Regulated desert native plants are defined as:

1. The following desert native plants with stems two inches or greater in diameter or six feet or greater in height:
    a. *Dalea spinosa* (smoketree).
    b. All species of the genus *Prosopis* (mesquites).
2. All species of the family *Agavaceae* (century plants, nolinas, yuccas).
3. Creosote Rings, 10 feet or greater in diameter.
4. All Joshua trees.
5. Any part of any of the following species, whether living or dead:
    a. *Olneya tesota* (desert ironwood).
    b. All species of the genus *Prosopis* (mesquites).

c. All species of the genus *Cercidium* (palos verdes).

Regulated riparian plants are defined as vegetation within 200 feet of the bank of a stream, or in an area indicated as a protected riparian area on an overlay map or Specific Plan; streams include those shown on USGS topographic maps as perennial or intermittent, blue or brown lines (solid or dashed), and river wash areas.

Impacts to Special-Status Plant Populations

Within the permanent right-of-way, the operation and maintenance of the proposed facility would convert special-status plant populations and their habitat to transportation use and permanently removed these populations. Due to prolonged drought in the region, focused presence/absence surveys have not been conducted for the project alignment. Preliminary surveys were conducted in Nevada during spring 2006. These surveys will be conducted in California once drought conditions dissipate and the extent of sensitive plant populations can be determined. The surveys in Nevada would be re-conducted at this time. These surveys will be conducted prior to initiating construction and stipulated project avoidance, minimization, and mitigation requirements would be revised in cooperation with resource agencies to reduce or mitigate adverse impacts to sensitive plant populations.

Impacts to Desert Tortoise and Desert Tortoise Habitat

The acreage of permanent loss of suitable tortoise habitat by project element is listed in Table 3.14-10 and acreages of temporary habitat are listed in Table 3.14-11. Only those project elements that would result in a permanent or temporary habitat loss are listed in the tables. The loss of suitable habitat would be an adverse effect because it would reduce foraging habitat and areas suitable for the construction of burrows.

Desert tortoises are known to occur within the action alternatives in Segments 1, 2, 3, and 4 based on CNDDB (2008) records and surveys conducted by FRA's EIS consultant. Suitable habitat for desert tortoises occurs in Segments 1-6. Construction-related activities in suitable habitat could result in injury or mortality of desert tortoises and removal of foraging habitat. Suitable desert tortoise habitat does not occur in Segment 7 due to urbanization of the area.

The construction of Alternative A would impact desert tortoise habitat within the Superior-Cronese DWMA in Segment 2A, Segment 3Aand 2A/2B, the and the Ivanpah DWMA in Segment 4A. The construction of Alternative B would impact desert tortoise habitat within the Ivanpah DWMA in Segment 4A. The construction of Alternative B would impact desert tortoise habitat within the Superior-Cronese DWMA in Segment 3B, and impacting the Shadow Valley DWMA in Segment 3B.

The impacts associated with the construction of both Alternative A and Alternative B include the removal or degradation of desert tortoise habitat within the proposed project right-of-way. Since the action alternatives occur near the DWMA boundaries edge and adjacent or near the existing I-15 roadway, the integrity of the individual DWMAs would remain intact.

Table 3.14-10 Acreage of Permanent Effects to Desert Tortoise Habitat by Segment

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Alignment		159.0	159.0	N/A
Victorville Site 1 Station		93.0 (option)	93.0 (option)	N/A
Victorville Site 2 Station		114.5 (option)	114.5 (option)	N/A
Victorville OMSF Option 1		92.4 (option)	92.4 (option)	N/A
Victorville OMSF Option 2		195.2 (option)	195.2 (option)	N/A
Autotransformer 2B		0.2	0.2	N/A
Victorville Utility Corridor		6.5	6.5	N/A
Total for Segment 1		*351.1 to 475.4*	*351.1 to 475.4*	*N/A*
Alignment 2A/2B		89.8	89.8	N/A
Alignment 2 A		84.2	N/A	N/A
Alignment 2 B		N/A	62.5	N/A
Autotransformer 4		0.07	0.07	N/A
Autotransformer 5A		0.07	N/A	N/A
Autotransformer 5B		N/A	0.16	N/A
Total for Segment 2		*174.1*	*152.5*	*N/A*
Alignment 3A		4.5	N/A	N/A
Alignment 3B		N/A	616.5	N/A
Baker MOW Facility		2.7	3.6	N/A
Autotransformer 9		0.17	0.17	N/A
Autotransformer 10		0.14	0.14	N/A
Autotransformer 11		0.04	0.04	N/A
Autotransformer 12		0.01	0.01	N/A
Baker Utility Corridor		0.7	0.7	N/A
Total for Segment 3		*8.3*	*621.2*	*N/A*
Alignment 4A		42.0	N/A	N/A
Alignment 4B		N/A	111.5	N/A
Autotransformer 13A		0.17	0.17	N/A
Autotransformer 13B		N/A	0.1	N/A
Total for Segment 4		*42.2*	*111.8*	N/A
Alignment 5A		0	N/A	N/A

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Alignment 5B		N/A	203.0	N/A
Sloan Road MSF (option for A and B)		13.9 (option)	9.7 (option)	N/A
Autotransformer 14		0.18	0.18	N/A
Autotransformer 15		0	0	N/A
Sloan Utility Corridor		2.5	2.5	N/A
Total for Segment 5		*2.7 to 16.6*	*205.7 to 215.4*	*N/A*
Alignment 6A Central A		40.0	N/A	N/A
Alignment 6A Central B		40.0	N/A	N/A
Alignment 6A Southern		40.0	N/A	N/A
Alignment 6B Central A		N/A	37.8	N/A
Alignment 6B Central B		NA	37.8	N/A
Alignment 6B Southern		N/A	37.8	N/A
Option C Central A		N/A	N/A	78.2
Option C Central B		N/A	N/A	78.2
Autotransformer 16A		0.16	0.16	N/A
Autotransformer 16B		N/A	N/A	0.02
Robindale Avenue MSF (option for A and B)		8.8 (option)	8.8 (option)	N/A
Wigwam Avenue MSF (option for A and B)		3.0 (option)	3.0 (option)	N/A
Total for Segment 6		*40.2 to 49.0*	*38.0 to 46.8*	*78.2*

Source: Jones & Stokes, 2008.

[1] Only those project elements that would result in a permanent habitat loss are listed.

[3] Alternative A totals range from 611.9 acres (Victorville Station 1 and OMSF 1) with the Wigwam Avenue MSF to 747.1 acres (Victorville Station 2 and OMSF 2) with the Sloan Road MSF.

[4] Alternative B totals range from 1,473.6 acres (Victorville Station 1 and OMSF 1) with the Wigwam Avenue MSF to 1,604.6 acres (Victorville Station 1 and OMSF 2) with the Sloan Road MSF.

Table 3.14-11 Acreage of Temporary Effects to Desert Tortoise Habitat by Segment

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Segment 1				
Alignment		665.2	665.2	N/A
TCA 1A		142.1	142.1	N/A

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
TCA 1B		114.5	114.5	N/A
TCA 2		10.3	10.3	N/A
Total for Segment 1		*932.1*	*932.1*	*N/A*
Segment 2				
Alignment 2A/2B		366.8	366.8	N/A
Alignment 2 A		364.7	N/A	N/A
Alignment 2 B		N/A	205.9	N/A
TCA 3		0.2	0.2	N/A
TCA 4		6.2	6.2	N/A
TCA 5		5.2	5.2	N/A
Total for Segment 2		*743.1*	*584.3*	*N/A*
Segment 3				
Alignment 3A		17.5	N/A	N/A
Alignment 3B		N/A	1,840.3	N/A
TCA 6		5.8	5.8	N/A
TCA 7		5.2	5.2	N/A
TCA 9		5.8	5.8	N/A
TCA 10		5.6	5.6	N/A
Total for Segment 3		*39.9*	*1,862.7*	*N/A*
Segment 4				
Alignment 4A		364.4	N/A	N/A
Alignment 4B		N/A	491.3	N/A
TCA 11		9.4	N/A	N/A
TCA 12		N/A	N/A	N/A
TCA 18		N/A	N/A	N/A
TCA 19		N/A	N/A	N/A
TCA 20		N/A	N/A	N/A
TCA 21		N/A	N/A	N/A
Total for Segment 4		*373.8*	*491.3*	*N/A*
Segment 5				
Alignment 5B in CA	13.5	N/A	13.5	N/A
Total for Segment 5B in CA		*N/A*	*13.5*	*N/A*
Alignment 5B in NV		N/A	663.4	N/A
TCE 13 in NV		8.7	8.7	N/A
Total for Segment 5 in NV		*8.7*	*672.1*	*N/A*
Total for Segment 5		*8.7*	*685.6*	*N/A*

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Segment 6				
Alignment 6A Central A		116.6	N/A	N/A
Alignment 6A Central B		116.6	N/A	N/A
Alignment 6A Southern		116.6	N/A	N/A
Alignment 6B Central A		N/A	116.6	N/A
Alignment 6B Central B		N/A	116.6	N/A
Alignment 6B Southern		N/A	116.6	N/A
Option C Central A		N/A	N/A	329.2
Option C Central B		N/A	N/A	329.2
TCA 14		N/A	N/A	19.8
Total for Segment 6		116.6	116.6	*349.0*

Source: Jones & Stokes, 2008.

[1] Only those project elements that would result in a temporary habitat loss are listed.

Barrier to Wildlife Movement

I-15 is an existing barrier to wildlife throughout the proposed project corridor. The construction and operation of the proposed DesertXpress facility will have an additive adverse impact to this movement.

In Segment 1 approximately 7 miles of the alignment deviates from the existing I-15 transportation corridor and traverses undeveloped lands (Figure 3-14.1). This proposed section of the alignment will increase habitat fragmentation and create an additional barrier to wildlife movement, including desert tortoise movement, and may reduce the distribution of genetic material between populations. Individual desert tortoises occurring in this area would be further isolated from surrounding populations by the construction and operation of the approximately 7 miles of this segment.

In Segment 2A, approximately 8 miles of the alignment would deviate from the existing I-15 transportation corridor and traverse undeveloped lands on the north side of I-15. While recreational OHV use in the area has reduced habitat quality within and immediately adjacent to the dry lake bed near Yermo, this proposed section of the alignment would increase habitat fragmentation and create an additional barrier to wildlife movement and may reduce the distribution of genetic material between populations. Individual wildlife occurring in this area would be further isolated from surrounding populations by the construction and operation within this area.

In Segment 4, approximately 2 miles of Alternative A would deviate from the existing I-15 corridor and traverses undeveloped lands of the National Park Service Mojave National Preserve east of I-15 (Figure 3-14.5). This proposed section of the alignment would result in wildlife habitat fragmentation. This 2 mile portion of Segment 4 would create a barrier to wildlife movement, including desert tortoise movement, isolating the small block of habitat between the proposed alternative alignment and I-15.

In Segment 4, approximately 6 miles of Alternative B would traverse undeveloped lands west of I-15 (Figure 3-14.5). This section of the alignment would cause habitat fragmentation and create a barrier to wildlife, including desert bighorn sheep and desert tortoise, movement and may isolate the block of habitat between this proposed alignment and I-15.

No desert tortoise habitat fragmentation is anticipated from the construction of the alignments with Segments 3, 5, 6A or 6B. The alignments would be developed within or immediately adjacent to the I-15 right-of-way. Portions of Segments 6A and 6B also would be constructed within an urbanized area including Las Vegas and developed portions of unincorporated Clark County. The Option C alignment of Segment 6 would nearly parallel the existing UPPR alignment. Approximately 8 miles of Option C would deviate from the existing UPRR track resulting in habitat fragmentation and isolation of a small block of habitat between the Option C alignment and the existing UPRR railroad grade.

No habitat fragmentation or desert tortoise movement barriers are anticipated to result from the construction of the action alternatives in Segment 7. No desert tortoise habitat occurs within the proposed right-of-way for this segment.

Direct Mortality of Mohave Ground Squirrels

Mohave ground squirrel is listed as threatened under CESA. Suitable habitat for Mohave ground squirrels was identified in Segments 1 and 2 as part of the Mohave ground squirrel habitat assessment (Figures 3-14.1 and Figure 3.14-2). Acreage of suitable habitats that will be permanently affected by the segment alignments, associated stations, and operation and maintenance facilities is presented in Table 3.14-12. Acreage of suitable habitats that will be temporarily affected by the segments alignments and temporary construction easements facilities is presented in Table 3.-14-13

Construction-related activities could result in injury or mortality of Mohave ground squirrels by equipment crushing squirrels, trapping squirrels in burrows, and removal of foraging habitat.

Table 3.14-12 Permanent Effects on Mohave Ground Squirrel Habitat by Segment

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Segment 1				
Alignment		198.5	198.5	N/A
Victorville Site 1 Station		85.1 (option)	85.1 (option)	N/A
Victorville Site 2 Station		105.2 (option)	105.2 (option)	N/A
Victorville OMSF Option 1		22.6 (option)	22.6 (option)	N/A
Victorville OMSF Option 2		339.7 (option)	339.7 (option)	N/A
Autotransformer 2B		0.16	0.16	N/A
Victorville Utility Corridor		6.5	6.5	N/A
Total for Segment 1		*312.9 to 650.1*	*312.9 to 650.1*	*N/A*
Segment 2				
Alignment 2A/2B		23.2	23.2	N/A
Alignment 2 B		N/A	17.1	N/A
Total for Segment 2		*23.2*	*40.3*	*N/A*
TOTAL FOR ALTERNATIVE		**336.1 to 373.3**[2]	**353.2 to 690.4**[3]	**N/A**

Source: Jones & Stokes, 2008.

[1] Only those project elements that would result in a permanent habitat loss are listed.

[2] Alternative A totals range from 336.1 acres with Victorville Station 1 and OMSF 1 to 373.3 acres with Victorville Station 2 and OMSF 2.

[3] Alternative B totals range from 353.2 acres with Victorville Station 1 and OMSF 1 to 690.4 acres with Victorville Station 2 and OMSF 2.

Table 3.14-13 Temporary Effects on Mohave Ground Squirrel Habitat by Segment

Project Element[1]		Alternative A (acres)	Alternative B (acres)	Option C (acres)
Segment 1				
Alignment		643.3	643.3	N/A
TCE 1A		64.9	64.9	N/A
TCE 1B		94.6	94.6	N/A
TCE 2		0.5	0.5	N/A
Total for Segment 1		*803.3*	*803.3*	*N/A*
Segment 2				
Alignment 2A/2B		407.6	N/A	N/A
Alignment 2A		456.0	N/A	N/A
Alignment 2B		N/A	311.0	N/A
TCE 4		8.4	8.4	N/A
Total for Segment 2		*872.0*	*319.4*	*N/A*
Segment 3				
Alignment 3A		70.1	N/A	N/A
Alignment 3B		N/A	61.5	N/A
Total for Segment 3		*70.1*	*61.5*	*N/A*
TOTAL FOR ALTERNATIVE		**1,745.4**	**1,184.2**	**N/A**

Source: Jones & Stokes, 2008.

[1] Only those project elements that would result in a temporary habitat loss are listed.

Direct Mortality of Mojave Fringe-toed Lizard

The Mojave fringe-toed lizard is a California species of special concern and is a BLM sensitive species. There are no known occurrences of Mojave fringe-toed lizard in the vicinity of the alternative alignments (Figures 3-14.1 to 3-14.5). [27] However, suitable habitat for Mojave fringe-toed lizards is present in the sand dunes in Segment 1 in the vicinity of Barstow and in the vicinity of where Segment 2A crosses the Mojave River (Figures 3-14.1 and 3-14.2). Construction activities in sand dune habitat, especially the use of heavy machinery, could crush Mojave fringe-toed lizards. Within the proposed right-of-way, the operation and maintenance of DesertXpress would convert Mojave fringe-toed lizard habitat to transportation use and permanently remove suitable habitat.

Potential Loss or Disturbance to Nesting Raptors and Migratory Birds

[27] CNDDB, 2008.

Segment 1 overlaps suitable nesting habitat for nesting special-status and migratory birds and raptors. The large rock outcrop near the southern end of the alignment and near Victorville Station Site 1 provide suitable nesting habitat for prairie falcons and red-tailed hawks.

Trees, shrubs, and cactus throughoutSegments 2A/2B, 2A, and 2B provide suitable nesting habitat for migratory birds and raptors. The dry lakebed crossed by Segment 2A north of Yermo provides potential nesting habitat for the western snowy plover. However, the dry lake bed has been historically used for OHV recreation resulting in frequent periods of air-borne dust and loose blowing sands. These conditions have reduced the quality of the western snowy plover potential nesting habitat.

Joshua trees, other tree species, shrubs, and cactus throughout Segment 3B provide suitable nesting habitat for migratory birds and raptors. This segment crosses the Soda Dry Lake bed, which provides potential nesting habitat for western snowy plover. There is no suitable habitat for nesting raptors or migratory birds along Segment 3A, which is proposed to be constructed within the I-15 median. However, shrubs located in the TCEs and the Baker MOW Facility provide suitable nesting habitat for migratory birds and raptors.

Joshua trees, other tree species, shrubs, and cactus throughout Segment 4A provide suitable nesting habitat for migratory birds and raptors. Ivanpah Dry Lake bed provides suitable nesting habitat for western snowy plover. Areas throughout Segment 4B provide suitable nesting habitat for nesting raptors or migratory birds. The cliff areas in Alternative B of Segment 4 provide impact potential nesting habitat for American peregrine falcons, prairie falcons, and golden eagles.

Joshua trees, other tree species, shrubs, and cactus throughout Segment 5B provide suitable nesting habitat for migratory birds and raptors. Cliff areas provide potential nesting habitat for American peregrine falcons, prairie falcons, and golden eagles. There is no suitable habitat for nesting raptors or migratory birds located within the I-15 median where Segment 5A is proposed. However, shrubs located in the Sloan Road MSF Site and TCE 13 in Segment 5A provide suitable nesting habitat for migratory birds and raptors.

Areas throughout Segment 6B and Option C provide suitable nesting habitat for migratory birds and raptors. Cliff areas provide potential nesting habitat for American peregrine falcons, prairie falcons, and golden eagles. Segment 6A would not affect habitat for nesting raptors or migratory birds.

There is no suitable nesting habitat for raptors or migratory birds in Segment 7A, 7B, or 7C.

Construction activities (e.g., grubbing, grading, excavation, and driving off-road) could result in the removal or disturbance of shrubs and trees that provide potential nesting habitat for migratory birds and raptors. In addition, construction activities near the cliff areas could result in disturbance to cliff-nesting raptors. If construction occurs during the breeding season (generally between March 1 and August 15), nesting raptors or migratory birds could be disturbed. This disturbance could cause nest abandonment and subsequent loss of eggs or developing young at active nests in or near the project area. The loss or abandonment of the eggs or young of migratory birds or raptors would be an adverse effect.

Direct Mortality of Banded Gila Monster

The banded gila monster is a California species of special concern and is a BLM sensitive species. There are no known occurrences of banded gila monsters in the vicinity of the project area (Figures 3-14.1 to 3-14.5).[28]

Construction activities in the Mountain Pass area of Segment 3B (approximately 61 acres) and Segment 4A (approximately 55 acres) and Segment 4B (approximately 315 acres) could impact suitable habitat for banded gila monster. Construction activities in this habitat, especially the use of heavy machinery, could crush banded gila monsters.

Direct Mortality of Clark County MSHCP Covered Reptile Species

Construction activities within Segments 5B and 6B and the Option C alignment of Segment 6, the Sloan Road MSF Site, and TCEs 13 and 14 would temporarily impact suitable habitat for banded gecko, Great Basin collard lizard, desert iguana, large-spotted leopard lizard, desert tortoise, chuckwalla, sidewinder, speckled rattlesnake, Mojave green rattlesnake, glossy snake, common king snake, western leaf-nosed snake, western long-nosed snake, and Sonoran lyre snake. Construction activities may injure or kill individuals of these species. The temporary and permanent impacts to suitable Clark County HCP covered reptile species habitat is the same as for the desert tortoise as listed in Table 3.14-9 and Table 3.14-10, respectively.

Potential Loss or Disturbance to Burrowing Owls

Burrowing owls are a California species of special concern and a BLM sensitive species. The shoulders of roads, dirt mounds and berms, and other open areas located in Segment 1 through 6 provide suitable habitat for burrowing owls, especially where open culverts, ground squirrel burrows, desert tortoise burrows, and badger burrows occur. Construction activities (e.g., grubbing, grading, excavation, and driving off-road) could result in the removal of active nests, if construction occurs during the nesting season (February 1 through August 31). Construction activities could also affect burrowing owls and their burrows during the non-breeding season (September 1 through January 31). The project impacts to burrowing owl habitat include the direct loss of burrows and foraging habitat. Since burrowing owl utilize similar habitat as the desert tortoise, the amount of burrowing owl habitat impacted by the proposed project alternatives is anticipated to be the same as described for the desert tortoise (Tables 3.14-9 and 3.14-10).

Potential Loss or Disturbance to Roosting Bats

Bridges throughout the study area in Segments 1 through 6 provide potential roosting and nursery sites for bats. The large rock outcrop near the southern terminus of Segment 1 and near Victorville Station Site 1 provides potential roosting and nursery sites. Caves and mines located in or near Segment 2 through 6 provide potential roosting and nursery sites. Disturbance to roosting or nursery sites could result in the injury or mortality of bats.

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[28] CNDDB, 2008.

Project-Related Effects to American Badger

American badger is a California species of special concern. Suitable habitat for American badger occurs in desert scrub habitats located throughout the project area. Construction activities such as grubbing and off-road travel could result in the injury or mortality of badgers. Since American badgers utilize similar habitat as the desert tortoise, the amount of impact by the proposed project alternatives is anticipated to be the same as described for the desert tortoise (Tables 3.14-9 and 3.14-10).

Direct Effects to Desert Bighorn Sheep

Desert bighorn sheep are a fully protected species under CDFG code and a BLM sensitive species. Suitable habitat for desert bighorn sheep occurs in the Cronese Basin (Cave Mountain) and Mountain Pass area of Segments 3B, 4A, and 4B. In addition, the proposed facility may act as an additional barrier to desert bighorn sheep movement within these same alignments, particularly in Segment 4B. Construction-related activities in these areas could directly affect desert bighorn sheep by disrupting lambing areas and by altering the flow of natural springs, which provide critical supply of water. Additionally, desert bighorn sheep could use the railroad corridor for movement and utilize the tunnels as shelter. The operation of a passenger train in this area could result in sheep mortality.

Loss of Special Management Lands

Segment 2A and 2 B would affect 60.9 acres and 60.7 acres, respectively, of the Superior-Cronese Desert Tortoise Critical Habitat

Segment 3B would affect 268.5 acres of the Superior-Cronese Desert Tortoise Critical Habitat, 225.7 acres of Ivanpah Desert Tortoise Critical Habitat, and 3.6 acres 0f the Cronese ACEC.

Segment 4A would affect 20.4 acres of the Ivanpah Desert Tortoise Critical Habitat and 13.8 acres of the Mojave National Preserve.

Segment 5B would be adjacent to, but not encroach on the LSTS located along the west side of I-15 from just north of Primm to Jean.

Direct and Indirect Impacts to Wetlands/Waters of the United States

Two categories of wetland impacts would occur: direct and indirect.

Direct impacts are impacts that would occur as a result of ground disturbance, including earthwork (clearing, grading, excavation, and fill) to create the rail bed, construction vehicle traffic, and staging and storage areas. For this analysis, it was assumed that direct impacts associated with the proposed project alternatives would be limited to the area within the proposed project's limits of disturbance, and that the area within the proposed right-of-way would be directly affected by conversion to use by the DesertXpress. This analysis was carried out by overlaying the project design on the USGS 7.5 minute quadrangle and assuming that all drainages within the project footprint would be filled, with subsequent loss of all natural functions.

Indirect impacts are impacts that would occur later in time and could affect the natural function of the drainage located outside the project footprint. This analysis determined the area of indirect effects by assuming that all drainages within the study area might be indirectly affected by the proposed project alternatives. In general, indirect impacts occur with the greatest intensity adjacent to the proposed project alignment and become less severe with distance. Some impacts, such as the effects of dissolved substances and suspended particles, may be manifested within 50 feet of the tracks but may extend up to 500 feet. Other indirect impacts, such as introduction of invasive exotic plant species or effects on wildlife use of and movement through the drainage feature, may extend for 1,000 feet. Potential direct and indirect effects that proposed project implementation could have on wetlands are listed below:

Construction of the proposed project would cause soil and vegetation disturbance within the channel and banks of project area drainages. This includes permanent disturbance from placement of culverts within the drainages and temporary impacts resulting from construction activity.

During construction, ground disturbance may cause sediment deposition and potential for erosion of sediments into the drainages within the study area. In addition, construction activity (i.e. driving in and across washes) in or near ephemeral washes can cause drainage bed and bank modifications due to the erodible nature of the study area soils. These modifications could adversely affect hydrology and vegetation within the construction area and immediately downstream.

Soil disturbance and removal of existing vegetation during construction would increase the potential for the spread of invasive exotic plant species into washes within the study area.

Construction materials, such as fuel, oil, lubricants, and concrete that may be spilled into associated drainages within the study area, could have adverse affects on vegetation and wildlife habitat.

Some of these effects would be short-term, such as construction impacts. Other effects, such as placement of culverts and the runoff of contaminants, would be ongoing, continual effects.

The proposed action alignment would cross 260 ephemeral drainages and the Ivanpah Playa (see Section 3.8, Hydrology for additional surface water and drainage information). Of these

260 drainages, the Mojave River, Duck Creek, Tropicana Wash and Flamingo Wash are the largest drainages crossed by the proposed action. Construction of the proposed action would permanently remove vegetation from these principal drainages and upland vegetation within the other ephemeral drainages. The stream crossings are identified in Table 3.14-14.

Table 3.14-14 Stream Crossings Impacted by Alignment Alternative by Segment

Project Element[1]		**Alternative A (stream crossings)**	**Alternative B (stream crossings)**	**Option C (stream crossings)**
Segment 1				
Alignment		24	24	N/A
Victorville Site 2 Station		2	2	N/A
Victorville OMSF Option 2		2	2	N/A
Total for Segment 1		*28*	*28*	*N/A*
Segment 2				
Alignment 2A/2B		11	11	N/A
Alignment 2A		5	N/A	N/A
Alignment 2B		N/A	1	N/A
Total for Segment 2		*16*	*12*	*N/A*
Segment 3				
Alignment 3A		101	N/A	N/A
Alignment 3B		N/A	113	N/A
Baker MOW Facility		1	1	N/A
TCE 8		1	1	N/A
TCE 9		1	1	N/A
TCE 10		1	1	N/A
Total for Segment 3		*105*	*117*	*N/A*
Segment 4				
Alignment 4A		24	N/A	N/A
Alignment 4B		N/A	38	N/A
TCE11		1	1	N/A
TCE 12		3	3	N/A
TCE 21		1	1	N/A
Total for Segment 4		*N/A*	*42*	N/A
Segment 5				
Alignment 5A		48	N/A	N/A
Alignment 5B		N/A	48	N/A
Sloan Road MSF Site Option		1	1	N/A
TCE 13		1	1	N/A

Project Element[1]		Alternative A (stream crossings)	Alternative B (stream crossings)	Option C (stream crossings)
Total for Segment 5		*50*	*50*	*N/A*
Segment 6				
Alignment 6A				
▪ Ending at Southern Station		16	N/A	N/A
▪ Ending at Central Station B		+1	N/A	N/A
▪ Ending at Central Station A		+1	N/A	N/A
Subtotal, Alignment 6A		16-18	N/A	N/A
Alignment 6B				
▪ Ending at Southern Station		N/A	16	N/A
▪ Ending at Central Station B		N/A	+1	N/A
▪ Ending at Central Station A		N/A	+1	N/A
Subtotal, Alignment 6B		N/A	16-18	N/A
Alignment 6C				
▪ Ending at Central Station B		N/A	N/A	26
▪ Ending at Central Station A		N/A	N/A	+1
Subtotal, Alignment 6C		N/A	N/A	26-27
Robindale Avenue MSF		1	1	1
Wigwam Avenue MSF		1	1	1
Las Vegas Southern Station		2	2	N/A
TCE 16		2	2	N/A
TCE 14		N/A	N/A	1
Total for Segment 6		*22-24*	*22-24*	*29-30*

Source: Jones & Stokes, 2008.

[1] Only those project elements that would result in a crossing of a stream are listed.

3.14.5 Mitigation Measures

The following avoidance, minimization and mitigation measures will be incorporated to reduce adverse effects to biological resources.

Mitigation Measure BIO-1: Conduct Mandatory Environmental Awareness Training Program: All personnel working within the project area will attend an environmental awareness training program. The program will be presented by qualified biologists and include information on the life history of special-status species that may be encountered during construction activities, the legal protection for each species, the definition of “take” for listed species, measures to protect special-status species, reporting requirements, specific measures that each worker will need to employ to avoid adverse impacts to individual sensitive species, a detailed description of environmental project commitments as described in the decision records (i.e. Record of Decision), right-of-way grants, and Biological Opinion, and penalties for violation of Federal and state environmental laws.

Mitigation Measure BIO-2: Conduct Preconstruction Surveys and Install Environmental Fencing: Preconstruction surveys for special-status species will be conducted by qualified biologists (third party contractor approved by BLM, NPS, and USFWS) prior to the start of construction. Preconstruction surveys will be tailored for specific species based on the species biology, natural history, and regulatory requirements. The locations for any individual or population of sensitive species within the limit of disturbance will be documented with a GPS unit and reported to the state and Federal regulatory agencies.

Mohave ground squirrel surveys are only valid for 12 months. Therefore, they should be done no more than 12 months prior to the start of construction in a particular area. If no Mohave ground squirrels are found during the surveys, no additional mitigation would be required.

Mojave fringe-toed lizard surveys will occur no more than 24 hours prior to the start of construction. Surveys will be conducted within the work area and a 100-foot buffer. Any Mojave fringe-toed lizards observed in the work area will be allowed to move out of the work area. Those that become trapped in the work area will be captured and moved to nearby suitable habitat outside of the work area.

Biologists will conduct preconstruction surveys for banded gila monsters no more than 24 hours prior to the start of construction within all suitable habitat in Segments 3 and 4. Surveys will be conducted within the work area and a 100-foot buffer. Any gila monsters observed within the work areas will be allowed to move out of the work area and those that become trapped within the work area will be carefully moved to nearby suitable habitat. The handler will have the necessary CDFG permit to handle and move lizards.

Biologists will conduct preconstruction surveys for BLM sensitive and Clark County MSHCP covered reptile species no more than 48 hours prior to the start of construction. Surveys will be conducted within the work area and include a 100-foot buffer. Any sensitive reptile species observed within the work areas will be allowed to move out of the work area and those that become trapped within the work area will be very carefully moved to nearby suitable habitat.

The project sponsor will implement the following measures, to avoid disturbance of tree-, shrub- or ground-nesting special-status and migratory birds and raptors.

1. If construction activities are scheduled to occur during the breeding season (generally between March 1 and August 15), a qualified wildlife biologist will conduct focused nesting surveys within the appropriate habitat and an appropriate buffer distance up to 0.25 mile from the limit of project disturbance for nesting raptors.

2. The focused surveys will include tree- and shrub-nesting birds, ground-nesting birds, and cliff-nesting birds. The surveys should be conducted within the 2-week period before initiation of construction activities in a particular area between March 1 and August 15. If no active nests are detected, then no additional mitigation is required.

3. Follow-up surveys will be required on a monthly basis during the breeding season. If surveys indicate that active nests are present in any areas that would be directly affected by construction activities, a no-disturbance buffer will be established around the site to avoid disturbance or destruction of the nest site until after a wildlife biologist determines that the young have fledged (usually late June to mid-July). The extent of these buffers will be determined by a wildlife biologist in consultation with CDFG in California and NDOW in Nevada and will depend on the level of noise or construction disturbance, line of sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers. These factors will be analyzed to make an appropriate decision on buffer distances.

A qualified biologist will conduct preconstruction surveys for active burrows according to CDFG guidelines for burrowing owl (1993 and 1995). The preconstruction surveys shall be conducted by a qualified biologist within the work area and include a 250-foot buffer and within the 2-week period before initiation of construction activities to locate active burrowing owl burrows. The preconstruction surveys will include a nesting season survey and a wintering season survey the season immediately preceding construction. If no burrowing owls are detected, no further mitigation is required.

Focused surveys for the presence of sensitive bat species shall be conducted in areas that provide suitable roosting or nursery habitat. If a roosting site is active and cannot be avoided, the project sponsor shall consult with a bat expert in conjunction with CDFG in California and NDOW in Nevada to develop appropriate exclusion methods. If it is determined that a nursery sites is active and cannot be avoided, construction activities that would disturb the nursing bats shall be delayed until the breeding cycles for the bats are completed. The project sponsor shall consult with a bat specialist in order to determine when the breeding cycle for bats. The project sponsor shall document the results of any exclusion or avoidance of roosting/nursery sites for bats.

Biologists will conduct preconstruction surveys for American badger no more than 48 hours prior to the start of construction. Surveys will be conducted within the work area and a 100-foot buffer. Any American badgers observed in the work area will be allowed to leave the work area.

Construction activities conducted within suitable desert bighorn sheep habitat in the Mountain

Pass area of Segment 4 shall not occur during the period of the year when desert bighorn sheep are lambing (from January 1 to April 30). If construction activities must occur during the desert bighorn sheep lambing period, pre-construction surveys for lambing desert bighorn sheep shall be conducted prior to construction. If lambing desert bighorn sheep are found, then the project sponsor shall consult with the BLM and DFG to identify appropriate avoidance measures.

Qualified botanists will conduct preconstruction surveys for sensitive botanical species and noxious weeds prior to initiating construction of the project. If sensitive botanical species are observed within the temporary construction area of impact, avoidance and minimization measures will be applied by the project sponsor. Temporary environmental fencing will be installed around sensitive biological resources during project construction in order to avoid unnecessary adverse impacts to the resource. USFWS and BLM approved desert tortoise exclusionary fencing will be erected within portions of the project that occur in desert tortoise habitat. This includes fencing all work areas, temporary equipment and vehicle yards, and material staging and storage areas. Desert tortoise exclusionary fencing and clearance surveys will be undertaken no more than 10 days prior to initiating construction activities. Desert tortoise encountered during preconstruction surveys will be relocated off the project right-of-way based on a USFWS, BLM, and CDFG approved project-specific Desert Tortoise Relocation Plan. The project sponsor will install and maintain permanent exclusionary fencing along the open portion of rail lines in areas of suitable bighorn sheep habitat. The fencing will be constructed to ensure that bighorn sheep cannot access the rails or any culverts/tunnels. In addition, prior to initiating construction, temporary exclusionary fencing will be placed around all sensitive botanical species that occur within the temporary construction areas. These areas will be signed for avoidance by construction equipment and personnel.

Mitigation Measure BIO-3: Conduct Construction Monitoring: The following measures will be implemented during project construction:

1. Qualified biologists will be on site during any construction activity within or near special-status species habitat to ensure the implementation and compliance of environmental commitments and avoidance measures.

2. The biologist will have the authority to stop work if dangers to desert tortoises or other special-status wildlife species arise and allow work to proceed after the hazard has been removed. The USFWS Las Vegas and Ventura Ecological Services Offices, BLM Field Offices and CDFG must be notified of any desert tortoise injury or death resulting from project-related activities. In addition, the USFWS Division of Law Enforcement will also be notified in accordance with reporting requirements.

3. As part of the monitoring, the biologists will check construction areas immediately before construction activities each day to ensure that no special-status wildlife species have moved into the construction area. If tortoises are discovered within the construction area they will be relocated based on the Desert Tortoise Relocation Plan.

4. All construction activities will be confined to the designated work areas. Grubbing of vegetation will only be to the extent necessary for construction and will be limited to areas designated for that. Overnight parking and storage of equipment and materials

would be limited to previously disturbed areas or areas identified in the BLM right-of-way grant.

5. All vehicle traffic will be restricted to existing roads or land management agency approved newly constructed roads.

6. Construction vehicles within sensitive species habitat will not exceed 15 miles per hour.

7. A litter-control program will be implemented during construction. The program will include the use of covered, raven-proof trash receptacles, daily removal of trash from work areas to the trash receptacles, and proper disposal of trash in a designated solid waste disposal facility. Precautions will also be taken to prevent trash from blowing out of construction vehicles.

8. No pets or firearms will be permitted in the work area.

9. Both pre- and post-construction photographs will be taken to document sensitive habitat conditions within the limits of project disturbance.

Mitigation Measure BIO-4: Avoid the dispersal of noxious weeds into uninfested areas: To avoid the introduction or spread of noxious weeds into uninfested areas, the project sponsor will incorporate the following measures into the project plans and specifications:

- Use only certified, weed-free, imported erosion-control materials (or rice straw in upland areas).
- Coordinate with BLM field offices and NPS to ensure that the appropriate best BMPs are implemented.
- Educate construction supervisors and managers on weed identification and the importance of controlling and preventing the spread of noxious weeds.
- Clean equipment at designated wash stations before and after entering the project construction area.
- A noxious weed survey of the proposed project right-of-way, including temporary work areas, will be completed prior to initiating project construction. All areas disturbed by the project will be surveyed using approximately 30-foot meandering transects. Populations of noxious weeds will be identified and mapped using GPS.
- Develop an approved Noxious Weeds Monitoring and Treatment Plan to detect and treat any noxious weeds in the construction area. The plan will include methods for monitoring, treating and reporting noxious weed infestations within the construction area.

Mitigation Measures BIO-5. Confine construction equipment to a designated work zone (including access roads) at each project site: Before construction begins, the work zone will be clearly staked and flagged. During the environmental training program, construction personnel will be informed about the importance of avoiding ground-disturbing activities outside the designated work area. During construction, the construction monitors and resource monitors will ensure that construction equipment and associated activities avoid any disturbance of native vegetation and sensitive resources outside the designated work zones.

Contaminant run-off will be contained within the temporary construction boundaries and clean-up efforts will be initiated immediately. Clean-up procedures will be coordinated with the responsible agency to insure additional resource damage does not occur.

Mitigation Measure BIO-6. Reestablish Preconstruction Site Conditions to Allow Revegetation: Disturbed areas of native vegetation will be restored to preconstruction site conditions. To ensure that impacts on native plant species and communities are not long-term, native topsoil will be stockpiled within the project ROW and immediately replaced, and natural site topography (including necessary amendments to soil structure) reestablished to allow natural colonization of plant species.

In California and Nevada, all succulents within the limits of disturbance will be relocated either off the alignment onto undeveloped BLM administered public lands or maintained within a temporary nursery (located within the ROW) and replanted within the ROW as part of site restoration activities.

In areas that require immediate stabilization, nonvegetative techniques that allow native species to reestablish can be used, including use of weed- and disease-free mulch, erosion blankets, or rolled organic fiber material.

Erosion control seed mixes may be necessary on selected sites. If sites need to be stabilized through seeding, the seed mix would be composed entirely of native and locally occurring species appropriate for stabilizing local site conditions. All seed mixes will be approved by the BLM, NPS, and CDFG prior to initiating restoration activities. Special attention will be given to erosion control near ephemeral drainages and within playas.

Site-specific erosion control measures (nonvegetation or mechanical techniques) will be determined on a site-specific basis by a vegetation specialist and project engineer.

Mitigation Measure BIO-7. Retain and Stockpile Topsoil: Native topsoil will be removed from areas of permanent disturbance and stockpiled within the ROW. To avoid altering local hydrologic conditions or flood flows, spoils materials will not be placed in sensitive habitat areas or within or adjacent to ephemeral drainages. Prior to disturbance, native topsoil will be excavated and stockpiled for later reapplication in native vegetation areas. Separate stockpiling areas will be identified and clearly marked for each different vegetation type as appropriate. The exact depths will be determined for each native vegetation type and depend upon the stratigraphy and soil profiles (estimated to be 6-12 inches in depth). The excavated soil depths will exceed the restored soil depths to allow for soil compaction during placement. The stockpiled soil will not be covered to minimize damage to propagation material from heated soil conditions but it will be protected from construction activity and signed to identify it as a protected resource.

Mitigation Measure BIO-8. Restore Natural Site Topography: Restore natural site topography to pre-project contours. The restored topography will mimic the pre-project condition to the greatest extent possible. Minor modifications may be required to conform with post-project site condition. Construction area soil compaction will be treated using grubbing, raking, and other BLM approved soil decompaction techniques as part of the project restoration.

Proper compaction of the subsurface material and plow furrows is necessary to help prevent surface and subsurface migration of water along the plow or trench furrow, and to prevent trench settlement. The reapplied topsoil in the ROW will be left in roughened condition to facilitate the establishment of vegetation and reduce the potential for erosion. Excessive passes of finish grading equipment that would compact topsoil will be avoided. Upon completion of the grading operations, no further vehicular traffic will be allowed, other than necessary mitigation planting equipment.

Mitigation Measure BIO-9. Implement Erosion Control Measures as Appropriate: An erosion control and restoration plan will be prepared and implemented to control short-term and long-term erosion and sedimentation effects and to restore soils and native vegetation in areas affected by construction activities. The plan will include all requirements of applicable erosion control ordinances and grading permits and will implement BMPs for erosion and sediment control as necessary.

In areas that require immediate stabilization, non-vegetative techniques that allow native species to reestablish can be used, including use of weed- and disease-free mulch, erosion blankets, or rolled organic fiber material. The use of such measures will be identified in the SWPPP or recommended by a soil or civil engineer based on slope, soil type, or other site factors as necessary and may be required later in the design phase.

Mitigation Measure BIO-10. Obtain a Tree or Plant Removal Permit from San Bernardino County and the Nevada Division of Forestry: This permit is issued in compliance with San Bernardino County Development Code Subsection 88.01.050 for removal of regulated plants. The project sponsor will comply with all provisions of the Permit. A permit will be required from the Nevada Division of Forestry and/or the BLM in order to relocate succulents within the project alignment.

Mitigation Measure BIO-11: Compensate for the Loss of Sensitive Vegetation Communities: The project sponsor will compensate for the loss of Sensitive Vegetation Communities prior to initiating construction. Compensation ratios will be based on site-specific information and determined through coordination with state and Federal agencies (CDFG and USACE and BLM). Compensation should be provided at a minimum 1:1 ratio (1 acre restored or created for every 1 acre removed/disturbed) and may be a combination of onsite restoration/creation, offsite restoration, or mitigation credits. The project sponsor will develop and implement a restoration and monitoring plan that describes enhancement of sensitive communities, creation, and monitoring over a select time period.

Mitigation Measure BIO-13: Conduct Preconstruction Surveys and Identify Sensitive Areas: Where Alternatives A and B crosses the Mojave River, specific areas of important riparian vegetation will be marked with orange fencing and the limits of disturbance narrowed to reduce impacts to sensitive vegetation.

Mitigation Measure BIO-14: Avoid Known Special-Status Plant Populations during Project Design: To the extent possible, the project sponsor will design the project to avoid special-status plant populations. Where avoidance is infeasible, the project sponsor will focus on minimizing the width of construction work areas in and around special-status plant populations. Before construction, special-status plant populations will be demarcated with temporary orange construction fencing and posted as a restricted area. Depending on the proximity of the populations to the construction work area, populations will be monitored to ensure adverse effects on special-status plant populations are avoided. If impacts on special-status plant populations are unavoidable, the project sponsor will implement Mitigation Measure BIO-15 described below.

Mitigation Measure BIO-15: Compensate for Adverse Effects on Special-Status Plant Populations: If effects on a special-status plant population are unavoidable the project sponsor will coordinate with USFWS and CDFG to determine the appropriate mitigation strategy. If affected plants are listed under the Federal ESA, the appropriate take permits would be obtained from USFWS. Currently accepted mitigation of impacts on special-status plants includes acquisition and preservation of nearby occupied habitat, or habitat creation at a ratio determined by the regulatory agency. Transplantation of affected populations is not considered a viable mitigation option. Creation of habitats with high levels of endemism, such as vernal pools, is effective only with stringent agency management guidelines. The project sponsor will coordinate with USFWS to develop an effective mitigation and monitoring plan for specific vernal pool plants in conjunction with the construction of compensatory vernal pool habitat. Alternatively, the project sponsor could acquire and preserve nearby high-quality occupied habitat, with the project sponsor responsible for the long-term habitat management.

Mitigation Measure BIO-16: Prepare a Desert Tortoise Relocation Plan: A Desert Tortoise Relocation Plan will be developed in conjunction with the USFWS Las Vegas and Ventura Ecological Services Offices, BLM, NPS, and the CDFG. The relocation plan will outline procedures and protocols to follow when tortoises need to be relocated out of the areas of disturbance. The relocation plans will include:

1. Clearance procedures for construction areas;
2. Relocation procedures;
3. Procedures for determining the health of tortoises;
4. Relocation areas;
5. Methods that will be used to manage and protect relocation areas;
6. Monitoring for short and long term success of the plan; and
7. Permitted activities.

Mitigation Measure BIO-17: Prepare Final Mitigation Monitoring Report: No more than 90 days after the completion of construction, the monitoring biologists will prepare a report for USFWS, BLM, and state agencies. The report will include the effectiveness of mitigation measures, the results of preconstruction and construction monitoring including the number of desert tortoises excavated and moved.

Mitigation Measure BIO-18: Implement Mitigation Measures Outlined by the

Nevada USFWS Ecological Services Office to Protect Desert Tortoises: In accordance with the USFWS guidance, mitigation fees (2008 fees are $753 per acre) for disturbance to Mojave Desert Tortoise habitat on BLM administered public lands in Nevada will be paid by the project sponsor.[29]

Mitigation Measure BIO-19: Compensate for the Permanent Loss of Desert Tortoise Habitat: The project sponsor will provide compensation for the permanent loss of desert tortoise habitat. Compensation for loss of habitat in California will be provided by the project sponsor according to BLM, USFWS, and CDFG requirements. Current requirements for loss of desert tortoise habitat are based on a formula of 5:1 inside DWMAs and 1:1 outside of DWMAs. For the purposes of this project, changes to the compensation formula must be reviewed and approved by the USFWS, NPS, and CDFG. For project-related loss of habitat in Nevada, the project sponsor will follow the mitigation measures outlined by the Nevada USFWS Ecological Offices for the protection of desert tortoises.

Mitigation Measure BIO-20: Construct Exclusion Fencing and Culverts: The project sponsor will install culverts under the proposed railroad line that match existing I-15 or UPRR culverts. Where the project deviates from existing transportation facilities, the project sponsor will install culverts at natural drainage features and at appropriate intervals to allow for wildlife passage, including desert tortoises to pass under the proposed rail grade. In order to reduce potential impacts to desert bighorn sheep, no natural drainages would be obstructed or block by the construction or operation of the proposed project. The culverts would be designed and spacing determined through coordination with USFWS, NPS, BLM, CDFG, and NDOW, to ensure the meet agency wildlife standards. Exclusion fencing would be constructed parallel to the rail line and would direct tortoises to the culverts.

Mitigation Measure BIO-21: Compensate for the Permanent Loss of Mohave Ground Squirrel Habitat: If Mohave ground squirrels are determined to be present in the project area, compensatory lands will be purchased by the project sponsor to mitigate for the permanent loss of suitable habitat. Acreage of suitable habitats that will be permanently affected by the segments alignments, associated stations, and operation and maintenance facilities is presented in Table 3.3-11. The mitigation ratios and the location of the compensatory lands will be determined through coordination with CDFG pursuant to Section 2081.

Mitigation Measure BIO-22: Avoid Active Burrows or Passively Relocate Owls: If burrowing owls are detected within 250 feet of proposed construction within the project area, the following measures will be implemented.

- Occupied burrows will not be disturbed during the nesting season (February 1 through August 31).
- If avoidance is the preferred method of dealing with potential impacts, no disturbance should occur within 160 feet of occupied burrows during the non-breeding season or within 250 feet during the breeding season.

[29] Hastey et al., 1991.

If destruction of occupied burrows is unavoidable during the non-nesting season (September 1–January 31), passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping and active relocation. At least 1 week will be necessary to accomplish passive relocation and allow owls to acclimate to alternate burrows. Unsuitable burrows that will not be destroyed in the vicinity of the project area will be enhanced (enlarged or cleared of debris).

3.14.5.1 Residual Impacts Following Mitigation

The incorporation of the above mitigation measures would mitigate permanent effects related to project construction and operation, but even with mitigation, the action alternatives would result in the permanent conversion of lands identified as sensitive habitat areas. Specifically, the project would result in the permanent loss of native vegetation communities, sensitive plant communities, and special status plant populations in areas where permanent project features would be located. Following mitigation, the project would still result in the permanent loss of desert tortoise habitat, suitable habitat for the Mohave ground squirrel, and BLM special management lands.

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3.15 SECTION 4(F) EVALUATION

3.15.1 INTRODUCTION

3.15.1.1 Regulations and Standards

Section 4(f) of the Department of Transportation Act of 1966, codified in federal law at 23 U.S.C 138 and 49 U.S.C. 303, declares that "it is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation land, wildlife and waterfowl refuges, and historic sites."

Section 4(f) specifies that the Secretary [of Transportation] may approve a transportation program or project . . . requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site) only if:

1) there is no prudent and feasible avoidance alternative to the use of the land from the Section 4(f) property; and

2) the program or project includes all possible planning to minimize harm to the Section 4(f) property resulting from the use.

In addition, 49 U.S.C. 303 (d) sets forth the standard for concluding potential *de minimis* impacts to Section 4(f) resources. This subsection provides separate requirements and criteria for determining *de minimis* impacts to historic sites as well as parks, recreation, and wetland/wildlife areas.

Section 4(f) properties may also include significant, but presently unknown or undesignated, historic or archeological sites or properties. If historic sites are involved, then coordination with the State Historic Preservation Officer (SHPO) is also needed, in addition to any coordination that may be required under Section 106 of the National Historic Preservation Act.

Section 4(f) further requires consultation with Department of the Interior and, as appropriate, the involved offices of the Departments of Agriculture (USDA) and Housing and Urban Development (HUD) in developing transportation projects and programs, which use lands protected by Section 4(f). Consultation with the USDA would occur whenever a project uses Section 4(f) land from the National Forest System. Consultation with HUD would occur whenever a project uses Section 4(f) land for/on which certain HUD funding had been utilized. Since neither of these conditions applies to the proposed project, consultation with USDA and HUD is not required.

In general, a Section 4(f) "use" occurs when: 1) Section 4(f) land is permanently incorporated into a transportation facility; 2) there is a temporary occupancy of Section

4(f) land that is adverse in terms of the Section 4(f) preservationist purposes as determined by specified criteria[1] Section 4(f) land is not incorporated into the transportation project, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired (constructive use)[2]. Proximity impacts resulting in a constructive use are defined to include impacts to noise, vibration, aesthetics, access, and ecological intrusion[3].

3.15.2 DESCRIPTION OF THE PROPOSED PROJECT

As described in Chapter 2, Alternatives, the Applicant proposes to construct and operate a privately financed interstate high-speed passenger train between Victorville, California and Las Vegas, Nevada along an approximately 200 mile corridor. The Applicant proposes to construct nearly all of the fully grade-separated, dedicated double track, passenger-only railroad either in the median or immediately alongside Interstate 15 (I-15). Limited portions of the proposed rail alignment would be located within existing railroad corridors or rights-of-way. [4]

3.15.2.1 Purpose and Need for Project

The purpose of the privately financed project is to provide reliable and safe passenger rail transportation using proven high-speed rail technology between Southern California (Victorville) to Las Vegas that is a convenient alternative to automobile travel on the Interstate-15 freeway (I-15), or air travel to and from Las Vegas, and that adds transportation capacity in the I-15 corridor.

The need for a high-speed rail service stems from several factors: high and increasing travel demand amidst lagging capacity on the I-15 corridor and constraints to expansion of air travel, and frequent accidents in the I-15 corridor.

3.15.2.2 Project Description

Alternatives evaluated and analyzed in the EIS include proposed action alternatives for construction of a privately financed steel-wheel-on-steel-rail high-speed train, and a No Action alternative (No-Project or No-Build). There are two primary action alternatives considered in this EIS, each based on various alignment routings. All alignment routings would include several cross-track switches at prescribed intervals to enable continuity of high-speed train service in the event of a track blockage. This section summarizes the

[1] 23 CFR §774.13[d]; and 3

[2] 23 CFR §774.15[a]

[3] 23 CFR §774.15[e]

[4] The use of any private railroad rights-of-way would be subject to approval by owner railroads. STB approval of the Project would not convey the authority to force any private railroad to sell, lease, or otherwise allow DesertXpress to use the right-of-way of an existing railroad.

action alternatives and the no build alternative: a complete description of each is provided in Chapter 2, Alternatives.

Action Alternative A: Median Alternative

Action Alternative A (Alternative A) involves construction of a fully grade-separated, dedicated double track passenger-only railroad along an approximately 200-mile corridor, from one of two potential station site options along I-15 near Victorville, California, to one of four potential station sites in Clark County, Nevada, or the City of Las Vegas. Alternative A is identified as the "Median Alternative" in that from Yermo, California, northeasterly to Clark County/Las Vegas, the alternative would primarily be located within the median of the I-15 freeway.

From Victorville to Yermo, Alternative A would generally be located parallel to the Burlington Northern and Santa Fe (BNSF) railroad tracks and Route 66.[5]

From Yermo to Mountain Pass, Alternative A would be located within the median of or adjacent to I-15. From Mountain Pass to the Nevada State line, Alternative A would divert south of the I-15 corridor and traverse at grade an approximately 1.55 mile portion of the Mojave National Preserve (MNP). East of the MNP near Primm, Alternative A would rejoin the I-15 corridor, continuing northeasterly toward metropolitan Las Vegas. Alternative A would terminate at one of four Las Vegas area passenger station site options, including:

- One "Southern Station" site option, along Polaris Road, west of I-15 across from the Mandalay Bay Resort;
- Two "Central Station" site options : one on the southwest corner of the intersection of Flamingo Road and I-15; the other on the north side of Flamingo Road adjacent to the Rio Resort;
- One "Downtown Station" site option, near Bonneville Avenue and the Clark County Government Center).

An optional routing (Option C) would diverge from the I-15 corridor near Sloan Road and generally follow or be located within the existing Union Pacific Railroad (UPRR) right-of-way to the Central, or Downtown station. [6] [7]

Action Alternative B: Right of Way Alternative

Action Alternative B (Alternative B) involves construction of a fully grade-separated, dedicated double track passenger-only high-speed train along an approximately 200-mile corridor. Alternative B is identified as the "Right of Way Alternative" in that for most of

[5] This routing would require approval by the Burlington Northern Santa Fe Railroad (BNSF).

[6] Option C would require approval by the Union Pacific Railroad (UPRR).

[7] Station options are discussed in further detail in Section 2.4.9.

the distance between Victorville and Clark County/Las Vegas, the tracks would be located within or immediately adjacent to the right-of-way of I-15. Alternative B would originate from the more northerly (Site 2) of the two Victorville area station site options and would end at one of the four potential station site options in Clark County or Las Vegas, Nevada.

From Victorville to Halloran Pass, Alternative B would be located on the north/west side of I-15, within the I-15 right-of-way. At Halloran Pass, Alternative B would extend through the Clark Range (through two tunnels, 1,300 feet and 5,000 feet in length respectively) to Primm. From Primm to Jean, Alternative B would be located on the east side of I-15, crossing over to the west side of I-15 at Jean where it would continue northeasterly into Clark County. Alternative B would terminate at one of the four Las Vegas area stations identified above (Southern, Central A or B, or Downtown).

An optional routing (Option C) would diverge from the I-15 corridor near the community of Sloan in unincorporated Clark County and generally follow or be located within the existing UPRR right-of-way. Option C would terminate at the Central A or B or Downtown Station options (the Southern Station option could not be utilized in the event the Option C alignment is selected). [8] [9]

No Action Alternative

The No Action Alternative is being studied as the baseline for comparison with the proposed action alternatives. The No Action Alternative would include existing access to Las Vegas via highway (I-15) and airport (McCarran International [LAS]) access. The No Action Alternative would analyze the system physical characteristics and capacity as they exist at the time of the EIS (2006-2008) as well as planned and funded improvements that are assumed to be in place by 2030.

3.15.3 DESCRIPTION OF SECTION 4(F) PROPERTIES

This section provides a description of Section 4(f) Resources determined to have the potential to be used by the project. Figures 3.15-1 through 3.15-4 show the Section 4(f) Resources in the project vicinity.

3.15.3.1 Historic Architectural Resources

Two historic architectural resources have been identified to be located in the project vicinity which would qualify as Section 4(f) Resources (a complete list of historic architectural resources is provided in Section 3.7, Cultural Resources). One is listed as

[8] Option C would require approval by the Union Pacific Railroad (UPRR).

[9] Station options are discussed in further detail in Section 2.4.9.

eligible for NRHP listing and the other is under review by Nevada SHPO for eligibility; it is assumed eligible for the purposes of this review. Mitigation included in the cultural resources section would reduce impacts to the properties to a level below that which would constitute a constructive use of this resource. As such, the project will not result in the use of any historic architectural resources eligible for protection as Section 4(f) resources.

3.15.3.2 Cultural Resources

There are numerous cultural sites located along the project corridor. Table 3.15-1 provides a list of all sites located along the corridor that have been determined 'eligible' or are 'potentially eligible' for listing on the National Register of Historic Places (NRHP), and qualify for protection under Section 4(f). Appendix F2, Direct APE Archaeological Resources includes complete lists of all cultural resources in the project area organized by segment.

Sites identified in Table 3.15-1 below include the following types:

'Historic habitation sites' defined by an implied period of occupation and identified by refuse deposits or hearth type features located in the area.

'Village sites' are habitation areas with features that imply a sustained period of occupation.

'Quarry sites' which are sites that encompass some form of tool stone procurement.

'Prehistoric rock alignments' are any culturally-derived systematic aligning of rocks or cobbles.

'Trails' and 'trail systems' are systems of travelled paths linking resource procurement areas or other prehistoric cultural resources.

'Prehistoric habitation sites' are sites that imply a period of occupation and are usually within a short distance of water sources.

'Rock art sites' are a unique prehistoric resource, this site type normally refers to paintings, engravings, and/or shallow relief (scratching or pecking) on natural rock surfaces.

All of these sites are archaeological sites that would warrant preservation in place and, as such, would qualify for protection as Section 4(f) Resources. Notably, any archaeological sites important chiefly because of what can be learned by data recovery, where the resources can be removed, are not considered 4(f) resources.

Table 3.15-1 Cultural Resource Sites Qualifying as Section 4(f) Resources

Site Number	Description	Alternative A Segment	Alternative B Segment	Option C
CA-SBR-70	Village Site	1	1	--

CA-SBR-5227	Village Site	1	1	--
CA-SBR-2294	Village Site	2A/2B	2A/2B	--
JSA-TC-S-23	Habitation Site	2A/2B	2A/2B	--
JSA-TC-S-31	Habitation Site	2A/2B; TCE 4	2A/2B; TCE 4	--
JSA-RN-S-5H	Flume	2A	2B	--
JSA-CS-S-23H	Habitation Site	--	2B	--
JSA-TC-S-30	Habitation Site	TCE 4	TCE 4	--
CA-SBR-3694	Village Site	3A	3B	--
CA-SBR-4272	Spanish Trail	3A	3B	--
P2272-2	Rock Art Area	3A	3B	--
PSBR-52	Trail System	3A	3B	--
CA-SBR-885	Rock Alignment	--	3B	--
26CK3822	Habitation Site	--	5B	--
26CK3825	Habitation Site	--	5B	--
26CK7166	Habitation Site	--	5B	--
JSA-CS-S-161-H	Habitation Site	--	5B	--
CA-SBR-4198	Habitation Site	TCE 7	TCE 7	TCE 7
P2044-11	Quarry and Habitation Site	TCE 7	TCE 7	TCE 7
P2044-9	Rock Art	TCE 7	TCE 7	TCE 7
JSA-CS-S-175	Rock Shelter	--	--	6C
JSA-CS-S-185	Rock Shelter	--	--	6C

Source: Jones & Stokes, 2008.

3.15.3.3 Public Parks and Recreation Areas

Clean Air Act 'Class 1 Areas'

The following wilderness and national park resources are Section 4(f) Resources because they are publicly owned parks and recreation areas:

Domeland Wilderness

San Gabriel Wilderness

San Gorgonio Wilderness
San Jacinto Wilderness
Agua Tibia Wilderness
Joshua Tree National Park
Grand Canyon National Park
Cucamonga Wilderness

The Clean Air Act designates national wilderness areas and national parks meeting certain criteria as "Class I Areas."[10] The resources listed above are classified as such. As a national goal, impairment of visibility in Class I Areas is to be prevented[11]. Figure 3.15-5 shows these resources to be located within 100 miles of the project. Given their unique classification and sensitivity to air pollution, they are evaluated below for potential proximity impacts related to aesthetics (visibility).

Mojave National Preserve

The Mojave National Preserve (MNP) is a unit of the National Park Service (NPS) and is a public park with recreational function, and, therefore, a Section 4(f) Resource. The MNP is a large expanse of desert lands (approximately 1.6 millions acres) that represents a combination of Great Basin, Sonoran, and Mojave Desert ecosystems. The MNP contains diverse mountain ranges, the Kelso dune system, dry lake beds and evidence of volcanic activity (domes, lava flows, and cinder cones). Plant and animal life complement the geological features. Providence Mountain State Recreation Area (Mitchell Caverns), the University of California's Granite Mountains Natural Reserve and California State University's Desert Studies Center at Soda Springs are also within its boundaries.

The MNP is open year round to visitors and offers a variety of recreational activities including camping, backpacking, 4-wheel drive routes, hiking, horseback riding, wildflower viewing, scenic drives and hunting.

An approximately 1.55 mile portion of Segment 4A would traverse MNP land south and east of the Nipton Road exit of I-15 (see Figure 3.15-3 and Figure 3.15-5). This portion of the MNP is in close proximity to both I-15 and Nipton Road (which becomes State Highway 164 in Nevada). The portion of the MNP through which Segment 4A would traverse does not have any hiking or riding trails in the immediate area. An unpaved, four-wheel drive road is located approximately 3 miles to the south of the proposed

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[10] 42 U.S.C. 7472

[11] 42USC7491

Segment 4A alignment through the MNP. The vast majority of recreational trails and scenic attractions associated with the MNP are located 10 or 20 miles or more to the south and southwest of the proposed Segment 4A alignment area.

Rockview Park (Victorville)

Rockview Park is a Section 4(f) resource because it is a public park with recreational function. It is a 52 acres park located in Victorville, at 17800 National Trails Highway (see Figure 3.15-1). Park amenities include use of the Nature Center, 1,900 square foot multipurpose room, an outdoor amphitheater with campfire area, two small open grass areas, a gazebo, play equipment, and restroom facilities.

Grady Trammel Park (Victorville)

Grady Trammel Park is a Section 4(f) resource because it is a public park. It is a 2.66 acre park located in Victorville, west of Interstate 15, at 17184 Stoddard Wells Road (see Figure 3.15-1). Park amenities include a ball field, an open grass area, an outdoor basketball court, a sand volleyball court, covered picnic areas, play equipment, and restroom facilities.

Waterman Park (Barstow)

Waterman Park is a section 4(f) resource because it is a public park. It is located in Barstow at 417 N. 3rd Avenue (see Figure 3.15-2). It is a small neighborhood park.

Bob Baskin Park (Las Vegas)

Bob Baskin Park is a Section 4(f) resource because it is a public park. It is a 5.92 acres park located in Las Vegas at South Rancho Drive and West Oakey Boulevard (see Figure 3.15-4). Park amenities include a playground, basketball court, picnic area, a jogging and walking track, 4 tennis courts, a fitness course, a water play area, open space, and restroom facilities.

Mary Dutton Park (Las Vegas)

Mary Dutton Park is a Section 4(f) resource because it is a public park. It is a 0.2 acre park located in Las Vegas, at East Charleston Boulevard and Eighth Street (see Figure 3.15-4). It is a smaller neighborhood park with open space amenities.

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Section 4(f) Resources (1) FIG 3-15.1

Source: Geografics Consulting 02.03.09

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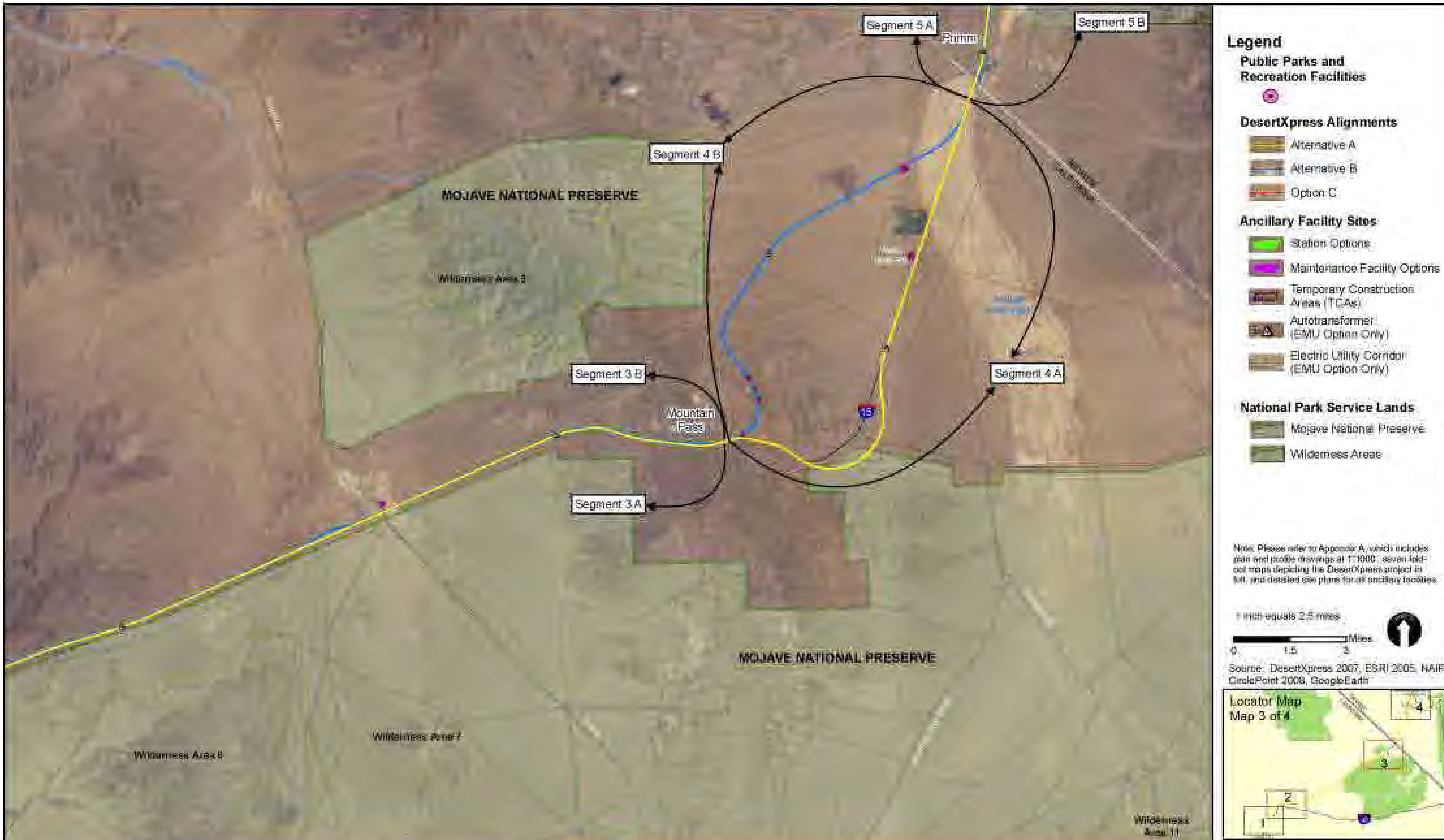
DesertXpress Project EIS

Section 4(f) Resources (2)

FIG 3-15.2



Federal Railroad Administration

DesertXpress Project EIS

Section 4(f) Resources (3) FIG 3-15.3

DesertXpress Project EIS

Section 4(f) Resources (4)

FIG 3-15.4

Federal Railroad Administration

DesertXpress Project EIS

Clean Air Act Designated Class I Areas FIG **3-15.5**

3.15.4 IMPACTS TO SECTION 4(F) PROPERTIES

3.15.4.1 Summary of Project Use of Section 4(f) Resources

All action alternatives would result in the use of one or more Section 4(f) Resources. The No Action alternative would avoid these uses, but could potentially result in other uses of Section 4(f) properties in the implementation of future projects. Table 3.15-2 below summarizes the use of Section 4(f) Resources by project alternative.

Table 3.15-2 Summary of Use of Section 4(f) Resources

Alternative	Park and Recreation Facilities	Cultural Resources Sites
Alternative A		
Segment 1	None	Direct Use of 2 Cultural Sites[b]
Segment 2A/2B		
2A/2B Joint Alignment	None	Direct Use of 3 Cultural Sites
2A (Separate Alignment)	None	Direct Use of 1 Cultural Sites
TCE 4[a]	None	Direct Use of 2 Cultural Sites
Segment 3A		
3A Alignment	None	Direct Use of 4 Cultural Sites
TCE 7[a]	None	Direct Use of 3 Cultural Sites
Segment 4A	Direct Use of the MNP	None
Segment 5A	None	None
Segment 6A	None	None
Segment 7A	None	None
Subtotal, Alternative A	*Direct Use of the MNP*	*Direct Use of 13 Cultural Sites*
Alternative B		
Segment 1	None	Direct Use of 2 Cultural Sites[b]
Segment 2A/2B		
2A/2B Joint Alignment	None	Direct Use of 3 Cultural Sites
2B (Separate Alignment)	None	Direct Use of 2 Cultural Sites
TCE 4[a]	None	Direct Use of 2 Cultural Sites
Segment 3B		
3B Alignment	None	Direct Use of 5 Cultural Sites
TCE 7[a]	None	Direct Use of 3 Cultural Sites
Segment 4B	None	None
Segment 5B	None	Direct Use of 4 Cultural Sites
Segment 6B	None	None
Segment 7B	None	None

Alternative	Park and Recreation Facilities	Cultural Resources Sites
Subtotal, Alternative B	*None*	*Direct Use of 21 Cultural Sites*
Option C		
Segment 6, Option C	None	Direct Use of 2 Cultural Sites
Segment 7C	None	None
No Action Alternative	None known	None known

Source: Jones & Stokes, 2008.

[a] As the EIS process continues, FRA will continue to work with DXE to identify and act on opportunities to avoid impacts to sensitive cultural resources, including relocating TCEs which result in a use of Section 4(f) Resources.

[b] These sites would only be used by utility corridors associated with the EMU technology option. They would not be used if the DEMU technology option is selected.

Note: The total number of cultural sites listed by alternative is less than the sum of the segment use of cultural sites because the same cultural sites are used by multiple segments.

3.15.4.2 Regional Project Impacts

Clean Air Act 'Class 1 Areas'

Due to their distance from project (see Figure 3.15-5), the project would not directly incorporate land from these resources and would, therefore, not result in their direct use. However, given the project's regional proximity to these areas, the potential for indirect impacts are evaluated here to determine if a constructive use of these resources would result from the project.

Alternative A and Alternative B would result in the emission of criteria air pollutants that contribute to reduced visibility, including NO_2, PM_{10} $PM_{2.5,}$ and fugitive dust. Under the EMU technology option, all alternatives would be in general conformity with criteria air pollutant thresholds. Under the DEMU technology option, all alternatives would exceed NO_x thresholds, and be in general conformity with all other thresholds. The DEMU technology option would be subject to locomotive emission standards and would meet Tier 2 standards at a minimum (Tier 2 is more stringent that Tier 1, on a 0-2 scale). Fugitive dust caused during construction could potentially contribute to reduced visibility, however the required Dust Control Plan would suppress dust emissions to a level where no visible dust would extend beyond the construction site limits. For a complete discussion of project air quality impacts see Section 3.11, Air Quality.

The DEMU technology option would result in the exceedance of emission thresholds for the criteria pollutant NO_x. Wind patterns in this region are dominated by prevailing westerlies for most of the year and the Santa Ana winds in the summer months. During much of the year pollutants from the project would be carried away from the majority of these areas towards the northwest. However, in the summer months, the Santa Ana would likely carry the pollutants in the southwest direction, towards several of these areas (See Figure 3.15-5). Given the great distance between the point of emission along the project corridor and the identified Class I Areas, the pollutant would be greatly dispersed prior to entering the airsheds of these Class I Areas and would, therefore, not have a substantial impact on the visibility in any of these areas.

The Class I Areas would not be subject to any other potential proximity impacts due to their distance from the project corridor. The project's regional proximity to these resources would not substantially impair protected activities, features or attributes which qualify them for protection as a Section 4(f) Resource. Nor would it result in severe proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of these resources.

3.15.4.3 Project Impacts by Segment

Segment 1

Cultural Resources

Within Segment 1, Alternative A and Alternative B would result in the use of 2 Section 4(f) Resources, both village sites. These alternatives would result in the direct use of these properties because construction of the proposed project elements may potentially impact subsurface deposits or have other physical impacts at these sites. These impacts are specifically associated with the utility corridor that would be necessary if the EMU technology option is selected and would not result from the DEMU technology option.

Public Parks and Recreation Facilities

Rockview Park (Victorville)

Rockview Park is located within ½-mile of OMSF-1, TCE-1 and a new power line corridor (EMU option only). The project would not directly incorporate land from this resource and would, therefore, not result in its direct use. However, given the project's proximity to the park, the potential for indirect impacts are evaluated here to determine if a constructive use of this resource would result from the project.

Under the EMU option, the new power line corridor would be visible from the park. Existing surrounding developments include several large industrial developments to the southeast and a large power transmission station to the southwest, as well as existing, more distant power line corridors to the north. As such, the proximity of the proposed power line corridor would not result in a substantial impairment or dramatic change of views enjoyed from the park, as developed features are already prominent in the area.

The park is located at a distance from the project facilities and alignment that would eliminate the potential for noise and vibration impacts. Noise impacts are not expected to occur at distances greater than 300 feet from the project corridor and facilities (see section 3.12, Noise). The nearest project component to the park is located approximately 600 feet away; therefore, there would be no noise impacts at this park. The park is located several miles from the alignment and would, therefore, not be subjected to vibration impacts, which only occur in close proximity to the alignment.

Access to this park is currently available from National Trails Hwy. Access would not be affected by the nearby project components as they are physically separated by an existing railroad corridor.

This park does not provide habitat for wildlife or waterfowl. The project would, therefore, not diminish habitat values or cause ecological intrusion.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

Grady Trammel Park (Victorville)

Grady Trammel Park is located within ½-mile of OMSF-1, TCE-1, Victorville Station 1, and TCE-2. The project would not directly incorporate land from this resource and would, therefore, not result in its direct use. However, given the project's proximity to the park, the potential for indirect impacts are evaluated here to determine if a constructive use of this resource would result from the project.

The park is located at a distance from the project facilities and alignment which would eliminate the potential for noise and vibration impacts. Noise impacts are not expected to occur a distance greater than 300 feet from the project corridor and facilities (see section 3.12, Noise). The nearest project component to the park is located approximately 1,800 feet away; therefore, there would be no noise impacts at this park. The park is located over ½-mile from the alignment and would therefore not be subjected to vibration impacts, which only occur in close proximity to the alignment.

The park is currently surrounded by industrial developments, a landfill, open desert plain, and distant rocky hills giving the area a moderate level of intactness, the existing paved freeway corridor and residential development to the east create a low level of unity (see Section 3.6, Visual/Aesthetics). The Victorville Station-1 was intentionally designed to be highly visible from I-15 to attract riders. This park's proximity to the station will result in the station's being highly visible to park users. Given the existing surrounding development, the introduction of the Victorville Station-1, OMSF-1, and TCE-1 would not result in substantial impairment of the visual character surrounding this park, nor would recreation activities enjoyed at the park be substantially impaired by the introduction of these new visual elements.

Access to the park is available from Stoddard Wells Road. Access would not be substantially affected by the nearby project components, while traffic would increase with the introduction of the train station, no severe impairment of access to the parks recreational facilities would occur.

This park does not provide habitat for wildlife or waterfowl. The project would therefore not diminish habitat values or cause ecological intrusion.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

Segment 2

Cultural Resources

Within Segment 2, Alternative A would result in the use of 4 Section 4(f) Resources, two habitation sites, one village site, and a flume. These alternatives would result in the direct use of these properties because construction of the proposed project elements may potentially impact subsurface deposits or have other physical impacts at these sites.

Alternative B would result in the use of 5 Section 4(f) Resources, including the same 4 sites as Alternative A, plus one additional habitation site. This alternative would result in the direct use of these properties because construction of the proposed project may result in impacts to subsurface deposits or other physical impacts to these sites.

All alternatives would include TCE 4 which would result in the direct use of two habitation sites. Use of this area for staging and construction activities may result in impacts to subsurface deposits at these sites, resulting in their direct use. Section 3.7, Cultural Resources, describes impacts to cultural resources in further detail.

Public Parks and Recreation Facilities

Waterman Park (Barstow)

Waterman Park is located within ½-mile of transformer 4 and Segment 2A/2B. The project would not directly incorporate land from this resource and would, therefore, not result in its direct use. However, given the project's proximity to the park, the potential for indirect impacts are evaluated here to determine if a constructive use of this resource would result from the project.

The park is located at a distance from the project facilities and alignment which would eliminate the potential for noise and vibration impacts. Noise impacts are not expected to occur at distances greater than 300 feet from the project corridor and facilities (see section 3.12, Noise). The nearest project component to the park is located approximately 3,000 feet away; therefore, there would be no noise impacts at this park. The park is located approximately ½-mile from the alignment and would therefore not be subjected to vibration impacts, which only occur in close proximity to the alignment.

This park is separated from Segment 2A/2B and transformer 4 by an existing railroad yard. Views from the park to the project would only be available looking across this existing development. As such, the introduction of similar development associated with the project would not alter the aesthetic character of the park.

Access to the park is currently available from East Cottage Street and North 3rd Street. Access would not be affected by the nearby project components as they are physically separated by an existing railroad yard.

This park does not provide habitat for wildlife or waterfowl. The project would therefore not diminish habitat values or cause ecological intrusion.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

Segment 3

Cultural Resources

Alternative B would result in the direct use of 5 cultural resource sites within this segment. The sites affected include a village site, a Spanish trail site, a rock art area, a trail system, and a rock alignment. The construction of the proposed alignment may potentially physically impact these sites, resulting in the direct use of these properties.

Alternative A would result in the direct use of 4 cultural resources sites within this segment, including the same village site, a Spanish trail site, a rock art area, and a trail system as Alternative B, but would avoid the use of the rock alignment. The construction of the proposed alignment may potentially physically impact these sites resulting in the direct use of these properties.

All alternatives would include TCE 7 and result in the direct use of 3 cultural resource sites. Site used by the TCE include a habitation site, a quarry and habitation site and a rock art site. Use of the easement for staging and construction activities would potentially result in disturbance of subsurface deposits or other physical impacts at these sites, resulting in a direct use. Section 3.7, Cultural Resources, describes impacts to these sites in further detail.

Public Parks and Recreation Areas

Mojave National Preserve

Alternative A and Alternative B would be located adjacent to the Mojave National Preserve from before Zzyzx Road to just before the segment's end. The MNP is located south of I-15 for the length of this segment (see Figure 3.15-3). All alternatives would be located in the median of I-15 or north of I-15. Because the segment alignments would be separated from the MNP by I-15 it would not result in the direct use of this resource. However, given the project's proximity, the potential for indirect impacts are evaluated here in order to determine if a constructive use of this resource would result from the project.

Along Segment 3, this park is located at a distance from the project facilities and alignment that would eliminate the potential for noise and vibration impacts. The MNP is subject to noise from I-15 and the additional noise from the project would not meaningfully change the character of the noise environment. Noise impacts are not expected to occur at distances greater than 300 feet from the project corridor and facilities (see Section 3.12, Noise). The alignment project is located approximately 800 feet from the alignment; therefore, there would be no noise impacts at this park. The park's distance from the alignment eliminates the potential for vibration impacts, which only occur in close proximity to the alignment.

The MNP is bordered on the north by the paved I-15 freeway corridor; the introduction of the railroad corridor within the median and/or to the north of I-15 would not alter the visual character of the MNP in this area.

Access to the MNP is available from many points, including several exits along I-15. Access would not be affected by the project as no exists off of I-15 would be impacted by the proposed alignments.

The MNP contains suitable desert tortoise habitat, this segment of the project would not interfere with the species' movement corridor or critical life cycle process or substantially reduce the use of the MNP by this species. Therefore, the project would not diminish the value of the adjacent wildlife habitat.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

Segment 4

Cultural Resources

There are no identified cultural resource sites which qualify for Section 4(f) protection within this segment, as such, no direct or constructive use of cultural resources sites would occur as a result of Alternative A or Alternative B along this segment.

Public Parks and Recreation Areas

Mojave National Preserve

Alternative A would result in the direct Section 4(f) use of 13.82 acres of the MNP and the indirect use of 27.65 acres. This alternative would bisect the northern portion of the MNP for approximately 1.55 miles (see Figure 3.15-5), and result in adverse impacts to visual/aesthetic, biological, and recreational resources.

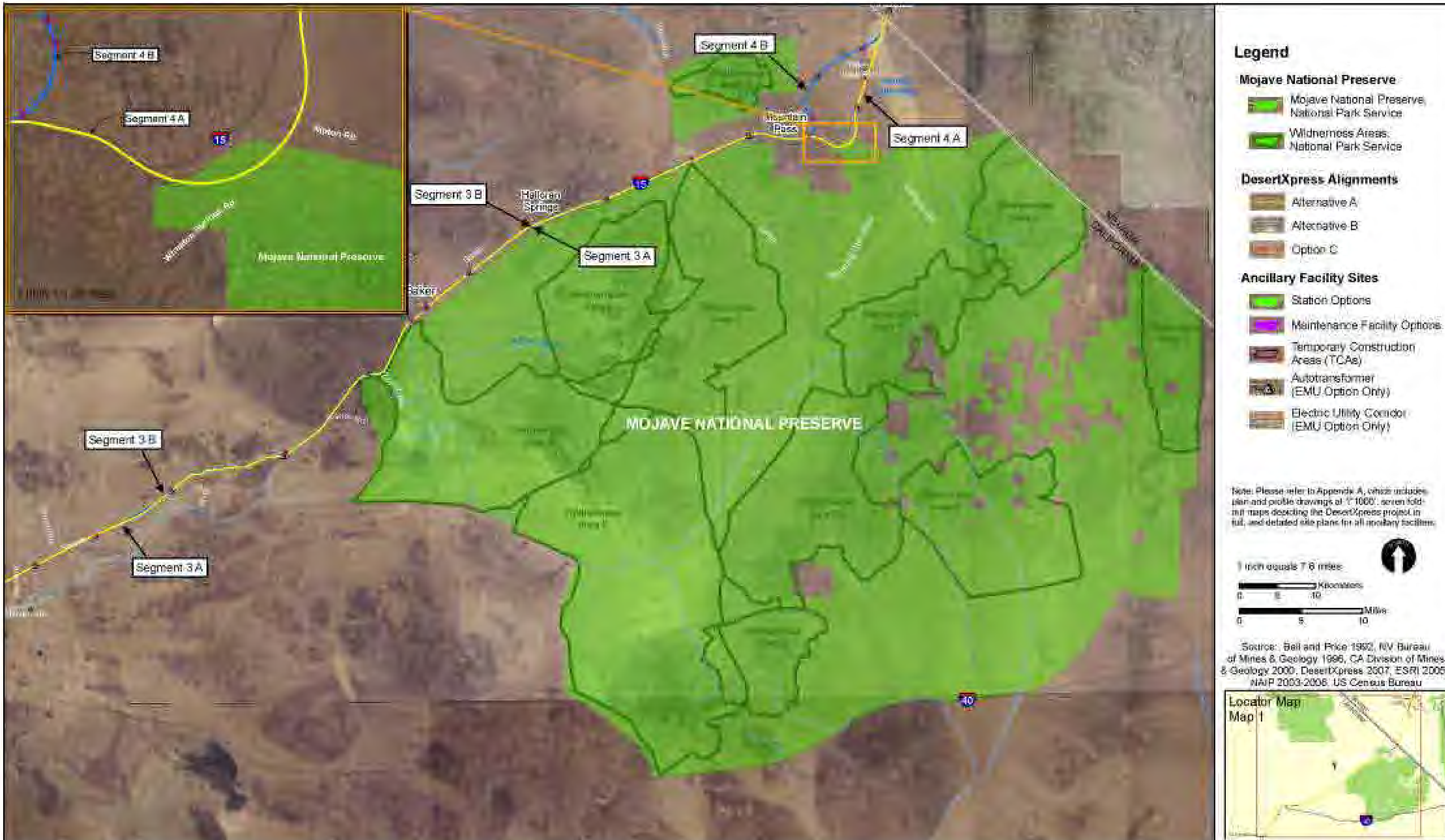
The portion of Segment 4A would traverse the MNP south and east of the Nipton Road exit of I-15. The elevated linear alignment of the portion of the segment which allows it to pass over Nipton Road (shown in Figure 3.6-27) would dominate the view of the casual observer. It would not be consistent with BLM Class I and II ratings. Additionally, this rail alignment breaks up the continuity of expansive desert views, decreasing visual intactness and adding elements to the setting that detract from the unity of the view. Section 3.6, Visual/Aesthetics, provides a complete discussion of these impacts. However, the alignment would affect a portion of the MNP that sees little to no recreational use, owing to the lack of trails, pathways, or related attractions in this portion of the MNP, as well as the close presence of the I-15 freeway corridor and Nipton Road, which becomes a Nevada state highway to the immediate east. Although the presence of Segment 4A would have the potential to affect the functioning of the MNP because it would alter the setting for recreational users and visitors, the recreational integrity of the area is compromised by all of the factors identified above. Segment 4A would thus have no discernible effect upon the recreational activities, attractions, and key features of the MNP. Segment 4A's effects on the MNP would thus be considered *de minimis*.

Segment 4A would introduce new sources of noise and vibration into the MNP, impacts would extend 200-300 feet on each side of the alignment. The recreational opportunities and human use in the areas potentially affected by these noise impacts are limited. There are no existing trails or built recreational facilities that would attract recreational users to this area for uses described as sensitive to noise by FHWA guidelines[12]. Recreational uses in the immediate area are limited to scenic drives along Nipton Road and hunting opportunities in where allowed. Recreational users passing in vehicles would be momentarily impacted by potential noise impacts from the project. This resource would, therefore, not be substantially affected by the new sources of noise and vibration.

Access to the MNP is available from many points, including several exits along I-15. Access would not be affected by the project as no exists off of I-15 would be impacted by the alignment. Segment 4A would pass over Nipton Road and thus not interfere with access currently available via this road. No constructive use related to proximity impacts to access would result from this segment.

The MNP General Management Plan identifies the portion of the MNP impacted by this segment as desert tortoise habitat. Within the MNP, this alternative would permanently impact suitable desert tortoise habitat and have temporary effects to this habitat. Implementation of this alternative would also result in habitat fragmentation for this species, as it could create a barrier to desert tortoise movement within the MNP. Although the introduction of the project would diminish the value of the surrounding habitat and thus result in a Section 4(f) use, the wildlife value of this portion of the MNP is somewhat compromised by the presence of Nipton Road and the I-15 corridor. Moreover, significant portions of the proposed rail alignment would be on raised structures, under which wildlife movement could occur relatively unimpeded. Where tracks are to be placed on embankment areas, opportunities exist to reduce wildlife impacts to *de minimis* levels through the introduction of wildlife-dedicated tunnels and passages, such as are common along many stretches of I-15 to the west. Impacts to biological resources are discussed in detail in Section 3.14, Biological Resources.

[12] 23CFR772.19



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Section 4(f) Use of the Mojave National Preserve

FIG 3-15.6

Segment 5

Cultural Resources

Within Segment 5, Alternative B would result in the use of 4 Section 4(f) Resources; all four sites are classified as prehistoric habitation sites. These alternatives would result in the direct use of these properties because construction of the proposed project elements may potentially impact subsurface deposits or have other physical impacts at these sites.

Alternative A would not result in the use of any cultural resource sites along this segment.

Public Parks and Recreation Areas

There are no public parks or recreation areas within this segment which would have the potential to be used by the project. As such, no direct or constructive use of recreational resource properties would occur along this segment as a result of Alternative A or Alternative B along this segment.

Segment 6

Cultural Resources

Alternatives A and B would not result in the use of any section 4(f) resources. Option C would result in the direct use of 2 cultural resource sites, including two rock shelter sites. Construction of the proposed alignment may potentially result in physical impacts to these sites and therefore, their direct use under Section 4(f). Section 3.7, Cultural Resources, describes impacts to these sites in further detail.

Public Parks and Recreation Areas

There are no public parks or recreation areas within this segment which would have the potential to be used by the project. As such, no direct or constructive use of recreational resource properties would occur along this segment as a result of the Alternative A, Alternative B, or Option C along this segment.

Segment 7

Cultural Resources

There are no identified cultural resource sites which qualify for Section 4(f) protection within this segment, as such, no direct or constructive use of cultural resources sites would occur as a result of Alternative A, Alternative B, or Option C along this segment.

Public Parks and Recreation Areas

Bob Baskin Park (Las Vegas)

Bob Baskin Park is located within ½-mile of Segment 7A/7B/7C. The project would not directly incorporate land from this resource and would, therefore, not result in its direct use. However, given the project's proximity to the park, the potential for indirect impacts are evaluated here in order to determine if a constructive use of this resource would result from the project.

The park is located at a distance from the project facilities and alignment which would eliminate the potential for noise and vibration impacts. Noise impacts are not expected to occur at distances greater than 300 feet from the project corridor and facilities. The nearest project component to the park is located approximately 3,200 feet away; therefore, there would be no noise impacts at this park. The park is located over ½-mile from the alignment and would therefore not be subjected to vibration impacts, which only occur in close proximity to the alignment.

This park is located in a heavily developed residential area approximately ½-mile from the I-15 corridor. The introduction of the project into this highly developed area would not change its existing visual character.

Access to the park is currently available from West Oakey Boulevard. Access would not be affected by the nearby project components as they would not substantially interfere with or alter the existing vehicle circulation patterns in the area of this park.

This park does not provide habitat for wildlife or waterfowl. The project would therefore not diminish habitat values or cause ecological intrusion.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

Mary Dutton Park (Las Vegas)

Mary Dutton Park is located within ½-mile of Segments 7 A/7B/7C, the Downtown Las Vegas Station, and TCE 17. The project would not directly incorporate land from this resource and would, therefore, not result in its direct use. However, given the project's proximity to the park, the potential for indirect impacts are evaluated here in order to determine if a constructive use of this resource would result from the project.

The park is located at a distance from the project facilities and alignment which would eliminate the potential for noise and vibration impacts. Noise impacts are not expected to occur at distances greater than 300 feet from the project corridor and facilities. The nearest project component to the park is located approximately 2,800 feet away; therefore, there would be no noise impacts at this park. The park is located approximately

½ - mile from the alignment and would therefore not be subjected to vibration impacts, which only occur in close proximity to the alignment.

This park is located in a heavily developed residential area approximately ½ -mile from the I-15 corridor. The introduction the project into this highly developed urban area would not change the existing visual character of the area surrounding the park.

Access to the park is currently available from East Charleston Boulevard. Access would not be affected by the nearby project components as they would not substantially interfere with or alter the existing vehicle circulation patterns in the area of this park

This park does not provide habitat for wildlife or waterfowl. The project would therefore not diminish habitat values or cause ecological intrusion.

The project's proximity to this resource would not substantially impair protected activities, features or attributes which qualify this park for protection as a Section 4(f) Resource. Nor would it result in proximity impacts to aesthetics, noise, vibration, access, or ecological resources at this property. Therefore, there would be no constructive use of this resource.

3.15.5 AVOIDANCE ALTERNATIVES

Other than the No Action alternative there are no feasible and prudent alternatives that would avoid the of all Section 4(f) Resources.

3.15.5.1 Alternative to Avoid Use of the Mojave National Preserve

Segment 4, Alternative B

This alternative would diverge from I-15 and avoid impacts to the MNP; it would not result in direct or constructive use of this resource. Segment 4, Alternative B would extend through the Clark Range (through two tunnels, 1,300 feet and 5,000 feet in length respectively) to Primm. As shown in Figure 3.15-3, this alignment would extend north, avoiding the use of the MNP.

While this alternative is feasible and considered adequate to meet the purpose and need of the project, it would result in more significant environmental impacts in several resource topic areas (see Section 3.8 Hydrology and Water Quality and Section 3.9, Geology and Soils).

3.15.5.2 Alternatives to Avoid Use of Cultural Resource Sites

There is no feasible and prudent alternative which would avoid the use of all cultural sites which qualify for Section 4(f) protection. Alternative A would result in the use of 6 fewer cultural resource sites which qualify for Section 4(f) protection than Alternative B) (see Section 3.15-2) The No Action alternative would avoid the use of these sites but may result in the use of other resources as part of future projects.

3.15.6 MEASURES TO MINIMIZE HARM

3.15.6.1 Alternative Development Process

A number of alignment alternatives were studied by the Applicant and some have been rejected from further consideration using standardized technical and environmental criteria. These criteria were developed largely by the Applicant. The process used by the applicant to evaluate conceptual alignment alternatives and to make feasibility and practicability determinations in consultation with the Lead and Cooperating agencies during the environmental review process is further described in Chapter 2, Alternatives. Key criteria used to distinguish among alternatives are listed in **Table 2.1**. Those criteria include technical and alignment factors, including connectivity, right-of-way constraints and compatibility, ridership potential, constructability, and environmental impacts.

3.15.6.2 Alternatives Considered and Rejected

Two existing transportation corridors exist between Victorville and Las Vegas: the I-15 freeway and the UPRR railroad. An alternative alignment was investigated that would follow the existing mainline UPRR alignment across the MNP, through Cima and Kelso. While a UPRR alternative would enable the trains to avoid the steep grades along I-15, it would be a much longer, less direct route that would require the construction of new tracks through the MNP alongside the UPRR tracks. Based on preliminary discussions with staff of the MNP, the Applicant determined that this alignment would be less viable from an environmental impact perspective than following the median and/or north side of the I-15 alignment, which minimizes, to the greatest extent, any potential impacts to the MNP. The Applicant also found this alternative would be significantly longer, with many speed-restricting curves which would add substantial travel time and thus fail to attract sufficient ridership.

Similarly, it was considered that any alignment alternative within the urbanized portions of the Las Vegas Valley that would not follow existing major transportation corridors (i.e., existing freeways and railroad rights-of-way) would have the potential to result in substantial adverse impacts to urban/suburban areas (such as displacement of residents and businesses, increased noise and visual impacts, and impacts to property access). Such impacts would result largely from the incompatibility of high-speed train operations within existing residential and/or commercial developments. This resulted in the elimination of routes that would divert from major transportation corridors and instead follow existing streets and boulevards.

Several other alternatives were eliminated for particular sections of the route. These are listed in Table 2.4, along with the rationale for their elimination.

3.15.7 COORDINATION

3.15.7.1 LEAST HARM ANALYSIS AND CONCLUDING STATEMENT

Because there are no feasible and prudent avoidance alternatives to the project, several factors must be considered so as to identify the alternative that causes the least overall harm in light of the Section 4(f) preservation purposes. The least overall harm is determined by balancing the following factors:

- The ability to mitigate adverse impacts to each Section 4(f) property
- The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
- The relative significance of each Section 4(f) property;
- The views of the officials with jurisdiction over each Section 4(f) property;
- The degree to which each alternative meets the purpose and need for the project;
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and

- Substantial differences in costs among the alternatives.

This analysis will incorporate input from the agencies and members of the public during circulation of the Draft EIS, as well as from the outcome of the Section 106 consultation process. The conclusions of this analysis will be presented in the Final Section 4(f) Evaluation that will be circulated with the Final EIS.

3.16 CUMULATIVE IMPACTS

This chapter summarizes the potential cumulative physical and growth-related environmental consequences associated with the DesertXpress alternatives. Please refer to Chapter 2.0, Alternatives, for a complete discussion of the action alternatives (Alternative A, Alternative B, and Option C) in terms of rail alignments, associated physical facilities, and propulsion technologies.

The purpose of this chapter is to provide a description of the cumulative effects on a natural resource, ecosystem or human community that would result from the action alternatives in combination with other past, present, or reasonably foreseeable major actions. The methodology for this evaluation was developed according to the guidance presented in the January 1997 CEQ publication, Considering Cumulative Effects Under the National Environmental Policy Act, the U.S. EPA publication, Consideration of Cumulative Impacts in EPA Review of NEPA Documents (May 1999), and other professional guidance publications on the assessment of cumulative effects.

For this EIS, indirect impacts, which are environmental impacts caused by the alternatives that occur later in time or are father removed in distance but still reasonably foreseeable, [1] are addressed in each resource section (Sections 3.1 through 3.15) and are also referenced here with a summary of the cumulative effects, described below.

3.16.1 REGULATIONS AND STANDARDS

Under the National Environmental Policy Act (NEPA) as amended, a cumulative impact is an impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts may result from individually minor by collectively significant actions taking place over a period of time.[2]

A cumulative impact includes the total effect on a natural resource, ecosystem, or human community that is attributable to past, present, or reasonably foreseeable future activities/actions of federal, nonfederal, public, or private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts on a particular resource that have occurred, are occurring, and will likely occur as a result of any action or influence, including the direct and indirect effects of a federal activity. Accordingly, there may be different levels of cumulative impacts on different environmental resources.

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[1] 40 CFR 1508.8 (b)

[2] 40 CFR §1508.7

3.16.2 Past Activities and Actions Considered in the Cumulative Analysis

As stated above, cumulative impacts include environmental effects attributable to past activities and actions. Past activities and projects considered in this analysis include existing projects that are closely related in location to the DesertXpress project, depending on the area of cumulative analysis identified for each environmental topic area.

The DesertXpress project area consists of both a rural and urban environment. At the two termini for the DesertXpress rail alignment in Victorville and Las Vegas, the station and maintenance facilities are situated in an urban and exurban environment, respectively. However, the areas between Victorville and Las Vegas located along the DesertXpress rail alignment are undeveloped, rural, desert lands, with the exception of several small developed communities, such as Barstow. Over the past decade, the urbanization in Victorville and Las Vegas has occurred rapidly, with development of urban uses, including residential, industrial, commercial, and service areas. There are numerous past projects that have been completed and developed within these urban areas. Conversely, the rural areas between Victorville and Las Vegas have experienced a slower trend in urbanization, with a limited number of isolated projects located near the proposed DesertXpress rail alignment.

Additionally, the DesertXpress project was sited and designed with consideration of the location of past related projects. The location of the DesertXpress project, including the rail alignment, station and maintenance facilities, and temporary construction areas, were designed to avoid impacts to past projects. For the majority of the rail alignment, the action alternatives have been located within the median or immediately adjacent to the I-15 corridor, so as to avoid impacts to past projects, such as existing solar and wind energy generating facilities located in the California Desert Conservation Area, existing mining operations near Mountain Pass, and residential, commercial, and recreational developments in Victorville, Las Vegas, and the smaller communities along the proposed DesertXpress rail alignment.

These past projects within the urban and rural environment of the DesertXpress project area are a part of the existing environmental conditions and establish a baseline for the potentially affected environment. As such, past related projects are not expected to affect or be affected by the DesertXpress project.

3.16.3 PRESENT AND FUTURE REASONABLY FORESEEABLE ACTIONS AND PROJECTS CONSIDERED IN THE CUMULATIVE ANALYSIS

The present and future projects listed below are considered reasonably foreseeable and have been included in the cumulative analysis. These projects were identified through:

1. Discussions with federal land management agencies, city and county planners, etc.

2. Review of projects identified under applicable San Bernardino and Clark County regional transportation improvement plans (RTIPs) as part of the transportation impact analysis.

The present and future projects included in the cumulative analysis are projects that are within close proximity to the action alternative alignments, stations, and maintenance facilities. These projects include transportation projects, land development projects (residential and commercial), energy projects, utilities, and projects related to parks, recreation, and natural resources. Implementation of the action alternatives is not dependent on any of these cumulative projects proceeding, and each project included in the cumulative analysis has its independent utility, i.e., could be built independent of the DesertXpress project. The projects included in the cumulative analysis are ones in which development is underway, applications have been filed, or that have recently been approved but not yet constructed. Figures 3.16-1 through 3.16-7 present the location of the present and future projects included in the cumulative analysis.

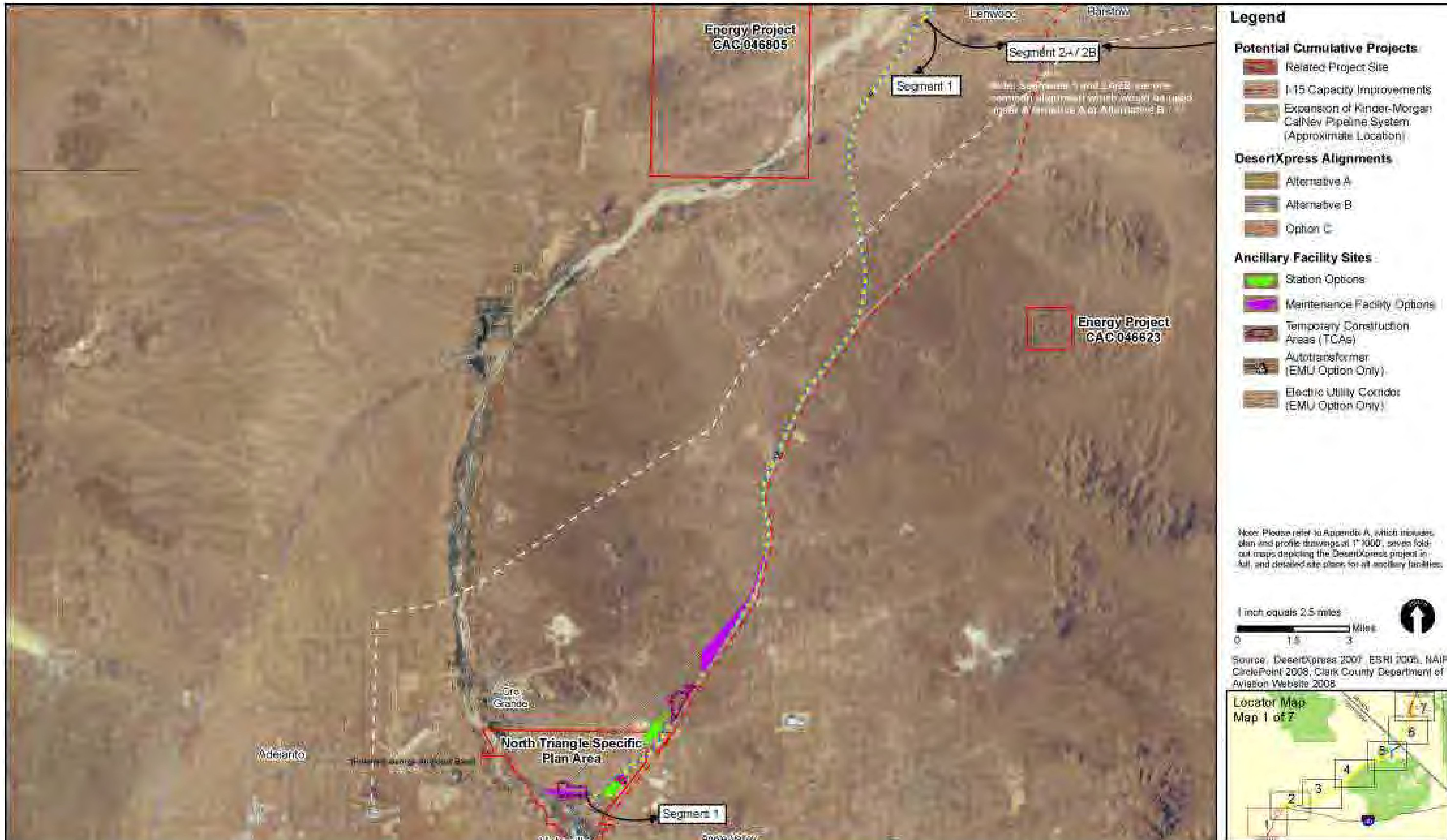
3.16.3.1 Transportation Projects

There are several present and future transportation projects within close proximity to the action alternatives, as described below.

Interstate-15 Capacity Improvements

Caltrans and the Nevada Department of Transportation (NDOT) are planning for future highway improvements along I-15 between Victorville and Las Vegas. I-15 is intended to remain in its existing configuration for most of the distance between Victorville and Las Vegas, with the exception of capacity improvements in the urbanized areas. The location of the I-15 capacity improvements are shown on Figures 3.16-1 through 3.16-7.

In Victorville, Caltrans plans to widen the bridge crossing over the Mojave River and to reconstruct the D Street, E Street, and South Stoddard Wells Road interchanges along I-15. Near Barstow, a 1-mile segment of I-15 would be widened to 6 lanes, with the reconstruction of an I-15 interchange in Barstow. In addition to the widening improvements to increase capacity, Caltrans plans to develop the I-15 Mountain Pass Truck Lane Project, which would add several truck lanes to I-15 sections with steep grades.



DesertXpress Project EIS

Potential Cumulative Projects (1) FIG 3-16.1

DesertXpress Project EIS

Potential Cumulative Projects (2) FIG 3-16.2

Legend

Potential Cumulative Projects

- Related Project Site
- I-15 Capacity Improvements
- Expansion of Kinder-Morgan CalNev Pipeline System (Approximate Location)

DesertXpress Alignments

- Alternative A
- Alternative B
- Option C

Ancillary Facility Sites

- Station Options
- Maintenance Facility Options
- Temporary Construction Areas (TCAs)
- Autotransformer (EMU Option Only)
- Electric Utility Corridor (EMU Option Only)

Note: Please refer to Appendix A, which includes plan and profile drawings at 1"1000', seven fold-out maps depicting the DesertXpress project in full, and detailed site plans for all ancillary facilities.

1 inch equals 2.5 miles

0 1.5 3 Miles

Source: DesertXpress 2007, ESRI 2005, NAIP CirclePoint 2008, Clark County Department of Aviation Website 2008

Federal Railroad Administration

DesertXpress Project EIS

Potential Cumulative Projects (3)

FIG **3-16.3**

DesertXpress
Project EIS

Potential Cumulative Projects (4)

FIG 3-16.4

DesertXpress Project EIS

Potential Cumulative Projects (5)

FIG 3-16.5

DesertXpress Project EIS

Potential Cumulative Projects (6) FIG 3-16.6

DesertXpress
Project EIS

Potential Cumulative Projects (7)

FIG 3-16.7

The NDOT is planning for two capacity improvement projects on I-15 within the City of Las Vegas. The "NEON" project involves the reconstruction of the Charleston interchange, local access improvements, and a High-Occupancy Vehicle (HOV) direct connector lane from US 95 to I-15. The "I-15 South" project, extending from Sloan Road to Tropicana Avenue, includes new interchanges on I-15 at Bermuda Road, Starr Avenue, and Cactus Road. This project would also reconstruct the Sloan Road and I-15 interchange. In addition to these two projects, NDOT has a planning study underway for potential upgrades to I-15 and parallel roadways between I-215 and US 95, referred to as the Urban Resort Corridor Study.

Interstate-15 Joint Point of Entry

The Joint Point of Entry facility proposes the construction of a Commercial Vehicle Enforcement Facility and an Agricultural Inspection Facility between Nipton Road and Yates Road on southbound I-15, just south of the California-Nevada state line in San Bernardino County. In addition, this project would also include construction of truck bypass, bridges, traffic lanes through the facilities, weigh-in motion scales, and demolition of the existing California Department of Food and Agriculture Inspection Station in Yermo. The Commercial Vehicle Enforcement Facility would be in operation 24 hours a day, seven days a week with the primary focus on inspection of vehicle equipment and loads. The Agricultural Inspection Facility would consist of six passenger vehicle and four truck lanes through the inspection facility. As of 2006, a Project Report has been prepared for this project. The location of this proposed facility is shown on Figure 3.16-5.

California High-Speed Rail

The California High Speed Rail project is a proposed high-speed rail system in the state of California. The system is being planned by the California High-Speed Rail Authority, which will design, build, and operate the system. The Statewide Final Program-Level Environmental Impact Report/Environmental Impact Statement for this project has been certified, allowing the California High-Speed Rail Authority to begin implementation of the 800-mile high-speed train system serving Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The system is forecast to potentially carry over 100 million passengers by 2030.[3] The closest California High-Speed Rail station to the DesertXpress project is the Ontario station, located approximately 45 miles south of Victorville. Due to the distance, the California High Speed Rail is not shown in Figures 3.16-1 through 3.16-7.

Supplemental Commercial Airport in Ivanpah Valley

Clark County is considering a new airport in the Ivanpah Valley, just south of Las Vegas.

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[3] California High Speed Rail. California High-Speed Rail Authority. 2008. <http://www.cahighspeedrail.ca.gov/>.

The new airport would supplement the existing McCarran airport in Las Vegas. Specific site plans for the proposed Ivanpah airport are not yet complete. The proposed Ivanpah Airport site would be just east of I-15 and Segments 5A and 5B of the DesertXpress rail alignment, between Primm and Jean. The location of the proposed Ivanpah Airport is shown on Figure 3.16-6.

Southern Nevada Regional Heliport

The proposed Southern Nevada Regional Heliport site would be located just south of Sloan to the west of I-15. The Clark County Department of Aviation (CCDOA) completed its initial helicopter noise assessment in December 2000, with the Needs Assessment and Site Suitability Assessment for a Southern Nevada Regional Heliport completed in late 2003.[4] Planning for this project is currently underway and the Draft Environmental Assessment was publicly released for comment in early 2008. The proposed Heliport site location would be situated to the east of where Segments 5A and 5B converge with Segments 6A and 6B. The location of the proposed Southern Nevada Regional Heliport is shown on Figure 3.16-6.

3.16.3.2 Parks, Recreation, or Natural Preservation Projects

West Mojave Coordinated Management Plan

The Bureau of Land Management (BLM) is proposing the West Mojave Coordinated Management Plan as a plan for defining a regional strategy for conserving plant and animal species and their habitats and to define an efficient, equitable, and cost-effective process for complying with threatened and endangered species. The project targets the Desert Tortoise, Mojave Ground Squirrel, and over 100 special status plant and wildlife species. The Plan encompasses approximately 9.4 million acres or public land managed by BLM and includes a Federal component that will amend the existing 1980 California Desert Conservation Area Plan and a Habitat Conservation Plan (HCP) that will cover development on private lands.[5] Due to the large expanse of land covered by the West Mojave Coordinated Management Plan, this potential cumulative project is not shown on Figures 3.16-1 through 3.16-7.

Mixed-Use Recreation – Ivanpah Dry Lake

This proposed Mixed-Use Recreation project would be located on BLM land within the Ivanpah Dry Lake, just south of the California-Nevada state border. Approximately 200 Casual Use permits are issued annually for use of the Ivanpah Dry Lake. Additionally, about 12 Permitted and Organized events occur on the Ivanpah Dry Lake annually on both

[4] Southern Nevada Regional Heliport, Clark County, Nevada. <http://www.ricondoprojects.com/Heliport/background.html>.

[5] Natural Resource Projects Inventory Catalog. California Resources Agency. 2008. <http://gis.ca.gov/catalog/BrowseRecord.epl?id=23951>.

the east and west sides. It is assumed that this recreational use of Ivanpah Dry Lake will continue into the foreseeable future and that permits will continue to be granted. The location of the Mixed-Use Recreation area is shown on Figure 3.16-5.

3.16.3.3 Development Projects

North Triangle Specific Plan

The North Triangle Specific Plan is a proposed specific plan within the North Mojave Plan area of the City of Victorville. Both site options for the Victorville passenger stations and a portion of OMSF site option 1 are located within the proposed Specific Plan. The North Triangle Specific Plan is expected to be adopted in 2008 and integrated into the Victorville General Plan Update, expected to be completed in 2008 or 2009.[6] The Specific Plan anticipates the inclusion of transportation related facilities, such as the Victorville passenger station and OMSF. The location of the North Triangle Specific Plan is shown on Figure 3.16-1.

Mixed- Use Development – Jean, Nevada

This Mixed-Use Development project would involve the development of approximately 166 acres near Jean, Nevada. The location of the proposed Mixed-Use Development is shown on Figure 3.16-6. The MGM Mirage has proposed to develop an area of land on both the east and west sides of I-15 with a mixed-use community, including affordable housing, commercial businesses, retail, and a new hotel and casino. Implementation of this Mixed-Use Development would result in the demolition of two existing casinos in Jean, Nevada that are currently owned and operated by MGM Mirage. However, this project is currently on hold due to the proposed Ivanpah Airport plans, as discussed above.

Fast Food Restaurant Development – Primm, Nevada

Development of a fast food restaurant is proposed in Primm, just north of the California-Nevada state border and immediately east of I-15. A development application was submitted to the Clark County permitting office in February 2008 and as of December 2008 the project was in the permitting process for development. The fast food restaurant development would be built adjacent to the existing Primm Outlet Mall at 32100 S. Las Vegas Boulevard. The location of the proposed fast food restaurant development is shown in Figure 3.16-5.

[6] John Roberts, Victorville Planning Department, personal communication, July 2007.

3.16.3.4 Energy Projects

Bureau of Land Management Solar and Wind Energy Projects

The Bureau of Land Management (BLM) has received several proposals for solar energy projects within close proximity to the action alternatives. The location of these energy projects are shown on Figure 3.16-1, Figure 3.16-2, Figure 3.16-3, Figure 3.16-4, and Figure 3.16-5 and listed below by BLM serial number:[7]

- 800 Mega-watt (Mw) Solar Trough Project near Baker (CACA 048741)
- 400 Mw Ivanpah Solar Power Project in Ivanpah Valley (CACA 048668)
- 300 Mw Photovoltaic Project near Ivanpah Valley (CACA 048669)

In addition to the solar energy projects, BLM has also received proposals for several wind energy projects in the California Desert. These projects are listed below by BLM serial number:

- Three wind towers near Lenwood (Mud Hills/Noble Well) (CACA 046623)
- Wind Energy Application near Barstow (CACA 046881)
- Three wind towers south of Barstow (CACA 047454)
- Three wind towers north of Helendale (CACA 046805)
- Three wind towers near Daggett (CACA 046803)
- Four wind towers in Calico Mountains (CACA 046804)
- Two wind towers near Calico Dry Lakebed (CACA 049052)
- Wind energy power plant near Mountain Pass (CACA 044236)
- Wind energy power plant near Mountain Pass (CACA 044988)

Ivanpah Energy Center

The proposed Ivanpah Energy Center would be located in Primm, Nevada. The Energy Center would be located east of I-15, just north of the California-Nevada state border. The proposed Energy Center would include development of a 500 Mw gas-turbine combined-cycle power plant. While construction was expected to begin in early 2006, no construction on the site has yet taken place. The project site is currently owned by Diamond Generating Corporation. The location of the Energy Center is shown on Figure 3.16-5.

Primm Solar Generating Plant

The proposed Primm Solar Generating Plant project would construct a 250 Mw solar trough plant on approximately 2,500 acres. The Primm Solar Generating Plant would be

[7] Bureau of Land Management Solar, Wind, and Geothermal Applications/Leases/Agreements, California Desert District, U.S. Department of Interior, March 20, 2008.

located east of I-15, immediately north of the California-Nevada state line and south of Primm, Nevada. The location of the proposed Solar Generating Plant is shown on Figure 3.16-5. An application for the Solar Generating Plant has been filed in the Las Vegas BLM Field Office.

3.16.3.5 Public Utilities Projects

Expansion of Kinder-Morgan CalNev Pipeline System

The CalNev Pipeline, operated by Kinder Morgan Energy Partners, transports gasoline, oil, jet fuel (kerosene) and gasoline from refineries in southern California to Las Vegas within two pipes (8 inch and 14 inches in diameter). An additional 6 inch pipe runs from near Hesperia to a fuel terminal along State Highway 58 east of Mojave. The main branch of CalNev Pipeline travels within or near the I-15 corridor for much of its distance between Las Vegas and Colton, California, crossing from the west to east side of the freeway – and thereby the study area --several times. In 2007, Kinder Morgan proposed adding a third pipeline, 16 inches in diameter, alongside the existing two pipelines that currently comprise the CalNev pipeline.[8] The location of the expansion of the Kinder-Morgan CalNev Pipeline is shown on Figures 3.16-1 through 3.16-7.

Ivanpah Substation

Southern California Edison (SCE) has proposed to construct a new Ivanpah Substation sized to accommodate 230/115 kV facilities. SCE plans to upgrade the existing 115 kV transmission line between the El Dorado Substation and the proposed Ivanpah Substation. This upgrade would result in the removal of approximately 36 miles of the El Dorado leg of the existing El Dorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115 kV transmission line and would construct a double circuit 230 kV transmission line in its place. The approximate location of the Ivanpah Substation project is shown on Figure 3.16-5.

3.16.4 Analysis of Cumulative Impacts

The following analysis of cumulative impacts follows the same order and environmental topics as Chapter 3.0, Affected Environment, Environmental Consequences, and Mitigation Measures. Under each topic a summary of the impacts associated with the action alternatives (from Chapter 3.0) is provided followed by a discussion of the geographic area of the cumulative analysis for that topic; the past, present and future projects considered in the analysis for that topic; and, the cumulative effects of the action alternatives in combination with the past, present and future projects.

[8] County of San Bernardino. CalNev Pipeline Expansion Project Notice of Preparation. March 17, 2008.

Land Use and Community Impacts

Summary of Project Effects: There is an inter-relationship between land development and transportation infrastructure. Transportation services, such as bus and rail transit as well as roadways, must be available to provide residents access and mobility as land is being developed. Likewise, the region's demand for economic growth and development also creates a demand for access, which in turn increases requests for improvements to the transportation infrastructure.

As discussed in Section 3.1, Land Use and Community Impacts, the action alternatives would have the potential to affect land use, including the potential to divide the existing communities of Lenwood, Yermo, and Sloan, potential conflicts with pockets of existing residential uses near the proposed alignment, conflicts with the Mojave National Preserve, and environmental justice effects.

In its June 2007 Declaratory Order, the Surface Transportation Board (STB) concluded that the DesertXpress project is subject to its preemption authority because DesertXpress intends to carry passengers by rail in interstate transportation. STB also found that DesertXpress will be providing this transportation as a common carrier, offering service to the general public. Thus, STB found that the project clearly involves transportation by a rail carrier.[9] Accordingly, STB determined that it has exclusive jurisdiction over the planned new track, facilities, and operations and that its Federal preemption authority under section 10501(b) applies. Therefore, state permitting and land use requirements such as the California Environmental Quality Act (CEQA), will be preempted.[10]

Area of Cumulative Analysis: The area of cumulative analysis for land use and community impacts includes San Bernardino County and Clark County. As discussed in Section 3.1, Land Use and Community Impacts, both direct and indirect effects were evaluated. Since the majority of the alignment is undeveloped, the area considered for cumulative impacts primarily includes Victorville and Las Vegas, as well as the communities within close proximity to the action alternative rail alignments, such as Barstow, Baker, Yermo, Lenwood, Primm, Jean, and Sloan.

Present and Future Projects: Present and future projects that could contribute to cumulative land use or community impacts include transportation, development, and

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[9] See American Orient Express Railway Company v. STB, No. 06-1077, slip op. at 4, 6 (D.C. Cir. Apr. 20, 2007), aff'g American Orient Express Railway Company, LLC—Petition For Declaratory Order, STB Finance Docket No. 34502 (STB served Dec. 27, 2005) (rail carrier may provide railroad transportation by transporting passengers over its own tracks).

[10] Although the DesertXpress project does not require a CEQA discussion, the EIS includes the analysis that would have been conducted under the regulations and guidance of CEQA. See City of Auburn, 154 F.3d at 1031. Moreover, state and local agencies and concerned citizens will have ample opportunity to participate in the ongoing EIS process under NEPA and related laws. A number of state agencies have been engaged in the ongoing EIS process, including Caltrans and NDOT.

energy projects. Transportation improvements, such as the capacity improvements to I-15, the Joint Port of Entry, the Ivanpah Airport, and Southern Nevada Regional Heliport, and wind and solar energy projects could conflict with existing land uses. The proposed North Triangle Specific Plan could also introduce new land use designations and therefore would affect land use patterns.

Cumulative Effects: The DesertXpress project, in combination with the related transportation, energy, and development projects, could contribute to cumulative impacts associated with land use and environmental justice. As discussed in Section 3.1, Land Use and Community Impacts, changes in land uses over time have been relatively slow over much of the DesertXpress rail alignment, with the exception of Victorville and Las Vegas. Over the past ten years, land use changes in Victorville and Las Vegas have rapidly changed through the development of urban uses, such as residential developments and industrial and commercial areas. The open space areas between Victorville and Las Vegas have experienced a slower trend in land use change, as much of this area has remained undeveloped. The DesertXpress project, in combination with the related projects, would further this land use trend, as the proposed development and transportation projects are primarily concentrated in Victorville and Las Vegas.

As described above, capacity improvements to I-15 are primarily located within the Victorville and Las Vegas areas. These capacity improvements would cumulatively contribute to land use effects, as the roadway improvements could encourage previously undeveloped areas near the roadway to develop residential, commercial, or service uses. The proposed North Triangle Specific Plan also anticipates urban developed near the Victorville Station and OMSF site options. Implementation of the North Triangle Specific Plan could amend existing land uses to allow for more pronounced commercial, residential, or transit-oriented development. For a discussion of the associated cumulative growth effects, refer to the discussion under the heading “Growth,” below. When considered with the Victorville Station and OMSF site options and the Las Vegas Station and MSF site options, these projects could cumulatively contribute to the regional trends of rapid land use changes.

Related projects located between Victorville and Las Vegas are, however, spread out and isolated in nature and would maintain the slow trend in the change to land uses. As the solar and wind energy projects within close proximity to Segments 2A/2B, Segments 3A/3B, and Segments 4A/4B are primarily located within open, undeveloped land, it is not anticipated that these projects would cumulatively effect or interfere with the normal functioning of adjacent land uses. The Ivanpah Airport, Southern Nevada Regional Heliport, and Joint Port of Entry site locations are situated in isolated locations, away from urban land uses. It is anticipated that these projects would not interfere with the normal functioning of existing land uses. As these transportation and energy facilities would not be located within an existing community, they would not result in impacts related to the disruption or displacement of an existing community, the displacement of a residential community, posing an adverse effect to a minority or low-income population, or interfering with adjacent land uses. However, the proposed Mixed-Use Development near Jean would develop urban uses in a currently undeveloped area, thus altering existing land uses. While the DesertXpress alignment would be located immediately adjacent to the Mixed-Use Development, the DesertXpress project would not interface or provide a connection to this development, as there would be no passenger station or maintenance facility located in Jean. As the DesertXpress project does not propose significant land use changes along the rail alignment, these related projects in combination with the DesertXpress project would maintain the slow trend in land use changes in this area.

Since the construction of the DesertXpress project would occur primarily within existing freeway or railroad rights-of-way, except at the proposed station and maintenance facility sites, and since the land use effects resulting from the DesertXpress project would be site and project-specific, the DesertXpress project would not result in a cumulative impact to land use and the community.

Growth

Summary of Project Effects: Because the project involves construction and operation of a high-speed railroad, growth inducing effects would be limited to station and maintenance facilities which would create jobs and attract riders. As a result, this analysis, as detailed in Section 3.2, Growth, is focused on the growth issues in areas immediately surrounding the proposed station and maintenance facilities.

Direct growth effects as a result of the action alternatives would occur during both construction and operational phases. Construction of the action alternatives would result in a short-term increase in construction related job opportunities within the Victorville and Las Vegas area. These new construction jobs could, however, help improve local employment impacts in San Bernardino County and Clark County associated with the 2008 economic downturn by providing job opportunity for local residents. While this potential employment growth would not result in significant permanent relocation of construction workers from outside the project area, it is reasonably foreseeable that salaries to construction workers and related spending on construction activities from local and regional suppliers could contribute to economic growth in the communities along the proposed rail alignment. These growth effects would be temporary in nature, however, and are not anticipated to result in permanent growth related effects.

As the DesertXpress project would create approximately 700 new permanent jobs in the Victorville, Baker, and Las Vegas areas in the buildout year (2030). During construction the anticipated number of workers to be employed directly by DesertXpress to design and construct all proposed facilities, including design, supply, manufacturing, testing, and training for the trains and system elements and heavy civil construction, would vary from about 1,730 to 3,000 per year, depending on the construction phase during the four-year design-construction period. The permanent jobs created by the action alternatives would constitute less than 1 percent of the anticipated employment growth in Victorville and Las Vegas and, therefore, would not adversely effect growth projections. Conversely, the

DesertXpress project could have a beneficial growth effect to the region by providing job opportunities for local residents, particularly in light of the 2008 and 2009 economic downturn. The minimal population and housing growth as a result of the development of the Victorville Station and OMSF and the Las Vegas Station and MSF would not be anticipated to exceed the rapidly growing projections on a city or county level.

Indirect growth effects would include removal of existing obstacles to growth, changes in local/regional economic vitality, and/or changes to population numbers or patterns. The DesertXpress project would not indirectly foster growth by extending potentially growth-inducing infrastructure to areas currently lacking infrastructure. Therefore, there would be no indirect effect associated with removing existing obstacles to growth.

However, implementation of any of the action alternatives could have effects to local and regional economic vitality, and could also result in changes in population amounts and patterns. The addition of new permanent jobs within the operation of the passenger stations and maintenance facilities in Victorville and Las Vegas would have the potential to indirectly affect the economic vitality of the local economy. This growth, however, would be in relatively miniscule numbers when compared to anticipated growth projections for these areas.

Area of Cumulative Analysis: Cumulative growth effects are evaluated on a county-wide basis. The area of cumulative analysis for growth effects includes San Bernardino County and Clark County. As discussed in Section 3.2, Growth, both direct and indirect growth effects were evaluated. The area considered for cumulative impacts to growth inducement primarily includes the Victorville and Las Vegas Metropolitan areas, in addition to the area near the Maintenance of Way (MOW) in Baker, as the station and maintenance facilities are the only “interfaces” of the project where passengers would board or exit trains and where the vast majority of DesertXpress employees would be located.

Present and Future Projects: Present and future projects that could impact growth in the area for cumulative analysis include transportation and development projects, including the capacity improvements to I-15, California High Speed Rail, the proposed Ivanpah Airport, the Southern Nevada Regional Heliport in Sloan, the proposed North Triangle Specific Plan in Victorville, and the Mixed-Use Development in Jean.

Cumulative Impacts: As stated in Section 3.2, Growth, San Bernardino County, and Clark County are anticipated to experience rapid growth between 2008 and 2030. According to the San Bernardino County General Plan EIR, the County population is expected to increase by nearly 35 percent between the year 2007 and 2030, adding approximately 700,000 people. The DesertXpress project would be located within the Desert Region of San Bernardino County. For this region alone, the total population, number of households, and total employment is anticipated to have an annual growth rate of 2 to 4 percent between 2000 and 2030. Additionally, the City of Victorville is currently contemplating a General Plan update that would expand the City limits to include an additional 37,000 acres (57 square miles) within the Northern Expansion Area, representing an aggressive strategy to growth.

Clark County is anticipated to experience similar growth, as it is expected that the County population would increase 38.4 percent between the years 2005 and 2020, and an additional 14 percent from 2020 to 2030. Employment in Clark County is expected to increase 33 percent by the year 2015, totaling nearly 1,229,445 total jobs. The Las Vegas area within Clark County is projected to experience similar growth rates through the year 2030.

The DesertXpress project in combination with transportation improvements and development projects would contribute to growth in San Bernardino County and Clark County. While the planned I-15 capacity improvements would not directly construct new homes or jobs, these improvements would allow more individuals to travel on I-15 on a daily basis, which could indirectly promote commercial and service uses in the urbanized areas along the I-15 corridor, including Victorville, Barstow, Baker, and Las Vegas. Development of the Ivanpah Airport and Southern Nevada Regional Heliport could also induce similar indirect growth effects around the facilities. However, this potential indirect growth would be small in nature and would be minimal in comparison to the anticipated growth in San Bernardino County and Clark County. While these transportation projects, in combination with DesertXpress, could increase the number of visitors to the Las Vegas area, a new permanent population or housing stock would not be substantially established as a result of project development.

The number of new permanent jobs in San Bernardino County and Clark County created by the action alternatives would be small in comparison to the projected employment growth in these areas. Direct and indirect growth associated with the DesertXpress project is expected to contribute less than 1 percent of the total anticipated growth for San Bernardino and Clark County. As such, the DesertXpress project would not result in a cumulative impact to growth. However, construction period jobs may have a more substantial effect on local growth especially if the construction period for the action alternatives overlaps with construction of several other large transportation and land development projects in the area. The effect of construction period employment on local growth tends primarily affects service industries (food, retail, etc.) and is generally temporary (duration of the construction period) because construction work forces are typically highly mobile and would not be anticipated to relocate permanently to the construction area.

Farmlands/Agricultural Lands

Summary of Project Effects: As discussed in Section 3.3, Farmlands/Agricultural Lands, lands within the majority of the project area are not identified with agricultural use. Agricultural lands are only present in Segments 1, 2A/2B, and 3A/3B, primarily along the irrigated areas near the Mojave River. No agricultural lands are present from a point immediately east of Newberry Springs, California (along Segment 3A/3B), easterly through Segments 4A/4B, 5A/5B, 6A/6B, 7A/7B, and Option C.

Segment 1 would neither directly nor indirectly affect any protected farmland. Segment 1 would traverse and lie adjacent to land allotted for grazing by the BLM and could affect grazing activities by cutting off livestock access to available water sources.

Segments 2A and 2B would directly affect 3.37 acres of prime farmland and indirectly affect 6.75 acres of prime farmland. No lands under Williamson Act contracts are located in or along Segment 2A or 2B.

Segment 3A would not directly or indirectly affect any farmland. Segment 3B would not directly affect any prime farmland; however it would indirectly affect 0.15 acres of prime farmland and 0.16 acres of unique farmland. The majority of these indirect impacts are associated with the proximity of Segment 3B to a pistachio orchard located in close proximity to the I-15 southbound lane.

No further discussion of lands in Segments 4 through 7 is included, as no farmlands are present in the vicinity of those segments. Thus, the DesertXpress project would have a relatively small impact to farmlands and agricultural resources.

Area of Cumulative Analysis: The area considered for cumulative impacts to farmlands includes San Bernardino County. Because no agricultural lands are present through Segments 4A/4B, 5A/5B, 6A/6B, 7A/7B, and Option C, the cumulative analysis is limited to Segments 1, 2A/2B, and 3A/3B.

Present and Future Projects: Present and future projects within San Bernardino County would have the potential to impact farmland and agricultural resources. Projects within San Bernardino County include, but are not limited to, capacity improvements on I-15 near Victorville and Barstow, the North Triangle Specific Plan in Victorville, and California High Speed Rail. The continued urban development within San Bernardino County would also contribute to the potential cumulative loss of farmlands and agricultural resources.

Cumulative Impacts: According to the San Bernardino County General Plan Environmental Impact Report (EIR), San Bernardino County ranks in the top 15 agricultural-producing counties in California. However, agricultural use within the County continues to decline with urban expansion. As urban expansion encroaches into agricultural areas, remaining agricultural lands become surrounded by urban uses, further exacerbating the conversion of farmland to non-agricultural use. The decreasing air quality, increasing water costs, and decreasing viability also contribute to the conversion of farmland to other uses. While the San Bernardino County General Plan identifies several polices relating to the preservation of agricultural land, the conversion of farmland in the County is identified as a significant and unavoidable impact.[11]

DesertXpress would be located in the Desert Region of San Bernardino County, where agricultural development is limited primarily to areas bordering the Mojave River near Lenwood, Yermo, and Newberry Springs. The DesertXpress project in combination with the future widening and capacity improvements to I-15 near Victorville and Barstow, the implementation of the North Triangle Specific Plan, and the California High Speed Rail project, as well as other projects and development in San Bernardino County, would continue the regional trend of converting farmland to non-agricultural uses. Between 2004 and 2006, approximately 7,785 acres of the 34,675 acres of important farmland were converted to other uses – over 22 percent of the important farmland remaining in the county at the end of 2004.[12] Therefore, on average approximately 2,595 acres of important farmland were converted per year during this period.

Transportation improvements would have the potential to sever access to active farmlands in the area, in combination with the severance of access established by the action alternatives. However, the DesertXpress project and related transportation projects would be located in the Desert Region, where farmland is confined to the irrigated areas near the Mojave River. Thus, the viability of farmland in this area is limited. Additionally, the urbanization of the Barstow and Lenwood areas, which could be furthered with I-15 improvements in these areas, may further reduce the agricultural viability of this area. Development of the California High Speed Rail would have similar limited effects to farmland as DesertXpress because of the linear nature and limited station site options.

The North Triangle Specific Plan would, however, encourage development surrounding the Victorville Station site options, which could further impact agricultural resources in the area.

In relation to the County's annual conversion rate, the amount of important farmland affected by the project would be small in scale (less than 1 percent). Additionally, mitigation identified in Section 3.3, Farmland/Agricultural Lands, would reduce the effects of the limited conversion of farmland. Thus, the DesertXpress project would not result in a cumulative impact to farmland and agricultural land.

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[11] San Bernardino County General Plan Draft Environmental Impact Report, 2006.

[12] California Department of Conservation, San Bernardino County Important Farmland Data Availability. 2006. <http://redirect.conservation.ca.gov/DLRP/fmmp/county_info_results.asp>. Accessed September 4, 2008.

Utilities and Emergency Services

Summary of Project Effects: The types of utilities evaluated as part of this EIS include electricity and gas, water, wastewater facilities, and solid waste providers. Emergency services evaluations considered police, fire, and emergency response. Potential impacts to existing pipelines and electrical transmission infrastructure were also considered. Operations of the action alternatives would be expected to increase demand for police, fire, and emergency services.

The EMU technology for locomotive power would require a substantial supply of electricity. The Victorville Station and OMSF site options utilize natural gas and electricity, provided by Southern California Edison and Southwest Gas Corporation, where operating conditions are sufficient to serve existing needs and those of the project. While the Las Vegas Station and MSF would utilize electricity and natural gas services, Southwest Gas Company service would be available.

Water: While operation of the railroad segments 1 through 7 and Option C would not generate a demand for water, the station and maintenance facilities in Victorville, Baker, and Las Vegas would generate demand for water. Water at these facilities would be needed for restrooms, food service, train maintenance and landscaping, for example. The Victorville Water District indicates that the anticipated 400 acre-feet per year (AFY) produced by the DesertXpress project in Victorville would be within their service capabilities. The eight employees anticipated to be headquartered at the Baker MOW would also require water for drinking, restrooms, and limited landscaping. Water services would be met with existing infrastructure and anticipated supply of the Baker Community Services District. The estimated water demand for the Las Vegas Station and MSF site options would be within projections for the Las Vegas Valley Water District service area.

Wastewater: Operation of the railroad segments 1 through 7 and Option C would not generate a demand for wastewater. The Victorville Station and OMSF site options would generate wastewater associated with anticipated water usage. The Victor Valley Water Reclamation Authority would, however, have adequate equipment and facilities to accommodate the increase in demand. Wastewater services for the Baker MOW would also be met with existing infrastructure and anticipated supply of the Baker Community Services District. According to the Clark County Water Reclamation District and the Las Vegas Valley Public Works Department, wastewater demands would be accommodated with existing infrastructure and services.

Stormwater: For the rail segments (Segments 1 through 7), the rail track beds would have the potential to generate stormwater, particularly during the short in duration, but high intensity rainfall events typical in the Mojave Desert. Where the rail alignment is within or adjacent to the I-15 right-of-way, there is an opportunity to tie into existing stormwater discharge systems. The proposed station and maintenance facilities would convert unimproved lands to paved and/or built facilities, decreasing permeability and potentially creating stormwater. The station sites and maintenance facilities in Clark County would not, however, conflict with existing flood control facilities or drainage facilities, with the exception of the Southern Las Vegas Station and Sloan MSF site options.

Solid Waste: Operation of the rail segments 1 through 7 and Option C would not generate a demand for solid waste. However, the Victorville Station and OMSF would generate solid waste related to ongoing operations, including passenger and employee usage, food service, and related uses. The nearest landfill, the Victorville Landfill, has abundant capacity to serve project related solid waste at this landfill. In regards to the Las Vegas Station and MSF site options, the Apex Regional Landfill would serve these Las Vegas facilities and would have the capacity to receive the solid waste generated by such facilities.

Police Services: The Victorville Station and OMSF sites, the Baker MOW, Segments 3A/3B and 4A/4B, and portions of Segments 1, 2A/2B, and 5A/5B would be located in the service area of the San Bernardino County Sheriff's Department (SBCSD), which includes the contract "Victorville Police Department." Project alignments immediately adjacent to or within freeway corridors would also receive police response services from the California Highway Patrol (CHP). The SBCSD anticipates that current and projected staffing would be sufficient to serve the DesertXpress project, but express concern that future high levels of human activity at the passenger station could lead to increased needs for police response/services.[13] The SBCSD also raised concern regarding train derailment, which could result in the blockage of I-15 where no secondary access exists.

Additionally, the Baker MOW and approximately 4 miles of Segments 2A/2B are within the jurisdictional area of the Barstow Police Department (BPD). BPD anticipates being able to serve the DesertXpress project without interfering with service to the community, as BPD has plans to expand its services and facilities to serve anticipated growth.[14]

The Las Vegas Station and MSF site options, Segments 6A/6B and 7A/7B, Option C, and portions of Segments 5A/5B are in the jurisdiction of the Las Vegas Metropolitan Police Department (LVMPD). In addition, the portions of Segments 5A/5B, 6A/6B, and 7A/7B within the I-15 corridor would also be within the jurisdictional area of the Nevada Highway Patrol (NHP). It is not anticipated that the DesertXpress project would impact services to the community as the current level of staffing is sufficient to serve the community and the DesertXpress project.[15]

Fire and Emergency Services: The Victorville Station and OMSF site options, the Baker MOW, Segment 1, and portions of Segments 2A/2B, 3A/3B, 4A/4B, and 5A/5B would receive fire and emergency services from the San Bernardino County Fire Department. Portions of Segment 2A/2B traveling through Barstow would be served by the Barstow

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[13] Letter of inquiry with San Bernardino County Sheriff's Department, January 2007.

[14] Letter of inquiry with Barstow Police Department, January 2007..

[15] Ibid.

Fire Protection District (BFPD). The BFPD has indicated that present staffing levels are insufficient to meet the District's present demands. A portion of Segment 4A would be under the jurisdiction of the Mojave National Preserve: Interagency Fire Center. It is not anticipated that the DesertXpress project would affect the fire or emergency services of the Mojave National Preserve and that the Mojave National Preserve would be able to respond to project needs.[16] Portions of Segments 5A/5B and 6A/6B would receive fire and emergency response services from the Clark County Fire Department (CCFD). The CCFD is currently understaffed and implementation of the project would further strain staffing levels and require new staff, equipment, and most likely, a new station also within the I-15 corridor in the unincorporated portions of Clark County.[17]

The remaining portions of Segments 5A/5B and Segments 7A/7B and Option C and the Las Vegas Station and MSF site options would be served by Las Vegas Fire and Rescue (LVFR). LVFR reports that its staffing levels are sufficient to serve the DesertXpress project.

Utility Infrastructure Crossing: The proposed rail alignments would overlap and/or intersect with numerous utility conveyance systems, such as gas pipelines, electric transmission lines, and water/wastewater infrastructure. Three major interstate pipeline systems (owned and/or maintained by Southwest Gas Corporation (SGC), Kern River, and Kinder-Morgan) would be crossed by rail alignments in several locations. The proposed rail alignments and portions of one OMSF site in Victorville would be located beneath elevated electric transmission lines owned and operated by several companies. Sierra Pacific and Nevada Power, Pacific Gas & Electric, and Southern California Edison indicated that they did not anticipate any major conflicts associated with the proposed rail alignments running beneath electrical transmission lines. The proposed rail alignments would also cross major water and wastewater conveyances and underground telecommunications lines. As discussed in Section 3.4, Utilities/Emergency Services, mitigations were included as part of the project to address any potential adverse effects of these crossings.

Area of Cumulative Analysis: The area considered for cumulative effects related to utilities and emergency services includes the utility and emergency service provider service areas, which vary greatly depending on the provider. The utilities and public service providers in the area of cumulative analysis are listed in Table 3.16-1, below.

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[16] Personal communications with Chuck Heard, Mojave National Preserve, June 12, 2008.

[17] Ibid.

Table 3.16-1 Utility and Public Service Providers

Type of Service	Service Providers
Electric/Gas	Southern California Edison Southwest Gas Corporation Nevada Power Electric Service Nevada Power Company
Water	Baker Community Services District Las Vegas Valley Water District
Sewage/Storm Water	Baker Community Services District Clark County Water Reclamation District City of Las Vegas Public Works Department
Solid Waste	Baker Community Services District Republic Services of Southern Nevada
Police	San Bernardino County Sheriff California Highway Patrol Las Vegas Metropolitan Police Department Nevada Highway Patrol
Fire/Emergency Response	San Bernardino County Fire Department Baker Community Services District Mojave National Preserve: Interagency Fire Center Clark County Fire Department Las Vegas Fire and Rescue

Source: CirclePoint, 2008.

Present and Future Projects: Present and future projects that could impact utilities and emergency services in the area of cumulative analysis include transportation, development, and public utility projects. Such projects include capacity improvements to I-15, the California High Speed Rail, the proposed Ivanpah Airport, the Southern Nevada Regional Heliport in Sloan, the proposed North Triangle Specific Plan in Victorville, the expansion of the Kinder-Morgan CalNev Pipeline System, and the development of the Ivanpah Substation and upgrade of the existing 115 kV transmission line.

Cumulative Effects: The identified service providers within the area of cumulative analysis generally have adequate services and facilities to serve their respective service areas, with the exception of concern from the SBCSD regarding the need for increased police response/services to accommodate future high levels of human activity at the Victorville Station. The DesertXpress project in combination with the related transportation, development, and public utility projects would place additional demand on the existing public utilities and service providers. For example, implementation of the I-15 capacity improvements in conjunction with the action alternatives would increase demand for police and emergency service in the areas where the action alternatives travel within close proximity to the I-15 corridor. Development of the Ivanpah Airport and Southern Nevada Regional Heliport would require the implementation of utility lines, placing demand on the public service providers in the communities of Primm, Jean, and Sloan. Additionally, the proposed development associated with the North Triangle Specific Plan in Victorville would require the implementation of water, wastewater, stormwater, and solid waste services in the area, in addition to the services required by the Victorville Station and OMSF site options. These additional service requirements would combine with the service needs of the DesertXpress project in the same areas, thus cumulatively affecting the capacity of the existing public utilities and the ability of the service providers to provide adequate services.

Conversely, public utility projects, such as the expansion of the Kinder-Morgan CalNev Pipeline and development of the Ivanpah Substation and associated upgrade to the existing 115 kV transmission line, would increase the capacity of existing utilities, increasing the viability of accommodating future growth and demand associated with the DesertXpress project and other related developments. The expansion of the Kind-Morgan CalNev Pipeline and development of the Ivanpah Substation would also enhance energy systems in the area. Cumulative effects related to energy are discussed further below, under the heading “Energy.”

Recommended avoidance, minimization, and mitigation measures identified in Section 3.4, Utilities/Emergency Services, would be incorporated into the DesertXpress project to reduce adverse effects related to utilities and emergency services. Similar mitigation measures would be implemented with the future and planned projects to alleviate potential adverse effects related to public utilities and service providers. These related transportation, development, and utility projects would, however, be required to abide by similar environmental review processes as the DesertXpress project so as to evaluate project specific impacts to public utilities and service providers. Therefore, the cumulative impact related to public utilities and the service providers in the San Bernardino County and Clark County regions would be negligible.

Traffic

Summary of Project Effects: The traffic analysis in Section 3.5, Traffic, took into consideration the related cumulative projects when calculating the future traffic levels in 2030 in the project study area. As such, a summary of the project traffic effects is included in the cumulative analysis below.

Area of Cumulative Analysis: The area of cumulative analysis includes transportation corridors between Southern California and Las Vegas. The area of cumulative analysis includes the I-15 freeway mainline and the areas around the proposed station sites in Victorville and Las Vegas, specifically the local roadway intersections in these areas.

Present and Future Projects: Present and future projects that could impact traffic in the area of cumulative analysis include transportation and development projects. Such projects include capacity improvements to I-15, the California High Speed Rail, the proposed Ivanpah Airport, the Southern Nevada Regional Heliport in Sloan, and the proposed North Triangle Specific Plan in Victorville.

Cumulative Effects: The DesertXpress project, in combination with the related transportation and development projects, would cumulatively affect traffic in the area of cumulative analysis. Operation of DesertXpress in conjunction with the related projects would improve traffic conditions on I-15 in year 2030. Future I-15 traffic volumes would be reduced since after construction of the DesertXpress railway, some people who would otherwise drive to Las Vegas would instead opt to ride the train. Additionally, capacity improvements to I-15 would reduce congestion on the I-15 mainline, thus resulting in a beneficial cumulative traffic impact.

However, the DesertXpress project in combination with the related projects would result in a cumulatively adverse effect at study intersections near the Victorville station options. Development of the North Triangle Specific Plan would cumulatively combine to adversely affect intersection operations near the Victorville station options. Additionally, the DesertXpress project and the related transportation and development projects would result in adverse cumulative effects to study intersections near the Las Vegas station site options. Refer to Section 3.5, Traffic, for a detailed analysis of the cumulative impacts related to traffic.

Recommended mitigation measures identified in Section 3.5, Traffic, would lessen the adverse effects related to traffic as a result of the action alternatives. It is also anticipated that the Agencies responsible for review, approval and permitting of these present and future projects would require similar mitigation measures be implemented to alleviate potential adverse traffic effects created by these projects. For example, these future projects would be required to abide by similar environmental review processes as the DesertXpress project so as to evaluate project specific impacts to traffic capacity and level of service operations. While cumulative effects would adversely affect local intersections near the station site options in Victorville and Las Vegas, cumulative traffic effects would be isolated to the two termini of the DesertXpress rail alignment. The I-15 freeway mainline would have a beneficial cumulative effect with the development of the DesertXpress project and related transportation improvements. Thus, the cumulative impact of the related projects in combination with the DesertXpress project would not be substantial.

Visual Resources

Summary of Project Effects: Overall, Alternative A would result in less visual change than Alternative B, as Alternative A would largely travel within the median of the I-15 freeway corridor, except for Segment 4. Within Segment 4, Alternative B would result in the lesser visual effect since it would avoid the Preserve. Between technology options, the

EMU option would include a greater number of visual features (transformers, substations, and catenary structures), and would thus result in greater visual change than the DEMU option.

Although the effects by segment analysis focuses on the alteration of existing views by the action alternatives, it is important to remember that the project would create a new viewer group of approximately 4 to 5 million train passengers per year. These new passengers would be considered a more sensitive viewer group than motorists since train passengers would not need to focus on driving, but could instead concentrate on views from the window. From the train, Alternative A alignment views would include the freeway on either side of the train, since it is located in the I-15 median. For the most part since they would be elevated higher than the cars and freeway elements in the foreground, passengers would still have middle ground and distant views of the existing landscape. Alternative B train passengers would have very different views depending on the side of the train they are sitting on. On one side passengers would have views of I-15 in the foreground and the landscape in the background. On the other side passengers would have uninterrupted views of the existing landscape. Any views from I-15 that would be altered, partially blocked, or degraded by development of Alternative B would be visible in their current condition from the train itself. Views from the train would be especially scenic in Segment 4 where the alignment travels either through the Preserve or the Clark Mountains.

Table 3.16-2 provides a summary of the visual effects of the DesertXpress project by segment.

Table 3.16-2: Summary of Visual Effects by Segment

Segment	Existing BLM Objective Class	Existing FHWA Visual Quality and Sensitivity Rating	Consistency with goals of BLM Objective Class	FHWA Visual Quality and Sensitivity Rating with Project Operation
1: Victorville to Lenwood via I-15 right-of-way	Class III within the I-15 Corridor	Moderate	Somewhat Consistent	Low
	Class II where the segment diverges from I-15 corridor	Moderate to High	Not Consistent	Low to Moderate
2A/2B: Lenwood to Yermo via Barstow	Class II (at proposed Mojave River Crossing)	Moderate to High	Somewhat Consistent	Moderate
	Classes III and IV (through Lenwood and Barstow areas)	Low to Moderate	Somewhat Consistent	Low to Moderate
3A/3B: Yermo to Mountain Pass	Class I immediately adjacent to the preserve	High	Not Consistent	Low to Moderate

Segment	Existing BLM Objective Class	Existing FHWA Visual Quality and Sensitivity Rating	Consistency with goals of BLM Objective Class	FHWA Visual Quality and Sensitivity Rating with Project Operation
4A: Mountain Pass to state line via Preserve	Class I within the Preserve	High	Not Consistent	Moderate
	Class II outside of the Preserve	Moderate	Not Consistent	Moderate
4B: Mountain Pass to state line via tunnels	Class I through the Clark Mountains	High	Somewhat Consistent	High
	Class II for areas outside the Clark Mountains	Moderate	Somewhat Consistent	Moderate
5A/5B: State line/Primm to Sloan Road	Class IV within Primm and Jean	Low	Consistent	Low
	Class II/III for areas outside Jean and Primm	Moderate	Somewhat Consistent	Moderate
6A/6B: Sloan Road to Southern or Central Stations	Class III (South Las Vegas Valley)	Low to Moderate	Consistent	Low
	Class IV (within metropolitan Las Vegas)	Low	Consistent	Low
7A/7B: West Twain Road to Downtown Station	Class IV	Low	Consistent	Low
Option C: Sloan Road to Central or Downtown Station via UPRR corridor	Class III outside metropolitan Las Vegas	Moderate to Low	Consistent	Moderate to Low
	Class IV within metropolitan Las Vegas	Low	Consistent	Low

Source: CirclePoint, 2008.

Area of Cumulative Analysis: The area of cumulative analysis for effects related to visual resources and aesthetics includes the viewshed, or the visible environment, surrounding the action alternatives.

Present and Future Projects: Present and future projects that could impact visual resources include transportation, development, energy, and natural resource projects within the area of cumulative analysis. Capacity improvements to I-15, the Joint Port of Entry, the Ivanpah Airport, and the Southern Nevada Regional Heliport would be visible from the DesertXpress project and would afford views of the DesertXpress project from their proposed locations. Additionally, the North Triangle Specific Plan and solar and wind energy projects would affect the visual environment in the viewshed.

Cumulative Effects: The DesertXpress project, in combination with the past, present and future projects within the area of cumulative analysis, would have the potential to create a cumulative impact to visual resources. Development of the tracks, fencing, elevated structures, station and maintenance facilities, and the DesertXpress trains themselves would introduce a linear transportation element into the landscape that could contribute to visual effects within the area of cumulative analysis.

As discussed in Section 3.6, Visual/Aesthetics, changes in the visual character from undeveloped, open desert land to a more urbanized, built-up visual environment have been relatively slow over much of the DesertXpress rail alignment, with the exception of Victorville and Las Vegas which has experience significant visual changes in recent decades as a result of urban and suburban development. The desert lands between Victorville and Las Vegas have experienced a slower trend in visual changes, as much of this area remains an expansive desert landscape. The DesertXpress project, in combination with these related projects, would further this visual trend, as the proposed development, transportation, and energy projects are primarily concentrated in the Victorville and Las Vegas areas.

The visual effects of the proposed development within the North Triangle Specific Plan area could combine with the development of the Victorville Station and OMSF to result in a cumulative change in the visual character of this area. Additionally, development of the North Triangle Specific Plan area and the DesertXpress facilities would cumulatively affect the existing lighting and glare within the Victorville area. As much of this land is currently undeveloped, the DesertXpress project, in combination with the North Triangle Specific Plan area, would introduce new lighting features to the previously naturally dark area.

Conversely, the capacity improvements to I-15 within the Victorville and Las Vegas areas would not, however, substantially alter the visual character of the area of cumulative analysis or introduce a substantial amount of new lighting, as the improvements would occur alongside an existing freeway and transportation corridor within Victorville and Las Vegas.

Present and future projects located between Victorville and Las Vegas are isolated in nature and spread out along the DesertXpress rail alignment. Development of these projects, in combination with the DesertXpress project, would maintain the slow trend of visual alterations to this area. While implementation of the Ivanpah Airport, Southern Nevada Regional Heliport, and Mixed-Use Development (Jean, Nevada) would introduce new visual features to the desert aesthetic, including mixed-use buildings and facilities, runways and landing pads, flight towers, aircrafts, and associated structures and cumulatively contribute to changes in the open desert visual environment, the isolated nature of these projects would not result in rapid visual changes to the area. Additionally, the energy and solar projects, primarily near Segments 2A/2B, would potentially be visible from the DesertXpress rail alignment, depending on the height of the wind towers and materials used. Similar to the transportation projects discussed above, these wind towers and solar panels could cumulatively introduce an industrial visual character to the open desert but would not result in a rapid change in visual character due to their dispersed locations. Therefore, while these isolated projects along the DesertXpress rail alignment would have cumulative effects in changing the open desert visual environment, the visual change for the majority of the area of cumulative analysis is anticipated to be slow, generally maintaining the existing trend of visual changes. However, these present and future projects, in combination with the DesertXpress project, would cumulatively introduce new sources of nighttime lighting and daytime glare to the existing, naturally dark, open desert land.

The construction of the transportation, development, and energy projects would have potential short-term effects on visual resources, as construction equipment, staging areas, signage, and night lighting would be visible from the adjacent properties in urbanized areas, such as Barstow, Baker, Primm, Jean, and Sloan, during the construction period. It is important to note that these cumulative visual effects would be temporary in nature.

Recommended mitigation measures identified in Section 3.6, Visual/Aesthetics, have lessened the adverse effects related to visual resources as a result of the action alternatives. It is reasonable to assume that similar mitigation measures would be implemented as part of present and future projects to alleviate potential adverse visual effects. These projects would most likely be required to abide by similar environmental review processes as the DesertXpress project so as to evaluate project specific impacts to visual resources. While cumulative effects would introduce new urban visual features into the open, expansive undeveloped, desert, cumulative visual effects would be isolated to the viewshed in the related projects' sites. Thus, the cumulative impact of the transportation, development, and energy projects in combination with the DesertXpress project would not be substantial.

Cultural and Paleontological Resources

Summary of Project Effects: Cultural resources are non-renewable resources that continue to be affected by development activities throughout California and Nevada. Direct impacts are the anticipated impacts from actual placement of the rail line and facilities within the Area of Potential Effect (APE). Indirect impacts are those impacts that while not directly anticipated, may occur through construction or maintenance activities along the route.

Archaeological and historic resources sites were identified throughout the area of the action alternatives with the exception of Segment 7 (where only architectural resources were identified). The number of sites eligible or anticipated to be eligible for listing in the National Register of Historic Places (NRHP) ranges from zero to about 50 for each rail segment. Construction of the action alternatives would result in ground-disturbing activities and would therefore result in impacts to known and unknown archaeological resources within the APE. Construction would not result in the removal of historic architectural resources (buildings and structures) that are NRHP eligible. Following initial construction, ongoing operation of the DesertXpress rail line, stations, and maintenance facilities would not result in ground-disturbing activities and would not result in additional impacts beyond those from construction.

While no architectural resources were identified within Segment 1 though Segment 6, approximately 41 sites were identified within Segment 7. Thus, no architectural properties would be adversely affected or subject to significant impacts within Segment 1 through Segment 6. Within Segment 7, while the proposed project would be visible from the vast majority of the identified historic properties, in most cases, it would not “change...physical features within the property’s setting that contribute to its historic significance” or “introduce visual...elements that diminish the integrity of the property’s significant historic features.”

The action alternatives have the potential to impact Paleontological resources in Segments 1 through 5, due to the various deposits known to underlay the area of the proposed rail alignment and facilities. Impact to paleontological resources would occur in areas where the rail alignments or facilities would be immediately underlain by highly sensitive materials, such as Pleistocene, Miocene, and Pz-Mz units, as well as Holocene materials, where sensitive materials are present at relatively shallow levels.

Area of Cumulative Analysis: The area of cumulative analysis for effects related to cultural resources include the identified historic and archaeological sites within the Area of Potential Effect (APE), as defined in Section 3.7, Cultural Resources. The APE is the geographic area within which an undertaking may directly or indirectly cause alternations in the character or use of historic properties.

Present and Future Projects: : Present and future projects that would cumulatively affect cultural and/or paleontological resources include the projects that would affect the same cultural or paleontological sites as the action alternatives. Within the area of cumulative analysis, transportation projects, such as the capacity improvements to I-15 and the Joint Point of Entry project, wind and solar energy projects, and development projects, such as the North Triangle Specific Plan and the Mixed-Use Development, would have the potential to cumulatively affect such resources.

Cumulative Effects: Cumulative impacts to historical and archeological resources can occur when development of an area results in the removal of a substantial number of historic structures (whether considered important historical features or not) or archeological sites that when taken in combination could degrade the physical historical record of an area. While impacts associated with such cultural resources tend to be limited to individual project sites and do not generally result in substantial cumulative impacts, the DesertXpress project in combination with the capacity improvements to I-15, Joint Port of Entry, and wind energy projects could result in cumulative impacts to such resources. The capacity improvements to I-15 would have the potential to cumulatively impact the same historical and archaeological resources that would be impacted by the DesertXpress project where the rail alignment is located within the median or immediately adjacent to I-15. Segment 4A would travel through the proposed site for the

Joint Point of Entry project, while Segment 4B would cross through two wind energy and one solar energy project sites, thus having the potential to cumulatively impact historical and archeological resources at these sites. Furthermore, the anticipated development and buildout of the North Triangle Specific Plan within Victorville could cumulatively impact the same resources as the Victorville Station site options 1 and 2 and OMSF site option 1, as these facilities are located within the North Triangle Specific Plan boundary. The Mixed-Use Development in Jean could also cumulatively impact the same resources as Segments 5A and 5B.

Similarly, the DesertXpress project, in combination with present and future projects could result in cumulative impacts to paleontological resources. Transportation projects, such as the capacity improvements to I-15 and the Joint Port of Entry, wind energy projects, and development of the North Triangle Specific Plan area could impact the same paleontological resources as the DesertXpress project, resulting in a cumulative impact. The development of these projects would have the potential to unearth additional fossils or other paleontological resources at each of the respective project sites, which could contribute to a direct or indirect cumulative impact to paleontological resources within the APE.

The DesertXpress project includes site specific mitigation measures to reduce environmental effects related to historical, archaeological, and paleontological resources, including monitoring and avoidance measures. Although the DesertXpress project in combination with other present and future projects would have the potential to cumulatively impact cultural resources in the area of cumulative analysis, implementation of mitigation measures would reduce the cumulative impacts associated with the DesertXpress and cumulative projects.

Hydrology

Summary of Project Effects: As discussed in Section 3.8, Hydrology and Water Quality, over 300 waterways either cross the action alternatives or are prominent water bodies that could experience adverse environmental effects. Most of the waterways in the vicinity of the action alternatives are desert washes that are shaped over a long period of time from small to large flashy intermittent storm water flows that create rills and gullies. The major water feature in the DesertXpress project vicinity is the Mojave River.

Water Quality: Operation of the action alternatives would result in potential impacts to water quality due to pollutants deposited within the proposed rail right-of-way from train operation and track maintenance activities that could contaminate adjacent drainages and washes. Stormwater runoff around the Victorville and Las Vegas station options, OMSF, and MSF options, and the Baker MOW would also potentially impact water quality due to pollutants deposited from vehicles and maintenance activities including potentially hazardous materials. The action alternatives would have the potential to directly impact 12,588 to 15,127 linear feet of these hydrologic resources, with the majority of the resources located in Segment 1 and Segment 3B.

Construction of the action alternatives could also affect water quality during construction. Water quality impacts from construction activities could violate water quality standards, exceed contaminant loadings, provide additional sources of polluted runoff, or otherwise degrade water quality. Construction of the action alternatives could impact approximately 24,035 linear feet of water resources, Alternative A could impact 30,000 linear feet, Alternative B could impact 43,630 linear feet, and Option C would add an additional 540 linear feet to each of these alternatives. Construction of the bridge over the Mojave River in Segments 2A/2B could provide for a direct path of construction related contaminants to reach the Mojave River.

Drainage Patterns: The action alternatives would bridge over the Mojave River, intermittent streams, washes, and ditches, and would not substantially alter these water resources. For rail alignment alternatives within the I-15 median, drainage for the trackway would be designed to integrate with the existing I-15 drainage system. The Victorville OMSF site option 2 would, however, be bisected by two small washes that connect to the Bell Mountain Wash, which could alter the drainage and result in flooding on the west side of this site. Autotransformers in Segment 3 would also alter existing drainage patterns for small washes.

Flooding: As portions of the action alternatives, particularly Segments 1 and 6, would be located within the 100-year floodplain, implementation of the DesertXpress project would increase the size of the 100-year floodplain and impede or redirect flood flows. Construction of the action alternatives would also have the potential to result in temporary impacts to the 100-year floodplain, posing a risk to equipment, workers, and structures.

Runoff: The DesertXpress trackway would not produce any considerable amount of runoff given the permeable nature of construction on ballast rather than paved or solid impervious surface. Bridges and elevated structures would provide new impervious surface and contribute to polluted runoff. Additionally, the station and maintenance facilities would introduce new impervious surface. However, as there are numerous other locations in the watersheds for groundwater recharge, the increase in impervious surface would not result in a considerable loss of groundwater recharge and would not substantially affect groundwater levels.

Area of Cumulative Analysis: The area considered for cumulative effects to hydrology and water quality includes the watersheds affected by the DesertXpress project. As discussed in Section 3.8, Hydrology and Water Quality, over 300 waterways either cross the action alternatives or are prominent water bodies that could experience adverse environmental effects. The watersheds and drainages include, but are not limited to, the Mojave River, Burkhardt Lake, Bell Mountain Wash, Daggett Wash, Ivanpah Dry Lake, and the Kelso Wash near Baker.

Present and Future Projects: Present and future projects within the area of cumulative analysis include projects that are located within the watersheds potentially impacted by the DesertXpress project. Transportation, development, energy, natural resource, and public utility projects would have the ability to cumulatively affect hydrology and water quality. These projects include the capacity improvements on I-15, the Ivanpah Airport, Kinder-Morgan CalNev Pipeline expansion, the North Triangle Specific Plan in Victorville, wind energy projects between Victorville and Barstow and near Mountain Pass, and the Mixed-Use Recreation project in the Ivanpah Dry Lake area. While the 9.4 million acre West Mojave Coordinated Management Plan would cover the majority of the watersheds impacted by the DesertXpress project, no development would occur as part of this project and the watersheds would be maintained; thus, no discussion of this project is included in the cumulative analysis below.

Cumulative Effects: The DesertXpress project in combination with the past, present and future transportation, development, public utility, and energy projects would cumulatively effect hydrology and water quality within the area of cumulative analysis. Capacity improvements along I-15 could affect numerous watersheds impacted by the action alternatives, including the Mojave River, Kelso Wash, and Ivanpah Dry Lake. As portions of I-15 would be widened, the increase in impervious surface could cumulatively contribute to stormwater runoff associated with the DesertXpress project, primarily near the Victorville and Las Vegas stations and maintenance facilities. Construction of the Kinder-Morgan CalNev Pipeline would also cross several watersheds, which could affect water quality due to contaminants during construction or changes in the existing drainage patterns. However, cumulative impacts associated with the project would be anticipated to be minimal, as the pipeline expansion involves the construction of a 16-inch pipeline adjacent to existing Kinder-Morgan pipelines. These construction-related hydrology effects would be similar to the DesertXpress project due to their close proximity. While the Mixed-Use Recreation project would have the potential to cumulatively affect the Ivanpah Dry Lake, as this related project would continue the issuance of Casual Use permits for permitted and organized events for recreational purposes, no development would occur as part of this project and this related project would not substantially contribute additional impacts in combination with the DesertXpress project.

The Ivanpah Airport would be located within a 100-year floodplain near Segment 5. While Segment 5 is not located in this floodplain, implementation of the Ivanpah Airport could potentially increase the floodplain or impede drainage, which could contribute to the hydrological impacts associated with Segment 5. However, present and future projects such as the Ivanpah Airport project would be required to comply with applicable Federal, state, and local water quality regulations.

The DesertXpress project includes site specific mitigation measures such as compliance with NPDES permit requirements, the use of Best Management Practices (BMPs), proper design of station and maintenance facility drainage systems, and reducing the encroachment into the 100-year floodplain. Implementation of these measures would help to accommodate the increase in stormwater runoff that would be generated by the new impervious surfaces created the by the action alternatives. With the implementation of these mitigation measures, the DesertXpress project would not considerably contribute to cumulative impacts to hydrology and water quality.

Geology & Soils

Summary of Project Effects: The action alternatives would occur within an area susceptible to numerous potential geologic and soil-related hazards common to the desert region of California and Nevada. Such hazards include surface fault rupture, ground shaking, liquefaction, dam inundation, settlement, corrosive and/or expansive soils, landslides, area of soil cementation ("caliche"), shallow groundwater, ground fissures, and hazards related to tunneling.

Area of Cumulative Analysis: The area considered for cumulative effects related to geology and soils includes the seismic fault zones that underlie the action alternatives. The active fault zones within California include the Eastern California/Mojave Shear Zone, the San Andreas Fault Zone, and the Garlock Fault Zone. As Nevada does not have specified fault zones, the Las Vegas Valley is considered for cumulative effects relating to geology and soils in Nevada.

Present and Future Projects: As environmental effects to geology and soils are site specific, the past, present and future transportation, development, public utility, energy, and parks, recreation, and natural resources projects listed above would have the potential to effect the geology and soils in the cumulative analysis area. The cumulative effects of these projects in combination with the DesertXpress project are described below.

Cumulative Effects: Geotechnical impacts related to the DesertXpress project in combination with past, present and future projects in the area of cumulative analysis would involve hazards associated with site-specific soil conditions, erosion, and ground shaking during earthquakes which could expose individuals to risk. Other projects in the area of cumulative analysis, including transportation improvements to I-15 and the proposed Ivanpah Airport, would experience similar seismic risks to the DesertXpress project. The impacts to each project would be specific to that site and its users and would not be common or contribute to (or shared with, in a additive sense) the impacts on other sites. In addition, development of each site would be subject to site development and construction standards (local, state and federal) that are designed to protect public safety. Therefore, no adverse cumulative impacts would occur as a result of the action alternatives in combination with the past, present and future projects.

Hazardous Materials

Summary of Project Effects: Within the 200-mile study area corridor of the action alternatives there are numerous locations, primarily in developed and urbanized areas, where hazardous materials releases are documented or suspected. Non-urbanized sites within the study area are also potential hazardous materials sites, including factories, military installations, landfills, railroad rights of way, and other remote point sources, such as gas stations. The action alternatives differ little in potentially adverse effects related to hazardous materials. The action alternatives would be constructed primarily within the I-15 right-of-way, where extensive contamination is not known to exist. However, the action alternatives would entail the use, storage, and transport of fuels, oils, solvents, paints, and other potentially hazardous materials.

Contaminated soils and groundwater are anticipated to be found on or near properties of moderate to high environmental concern; within and or near existing or abandoned railroad corridors, where herbicides, petroleum hydrocarbons, and metals may be found in soils and/or groundwater; and within or near existing freeway corridors, where petroleum hydrocarbons and aerially deposited lead may be found in soils and/or groundwater. Based on environmental database review, review of field photography, and site reconnaissance, sites of moderate to high environmental concern were identified in all segments with the exceptions of Segments 1, 4B, and 5A/5B. Segments 2A/2B, 6A/6B, 7A/7B, and Option C would be located near hazardous sites on or near existing or abandoned railways, and all segments, with the exception of Segments 2A/2B and 4A/4B, are near sites in close proximity to freeway corridors.

Area of Cumulative Analysis: The area of cumulative analysis considered for hazardous materials effects includes the properties of moderate to high environmental concern identified within a 1/8-mile radius around the action alternatives.

Present and Future Projects: Present and future projects located within the area of cumulative analysis include transportation improvements on I-15, the Ivanpah Airport, the Southern Nevada Regional Heliport, the expansion of the Kinder-Morgan CalNev Pipeline System, and BLM solar and wind energy projects, as these projects are all within close proximity to the I-15 freeway corridor. However, none of the present and future projects are located on the identified properties of moderate to high environmental concern within the DesertXpress 1/8-mile radius study area.

Cumulative Effects: Environmental effects related to hazardous materials generally occur on a site specific basis, or else are linked to a specific hazardous waste site, such as a designated superfund site. The present and future projects within close proximity to the DesertXpress project are generally geographically disperse and it is not anticipated that they would use quantities of hazardous materials that would combine in such a way to endanger human or environmental health. The planned capacity improvements on I-15 would potentially encounter hazardous materials and contaminated soils and groundwater, as construction activities would occur on and within close proximity to the existing freeway. Similarly, the proposed sites for the Ivanpah Airport and Southern Nevada Regional Heliport would be within close proximity to I-15 and could potentially experience adverse effects related to contaminated soils and/or groundwater. However, as effects related to hazardous materials are site specific, the DesertXpress project, in combination with the I-15 improvement projects, the Ivanpah Airport, and the Southern Nevada Regional Heliport, would not result in cumulative impacts.

Hazardous materials are strictly regulated by state and federal laws specifically to ensure that they do not result in a gradual toxification of the environment. Recommended mitigation measures identified in Section 3.10, Hazardous Materials, would lessen the adverse effects related to hazardous materials as a result of the action alternatives. It is reasonable to assume that similar mitigation measures would be implemented as part of the present and future projects to alleviate potential adverse effects related to hazardous materials. Each individual project would be required by NEPA to investigate and report any findings of contaminated soil or groundwater. Therefore, it is not anticipated that there would be any cumulative impact related to hazards.

Air Quality and Global Climate Change

Summary of Project Effects: The air quality analysis in Section 3.11, Air Quality and Global Climate Change, took into consideration the related cumulative projects when calculating the future air quality emissions in year 2030 in the project study area. As such, a summary of the project air quality and global climate change effects are included in the cumulative analysis below.

Area of Cumulative Analysis: The area of cumulative analysis considered for air quality effects includes the Mojave Desert Air Basin in California and the Clark County Department of Air Quality and Environmental Management (DAQEM) in Nevada.

Present and Future Projects: As the area of cumulative analysis encompasses two air basins, all of the aforementioned past, present and future projects, as identified in Section 3.16.3, would have the potential to contribute to cumulative air quality effects.

Cumulative Effects: The DesertXpress project in combination with the related transportation, development, energy, and public utility projects would contribute to air quality effects within the Mojave Desert Air Basin in California and the Clark County Department of Air Quality and Environmental Management (DAQEM) in Nevada. Refer to Section 3.11, Air Quality, for further analysis of cumulative air quality effects for year 2030.

Within the Mojave Desert Air Basin, the regional criteria pollutant and GHG emissions that would result from implementation of either technology option (EMU or DEMU) for the year 2030 is provided in Table 3.16-3. As shown therein, O_3 precursor emissions of NO_X under the DEMU technology option would exceed general conformity thresholds in 2030 and would require the purchase of NO_x emissions offsets should the DEMU technology option be chosen. The purchase/acquisition of NO_X offsets for emissions occurring within the Mojave Desert Air Basin would be coordinated through the MDAQMD. All criteria pollutant emissions under the EMU technology option would remain below general conformity thresholds in 2030. The potential air quality effects for the related projects are included as part of the air quality analysis for the Mojave Desert Air Basin for year 2030 and are thus cumulatively accounted for in Table 3.16-3.

Table 3.16-3: Horizon Year 2030 Mojave Desert Air Basin Regional Criteria Pollutant and Greenhouse Gas Emissions (tons per year)

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	56	1,007	928	70	54	49	188,728
Mobile-source Emissions	(62)	(298)	(1,234)	(6)	(56)	(51)	(25,691)
Net Emissions	(6)	709	(306)	64	(2)	(3)	162,947
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	Yes	No	No	No	No	N/A
EMU Technology Option							
Railway Emissions	1	118	21	12	4	4	75,122
Mobile-source Emissions	(79)	(378)	(1,565)	(8)	(71)	(65)	(32,594)
Net Emissions	(78)	(260)	(1,544)	4	(67)	(61)	42,528
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	No	No	No	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

For the DAQEM in Nevada, the regional criteria pollutant and GHG emissions that would result from implementation of either technology option for year 2030 is provided in Table 3.16-4. As shown therein, O_3 precursor emissions of NO_X under the DEMU technology option would exceed general conformity thresholds in 2030 and would require the purchase of NO_x emissions offsets should the DEMU technology option be chosen. The purchase/acquisition of NO_X offsets for emissions occurring within Clark County Nevada would be coordinated through the Clark County DAQEM. All criteria pollutant emissions under the EMU technology option would remain below general conformity thresholds in 2030. The potential air quality effects for the related projects are included as part of the air quality analysis for Clark County for year 2030 and are thus cumulatively accounted for in Table 3.16-4.

Table 3.16-4: Horizon Year 2030 Clark County Criteria Pollutant and Greenhouse Gas Emissions (tons per year)

	Criteria Pollutant Emissions						CO_2e Emissions
	ROC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	
DEMU Technology Option							
Railway Emissions	35	612	137	17	21	19	45,695
Mobile-source Emissions	(67)	(58)	(2,231)	(3)	(8)	(4)	(6,197)
Net Emissions	(32)	554	(2,094)	14	13	15	39,498
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	Yes	No	No	No	No	N/A
EMU Technology Option							
Railway Emissions	<1	29	5	3	1	1	18,197
Mobile-source Emissions	(85)	(74)	(2,830)	(3)	(10)	(5)	(7,862)
Net Emissions	(85)	(45)	(2,825)	<1	(9)	(4)	10,335
General Conformity Threshold	50	50	100	100	70	70	--
Exceed Threshold?	No	No	No	No	No	No	N/A

[a] Criteria pollutant emissions expressed in short tons (1 ton = 2,000 lbs); CO_2e emissions expressed in metric tons (1 ton = 2,204.62 lbs)

Source: ICF Jones & Stokes, September 2008; Calculation worksheets provided in Appendix J.

Additionally, for both the Mojave Desert Air Basin and Clark County, the DesertXpress project in combination with past, present and future projects in year 2030 is predicted to result in an increase in greenhouse gas emissions under both technology options.

Additionally, construction of the action alternatives would temporarily generate emissions of fugitive dust, construction equipment tailpipe emissions, and evaporative volatile organic compound (VOC) emissions from paving and painting operations. In addition to the temporary nature of construction-period emissions, impacts would be localized to the areas adjacent to the construction activity. Construction present and future transportation, development, energy, and public utility projects would have similar temporary construction-related air quality impacts. However, these projects would be subject to specific control measures to reduce such impacts, similar to the DesertXpress project.

While the DesertXpress project in combination with the present and future projects would constitute cumulative air quality effects, the DesertXpress project would not substantially contribute to the cumulative impact, as operation of either the EMU or DEMU technology options would not exceed criteria pollutant emission standards within the Mojave Desert Air Basin or within Clark County, with the exception of NOx emissions under the DEMU option. Mitigation strategies to address these construction and operational air quality impacts would reduce such potential impacts, particularly during construction. While there would be a cumulative impact to air quality due to the operation of the DesertXpress project and the present and future transportation and development projects, the DesertXpress project would not considerably contribute to the cumulative effect related to air quality.

Noise and Vibration

Summary of Project Effects: Noise sensitive land uses along the DesertXpress project corridor are primarily located within the urbanized and residential areas along the rail alignments, including Victorville, Lenwood, Barstow, Yermo, and Baker in California and southern Las Vegas in Nevada. The primary adverse noise effects would occur in Barstow, Yermo, and southern Las Vegas, as the DesertXpress rail alignments would be located within close proximity to scattered single-family homes and residential developments. The DEMU technology option would also generate higher noise levels than the EMU technology option. The noise analysis in Section 3.12, Noise and Vibration, took into consideration past, present and future projects when calculating the future noise levels in year 2030 in the project study area.

Area of Cumulative Analysis: The area for cumulative analysis includes a ¼-mile radius from the action alternatives, including stations, and maintenance facilities. As noise attenuates with distance, significant noise impacts are not anticipated beyond the ¼-mile radius from the DesertXpress project.

Present and Future Projects: Present and future projects that could have noise effects within the area of cumulative analysis include transportation, energy, and development projects. Transportation projects include the capacity improvements on I-15, California High Speed Rail, Ivanpah Airport, and the Southern Nevada Regional Heliport. The anticipated development within the North Triangle Specific Plan would also affect the noise environment in the Victorville area. Energy projects, such as the wind and solar projects on BLM land could also contribute to increased noise levels within the area of cumulative analysis, particularly during construction.

Cumulative Effects: The DesertXpress project in combination with present and future transportation, development, and energy projects would primarily affect noise levels in urbanized areas along the rail alignment, including Victorville, Lenwood, Barstow, Yermo, and southern Las Vegas, as these areas include scattered developments of single-family homes that would be sensitive to an increase in noise levels.

While development of the North Triangle Specific Plan in Victorville in combination with the DesertXpress high-speed passenger train would increase the existing noise levels in the currently undeveloped area of Victorville, there are limited sensitive receptors within close proximity to the area proposed for the development of the Victorville station and maintenance facilities. As such, the DesertXpress project would not result in an adverse cumulative noise impact in the Victorville area.

However, construction and operation of the wind and solar energy projects near Barstow in combination with Segments 2A and 2B would cumulatively combine to exceed acceptable noise standards for the single-family home developments within the area of cumulative analysis in and near Barstow and Yermo. As documented in Section 3.12, Noise and Vibration, noise levels in 2030 in this area would impact up to 83 single-family homes, depending on the chosen technology option (EMU or DEMU) and option of Segment 2A or Segment 2B. The combination of the DEMU technology option and Segment 2B, in conjunction with other present and future projects, would have the greatest impact, while the EMU technology option under Segment 2A would have a lesser impact to the cumulative noise environment.

Development of present and future transportation projects, including capacity improvements to I-15, wind and solar energy projects near Mountain Pass, and public utility projects, such as the Ivanpah Substation and expansion of the Kinder-Morgan CalNev Pipeline, would also cumulatively combine with the DesertXpress project to increase noise levels near the Mojave National Preserve. However, as indicated in Section 3.12, Noise and Vibration, the noise generated by the high-speed rail under both technology options would affect the same area of the Mojave National Preserve as would traffic noise on I-15. Thus, the DesertXpress project would not considerably contribute to the increased noise levels near the Mojave National Preserve.

Capacity improvements to I-15 would also combine with the DesertXpress project to exceed noise level standards near the residential developments in southern Las Vegas. With the exception of Option C, the DesertXpress rail alignment and capacity improvements to I-15 would occur immediately adjacent to one another and would have similar cumulative noise and vibration impacts during construction and operation.

Recommended mitigation measures for the DesertXpress project would lessen the adverse effects related to noise and vibration as a result of the action alternatives. It is reasonable to assume that similar mitigation measures would be applied to present and future projects to reduce potentially adverse noise and vibration impacts. Each project would be required by NEPA to evaluate the existing noise environment and document whether the construction and operation of such a project would exceed established noise level standards. While recommended mitigation would reduce adverse noise impacts, when taken collectively, the DesertXpress project in combination with past, present, and future projects would result in a cumulative increase in noise within the area of cumulative analysis.

Energy

Summary of Project Effects: Among the United States, California is ranked second in overall energy consumption and 49th on a per capita basis. Of the overall energy consumed in the state, the transportation sector represents the largest proportion at 39 percent. Nevada's total energy consumption ranks 37th in the United States and 38th on a per capita basis. Thirty three percent of Nevada's energy consumption is spent on transportation.

As described in Section 3.13, Energy, the action alternatives would result in lower energy consumption compared to the No Action Alternative in 2030. Furthermore, the EMU would result in more than twice the energy savings benefit than the DEMU, as the EMU would provide an opportunity to further reduce consumption of non-renewable resources, such as petroleum. Thus, the DesertXpress project would have a net positive impact on energy resources. As the EMU would use electricity to power train operations, the EMU would place the most load on the electrical system on Fridays and Sundays. This peak load would not substantially interfere with peak demand on existing electricity systems, as typical peak hours occur on weekdays. The electricity demand stemming from the EMU would constitute less than 1 percent of the total capacity and demand on regional electricity resources, thus, not resulting in an impact.

The action alternatives would also require the commitment of energy resources during construction. It is anticipated that the payback of these energy resources would be approximately 5.5 years for the DEMU and 2.6 years for the EMU. As such, the action alternatives' construction-related energy consumption would not be anticipated to result in an adverse effect to energy.

Area of Cumulative Analysis: The area of analysis for cumulative effects related to energy includes California and Nevada, specifically San Bernardino County and Clark County. Section 3.13, Energy, evaluated direct and indirect impacts of the DesertXpress project to energy and electricity consumption on a statewide basis.

Present and Future Projects: Present and future projects that could affect energy consumption within the area of cumulative analysis include transportation, public utility, energy, and development projects. Transportation projects include the capacity improvements on I-15, California High Speed Rail, Ivanpah Airport, and Southern Nevada Regional Heliport. Additionally, the anticipated development within the North Triangle Specific Plan would affect energy consumption in California, while the Mixed-Use Development in Jean would affect energy consumption in Nevada. The expansion of the Kinder-Morgan CalNev Pipeline and Ivanpah Substation would have energy effects during construction, as it would require the commitment of energy resources. These public utility projects in addition to the BLM solar and wind energy projects could, however, positively contribute to energy production and electricity systems in California.

Cumulative Effects: The DesertXpress project in combination with present and future transportation, development, public utility, and energy projects would result in cumulative impacts related to energy and electricity consumption. Capacity improvements on I-15 would increase the number of passenger trips on I-15 between Victorville and Las Vegas. As discussed in Section 3.13, Energy, by 2030, an increase of approximately 20,754,000 MMBTUs, or 3.8 million barrels of oil, would be used for automobile transportation on I-15. While the DesertXpress project would provide a mode shift from automobile travel from Victorville to Las Vegas, the capacity improvements on

I-15 would contribute to an increase in automobile energy consumption on this highway. Additionally, implementation of the Ivanpah Airport and Southern Nevada Regional Heliport would also contribute to energy consumption, as these projects would promote air travel within the cumulative area. The California High Speed Rail would have similar energy effects as the DesertXpress project, as they are also high speed rail projects and would provide a mode shift from automobile and air travel, which would have the potential to have a net positive effect on energy consumption.

Development projects would also cumulatively contribute to energy consumption within the area of cumulative analysis. As the North Triangle Specific Plan would propose development within Victorville, the Specific Plan area would require the consumption of energy for development and operation of the proposed urban uses within the previously open, low-density area. While on a smaller scale than the North Triangle Specific Plan, the Mixed-Use Development near Jean, Nevada would also require the consumption of energy for construction and operation of such facilities.

Construction of the transportation and development projects, as described above, and the expansion of the Kinder-Morgan CalNev Pipeline and development of the Ivanpah Substation in combination with the DesertXpress project would indirectly affect energy consumption, as the commitment of energy resources would be required for construction. Project specific analyses would be required to determine the payback periods for these related projects, if applicable. However, mitigation similar to that included as part of the DesertXpress project, such as a construction energy conservation plan or the use of efficient construction equipment, would reduce the commitment of non-renewable energy resources for these related projects.

Conversely, the proposed wind and solar energy projects could establish positive energy effects in California. These projects would use renewable energy resources to create power and electricity to serve California. Energy produced by these wind and solar energy projects could potentially contribute to the electricity required by the DesertXpress project, particularly under the EMU option, thus promoting the use of renewable resources and the reduction of petroleum dependence.

While the DesertXpress project in combination with the present and future projects would constitute cumulative energy effects, the DesertXpress project would not substantially contribute to a cumulative impact. As discussed in Section 3.13, Energy, the electricity requirement of the action alternatives, under either the EMU or DEMU, would constitute less than one percent of the projected statewide electricity demand in California and Nevada. The action alternatives are anticipated to reduce energy consumption overall because of the mode shift (from auto to train) that would occur with the project. Additionally, the energy consumed for construction of the action alternatives would be recovered within 3 to 5 years with the EMU and DEMU options, respectively. Mitigation strategies to address construction energy use, including implementation of a construction energy conservation plan, would conserve energy resources, however. Thus, the DesertXpress project would not result in a cumulative impact related to energy.

Biology

Summary of Project Effects: The action alternatives would be constructed and operated in areas with numerous biological resources. These areas include habitats that support special-status plant and wildlife species, ephemeral drainages, and public lands administered by the Bureau of Land Management and National Park Service for, among other purposes, the protection of biological resources.

Biological resources affected by the action alternatives include Joshua Tree Wooded Shrubland, Mesquite Shrubland, Desert Tortoise habitat, and Mojave ground Squirrel habitat. Special Management Land affected by the action alternatives includes Desert Tortoise critical habitat, the Area of Critical Environmental Concern (ACEC) Cronese Basin, and the National Park Service (NPS) Mojave National Preserve. Portions of the action alternatives, specifically Segments 3A and 3B between Nipton Road and Zzyzx Road, would be located immediately adjacent to the Mojave National Preserve and several wilderness areas within the Preserve. While the action alternatives abut the northern boundary of the wilderness areas within the Preserve, the DesertXpress rail alignment would not traverse through these areas. Table 3.16-5 represents the approximate acres of sensitive plant and wildlife habitats, acres of sensitive biological land use areas, and special-status species affected by the DesertXpress project.

Construction of the action alternatives would also have direct and indirect effects on wetlands and waters of the United States. Construction would cause soil and vegetation disturbance within the channel and banks of project area drainages. This includes permanent disturbance from placement of culverts within the drainages and temporary impacts resulting from construction activity. During construction, ground disturbance may cause sediment deposition and potential for erosion of sediments into the drainages within the study area. In addition, construction activity (i.e. driving in and across washes) in or near ephemeral washes can cause drainage bed and bank modifications due to the erodible nature of the study area soils. These modifications could adversely affect hydrology and vegetation within the construction area and immediately downstream. Soil disturbance and removal of existing vegetation during construction would increase the potential for the spread of invasive exotic plant species into washes within the study area. Construction materials, such as fuel, oil, lubricants, and concrete that may be spilled into associated drainages within the study area, could have adverse affects on vegetation and wildlife habitat. Some of these effects would be short-term, such as construction impacts. Other effects, such as placement of culverts and the runoff of contaminants, would be ongoing, continual effects.

The action alternatives would cross 260 ephemeral drainages and the Ivanpah Playa. Of these 260 drainages, the largest are the Mojave River, Duck Creek, Tropicana Wash and Flamingo Wash. Construction of the action alternatives would permanently remove vegetation from these principal drainages and upland vegetation within the other ephemeral drainages.

Area of Cumulative Analysis: The area of cumulative analysis includes the areas and sites of identified biological resources within a 400-foot-wide corridor surrounding the action alternative alignments including stations and maintenance facilities Section 3.14, Biological Resources, analyzed the direct and indirect effects on biological resources within this 400-foot-wide corridor. Direct effects include activities that disturb vegetation and soil resources and disrupt the biological or hydrologic function of surface water features. Indirect effects include the modification of habitat functions resulting from wind-blown dust, erosion of sediments, noxious weed invasion, or hydrologic modifications.

Present and Future Projects: Present and future projects that could contribute to cumulative impacts to the identified biological resources within the area of cumulative analysis include transportation, development, and energy projects. Capacity improvements to I-15, the proposed Ivanpah Airport, and the Southern Nevada Regional Heliport would all be located within close proximity to identified plant and wildlife resources. The anticipated development associated with the North Triangle Specific Plan could also impact biological resources in Victorville, while the Mixed-Use Development project would affect biological resources near Jean. Solar and wind energy projects on BLM lands, in addition to the Ivanpah Energy Center and Primm Solar Generating Plant, would also have the potential to disrupt biological resources, particularly near Barstow and Primm. The West Mojave Coordinated Management Plan would also affect biological resources in the area of cumulative analysis, as it seeks to preserve and restore such resources.

Resource/Type of Impact		Alternative A	Alternative B	Option C
Biological Resource	Sensitive Plant Community – Permanent Impact	--	Joshua tree Wooded Shrubland: 83.8 acres Mesquite Shrubland: 1.9 acres	--
	Sensitive Plant Community – Temporary Impact	Mesquite Shrubland: 4.6 acres	Joshua tree Wooded Shrubland: 194.7 acres Mesquite Shrubland: 13.4 acres	--
	Desert Tortoise Habitat – Permanent Impact	611.9 acres to 747.1 acres	1,473.6 acres to 1,604.6 acres	--
	Desert Tortoise Habitat – Temporary Impact	2,108.6 acres	4,558.4 acres	--
	Mohave Ground Squirrel Habitat – Permanent Impact	329.6 acres to 666.8 acres	346.7 acres to 683.9 acres	--
	Mohave Ground Squirrel Habitat – Temporary Impact	1,745.4 acres	1,184.2 acres	--
Special Management Lands	Desert Tortoise Critical Habitat – Permanent Impact	60.9 acres	555.0 acres	--
	Desert Tortoise Critical Habitat – Temporary Impact	264.0 acres	1,598.9 acres	--
	ACEC Cronese Basin – Permanent Impact	--	3.6 acres	--
	ACEC Cronese Basin – Temporary Impact	--	16.6 acres	--

	ACEC Halloran Basin – Temporary Impact	--	25.5 acres	--
	NPS Mojave National Preserve – Permanent Impact	13.8 acres	--	--
	NPS Mojave National Preserve – Temporary Impact	59.9 acres	--	--
Special Status-Species	Special-Status Plants	22	23	--
	Special-Status Fish	2	2	--
	Special-Status Reptiles	17	17	--
	Special-Status Birds	12	12	--
	Special-Status Mammals	7	12	--

Source: Jones and Stokes, 2008.

Cumulative Effects: The DesertXpress project in combination with other past, present, and future projects would result in the conversion of open space lands to developed land, contributing to the loss of ruderal habitats, wetland habitats, and other biological resources in the area of cumulative analysis. There would be an associated loss of common plant and animal species, and a cumulative loss of habitat for common special-status species. Transportation, development, energy, public utility, and natural resource projects would cumulatively affect plant and animal species, including the Desert Tortoise, Mojave ground squirrel, and numerous special-status plant species.

Biological resources impacts related to the I-15 capacity improvements in combination with the DesertXpress project would primarily affect the same biological resources as the DesertXpress project, with the exception of portions of Segment 1 and Segment 2. Capacity improvements near Barstow, just south of Segment 2, could directly impact additional special-status plant and animal species, particularly the Mojave ground squirrel and various special-status plants.

Present and future public utility projects, including the Ivanpah Substation and expansion of the Kinder-Morgan CalNev Pipeline would also have a cumulative adverse effect on biological resources, including special-status plant and animal species. The expansion of the Kinder-Morgan CalNev Pipeline would, however, have similar cumulative biological impacts, as it would primarily follow the DesertXpress alignment. However, cumulative impacts would be focused on construction-related impacts, as the expansion would only construct a 16-inch pipeline adjacent to existing pipelines.

Present and future development and energy projects would cumulatively affect biological resources near Victorville, Barstow, and the California-Nevada state line. As the North Triangle Specific Plan would propose urban development in a previously undeveloped area near the Victorville station and maintenance facility site options, this development project would contribute to cumulative impacts to special-status plant and animal species, including the Mojave ground squirrel, in and surrounding the Specific Plan area. The Mixed-Use Development project near Jean would cumulatively affect the large-scale translocation site for Desert Tortoise on the west side of I-15, as Segments 5A and 5B would traverse the eastern boundary of the translocation site. Wind energy projects between Victorville and Barstow and near the California-Nevada state line would cumulatively impact biological resources as well. Together, the DesertXpress project and wind energy projects would affect the same cluster of biological resources just north of Barstow and near Mountain Pass.

Construction and operation of the Ivanpah Airport in conjunction with the DesertXpress project would also have the potential to cumulatively affect the Mojave National Preserve and designated wilderness areas within the Preserve. Although the Ivanpah Airport project site would not be located within or immediately adjacent to the Mojave National Preserve, indirect growth associated with the Airport, such as commercial development, would have the potential to adversely affect the Mojave National Preserve and associated biological resources to the south. The DesertXpress project, in combination with the Ivanpah Airport, would therefore have the potential to cumulatively affect such Special Management Land areas. While Segment 4A would travel through a small portion of the northern Mojave National Preserve, there would be no station or maintenance facilities constructed along this segment or in close proximity to the Preserve. Additionally, Segments 3A/AB and 4A would not traverse through any designated wilderness areas in the Preserve, but rather travel immediately north of two wilderness area boundaries. However, cumulatively, the DesertXpress project and the associated growth of the Ivanpah Airport development would affect similar areas of Special Management Land and biological resources within the Mojave National Preserve.

Conversely, the West Mojave Coordinated Management Plan would provide a regional strategy for conserving plant and animal species in the area of cumulative analysis. Implementation of the West Mojave Coordinated Management Plan could reduce cumulative impacts to plant and animal species, as plans and policies would be set in place for preserving and conserving biological resources that could potentially be affected by future development.

Recommended mitigation measures for the DesertXpress project have lessened the adverse effects related to biological resources as a result of the action alternatives. Similar mitigation measures would be applied to each individual related project to reduce potentially adverse impacts to biological resources. Each individual project would be required by NEPA to evaluate the biological conditions of the site and document the suitability of special-status plant and animal species on the site. While mitigation would reduce impacts to biological resources, when taken collectively, the DesertXpress project in combination with past, present, and future projects would result in a cumulative impact to special status plants and animals and their associated habitats.

3.16.4.1 No Action Alternative

The No Action Alternative would not involve the construction and operation of the DesertXpress project . However, it is assumed that the past, present, and future projects, as described above, would continue to be implemented. For example, land use changes, development, transportation projects, utility projects, energy projects and redevelopment of properties would continue to occur. As such, for most environmental topics the No Action Alternative would not avoid or greatly reduce the cumulative effects associated with the action alternatives described above.

However, several project specific impacts associated with the action alternatives would not occur such as cumulative traffic effects at location intersections surrounding station and maintenance facilities in Victorville and Las Vegas. As such, the No Action Alternative would avoid or greatly reduce this cumulative effect. Additionally, the No Action Alternative would avoid the construction of tracks, fencing, elevated structured, station and maintenance facilities that would occur as a result of the action alternatives which would in turn reduce or avoid a portion of the cumulative visual changes that would occur with the action alternatives.

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3.17 IRRETREIVABLE AND IRREVERSIBLE COMMITTMENTS OF PUBLIC RESOURCES

Implementation of the action alternatives would involve a commitment of a range of natural, physical, human, and fiscal resources. Land used in the construction of the rail line, stations, maintenance and other ancillary facilities associated with this project would be considered an irreversible commitment during the time period that the land is used for a project. However, if a greater need arises for use of the land or if the rail line and facilities are no longer needed, the land could be converted to another use. At present, there is no reason to believe such a conversion would ever be necessary or desirable.

Considerable amounts of fossil fuels, labor, and construction materials such as cement, aggregate, and bituminous material would be expended to construct the project. Additionally, large amounts of labor and natural resources are used in the making of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of funds, which are not retrievable.

The commitment of these resources is based on the concept that residents and businesses within the region would benefit from the improved quality of the transportation system. These benefits would consist of improved accessibility, increased capacity and energy savings, which are expected to outweigh the commitment of these resources.

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3.18 SHORT TERM USES VERSUS LONG TERM PRODUCTIVITY

Project implementation would result in attainment of short-term and long-term transportation and economic objectives at the expense of some long-term social, aesthetic, biological, noise, parkland, and other land use impacts.

3.18.1 BUILD ALTERNATIVES

The action alternatives would have similar impacts.

Short-term losses include: economic losses experienced by businesses affected by construction impacts such as noise, motorized and non-motorized traffic delays or detours; and recreational impacts such as access inconveniences to the little league fields and/or the regional park, and trail detours or closures.

Short-term benefits include: increased jobs and revenue generated during construction.

Long-term losses would include: permanent loss of plant and wildlife resources, visual impacts, conversion of farmlands, noise increases, cultural resource site values lost, use of construction materials and energy, and loss of a portion of the Mojave National Preserve.

Long-term gains include: Improvement of the transportation network of the region and the project vicinity, increased capacity and reduction of congestion on the I-15 freeway, use of private funds to construct and operate the project, more expeditious project delivery through use of private funds, increased jobs, and revenue through creation of new passenger train operation, and support of approved development.

3.18.2 NO PROJECT

This alternative would offer none of the gains or have the losses listed above. Private funding to provide public transportation facilities would not be available.

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3.19 UNAVOIDABLE ADVERSE EFFECTS

This section describes all potentially significant adverse effects resulting from the implementation of the action alternatives that even after application of mitigation measures would still result in a significant adverse effect.

The development of a high-speed passenger rail service from Victorville, California to Las Vegas, Nevada would result in unavoidable adverse effects to the physical and human environment. As described below, the action alternatives would cause unavoidable adverse effects in the following resource categories: Traffic and Transportation, Cultural and Paleontological Resources, and Section 4(f) Resources.

3.19.1 TRAFFIC AND TRANSPORTATION

Unavoidable adverse effects would remain at a few intersections as unacceptable level of service would remain after mitigation measures. Intersections include: Victorville Station Site 1 and two Stoddard Wells Road intersections.

3.19.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

Unavoidable adverse effects to up to 67 cultural resources sites resulting from direct impacts from placement of the rail line and facilities and the use of TCAs within the APE.

3.19.3 SECTION 4(F) RESOURCES

- Segment 4A would result in the unavoidable direct use of 13.82 acres of the MNP and the indirect use of 27.65 acres.
- Alternative A as a whole would result in unavoidable use of 13 cultural resource sites which qualify for Section 4(f) protection.
- Alternative B as a whole would result in the unavoidable use of 21 cultural resource sites which qualify for Section 4(f) protection.
- Option C would result in the unavoidable use of two (2) cultural resource sites which qualify for Section 4(f) protection.

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