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Environmental Analysis

Environmental issues will play a major role in the overall evaluation of project feasibility for the Phase I Maglev Study, and in planning of the project.

The purpose of this appendix is to review the environmental issues associated with alignment alternatives for the Phase I Maglev Study. A summary of information from the appendix is provided in Chapter 8 of the Study Report. The approach used has been to review the environmental assessments conducted to date by the San Diego County Regional Airport Authority (Ricondo & Associates Team 2005) and the San Diego County Water Authority (Boyle Engineering 2002), and to report findings. The environmental assessments from the Black and Veatch (1996) report were also reviewed. These reviews were supplemented with new research and analysis, where such information was available. This appendix also includes a review of permitting requirements.

This appendix is organized into the following areas:

- **1.1 Study Area:** Summarizes the environmental documentation and approval process and reviews the biology; architectural, archaeological and Native American resources; visual resources; Section 4(f) resources; and environmental justice constraints associated with the proposed alignment alternatives.

- **1.2 Potential Environmental Constraints:** Describes the potential biology; architectural, archaeological and Native American resources; visual resources; Section 4(f) resources; and environmental justice impacts associated with the proposed alignment alternatives.

- **1.3 Potential Mitigation Measures and Costs:** Provides potential mitigation measures and costs for identified environmental impacts associated with the proposed alignment alternatives.

### 1.1 Study Area

The study area consists of a 100-mile wide swath between San Diego and the western Imperial County airport site. Five alignment alternatives are considered. Four of these (Alignment 1A, Alignment 1B, Alignment 2, and Alignment 3) are located entirely within the U.S. Alignment 4 is located on both sides of the Mexico-U.S. border.
1.1.1 Environmental Permitting Process

1.1.1.1 Overview of the United States’ Environmental Permitting Process

National Environmental Policy Act (NEPA)
Under NEPA, Congress authorizes and directs federal agencies to carry out their regulations, policies, and programs as fully as possible in accordance with the statute’s policies on environmental protection (42 U.S.C. 4322; 40 C.F.R. 1500.2). In NEPA, the phrase “other major federal actions” refers to actions proposed by either a federal agency or a nonfederal entity if the action is subject to some form of federal control. In order to trigger NEPA, the proposal must be for an action and must be federal (i.e., a federal agency must have discretionary authority over the project) (40 C.F.R. 1502.4, 1508.18(a)).

Generally, U.S. statutes including NEPA, apply only to conduct that occurs within or affects United States territory. Although NEPA does not apply to federal activities outside the U.S., the federal government recognizes that environmental problems cross international borders. Executive Order 12114, which took effect in 1979, mandates analysis of the environmental effects of major federal actions abroad (E.O. 12114, Environmental Effects Abroad of Major Federal Actions, 3 C.F.R. 356, 1980). Special rules apply for the evaluation of trans-boundary impacts. These are defined as proposed actions which occur in the United States that have the potential to result in environmental impacts in other countries (e.g., Mexico or Canada). The evaluation of trans-boundary impacts is governed by the provisions of the Convention on Environmental Impact Assessment in a Trans-boundary Context, a multinational treaty to which the United States is a signatory. Congress has yet to sign the treaty, however the CEQ has issued a memorandum advising federal agencies of their responsibilities under the treaty and setting specific procedures to follow in implementing it (Memorandum to the Heads of Agencies on the Application of NEPA to Proposed Federal Actions in the U.S. with Trans-boundary Effects, July 1, 1997).

According to the CEQ advisory memorandum, when trans-boundary impacts are likely to occur, the lead agency should take the following steps as part of its NEPA process:

• Use the scoping process to identify trans-boundary environmental effects and determine what information is needed to evaluate them;
• Focus on actions that may affect the other nation, including:
  - Migratory species
  - Air quality
  - Watersheds
  - Other resources that cross borders
  - Interrelated social or economic effects;
• Rely on professional and research sources and consult with agencies in affected nations that have relevant jurisdiction and expertise; and
• Use the Draft EIS (and EA) to analyze and disclose reasonably foreseeable trans-boundary effects using reasonably available information.
Endangered Species Act
The Endangered Species Act (ESA), 16 U.S.C. Sections 1531-1544, is the primary federal statute for protecting threatened and endangered species within the United States. The ESA, under section 1537, authorizes participation of the U.S. in international conservation efforts. An example of this is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a 130-nation agreement designed to prevent species from becoming endangered or extinct because of international trade.

A Memorandum of Understanding (MOU) also exists between the wildlife conservation agencies of the United States, Mexico and Canada. Signed in 1996, this MOU established the Canada/Mexico/US Trilateral Committee for Wildlife and Ecosystem Conservation and Management. This agreement formally brought together the three nations of North America, consolidating a continental effort for wildlife and ecosystem conservation and management.

The committee works together with a diverse array of stakeholder groups for the promotion of joint conservation initiatives. In 1999, the trilateral committee initiated work on a project, which is intended to support the conservation of a selected group of 17 migratory and trans-boundary species and their habitats. Upon its completion, the report, Species of Common Conservation Concern in North America, will address the conservation status and the associated conservation programs of trans-boundary and migratory species, with special emphasis on species of concern in each country.

There is an ongoing debate over ESA’s application to species in Mexico that may be affected as a result of actions taking place in the United States. It is the position of most federal regulatory agencies that ESA and Section 7 consultation does not apply outside of the United States, since the agencies have no authority to control actions beyond sovereign boundaries. Although not required by law, the Department of Interior and USFWS have begun informal discussions to engage in formal ESA section 7 consultations over species in Mexico as they relate to lower Colorado River operations.

California Environmental Quality Act (CEQA)
Projects located in California are subject to the California Environmental Quality Act (CEQA) of 1970, as amended (Public Resources Code, Section 2100, et seq.) and the State CEQA Guidelines, as amended (California Code of Regulations, Section 1500, et seq.). Projects located outside of California are partially exempted from CEQA. Per CEQA Guideline 15277, “CEQA does not apply to any project or portion thereof located outside of California which will be subject to environmental impact review pursuant to the National Environmental Policy Act of 1969 or pursuant to a law of that state requiring preparation of a document containing essentially the same points of analysis as in an Environmental Impact Statement prepared under the National Environmental Policy Act of 1969”.

This partial exemption from CEQA was a response to an Attorney General's opinion stating that when a California public agency takes an action outside of the State of California, the California agency is still bound by the requirements in CEQA to prepare an EIR if the agency's action would cause a significant effect on the environment. The Attorney General's opinion noted that the definition of the term "environment" in CEQA did not stop at the borders of the State of
California. It said that CEQA applies to any exercise of powers by a California state or local agency. Where the agency was exercising powers granted by the Legislature, they were also subject to constraints enacted by the Legislature. Accordingly, when the California Department of Water Resources proposed to build a power plant in Nevada, the Department prepared an EIR analyzing the effects of its proposed action on the environment (Title 14, California Code of Regulations, Article 18, Statutory Exemptions).

1.1.1.2 Overview of Mexico’s Environmental Permitting Process

Federal Environmental Regulatory Agency

The Secretary of the Environment and Natural Resources (SEMARNAT) is Mexico’s federal environmental agency. Federal environmental regulations, which are included in the General Law of Ecology, identify different steps for the preparation of environmental studies. The environmental permitting process is initiated with the submittal of the Preventive Report to SEMARNAT. This document should provide a baseline level of analysis for the proposed project. It should also include:

1. Project applicant information;
2. Project description; and
3. A description of the substances or products to be used for project implementation, including a listing of emissions, wastes and discharges that may occur.

The Preventive Report is published in Mexico’s Ecological Gazette and is also made available to the public. Once this report is submitted, SEMARNAT reviews the report and within twenty days, determines whether an environmental impact statement needs to be submitted.

The agency will determine the level of environmental studies required for the proposed project (general, intermediate and specific). If SEMARNAT requires preparation of a Manifestación Impacto Ambiental (MIA), the document must contain a description of impacts to the existing environment, a description of the affected environment, and necessary preventive mitigation measures to either avoid or minimize the adverse effects on the environment. SEMARNAT makes a determination of adequacy within sixty days following the receipt of the MIA. Sometimes the period may be extended for an additional sixty days.

Baja California and the State Law of Environmental Equilibrium and Environmental Protection

The state environmental agency for the state of Baja California is the Dirección General de Ecología (DGE), which is responsible for the enforcement of environmental regulations, overseeing preparation and public access to environmental impact studies for construction projects and other activities.

As part of the national plan to decentralize environmental administration, Baja California now has the Law of Environmental Equilibrium and Environmental Protection and a set of enabling regulations. These regulations are included in the Plan de Ordenamiento Ecologico del Estado (State Plan for Ecological Resources), which serves as a regional planning tool to guide the physical development of Baja California. The Plan de Ordenamiento (Plan) was approved in 1995 and incorporates by reference several Mexican federal environmental laws. The Plan includes various elements including climate, topography, soils, hydrology, minerals, biology
(flora and fauna), and cultural resources. It also identifies Baja California’s Protected Areas and associated natural resources. There are seven Protected Areas in Baja California, none of which are in proximity to the SD&AE Alignment Alternative.

As previously noted, the determination to prepare a MIA is made by SEMARNAT. The MIA process considers impacts from pre-construction, construction, maintenance, and operations activities on a variety of resources, including air, water, vegetation, land use, visual, etc. The MIA process also considers socioeconomic impacts and regional ecosystem impacts. Impacts are classified within the following categories:

- Adverse but not significant (with no mitigation);
- Adverse but not significant with mitigation;
- Significant adverse effect (with no mitigation);
- Significant adverse effect with mitigation;
- Beneficial effect; and
- Significant beneficial effect.

1.1.2 Biology

The implications of biological resources along the proposed Maglev routes are assessed in this section. The focus is on sensitive vegetation communities as well as rare endangered species. A brief summary of the general impacts associated with the various alternatives is included along with an estimate of the cost associated with mitigating the biological impacts.

The information contained in the following section is based on existing information including:

- Airport Site Alternatives Analysis (Ricondo and Associates, 2005);
- IID Water Transfer Project Environmental Assessment (Black and Veach, 1999);
- San Diego Association of Governments (SANDAG); vegetation mapping;
- California Gap Analysis Project (GAP); vegetation mapping for Imperial County;
- County of San Diego MSCP Subarea Plan Geographic Information Systems (GIS) database; and
- Blueline drainages as depicted on U.S. Geological Survey (USGS) topographic maps.

No sources of information exist for the alignment which passes through Mexico.

1.1.2.1 Existing Conditions

Due to the variations in climate and topography that exist along the various alignments, a broad variety of vegetation communities lie along the potential alignments for the Maglev. In addition, rare and endangered plants and animals inhabit the various vegetation communities.

Vegetation Communities

For the purposes of evaluating the level of impact and the corresponding potential cost of compensating for those impacts, commonly referred to as mitigation, the vegetation communities are grouped into three basic sensitivity levels: high, moderate and low. The overall criteria are based on the criteria used in the Ricondo study and are shown in Table 5-1.
Table 0-1: Vegetation Sensitivity

<table>
<thead>
<tr>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Regulated waters, including wetlands (USACE, CDFG, RWQCB) habitats</td>
<td>– Nonregulated native habitats</td>
<td>– MSCP Tier IV habitats</td>
</tr>
<tr>
<td>– MSCP Tier I and II upland habitats</td>
<td>– MSCP Tier III upland habitats</td>
<td>– Nonregulated agricultural or developed lands</td>
</tr>
</tbody>
</table>

The sensitivity levels assigned to the vegetation communities found within the alignments are illustrated in Figure 5-1 on the following page. There are as many as 58 different vegetation communities within the four general alignments. These vegetation communities fall into the following general categories: Wetland, Sage Scrub, Chaparral, Grassland, and Woodland. Within each of these categories are a variety of sub-groups which exhibit different species of the general plant types which comprise these categories.

The high value vegetation is comprised of habitats which are the most rare in the region. The high value vegetation falls into two subsets: wetlands and uplands. All wetlands are considered high value. High value uplands include woodlands and sage scrub which supports sensitive species. The high value wetland areas are shown in blue on Figure 5-1; high value uplands are indicated in green.
Figure 0-1: Vegetation Sensitivity

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See figure on next page.
The moderate value vegetation areas are shown in brown on Figure 5-1. The moderate sensitivity vegetation includes sage scrub, chaparral and grasslands.

The low value vegetation areas are predominantly disturbed and non-native vegetated areas which have limited general wildlife value. For example, agricultural fields offer foraging opportunities for raptors.

Sensitivity was also based on the tier system identified in the MSCP. The MSCP uses Tiers I through IV to indicate overall sensitivity of the various vegetation communities found within the plan area. Tier I is considered the most sensitive and Tier IV is the least sensitive.

**Rare and Endangered Species**

The focus of this discussion is on those plant and animal species which are listed under the California and/or United States Endangered Species Acts which could occur along the alternative alignments. While additional species are listed by local organizations as sensitive, these species do not have the standing of state and federal listed species.

**Alignment 1A: I-8 Corridor (Miramar – Desert Site)**

*Urban:* From the Miramar Station, the route passes through areas which are largely urbanized. However, two major open spaces occur along the route which possess the following biological resources coastal sage scrub, chaparral, and grasslands. It would also cross several drainages including Sycamore Creek.

*Mountain:* Upon leaving the urban areas, the alignment would generally follow I-8 and would cross through sage scrub, chaparral, grassland, and oak, Jeffery pine, riparian and mountain alder woodlands.

*Desert:* From this point on toward the desert site, the vegetation would primarily consist of creosote, saltbush, and cholla-prickly pear.

**Alignment 1B: I-8 Corridor (Qualcomm – Desert Site)**

*Urban:* This alignment passes through the urban area through the central portion of the metropolitan area along the I-8 corridor.

*Mountain:* Upon leaving the urban areas, Alignment 1B would follow the same path as Alignment 1A through the mountains and traverse similar vegetation types.

*Desert:* Alignment 1B would follow the same path as Alignment 1A through the desert and traverse similar vegetation types.

**Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)**

*Urban:* From the Santa Fe Depot through the urban area, alignment would pass through limited areas of native vegetation consisting of coastal sage scrub and non-native grassland.
Mountain: As it leaves the urban area, Alignment 2 would cross riparian habitat associated with the Sweetwater River. As it heads east, the route passes through the same types of resources associated with the mountain portion of Alignments 1A and 1B.

Desert: Alignment 2 would follow the same path as Alignment 1A and 1B through the desert and traverse similar vegetation types.

Alternative 3: Tunnel Alignment (Qualcomm – Desert Site)
As the train would be located in a tunnel for entire length through the urban and mountain portions of the route, no discussion of biological resources along the route is necessary.

Alternative 4: SD&AE Corridor (Santa Fe Depot – Desert Site)
Urban: From the Santa Fe Depot Station, this route would travel south through urbanized areas of National City and Chula Vista toward the Mexican border along I-5. On the way to the border it would cross wetland vegetation associated with the Sweetwater, Otay and Tijuana Rivers. The tracks would cross the Mexican border near San Ysidro. Although detailed vegetation information is not available on the portion Alignment 4 through Mexican, generalizations are made for the sake of comparison with the other alignments. Once across the border, the alignment would traverse the urbanized area of Tijuana. Although urbanized, a substantial amount of coastal sage scrub and natural drainage courses are expected to remain within this portion of the alignment.

Mountain: As it approaches Rodriguez Reservoir, the alignment would head north back toward the border. The alignment would cross the border back into the U.S. just southwest of Jacumba where it would converge with Alignment 2, east of Ocotillo. Primary vegetation types along this portion of the route would be anticipated to reflect those occurring along Alternatives 1A and 1B.

Desert: Alignment 4 would follow the same path as the other three alignments through the desert and result in comparable impacts.

1.1.3 Architectural, Archeological and Native American Resources
Architectural, archaeological and Native American resources reflect southern California's history and enhance its environmental value. This section describes the cultural resources associated with the study area.

The potential for impacts to architectural, archaeological and Native American resources will vary for individual alignment alternatives. This section describes the regulatory setting and discusses the characteristics of the study area relative to cultural resources and the potential for impacts. The approach is to review and report the findings of the cultural resources assessments conducted to date by the San Diego County Regional Airport Authority (Ricondo & Associates Team 2005) and the San Diego County Water Authority (Boyle Engineering 2002). The cultural resource assessment from the Black and Veatch (1996) report was also reviewed. These reviews were supplemented with new research and analysis, where such information was readily available. No information on the Mexico portion of the SD&AE Alignment was available. Records searches were not conducted at the South Coastal Information Center (SCIC), the San
Diego Museum of Man or the Southeastern Information Center (SIC) for the study area. No cultural resources surveys or site visits were performed. In addition, the Native American Heritage Commission (NAHC) was not consulted and a Native American contact program was not undertaken.

1.1.3.1 Regulatory Setting
A number of regulations and policies have been implemented at the federal, state and local levels to promote the preservation of architectural, archaeological, and Native American resources. Generally a resource must be at least 50 years old to qualify for consideration as important or significant.

On a federal level, the National Historic Preservation Act (NHPA) of 1966, as amended, establishes a program for the preservation of historic properties throughout the United States. Under Section 106 of the NHPA, federal agencies must consider the effects of their undertaking on properties on or eligible for inclusion in the National Register of Historic Places (NRHP).

On a state level, the CEQA and its implementing guidelines address resources that qualify for the California Register of Historical Resources (CRHR) and archaeological resources that are unique. CEQA requires that historically significant cultural resources be protected, to the extent prudent and feasible, from substantial adverse change. Under CEQA, a project with an effect that may cause a substantial adverse change in the significance of a historical resource may have a significant effect on the environment. The CEQA guidelines include provisions for addressing the discovery and disposition of Native American human remains. The treatment of other human remains is addressed under the California Health and Safety Code.

Recently enacted California Senate Bill (SB) 18 requires that before a city or county adopts or amends their general plan, they must conduct consultations with California Native American tribes that are on the contact list maintained by the NAHC. Although SB18 does not specifically call out the need for consultation for adoption or amendment of specific plans, existing state law requires local governments to use the same procedures for adoption and amendment of specific plans as for general plans. Therefore the consultation and/or notice also extends to specific plans.

The County of San Diego, County of Imperial and City of San Diego have regulations pertaining to resource protection. The San Diego County Administrative Code promotes the identification, designation and preservation of buildings and structures within the unincorporated area of San Diego County. In addition, the County’s Resource Protection Ordinance (RPO) encourages avoidance of significant archaeological resources. The City of San Diego’s Historical Resource Regulations require preservation of designated historic structures and limits encroachment into significant archaeological sites. The Land Use Code of Imperial County promotes open space preservation to preserve the cultural, biological and open space areas that are rich with natural as well as cultural resources.

1.1.3.2 Cultural Context
The following discussion briefly describes current understanding of major prehistoric, ethnohistoric and historic developments in the study area.
Prehistory
The prehistory of San Diego and Imperial Counties can be summarized within three major periods of occupation: Paleoindian, Archaic and Late Prehistoric. The Paleoindian period is thought to have occurred between 10,000 B.C. (or earlier) and 8,000 B.C. in San Diego County. The Archaic period dates between approximately 8,000 B.C. and 500 A.D. The Late Prehistoric period begins in the San Diego region with the introduction of ceramics and the bow and arrow around 500 A.D. and ends with European contact in 1769. In the coastal areas, foothills and interior mountains, the Archaic period is differentiated from the earlier Paleoindian period by a shift to a more generalized economy, as indicated by the presence of grinding and seed processing technology. The local archaeological manifestations of the Archaic period are called the La Jolla and Pauma Complexes. The Pauma complex, however, may simply represent seasonal inland occupations of La Jollan groups whose primary settlements were along the coast. The settlement system during the Late Prehistoric period was characterized by small groups living in seasonal villages at springs, wells or streams. Subsistence is thought to have focused on acorns and grass seeds, with small game serving as a primary protein resource and big game as a secondary resource.

The prehistory of the Imperial County desert region was significantly influenced by the filling and drying cycles of Lake Cahuilla, a vast fresh water lake. Lake Cahuilla is thought to have undergone numerous fillings and recessions since the mid-Pleistocene. There are believed to have been three or four cycles during the Paleoindian and Archaic periods and three or four cycles during the Late Prehistoric period. The Paleoindian period is thought to have lasted somewhat longer in Imperial County, from 10,000 B.C. to 5,000 B.C., and the Late Prehistoric period to have begun somewhat earlier, around 1540 A.D. An earlier pre-projectile point culture (the Malpais pattern, prior to 10,000 B.C.) has also been suggested by some researchers. The Paleoindian period assemblage suggests a subsistence strategy focused on big game with a settlement system of relatively high residential mobility. The Archaic period is characterized by two archaeological complexes, the Pinto complex (between 5,000 and 2,000 B.C.) and the Amargosa-Gypsum complex (2,000 B.C. to 500 A.D.). During the Pinto complex, there is an apparent shift to a more generalized economy and a gradually increased emphasis on the exploitation of plant resources. The florescence of tool types for the Amargosa-Gypsum complex and the refinement of milling equipment suggest a more generalized and effective adaptation to desert conditions in the Greater Southwest. The Late Prehistoric period, the local manifestations of which are often called the Patayan pattern, is characterized by paddle and anvil pottery and the introduction of the bow and arrow. Burial practices also shifted from inhumations to cremations. A subsistence shift from hunting and gathering to floodplain horticulture took place at this same time along the Colorado River. Other culture traits generally associated with this period include increasingly elaborate kinship systems; rock art, including geoglyphs or ground figures; and expanded trading networks.

Ethnohistory
San Diego County was within the territory of the Kumeyaay people, a group of exogamous, nontotemic territorial bands with patrilineal descent. The Kumeyaay spoke a Yuman language of the Hokan linguistic stock. South of the Kumeyaay, in the vicinity of modern-day Ensenada, are the closely related Paipai. The Kumeyaay neighbors to the north are the Shoshonean-speaking Luiseño. Acorns and grass seeds were probably the primary foods. Shellfish and fish were the
primary source of protein on the coast; small game was the primary source of protein among inland groups, but deer were hunted as well. Settlements were moved seasonally to areas where wild foods were in season. For example, inland bands might move to the coast to fish and gather salt, then to desert areas in the spring to gather agave, then to higher altitude areas in the fall, to collect acorns and pine nuts. Major villages, however, probably retained some inhabitants year round.

Imperial County was within Desert Kumeyaay or Kamia territory. The territory extended from the divide north of San Felipe Creek, then south to the southern shore of the Salton Sea, and east to the Algodones Dunes area. The Desert Kumeyaay-Kamia followed a hunter-gatherer subsistence base, which included floodplain agriculture along the Colorado, New and Alamo rivers. They are closely linked linguistically and culturally with the Colorado River tribes (e.g., Quechan, Mojave, Halchidhoma). The social and economic system was based on a clan system with elaborate kinship patterns. Ethnohistoric trails linked the desert inhabitants. Several travel corridors (the Southern Emigrant Trail and the Anza Trail) have been identified from the Colorado River west across the Yuha Desert to the Pacific Coast.

**History**

Taking advantage of a navigable bay, in 1769 the first area settled by the Spanish in Alta California was San Diego. Both a mission and a military presidio were located on Presidio Hill, overlooking the San Diego River. In 1795, the Spanish began fortifying the mouth of San Diego Harbor, constructing a fortification on Ballast Point in 1795. A small community of Hispanic settlers developed in what is today known as Old Town, at the foot of Presidio Hill, starting in the 1820s. When Mexico won independence in 1821 from Spain, San Diego became essentially an open port and San Diego County was subdivided into large ranchos. The United States declared war on Mexico in 1846. The discovery of gold and the conquest of California by the United States in 1848 dramatically changed the nature of the settlement in San Diego County. During the Gold Rush, hundreds of immigrants came through San Diego on their way to the gold fields. While San Diego continued to grow, settlers began drifting into the back country in the 1850s and 1860s. Many trails and roads wind through San Diego County where supplies were transported on pack animals along the old Mexican trail that linked San Diego and Yuma. Cattle and sheep ranching was the economic base of the area. Old Highway 80 was constructed in this region between 1911 and 1918, nearly following the old Mexican Trail. Numerous communities were built along Old Highway 80, including the communities of Alpine, Buckman Sprints, Manzanita, Boulevard, and Jacumba. Camp Lockett, home of the Buffalo Soldiers, was established in Campo in 1941.

The Historic period in Imperial County begins in 1540 with the Spanish entradas of Hernando De Alarcón by sea up the Colorado River and by Melchior Díaz overland to the Yuma/Winterhaven area. In 1774, the De Anza expedition crossed what is now known as Imperial Valley, led by Padre Francisco Garcés. In 1769, Francisco Garcés and Padre Juan Díaz founded two Franciscan missions on the Colorado River at Yuma and Andrade. The Spanish then attempted to establish a land route from their Sonoran (Arizona) settlements to California. In 1774, while scouting trade routes from Tubac, Sonora (Mexico) to California, De Anza along with a native Indian guide stopped at the Yuha Well. The Yuha Well became a regular water stop along the Anza Trail. In 1781, the Quechan revolted destroying the missions. The Spanish
and later the Mexican governments were never again able to subjugate the Quechan; American forces defeated the Quechan after a prolonged struggle in 1852. The war between the United States and Mexico resulted in the permanent reestablishment of the Anza Route, as invading armies traveled to the area and opened a wagon road into California. Gold was discovered in California shortly before the Treaty of Guadalupe-Hidalgo ended the war between the United States and Mexico in 1848. During the next few years, gold rush emigrants from the United States and Mexico poured into the region by way of the old Anza Trail.

Development in the Imperial Valley was hampered by a lack of water. After some failed attempts, an irrigation system was developed. By 1905, there were 80 miles of main canals, 700 miles of distribution canals, and 80,000 acres under cultivation; some 12,000 to 14,000 people were living in the valley. A branch rail line from the Southern Pacific Railway, near present-day Niland, south to Imperial was built early in 1903 and then on to Calexico early in 1904. In 1905, floods overwhelmed the Imperial Canal headgates and quickly eroded the surrounding area so that soon the entire flow of the Colorado River passed down the canal bed through Mexicali and Imperial Valley into what became the Salton Sea. A very difficult two-year struggle ensued, spearheaded by the Southern Pacific Railway. The river was finally diverted back into its primary channel in 1907. Today, the Salton Sea is maintained at its current level by agricultural and urban runoff. Imperial County was formed in 1907 out of eastern San Diego County; it was the last county in California to be created. In 1908, the cities of Calexico, Brawley, Holtville, and El Centro were incorporated. In 1911, Imperial Valley voters approved the organization of the Imperial Irrigation District (IID). The IID soon issued financial bonds and purchased the 13 small mutual water companies in the valley, bringing the Imperial County water delivery system under a single controlling body. By 1919, El Centro and the Imperial Valley were linked to San Diego by rail. Construction of the All American Canal to replace the Imperial Canal was begun in 1934. Water was first delivered through the All American Canal in 1940, and hydroelectric plants on the All American Canal began producing power for Imperial Valley the next year. The complex system of main canals, feeder canals and drains was expanded, improved and lined with concrete over the years. Today there are some 230 miles of main canals, 1,438 miles of secondary canals and laterals, and 1,406 miles of concrete-lined or piped drains. The IID is considered to be the largest irrigation district in the United States. In 1944, the War Department acquired interest in a 1,040-acre site by transfer of public domain lands under use permit No. RE-D2886 (General) from the Department of the Interior. The acquisition was part of a 1,280-acre transfer associated with Camp Seeley Ordnance Training Center. Located about 12 miles southwest of El Centro, Camp Seeley Ordnance Desert Proving Ground was used by the Army Service Forces as desert dust proving ground. No indications or records of the War Department improvements were noted. The 1,040-acre proving grounds was declared excess and the site was retransferred to Department of the Interior by revocation of the use permit; custody was assumed by the Department of the Interior on April 18, 1946.

1.1.3.3 Existing Conditions
A general, qualitative discussion is provided regarding the potential cultural resources along the alignment alternatives.

Alignment 1A: I-8 Corridor (Miramar – Desert Site)
Alignment 1A begins at Miramar, generally follows SR-52 east to SR-125 in Santee, follows SR-125 south to La Mesa, turns east to I-8 in El Cajon, and generally follows the alignment of I-8 to the Imperial Valley airport site. The proposed Alignment 1A runs through the cities and established communities of Santee, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells. It also runs adjacent to the Viejas Indian Reservation, and crosses the La Posta Indian Reservation and Campo Indian Reservation. Known archaeological resources occur along the alignment. Prehistoric archaeological resources include habitation sites, temporary camps, rock shelters, rock art sites, lithic and ceramic scatters, bedrock milling features, ceremonial features, and isolated finds. Historic archaeological resources consist of trash scatters and dumps, foundations, stacked rock walls, machinery, dams, and segments of Old Highway 80.

The eastern portion of Alignment 1A transects the Table Mountain Area of Critical Environmental Concern (ACEC), which has archaeological resources, and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes. The BLM states that contemporary Native American values are quite high for certain features within the ACEC. The resource values of the Yuha Basin ACEC include prehistoric and historic values and wildlife habitat. The ages of the archaeological resources range from 8,000 B.C. to 500 A.D. The older Paleoindian sites are significant because of their rarity. Many of the archaeological sites are associated with activities along the relict shoreline of Lake Cahuilla, ranging from low-density ceramic scatters to large temporary camps. These sites are important to the study of how prehistoric people adapted to change. Sensitive Native American resources are often located near the former shoreline. The Yuha Basin area is also important for the presence of geoglyphs, ground figures etched into desert pavement surfaces by Native Americans. Geoglyphs are considered particularly significant because of their rarity, sensitivity and unique association to Native Americans. An area of noteworthy geoglyphs is located just west of the Imperial Valley airport site. In addition, the Yuha Basin ACEC is valued for DeAnza's expeditions to coastal California.

Alternative 1B: I-8 Corridor (Qualcomm – Desert Site)
Alignment 1B begins at Qualcomm Stadium, and generally follows the alignment of I-8 to the Imperial Valley airport site. Alignments 1A and 1B are identical east of El Cajon. As Alignment 1B follows prehistoric and historic routes, it goes through portions of numerous cities and towns, as well as historic settlements and areas occupied by Native Americans. Alignment 1B runs through the cities and established communities of San Diego, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells. It also runs adjacent to the Viejas Indian Reservation, and crosses the La Posta Indian Reservation and Campo Indian Reservation. Known archaeological resources occur along the alignment. Prehistoric archaeological resources include habitation sites, temporary camps, rock shelters, rock art sites, lithic and ceramic scatters, bedrock milling features, ceremonial features, and isolated finds. Historic archaeological resources consist of trash scatters and dumps, foundations, stacked rock walls, machinery, dams, and segments of Old Highway 80. The eastern portion of the alignment crosses the Table Mountain ACEC, which has archaeological resources, and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.
Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)
Alignment 2 begins at the Santa Fe Depot in downtown San Diego, extends east along Broadway to SR-94, and continues east generally following the alignment of SR-94 to I-8 in the vicinity of Boulevard. Alignments 1 and 2 are identical east of Boulevard. As Alignment 2 also follows prehistoric and historic routes, it goes through portions of numerous cities and towns, as well as historic settlements and areas occupied by Native Americans. The alignment runs through the cities and established communities of San Diego, Golden Hill, Lemon Grove, La Mesa, Spring Valley, Rancho San Diego, Jamul, Dulzura, Potrero, Campo, Cameron Corners, Manzanita, Boulevard, Ocotillo, Coyote Wells. The alignment crosses the Campo Indian Reservation and runs adjacent to the Jamul Indian Reservation. In addition, it passes near Tecate Peak, a sacred mountain, and another site sacred to the Ewiaapaayp. Known archaeological resources occur along the alignment. Prehistoric archaeological resources include habitation sites, temporary camps, rock shelters, rock art sites, lithic and ceramic scatters, bedrock milling features, ceremonial features, and isolated finds. Historic archaeological resources consist of trash scatters and dumps, foundations, stacked rock walls, machinery, dams, segments of Old Highway 80, and segments of the SD&AE Railway. The eastern portion of the alignment crosses the Table Mountain ACEC, which has archaeological resources, and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

Alternative 3: Tunnel Alignment (Santa Fe Depot – Qualcomm – Desert Site)
As the train would be located in a tunnel for entire length through the urban and mountain portions of the route, no discussion is necessary.

Alternative 4: SD&AE Corridor (Santa Fe Depot – Desert Site)
The SD&AE Alignment begins at the Santa Fe Depot in downtown San Diego and extends south along I-5 to Tijuana, then generally follows the SD&AE alignment east to Tecate, Jacumba and Ocotillo. Alignments 1, 2 and 4 are identical east of Ocotillo. Alignment 4 goes through portions of numerous cities and towns, as well as historic settlements and areas occupied by Native Americans. The alignment runs through the cities and established communities of San Diego, National City, Chula Vista, San Ysidro, Tijuana, Tecate, Jacumba, Ocotillo, Coyote Wells. It also crosses the southern portion of the Campo Indian Reservation. In addition, it passes near Tecate Peak, a sacred mountain. Significant archaeological resources are known within the alignment. Prehistoric archaeological resources include habitation sites, temporary camps, rock shelters, rock art sites, lithic and ceramic scatters, bedrock milling features, ceremonial features, and isolated finds. Historic archaeological resources consist of trash scatters and dumps, foundations, stacked rock walls, machinery, dams, segments of Old Highway 80, and segments of the SD&AE Railway. The eastern portion of the alignment crosses the In-Ko-Pah Gorge ACEC, which has archaeological resources, and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

It is recommended that record searches be conducted at the SCIC, San Diego Museum of Man and SIC to identify cultural resource investigations and previously recorded architectural and archaeological located within one mile of individual alignment alternatives. In addition, a Sacred Lands Search needs to be requested from the NAHC for a one-mile radius of each alignment alternative. Based on this information, architectural surveys, archaeological surveys and a Native American contact program can be undertaken for the alignment alternatives.
1.1.4 Visual Resources

The visual resources of southern California enhance its environmental value. Visual resources are the composite of features that create the visual environment, which includes the basic terrain, geologic features, hydrologic features, vegetative patterns, and land use effects that typify the area being analyzed and influence the visual appeal that the area may have for visitors, as well as scenic vistas and scenic resources. Two categories of viewsheds are identified, short-range views and long-range or panoramic views. This section describes the visual quality and aesthetic resources associated with the study area.

The potential for impacts to visual resources will vary for individual alignment alternatives. This section describes the regulatory setting and discusses the characteristics of the study area relative to visual resources and the potential for impacts. The section is based on the assessment of visual resources conducted by the San Diego County Regional Airport Authority (Ricondo & Associates Team 2005). This review was supplemented with new research and analysis, where such information was available. No site visits were conducted. No information was available on the Mexico portion of the SD&AE Alignment.

1.1.4.1 Regulatory Setting

California’s Scenic Highway Program

California's Scenic Highway Program was created by the Legislature in 1963 to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. The state laws governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been so designated. These highways are identified in Section 263 of the Streets and Highways Code. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The status of a state scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway.

A scenic corridor is the land generally adjacent to and visible from the highway and is identified using a motorist's line of vision. A reasonable boundary is selected when the view extends to the distant horizon. Jurisdictional boundaries of the applicants are also considered. When a city or county nominates an eligible scenic highway for official designation, it must identify and define the scenic corridor of the highway. The agency must also adopt ordinances to preserve the scenic quality of the corridor or document such regulations that may already exist in various portions of local codes. These ordinances make up the scenic corridor protection program. There are minimum requirements for scenic corridor protection:

- Regulation of land use and density of development;
- Detailed land and site planning;
- Control of outdoor advertising (including a ban on billboards);
- Careful attention to and control of earth moving and landscaping; and
• Careful attention to design and appearance of structures and equipment.

Citizen participation in developing these requirements is very important if the program is to have popular support.

**County of San Diego – Resource Protection Ordinance**

The County’s RPO is designed to protect sensitive lands and prevent their degradation and loss by requiring a Resource Protection Study for certain discretionary projects. The RPO would increase the preservation and protection of the County’s unique topography, natural beauty, diversity, and natural resources, and maintain a high quality of life for current and future County residents. The intent of the RPO is not to prohibit all development on steep slopes, but only to limit the amount of disturbance consistent with the encroachment allowances as provided in the RPO.

**County of San Diego General Plan – Scenic Highway Program**

The Scenic Highway Element establishes a Scenic Highway Program to protect and enhance the County’s scenic, historic, and recreational resources within a network of scenic highway corridors.

**County of San Diego General Plan – Transportation Element**

The Transportation Element provides a framework for developing a comprehensive and coordinated transportation system to meet the varied needs of San Diego’ residents, visitors and businesses. Since 1964, the City has maintained a 52-mile Scenic Route traversing many scenic areas of San Diego. This route was designated to afford scenic views of the community, as well as to link points of visitor interest. However, no special regulatory provisions are presently in force to protect the scenic values of the route.

**Imperial County General Plan – Circulation and Scenic Highways Element**

The Circulation and Scenic Highways Element identifies the location and extent of transportation routes and facilities. It is intended to meet the transportation needs of local residents and businesses, as well as provide a source for regional coordination. The purpose of this element is to provide a comprehensive document that contains the latest knowledge about the transportation needs of the County and the various modes available to meet these needs. This element also provides a mean for protecting and enhancing scenic resources within both rural and urban scenic highway corridors in Imperial County.

### 1.1.4.2 Existing Conditions

A general, qualitative discussion is provided regarding the potential visual resources along the alignment alternatives. Overall, the existing visual setting is similar for all of the alignment alternatives. The western portions of the alignments occur within urbanized portions of San Diego County, where the visual setting is largely dominated by the density of buildings, structures, roadways, and ornamental landscaping, and have relatively limited uninterrupted/unobstructed viewsheds from motorists, patrons, and residents. As the various alignments extend east, the visual setting takes on more of a suburban and rural nature, with views characterized primarily by undeveloped natural varying topography with structures that are primarily private residential homes and a few business/retail centers. This viewshed is observed
from motorists, patrons, and residents. In the eastern portions of the alignments, the visual setting is dominated by undeveloped, natural lands, and the viewshed is observed primarily by motorists.

**Alternative 1A: I-8 Corridor (Miramar – Desert Site)**
Alternative 1A begins at Miramar to SR-52, generally follows SR-52 east to SR-125 in Santee, follows SR-125 south to La Mesa, turns east to I-8 in El Cajon, and generally follows the alignment of I-8 to the Imperial Valley airport site. I-8 from SR-67 in El Cajon to SR-98 near Ocotillo is also eligible for designation as a State Scenic Highway. Alignment 1A passes through numerous cities and established communities, including San Diego, Santee, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells.

**Alternative 1B: I-8 Corridor (Qualcomm – Desert Site)**
Alternative 1B begins at Qualcomm Stadium, generally following the alignment of I-8 to the Imperial Valley airport site. Alignments 1A and 1B are identical east of El Cajon. The western portion of the alignment occurs largely within an urbanized area, whereas the eastern portion of the alignment is within more of a rural and undeveloped setting. I-8 from I-5 to SR125 in La Mesa and from SR-67 in El Cajon to SR-98 near Ocotillo is also eligible for designation as a State Scenic Highway. Alignment 1B passes through numerous cities and established communities, including San Diego, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells.

**Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)**
Alternative 2 begins at the Santa Fe Depot in downtown San Diego, extends east along Broadway to SR-94, and then continues east generally following the alignment of SR-94 to I-8 in the vicinity of Boulevard. Alignments 1 and 2 are identical east of Boulevard. The western portion of this alignment extends through a largely urbanized area, but reaches rural and undeveloped areas sooner than with Alignment 1B. SR-94 from SR-125 in La Mesa to I-8 near Boulevard is eligible for designation as a State Scenic Highway. I-8 from Boulevard to SR-98 near Ocotillo is also eligible for designation as a State Scenic Highway. The SR-94 Alignment extends through several cities and established communities, including San Diego, Lemon Grove, La Mesa, Spring Valley, Rancho San Diego, Jamul, Dulzura, Potrero, Campo, Cameron Corners, Manzanita, Boulevard, Ocotillo, and Coyote Wells.

**Alternative 3: Tunnel Alignment (Santa Fe Depot – Qualcomm - Desert Site)**
As the train would be located in a tunnel for entire length through the urban and mountain portions of the route, no discussion is necessary.

**Alternative 4: SD&AE (Santa Fe Depot - Desert Site)**
Alternative 4 begins at the Santa Fe Depot in downtown San Diego, extends south along I-5 to Tijuana, then generally follows the SD&AE alignment east to Tecate, Jacumba and Ocotillo. Alignments 1, 2 and 4 are identical east of Ocotillo. The westernmost portion of this alignment extends through a largely urbanized area, but also reaches rural and undeveloped areas sooner than with Alignment 1B. I-5 from SR-75 to the U.S.-Mexico Border is eligible for designation.
as a State Scenic Highway. I-8 from Jacumba to SR-98 near Ocotillo is also eligible for designation as a State Scenic Highway. Alignment 4 extends through the fewest cities and established communities, including San Diego, National City, Chula Vista, San Ysidro, Tijuana, Tecate, Jacumba, Ocotillo, and Coyote Wells.

1.1.5 Section 4(f) Resources

This section addresses the potential for construction and operation of the alignment alternatives to result in a "use" of public parks and recreation lands, wildlife and waterfowl refuges, and any historic sites, as defined by Section 4(f) of the Department of Transportation Act of 1966 (recodified as amended at 49 USC Section 303). The section also assesses whether the proposed alignment alternatives would result in the conversion of public park and recreation lands funded through the U.S. Department of the Interior Land and Water Conservation Fund Act (LWCF Act) of 1965.

The potential for impacts to Section 4(f) resources will vary for individual alignment alternatives. This section describes the regulatory setting and discusses the potential Section 4(f) resources including public parks, recreation lands, wildlife and waterfowl refuges, and historic sites located within the study area for each alignment alternative. This section also provides an assessment of potential impacts to public park and recreation lands funded through LWCF Act funds. The section is based on the findings of the Section 4(f) assessment conducted by the San Diego County Regional Airport Authority (Ricondo & Associates Team 2005). An inventory of parks and recreational uses was conducted through a review of existing U.S.G.S. maps to confirm the presence of parks, recreation lands and wildlife refuges within each alignment study area. Publicly owned properties were researched via the County of San Diego Recorders office. No information was available for the Mexico portion of the SD&AE alignment.

1.1.5.1 Regulatory Setting

Section 4(f) of the U.S. Department of Transportation Act of 1966 (recodified as amended at 49 USC Section 303), declares that "[i]t 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 lands, 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:

- There is no prudent and feasible alternative to using that land; and
- The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

Section 4(f) further requires consultation with the Department of the Interior and, as appropriate, the involved offices of the Departments of Agriculture and Housing and Urban Development in developing transportation projects and programs that use lands protected by Section 4(f). If
historic sites and archaeological resources are involved, then coordination with the State Historic Preservation Officer is also required.

In general, a Section 4(f) "use" occurs with a U.S. Department of Transportation-approved project or program 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 (23 CFR §771.135[p][7]); or (3) 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 (i.e., defined as "constructive use") (23 CFR §§771.135(p)(1) and (2)).

The LWCF Act of 1965, as amended, and codified at 16 U.S. Code, Section 4601-8(f)(3), requires that all properties receiving LWCF assistance for planning, acquisition or development be permanently maintained for public outdoor recreation use. The Act requires, in part, that "No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of the Interior), be converted to other than public outdoor recreation uses."

1.1.5.2 Existing Conditions
A general, qualitative discussion is provided regarding the potential 4(f) resources along the five alignment alternatives (see Figure 5-2 on the following page).

Alternative 1A: I-8 Corridor (Miramar – Desert Site)
Alternative 1A begins at Miramar, generally follows SR-52 east to SR-125 in Santee, follows SR-125 south to La Mesa, turns east to I-8 in El Cajon, and generally follows the alignment of I-8 to the Imperial Valley airport site. Alignment 1A extends through numerous cities and communities that include the presence of 4(f) resources such as the City of San Diego Urban Area and Eastern Area Multi-Habitat Planning Areas (MHPAs), Mission Trails Regional Park, East County Multiple Species Conservation Program (MSCP) Subarea Plan, Cleveland National Forest, Carrizo Gorge Wilderness Area, Anza Borrego Desert State Park, and BLM public lands, including the Jacumba National Cooperative Land and Wildlife Management Area, and Table Mountain ACEC; as well as architectural, archaeological and Native American resources such as the Viejas Indian Reservation, La Posta Indian Reservation and Campo Indian Reservation. In Imperial County, Alignment 1A is located within the BLM’s Yuha Basin ACEC, which was designated to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. The Yuha Basin ACEC is open for public use and is largely used for off-road recreational activities within approved routes of travel. In addition, the Yuha Basin ACEC includes the flat-tailed horned lizard management area. Further research and analysis will be needed to determine if there are any historic sites of significance based on a comprehensive pedestrian survey of the entire alignment.

Alternative 1B: I-8 Corridor (Qualcomm – Desert Site)
Alternative 1B begins at Qualcomm Stadium, generally following the alignment of I-8 to the Imperial Valley airport site. Alignments 1A and 1B are identical east of El Cajon. Alignment
1B extends through numerous cities and communities that include the presence of 4(f) resources such as Presidio Park in the City of San Diego, the City of San Diego Urban Area MHPA, East County MSCP Subarea Plan, Cleveland National Forest, Carrizo Gorge Wilderness Area, Anza Borrego Desert State Park, and BLM public lands, including the Jacumba National Cooperative Land and Wildlife Management Area, Table Mountain ACEC and Yuha Basin ACEC; as well as architectural, archaeological and Native American resources such as the Viejas Indian Reservation, La Posta Indian Reservation and Campo Indian Reservation. Further research and analysis will be needed to determine if there are any historic sites of significance based on a comprehensive pedestrian survey of the entire alignment.
Figure 0-2: 4(f) Ownership

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See figure on next page.
Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)
Alternative 2 begins at the Santa Fe Depot in downtown San Diego, extends east along Broadway to SR-94, and then continues east generally following the alignment of SR-94 to I-8 in the vicinity of Boulevard. Alignments 1 and 2 are identical east of Boulevard. Alignment 2 extends through numerous cities and communities that include the presence of 4(f) resources such as Balboa Park in the City of San Diego, the South County and East County Multiple MSCP Subarea Plans, Carrizo Gorge Wilderness Area, Anza Borrego Desert State Park, and BLM public lands, including the Jacumba National Cooperative Land and Wildlife Management Area, Table Mountain ACEC and Yuha Basin ACEC; as well as architectural, archaeological and Native American resources such as the Jamul Indian Reservation and Campo Indian Reservation. Further research and analysis will be needed to determine if there are any historic sites of significance based on a comprehensive pedestrian survey of the entire alignment.

Alternative 3: Tunnel Alignment (Santa Fe Depot – Qualcomm - Desert Site)
As the train would be located in a tunnel for entire length through the urban and mountain portions of the route, no discussion is necessary.

Alternative 4: SD&AE (Santa Fe Depot - Desert Site)
Alternative 4 begins at the Santa Fe Depot in downtown San Diego, extends south along I-5 to Tijuana, then generally follows the SD&AE alignment east to Tecate, Jacumba and Ocotillo. Alignments 1, 2 and 4 are identical east of Ocotillo. Alignment 4 extends through numerous cities and communities that include the presence of 4(f) resources such as the East County Multiple MSCP Subarea Plan and BLM public lands, including the In-Ko-Pah Gorge ACEC and Yuha Basin ACEC; as well as architectural, archaeological and Native American resources such as the Campo Indian Reservation. Further research and analysis will be needed to determine if there are any historic sites of significance based on a comprehensive pedestrian survey of the entire alignment.

1.1.6 Environmental Justice
This section presents relevant data regarding environmental justice. The analysis of environmental justice considers disproportionate impacts of an action upon low-income and minority populations. Two areas must be defined to facilitate comparison between the area actually affected and the larger regional area that serves as the basis for comparison and includes the area actually affected. The larger regional area is called the community of comparison and is defined as the smallest political unit that includes the affected area. For purposes of this analysis, the community of comparison is San Diego County and Imperial County.

1.1.6.1 Regulatory Setting
Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, encourages federal agencies to achieve environmental justice by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations. Minorities are considered people that are Black, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. Accompanying E.O. 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with E.O. 1289. One of the items in this memorandum was the use of
the policies and procedures of NEPA, specifically that “Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, when such analysis is required by the NEPA 42 USC Section 4321, et seq.”

1.1.6.2 Existing Conditions

A general, qualitative discussion is provided regarding the potential for disproportionate impacts low-income and minority populations along the five alignment alternatives.

Alternative 1A: I-8 Corridor (Miramar – Desert Site)
Alignment 1A begins at Miramar, generally follows SR-52 east to SR-125 in Santee, follows SR-125 south to La Mesa, turns east to I-8 in El Cajon, and generally follows the alignment of I-8 to the Imperial Valley desert site. The proposed Alignment 1A runs through several cities and communities including, but not limited to, San Diego, Santee, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells. It also runs adjacent to the Viejas Indian Reservation, and crosses the La Posta Indian Reservation and Campo Indian Reservation. Further research and analysis will be needed to determine if there are any low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

Alternative 1B: I-8 Corridor (Qualcomm – Desert Site)
Alignment 1B begins at Qualcomm Stadium, and generally follows the alignment of I-8 to the Imperial Valley desert site. Alignments 1A and 1B are identical east of El Cajon. The proposed Alignment 1B runs through several cities and communities including, but not limited to, San Diego, Santee, La Mesa, El Cajon, Glenview, Johnstown, Flinn Springs, Alpine, The Willows, Pine Valley, Boulder Oaks, Buckman Springs, Live Oak Springs, Manzanita, Boulevard, Ocotillo, and Coyote Wells. It also runs adjacent to the Viejas Indian Reservation, and crosses the La Posta Indian Reservation and Campo Indian Reservation. Further research and analysis will be needed to determine if there are any low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)
Alignment 2 begins at the Santa Fe Depot in downtown San Diego, extends east along Broadway to SR-94, and continues east generally following the alignment of SR-94 to I-8 in the vicinity of Boulevard. Alignments 1 and 2 are identical east of Boulevard. Alignment 2 runs through several cities and communities including, but not limited to, San Diego, Lemon Grove, La Mesa, Spring Valley, Rancho San Diego, Jamul, Dulzura, Potrero, Campo, Cameron Corners, Manzanita, Boulevard, Ocotillo, and Coyote Wells. The alignment also runs adjacent to the Jamul Indian Reservation and crosses the Campo Indian Reservation. Further research and analysis will be needed to determine if there are any low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

Alternative 3: Tunnel Alignment (Santa Fe Depot – Qualcomm - Desert Site)
Alignment 3 is a tunnel that begins at Qualcomm Stadium in Mission Valley, and extends east to the Imperial Valley desert site. Alignment 3 extends under the cities of San Diego, La Mesa and
El Cajon, as well as the La Posta Indian Reservation, Manzanita Indian Reservation and Campo Indian Reservation.

Alternative 4: SD&AE (Santa Fe Depot - Desert Site)
Alignment 4 begins at the Santa Fe Depot in downtown San Diego and extends south along I-5 to Tijuana, then generally follows the SD&AE alignment east to Tecate, Jacumba and Ocotillo. Alignments 1, 2 and 4 are identical east of Ocotillo. Alignment 4 goes through several cities and towns including, but not limited to, San Diego, National City, Chula Vista, San Ysidro, Tijuana, Tecate, Jacumba, Ocotillo, Coyote Wells. It also crosses the southernmost portion of the Campo Indian Reservation. Further research and analysis will be needed to determine if there are any low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

1.2 Potential Environmental Constraints
The primary focus of the Phase I Maglev Study is to determine the feasibility of constructing and maintaining a Maglev transportation system between San Diego and the Imperial Valley airport site. At this preliminary level of analysis, the alignment alternatives are anticipated to have similar impacts. In the highly urbanized western portion of the study area, impacts to architectural resources, visual resources, Section 4(f) resources, and Environmental Justice will dominate. In the mountains of the Peninsular Range, impacts to biological resources, archaeological and Native American resources, visual resources, Section 4(f) resources, and Environmental Justice will all be important. Finally, in the desert region of Imperial Valley, impacts to biological resources, archaeological and Native American resources, and Section 4(f) resources will dominate. It is expected that most, if not all, environmental impacts can be mitigated.

1.2.1 Biology
1.2.1.1 Biological Constraints
For the purposes of this document, all vegetation communities and plant and animal species within the 100-foot right of way of the Maglev, except tunneled areas, are assumed to be impacted by construction. In addition, areas outside of the right of way are anticipated to be impacted by disposal of material excavated from tunnels. However, as no locations for the disposal of this excavated material is known at this time, no predictions are possible relative to the biological impacts of offsite disposal.

Direct Impacts
Direct impacts would occur during construction when individual plants or animals may be destroyed. While some of the disrupted habitat upon which listed species depend would be restored after construction. Residual loss of habitat would continue from habitat displacement by support columns and/or service roads. Table 5-2 on the following page illustrates the overall impacts of each of the alignments on the different vegetation types. Table 5-3 on the page after Table 5-2 illustrates the impact by sensitivity rating. Following Table 5-3, Table 5-4 identifies the rare and endangered species which are known to exist in the vicinity of the various alignments.
**Indirect Impacts**

Indirect impacts would occur during construction as well as subsequent train operations. Indirect impacts would be associated with animals. Elevated noise levels as well as lighting could also disrupt listed species. For example, construction and operation noise during the breeding season of songbirds could adversely affect breeding success by interfering with communications. The startle factor associated with noise generated by construction or passing trains could also discourage wildlife activities near the train corridor. Construction lighting could adversely impact listed animals by exposing them to night-time predation.
### Table 0-2: Vegetation Impacts

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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Coastal Salt Marsh</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Southern Cottonwood-willow Riparian Forest</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Riparian Forest</td>
<td>Tier I</td>
<td>High</td>
<td>5</td>
<td>6</td>
<td>2</td>
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</tr>
<tr>
<td>Southern Riparian Scrub</td>
<td>Tier I</td>
<td>High</td>
<td>4</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>Southern Sycamore-alder Riparian Woodland</td>
<td>Tier I</td>
<td>High</td>
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<tr>
<td>Southern Willow Scrub</td>
<td>Tier I</td>
<td>High</td>
<td>&lt;1</td>
<td></td>
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</tr>
<tr>
<td>Wet Montane Meadow</td>
<td>Tier I</td>
<td>High</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td></td>
<td></td>
<td>&lt;1</td>
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<tr>
<td>Non- Vegetated Channel, Floodway, Lakeshore Fringe</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep Bay</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Woodland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Oak/Coniferous/Bigcone/Coulter</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Peninsular Pinon and Juniper Woodlands</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
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<td></td>
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<td>Dense Coast Live Oak Woodland</td>
<td>Tier I</td>
<td>High</td>
<td>13</td>
<td>13</td>
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<tr>
<td>Dense Engelmann Oak Woodland</td>
<td>Tier I</td>
<td>High</td>
<td>4</td>
<td>4</td>
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<td>Open Coat Live Oak Woodland</td>
<td>Tier I</td>
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<td>6</td>
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<tr>
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<td>Tier I</td>
<td>High</td>
<td>&lt;1</td>
<td>1</td>
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<td>Southern Coast Live Oak Riparian Forest</td>
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<td>5</td>
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<tr>
<td>Jeffery Pine Woodland</td>
<td>Tier I</td>
<td>High</td>
<td></td>
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<tr>
<td>Mountain Alder Woodland</td>
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<td>High</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Desert Dry Wash Woodland</td>
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<td>High</td>
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</tr>
<tr>
<td><strong>Sage Scrub</strong></td>
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<td>Desert Saltbush Scrub</td>
<td>Tier II</td>
<td>High</td>
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<tr>
<td>Diegan Coastal Sage Scrub</td>
<td>Tier II</td>
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<td>24</td>
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<td>Sonoran Mixed Woody and Succulent Scrub</td>
<td>Tier II</td>
<td>High</td>
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<tr>
<td>Sonoran Mixed Woody Scrub</td>
<td>Tier II</td>
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<td>Acacia Scrub</td>
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<td>Colorado Desert Wash Scrub</td>
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<td>Creosote</td>
<td>Tier II</td>
<td>High</td>
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<td>Cholla-Prickly Pear</td>
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<tr>
<td>Big Sagebrush Scrub</td>
<td>Tier III</td>
<td>Moderate</td>
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<tr>
<td>Sagebrush Scrub</td>
<td>Tier III</td>
<td>Moderate</td>
<td>9</td>
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<tr>
<td><strong>Chaparral</strong></td>
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<tr>
<td>Mafic Chamise Chaparral</td>
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<td>High</td>
<td>&lt;1</td>
<td>&lt;1</td>
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<tr>
<td>Mafic Southern Mixed Chaparral</td>
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<td>&lt;1</td>
<td>&lt;1</td>
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<td>Scrub Oak Chaparral</td>
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<td>Scrub Oak Chaparral-MISC</td>
<td>Tier I</td>
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<td>Chaparral</td>
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<td>High</td>
<td>34</td>
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<td>Granitic Northern Mixed Chaparral</td>
<td>Tier II</td>
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<td>Chamise Chaparral</td>
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<td>23</td>
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<td>Granitic Chamise Chaparral</td>
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<td>Moderate</td>
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<td>Northern Mixed Chaparral</td>
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<td>Moderate</td>
<td>4</td>
<td>4</td>
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<td>Red Shank Chaparral</td>
<td>Tier III</td>
<td>Moderate</td>
<td></td>
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<tr>
<td>Semi-Desert Chaparral (same as Desert Transition Chaparral)</td>
<td>Tier III</td>
<td>Moderate</td>
<td>24</td>
<td>27</td>
<td>10</td>
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<tr>
<td>Southern Mixed Chaparral</td>
<td>Tier III</td>
<td>Moderate</td>
<td>39</td>
<td>65</td>
<td>964</td>
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<tr>
<td>Grassland</td>
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</tr>
<tr>
<td>Foothill/Mountain Perennial Grassland</td>
<td>Tier I</td>
<td>High</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Valley and Foothill Grassland</td>
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<td>High</td>
<td>20</td>
<td>1</td>
<td>15</td>
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<tr>
<td>Valley Needlegrass Grassland</td>
<td>Tier I</td>
<td>High</td>
<td></td>
<td></td>
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<tr>
<td>Valley Sacaton Grassland</td>
<td>Tier I</td>
<td>High</td>
<td>4</td>
<td>4</td>
<td></td>
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<td></td>
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<tr>
<td>Non-Native Grassland</td>
<td>Tier III</td>
<td>Moderate</td>
<td>1</td>
<td>1</td>
<td>7</td>
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<td></td>
</tr>
<tr>
<td>Other</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disturbed Habitat</td>
<td>Tier IV</td>
<td>Low</td>
<td>10</td>
<td>6</td>
<td>25</td>
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<td></td>
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<tr>
<td>Eucalyptus Woodland</td>
<td>Tier IV</td>
<td>Low</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td></td>
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</tr>
<tr>
<td>Extensive Agriculture - Field/Pasture, Row Crops</td>
<td>Tier IV</td>
<td>Low</td>
<td>1</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field/Pasture</td>
<td>Tier IV</td>
<td>Low</td>
<td></td>
<td></td>
<td>14</td>
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<tr>
<td>Intensive Agriculture - Dairies, Nurseries, Chicken Ranches</td>
<td>Tier IV</td>
<td>Low</td>
<td>1</td>
<td>2</td>
<td>&lt;1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orchards and Vineyards</td>
<td>Tier IV</td>
<td>Low</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban/Developed</td>
<td>Tier IV</td>
<td>Low</td>
<td>260</td>
<td>1,258</td>
<td>283</td>
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</table>
### Table 0-3: Comparison of Alignment Impacts by Vegetation Sensitivity

<table>
<thead>
<tr>
<th>Vegetation Sensitivity</th>
<th>Alignment (Impacts in acres)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1A</td>
</tr>
<tr>
<td>Wetland</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>14</td>
</tr>
<tr>
<td>Upland</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>637</td>
</tr>
<tr>
<td>Moderate</td>
<td>105</td>
</tr>
<tr>
<td>Low</td>
<td>272</td>
</tr>
<tr>
<td>Total</td>
<td>1,028</td>
</tr>
</tbody>
</table>

### Table 0-4: Listed Species with Alignments

<table>
<thead>
<tr>
<th>Species</th>
<th>Listing Status</th>
<th>Sensitivity</th>
<th>Alignment (Present?)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1A</td>
<td>1B</td>
</tr>
<tr>
<td><strong>Animals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Big Horn Sheep</td>
<td></td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego thorn mint (Acanthomintha ilicifolia)</td>
<td>SE</td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td>Pierson’s milk-vetch (Astragalus magdalenae var. peirsonii)</td>
<td>SR</td>
<td>High</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Alignment 1A: I-8 Corridor (Miramar – Desert Site)

**Urban:** From the Miramar Station, the train would remain in a tunnel until the City of El Cajon which would avoid impacts to the open space areas comprising MCAS Miramar as well as the former Camp Elliott, west of Santee. The tracks would be elevated above the second crossing of the San Diego River, west of Santee, where it would return to a tunnel to avoid wetland vegetation in the Sycamore Canyon area.

**Mountain:** Upon leaving the urban areas, the alignment would generally follow I-8 and would potentially impact coastal sage scrub, chaparral and grasslands as it approaches the community of Alpine. At Alpine, the tracks would run through a tunnel that would extend most of the way between Alpine and Boulder Oaks where the freeway changes from north/south to east/west again. From this point to Live Oak Springs, the tracks would be elevated and travel through coastal sage scrub and chaparral. At Live Oak Springs, the train would again be located...
primarily in a tunnel to just east of Bankhead Springs where it would be mostly elevated as it approaches the county boundary where it would again be in and out of tunnels until just west Ocotillo. Impacted vegetation along this section of the route would include: sage scrub, chaparral, grasslands and some areas of oak, Jeffery pine, and mountain alder woodlands.

Desert: Construction of the maglev through the desert portion of the alignment would impact the following vegetation types: creosote, saltbrush, and cholla-prickly pear.

Alternative 1B: I-8 Corridor (Qualcomm – Desert Site)
Urban: Minimal impacts to coastal sage scrub and grasslands would occur within the urban portion of Alignment 1B.

Mountain: Upon leaving the urban areas, the Alignment 1B would follow the same path as Alignment 1A through the mountains and result in comparable impacts.

Desert: Alignment 1B would follow the same path as Alignment 1A through the desert and result in comparable impacts.

Alternative 2: SR-94 Corridor (Santa Fe Depot – Desert Site)
Urban: Alignment 2 from the Santa Fe Depot through the urban area, the tracks would be elevated and pass through areas which are urbanized. The primary resources affected within the urban portion of Alignment 2 would consist of coastal sage scrub and non-native grassland.

Mountain: As it leaves the urban area, Alignment 2 would be placed in a tunnel that would cross under the Sweetwater River and surfaces again west of Jamul. The tracks would be primarily elevated between Jamul and the point where in converges with Alignments 1A/1B. The primary vegetation communities affected along this portion of Alignment 2 would include sage scrub, chaparral, grasslands and some areas of oak woodland.

Desert: Alignment 2 would follow the same path as Alignment 1A/1B through the desert and result in comparable impacts.

Alternative 3: Tunnel Alignment (Qualcomm – Desert Site)
As the train would be located in a tunnel for entire length through the urban and mountain portions of the route, no biological resources would be directly impacted. Although vegetation would be expected to be affected by areas used to dispose of the material excavated from the tunnels, no specific disposal areas have been identified.

Alternative 4: SD&AE Corridor (Santa Fe Depot – Desert Site)
Urban: This route would cross three major drainages: Sweetwater River, Otay River and Tijuana River as it travels south to the Mexican border. As the crossings would be elevated, impacts would be limited to footings and shading. Once across the border, the alignment would traverse the urbanized area of Tijuana. Although urbanized, a substantial amount of coastal sage scrub and natural drainage courses are expected to remain within this portion of the alignment.
Mountain: As it approaches Rodriguez Reservoir, the alignment would head north back toward the border passing potentially impacting coastal sage scrub and chaparral. The alignment would cross the border back into the U.S. just southwest of Jacumba where it would converge with Alignment 2, east of Ocatillo. This segment would impact sage scrub, chaparral, grasslands and some areas of oak woodland.

Desert: Alignment 4 would follow the same path as the other three alignments through the desert and result in comparable impacts.

1.2.2 Architectural, Archeological and Native American Resources
Since complete resource inventories are not available, the current assessment relies on non-equivalent data for the characterization of impacts at the different sites. In an effort to provide a more standardized basis for the impacts assessment, the potential for significant architectural, archaeological and Native American resources for the alignment alternatives has been rated high, medium or low (Table 5-5). The analysis is a generalized discussion of potential impacts. Neither a records search nor pedestrian surveys were conducted. A brief literature review provided some resource-specific information.

Table 5-5: Summary Cultural Sensitivity

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Architectural Resources</th>
<th>Potential</th>
<th>Resources Prehistoric</th>
<th>Archaeological Historic</th>
<th>Potential Prehistoric</th>
<th>Historic</th>
<th>Native American Sacred Lands</th>
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<tbody>
<tr>
<td>1A Coastal Mountains Desert</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>Low-Medium</td>
<td>Medium-High</td>
<td>High</td>
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<tr>
<td>1B Coastal Mountains Desert</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>Low-Medium</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>2 Coastal Mountains Desert</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>Low-Medium</td>
<td>Medium-High</td>
<td>High</td>
</tr>
<tr>
<td>3 Coastal Mountains Desert</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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<tr>
<td>4 Coastal Mountains Desert</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Low-Medium</td>
<td>Low-Medium</td>
<td>Medium-High</td>
<td>High</td>
</tr>
</tbody>
</table>

1.2.2.1 Alternative 1A
Construction impacts could affect potentially significant architectural, archaeological and Native American resources. It is unknown if any human remains would be affected, but ground-disturbing activities in prehistoric archaeological sites do have the potential to disturb human remains, if they are present. Construction impacts would result from:

- Demolition of significant architectural resources;
- Ground-disturbing activities; or
- Temporary alterations to the setting or other qualities that make a resource significant.
The fact that Alternative Alternative 1A traverses portions of numerous cities and towns, and passes through historic settlements and areas occupied by Native Americans, strongly suggests that adverse impacts to architectural, archaeological and Native American resources would likely occur. The eastern portion of the alignment transects the Table Mountain ACEC, which has archaeological resources and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

Operations impacts would include disturbance of resources that are located in proximity to ongoing maintenance and other operations activities. In addition, increased noise and visual intrusion could also adversely impact the setting of architectural, archaeological, and Native American resources. These impacts would be significant.

1.2.2.2 Alternative 1B

Construction impacts could affect potentially significant architectural, archaeological and Native American resources. It is unknown if any human remains would be affected, but ground-disturbing activities in prehistoric archaeological sites do have the potential to disturb human remains, if they are present. Construction impacts would result from:

- Demolition of significant architectural resources;
- Ground-disturbing activities; or
- Temporary alterations to the setting or other qualities that make a resource significant.

The fact that Alternative 1B traverses portions of numerous cities and towns, and passes through historic settlements and areas occupied by Native Americans, strongly suggests that adverse impacts to architectural, archaeological and Native American resources would likely occur. The eastern portion of the alignment transects the Table Mountain ACEC, which has archaeological resources and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

Operations impacts would include disturbance of resources that are located in proximity to ongoing maintenance and other operations activities. In addition, increased noise and visual intrusion could also adversely impact the setting of architectural, archaeological, and Native American resources. These impacts would be significant.

1.2.2.3 Alternative 2

Within the construction area, impacts could affect architectural, archaeological and Native American resources that are potentially significant. It is not known if any human remains would be affected, but ground-disturbing activities in prehistoric archaeological sites do have the potential to disturb human remains if they are present. Construction impacts would result from:

- Demolition of significant architectural resources;
- Ground-disturbing activities; or
- Temporary alterations to the setting or other qualities that make a resource significant.

Given that the Alternative 2 follows prehistoric and historic routes, it traverses portions of numerous cities and towns, as well as historic settlements and areas occupied by Native
Americans, including passing near Tecate Peak, a sacred mountain, it is likely that adverse impacts to architectural, archaeological and Native American resources would occur. The eastern portion of the alignment transects the Table Mountain ACEC, which has archaeological resources and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

Operations impacts would include disturbance of resources that are located in proximity to ongoing maintenance and other operations activities. In addition, increased noise and visual intrusion could also adversely impact the setting of architectural, archaeological, and Native American resources. These impacts would be significant.

1.2.2.4 Alternative 3
Alternative 3 is a tunnel from the Santa Fe Depot to the Imperial Valley airport site. A tunnel would not impact architectural, archaeological or Native American resources.

1.2.2.5 Alternative 4
Within the construction area, impacts could affect architectural, archaeological and Native American resources that are potentially significant. It is not known if any human remains would be affected, but ground-disturbing activities in prehistoric archaeological sites do have the potential to disturb human remains if they are present. Construction impacts would result from:

- Demolition of significant architectural resources;
- Ground-disturbing activities; or
- Temporary alterations to the setting or other qualities that make a resource significant.

Given that the Alternative 4 traverses portions of numerous cities and towns, as well as historic settlements and areas occupied by Native Americans, including passing near Tecate Peak, a sacred mountain, it is likely that adverse impacts to architectural, archaeological and Native American resources would occur. The eastern portion of the alignment transects the In-Ko-Pah Gorge ACEC, which has archaeological resources and the Yuha Basin ACEC, which has prehistoric and historic cultural attributes.

Operations impacts would include disturbance of resources that are located in proximity to ongoing maintenance and other operations activities. In addition, increased noise and visual intrusion could also adversely impact the setting of architectural, archaeological, and Native American resources. These impacts would be significant.

1.2.2.6 Mitigation Measures/Regulatory Process/Permits and Approvals
Implementation of appropriate mitigation measures could reduce overall level of impacts to cultural resources. Adverse impacts to Native American sacred sites are more difficult to mitigate. In addition, under the National Historic Preservation Act (NHPA), adverse effects to significant archaeological resources do not necessarily result in a sufficient reduction of impacts.

**General Mitigation Measures**
Resources that are eligible for protection under the law are required to meet certain criteria. The first step in designing mitigation measures is to identify the significant resources that exist within
Avoidance of impacts is the preferred mitigation measure for most cultural resources. When avoidance is not feasible there are measures that can reduce the level of impact. These include:

- **Architectural resources:**
  1. Preparation of Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) (documentation)
  2. Preparation of adaptive reuse under Secretary of Interior Standards

- **Archaeological resources:**
  1. Data recovery
  2. Capping

- **Native American resources:**
  1. Consultation with appropriate Native Americans

**Architectural Resources**

Once a project footprint has been defined, the following mitigation measures should be undertaken to assess and mitigate impacts to significant architectural resources. In addition, once the area of potential effects has been determined, mitigation of impacts to adjacent buildings, structures, and districts may also be required. Architectural mitigation necessitates the identification, documentation, and evaluation of the architectural environment prior to its reuse or demolition. Performance standards in architectural history apply to all monitoring and mitigation procedures. If the following mitigation measures are implemented, they are anticipated to reduce potential adverse impacts on architectural resources at this planning level stage of analysis. HABS/HAER documentation may not sufficiently mitigate affects from demolition.

Prior to the commencement of demolition activities, a qualified architectural historian should conduct inventories of buildings, structures, and districts within the project area.

Buildings, structures, and districts identified within the project area and adjacent should be evaluated by a qualified architectural historian. If significant buildings, structures, or districts are identified within the project area, mitigation measures 3 through 5 below should be implemented.

Project designs should be revised to avoid buildings, structures, and districts evaluated as significant.

Significant buildings, structures, and districts that cannot be avoided should be considered for reuse. Plans for adaptive reuse should be prepared following the Secretary of Interior Standards.

Significant buildings, structures, and districts that cannot be avoided or reused should be documented following the HABS/HAER specifications.
A final report should be completed that outlines the results of the mitigation program and documentation.

**Archeological Resources**
The following mitigation measures should be undertaken to assess and mitigate impacts to significant archaeological resources, once the project area of potential effects has been defined. Archeological mitigation seeks to identify, document, evaluate, and recover significant cultural materials prior to their destruction. Performance standards in archaeology apply to all monitoring and mitigation procedures, ensuring thorough documentation according to professional archaeological standards. If the following mitigation measures are implemented, they are anticipated to reduce potential adverse impacts on archaeological resources at this planning level stage of analysis. Under the California Environmental Quality Act, capping and data recovery would sufficiently mitigate impacts. Under the NHPA, adverse impacts would not be sufficiently mitigated by data recovery.

Prior to the commencement of ground-disturbing activities, a qualified archaeologist should conduct surveys of exposed land within the project area.

Archeological resources identified within the project area should be evaluated by a qualified archaeologist. Archaeological testing may be required for evaluation.

Project designs should be revised to avoid archaeological resources evaluated as significant.

Significant archaeological resources that cannot be avoided should be either mitigated through capping (mitigation measure 5) or data recovery (mitigation measures 6 through 10).

Capping should occur over the areas of significance within the archaeological site(s). This should begin with a small indexing excavation to determine the site's context. Once determined, geotextile is placed over the site, and it is capped by fill. This measure should preserve the significant areas of the site(s).

Data recovery is a comprehensive method to document and remove significant cultural materials from archaeological sites. The process begins with a research design. The research design should place the resource(s) in a regional context and identify relevant research issues and methods to address them. In addition to pertinent research questions, the research design should address the percent of the area to be excavated, the methodology proposed, and the analysis to be performed.

Excavations should follow professional archaeological standards. If the site is prehistoric, a Native American monitor should be present.

During excavation, the extent of special studies should be decided and appropriate samples should be collected. Analyses could include pollen analysis, botanical analysis through flotation samples, radiocarbon dating, lithic analysis, ceramic seriation studies, and obsidian sourcing for
prehistoric sites. Analyses for historic sites could involve detailed glass analysis, brick sourcing, detailed ceramic analysis, and extended historic research.

Cultural material recovered from data recovery excavations should be cataloged and analyzed using standard procedures.

All cultural material collected during excavations should be curated at an agreed upon facility.

The results of the investigations should be presented in a technical report.

In the event that a potential feature or intact archaeological deposit is encountered during development, work should be halted in that area, and the resource assessed for significance by a qualified archaeologist. If the find is deemed significant, mitigation measures 4 through 10 apply. Once a discovery has been made, an archaeological monitor may need to be present for continuing work in that area.

When grading, excavation, or other ground-disturbing activities are proposed in a sensitive area, an archaeological monitor may need to be present.

Native American Resources
To mitigate impacts to significant Native American resources, the following measures should be undertaken. Native American resources are non-renewable and cannot be recovered. If the following mitigation measures are implemented, they are anticipated to reduce potential adverse impacts on Native American resources at this planning level stage of analysis. Destruction of a sacred site could not be sufficiently mitigated.

Prior to the commencement of any project-related activities, a formal consultation should be initiated.

Consultation should continue throughout the project. The Native American community should be apprised of all project changes.

Project designs should be revised to avoid visual and direct impacts to all Native American resources (sacred sites). Sacred sites that cannot be avoided and are archeological in nature can be addressed as an archaeological resource (see mitigation measures above). This may include capping, data recovery, or the removal of features with cultural significance (e.g., boulders).

Native American monitors should be present during all construction activities in the vicinity of a sacred site.

In the event that human remains are encountered during development, another set of procedures applies.

Potentially destructive activities in the vicinity of the find will be stopped.
Ensure that any such remains are treated in a respectful manner and that applicable state and federal laws are followed (measures 3 through 5).

If human remains of Native American origin, associated grave goods, or objects of cultural patrimony are discovered on lands managed by a federal agency, the provisions of the Native America Graves Protection and Repatriation Act (NAGPRA) will be followed.

In the event that the discovery of human remains occurs on non-federal lands, the provisions of the California Public Resources Code §5097 and Health and Safety Code §7050.5 are followed. In particular, the appropriate County Coroner will be notified. If the remains are determined to be of Native American origin, the Native American Heritage Commission will be notified and they will name the Most Likely Descendant. A reasonable and good faith effort will be made to consult with the appropriate Native American individual (Most Likely Descendant), ethnic group, or organization. Reburial on-site requires the property owner's permission.

1.2.3 Visual Resources
Impacts to visual resources are considered to be substantial and adverse if they would result in one or more of the following:

- Adverse effect on a scenic vista;
- Substantial damage to scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings, within a state scenic highway;
- Substantial degradation of the existing visual character or quality of the site and its surroundings; or
- Substantial alteration of existing landscape/terrain.

The degree or importance of visual effects is very subjective and depends on the degree of alteration, scenic quality of the area disturbed, sensitivity of the viewers, and consistency with adopted goals and policies of the jurisdiction in which the project site lies. The degree of alteration refers to the amount of change to the existing terrain and the introduction of structural elements into an undeveloped or minimally developed environment, while acknowledging any unique topographical formation or natural landmark. Visual impacts may be associated with changes in either the built or natural environment and can be temporary or permanent. The presence of heavy machinery or stockpiling of material for construction activities would potentially have a short-term visual effect. Long-term visual changes are associated with altering the natural topography and erecting permanent structures.

Scenic quality is evaluated by identifying the memorability of landscape components as they combine in distinctive visual patterns, the visual integrity of the natural and man-built landscape and its freedom from encroaching elements, and the visual coherence and compositional harmony of the landscape considered as a whole unity present in the viewshed.

Sensitive viewers are those who use the outdoor environment or value a scenic viewpoint to enhance their daily activity. Changes in the existing landscape where there are no identified scenic values or sensitive viewers are considered less than substantial. Viewer response is composed of two elements: viewer sensitivity and viewer exposure. Viewer sensitivity is the
viewers' concern for scenic quality and the viewers' response to change in the visual resources that make up the view. Local values and goals may confer visual importance on landscape components and areas that would otherwise appear unexceptional in a visual resource analysis. Even when the existing appearance of a project site is uninspiring, a community may still object to projects that fall short of its visual goals. Viewer exposure is typically assessed by determining the number of viewers exposed to the resource change, the type of viewer activity, the duration of their view, the speed at which the viewer moves, and the position of the viewer. Visual impacts would also occur if proposed development is inconsistent with existing goals and policies of jurisdictions in which the project is located.

1.2.3.1 Alternative 1A

Based upon the size and location of improvements for Alternative 1A, additional impacts to visual resources may occur if construction activities are located directly within a viewshed with sensitive observers. These are primarily within populated areas and motorists along SR-52, SR-125, and I-8. Although, it is anticipated that construction times would be over the duration of many months, the construction activity is primarily restricted to daytime and construction impacts are considered to be temporary as they would occur only for the duration of the construction activities. This would result in visual impacts within the more populated areas occurring along the western end of the alignment. As the alignment traverses east, generally along I-8, the affected viewer groups would become less substantial with respect to established communities, and in areas with no development nearby, the visual impacts would generally be limited to motorists. Therefore, no substantial impacts to visual resources are anticipated during construction.

Alternative 1A would be located in a densely populated and urbanized area, as well as a sparsely populated and undeveloped area. The views of the proposed alignments and operation would be primarily from the existing residents surrounding the alignment, particularly in more densely populated and urbanized areas, and motorists. Impacts to visual resources would be substantial, as a Maglev transportation system would be introduced to a sparsely populated and relatively undeveloped area.

1.2.3.2 Alternative 1B

Based upon the size and location of improvements for Alternative 1B, additional impacts to visual resources may occur if construction activities are located directly within a viewshed with sensitive observers. These are primarily within populated areas and motorists along I-8. Although, it is anticipated that construction times would be over the duration of many months, the construction activity is primarily restricted to daytime and construction impacts are considered to be temporary as they would occur only for the duration of the construction activities. This would result in visual impacts within the more populated areas occurring along the western end of the alignment. As the alignment traverses east, generally along I-8, the affected viewer groups would become less substantial with respect to established communities, and in areas with no development nearby, the visual impacts would generally be limited to motorists. Therefore, no substantial impacts to visual resources are anticipated during construction.
Alternative 1B would be located in a densely populated and urbanized area, as well as a sparsely populated and undeveloped area. The views of the proposed alignments and operation would be primarily from the existing residents surrounding the alignment, particularly in more densely populated and urbanized areas, and motorists. Impacts to visual resources would be substantial, as a Maglev transportation system would be introduced to a sparsely populated and relatively undeveloped area.

1.2.3.3 Alternative 2
Based upon the size and location of improvements for Alternative 2, additional impacts to visual resources may occur if construction activities are located directly within a viewshed with sensitive observers. These are primarily within populated areas and motorists along SR 94. Although, it is anticipated that construction times would be over the duration of many months, the construction activity is primarily restricted to daytime and construction impacts are considered to be temporary as they would occur only for the duration of the construction activities. This would result in visual impacts within the more populated areas occurring along the western end of the alignment. As the alignment traverses east, generally along SR-94, the affected viewer groups would become less substantial with respect to established communities, and in areas with no development nearby, the visual impacts would generally be limited to motorists. Therefore, no substantial impacts to visual resources are anticipated during construction.

Alternative 2 would be located in a densely populated and urbanized area, as well as a sparsely populated and undeveloped area. The views of the proposed alignment and operation would be primarily from the existing residents surrounding the alignment, particularly in more densely populated and urbanized areas, and motorists. Impacts to visual resources would be substantial, as a Maglev transportation system would be introduced to a sparsely populated and relatively undeveloped area.

1.2.3.4 Alternative 3
Alternative 3 is a tunnel from the Santa Fe Depot to the Imperial Valley airport site. A tunnel would not impact visual resources.

1.2.3.5 Alternative 4
Based upon the size and location of improvements for Alternative 4, additional impacts to visual resources may occur if construction activities are located directly within a viewshed with sensitive observers. These are primarily within populated areas. Although, it is anticipated that construction times would be over the duration of many months, the construction activity is primarily restricted to daytime and construction impacts are considered to be temporary as they would occur only for the duration of the construction activities. This would result in visual impacts within the more populated areas occurring along the western end of the alignment. As the alignment traverses east, generally along the SD & AE alignment, the affected viewer groups would become less substantial with respect to established communities, and in areas with no development nearby, the visual impacts would generally be limited to motorists. Therefore, no substantial impacts to visual resources are anticipated during construction.
Alignment 4 would be located in a densely populated and urbanized area, as well as a sparsely populated and undeveloped area. The views of the proposed alignment and operation would be primarily from the existing residents surrounding the alignment, particularly in more densely populated and urbanized areas, and motorists. Impacts to visual resources would be substantial, as a Maglev transportation system would be introduced to a sparsely populated and relatively undeveloped area.

1.2.4 Section 4(f) Resources
Construction activities could potentially have adverse effects on Section 4(f) resources. The analysis of off-airport improvements is a generalized discussion of potential impacts.

1.2.4.1 Alternative 1A
Construction activities associated with Alternative 1A could potentially result in effects on Section 4(f) resources. A complete inventory and assessment of these resources would need to occur to determine which sites would be defined as Section 4(f) resources. There is the potential for adverse constructive and permanent impacts to Section 4(f) resources.

If the operation of Alternative 1A involves resources that are considered Section 4(f) resources, impacts would be considered adverse. Should the operation of the alignment impact the use of the resources or substantially impact the function of the public use, impacts would be considered adverse. Increased noise and visual intrusion could also adversely impact the setting of public lands and be considered a constructive use impact to the Section 4(f) resources. Operations impacts could be considered adverse.

1.2.4.2 Alternative 1B
Construction activities associated with Alternative 1B could potentially result in effects on Section 4(f) resources. A complete inventory and assessment of these resources would need to occur to determine which sites would be defined as a Section 4(f) resources. There is the potential for adverse constructive and permanent impacts to Section 4(f) resources.

If the operation of Alternative 1B involves resources that are considered Section 4(f) resources, impacts would be considered adverse. Should the operation of the alignment impact the use of the resources or substantially impact the function of the public use, impacts would be considered adverse. Increased noise and visual intrusion could also adversely impact the setting of public lands and be considered a constructive use impact to the Section 4(f) resources. Operations impacts could be considered adverse.

1.2.4.3 Alternative 2
Construction activities associated with Alternative 2 could affect Section 4(f) resources that are potentially significant. A complete inventory and assessment of these resources would need to occur to determine which of these areas are considered Section 4(f) resources. Impacts to Section 4(f) resources could be considered adverse.

If the operations of Alternative 2 involve resources that are considered Section 4(f) resources, impacts would be considered adverse. Should the operations of the alignments impact the use of the resources or substantially impact the function of the public use, impacts would be considered adverse.
adverse. Increased noise and visual intrusion could also adversely impact the setting of public lands and be considered a constructive use impact to the Section 4(f) resources. Operations impacts could be considered adverse.

1.2.4.4 Alternative 3
Alternative 3 is a tunnel from the Santa Fe Depot to the Imperial Valley airport site. A tunnel would not impact Section 4(f) resources.

1.2.4.5 Alternative 4
Construction activities associated with Alternative 4 could affect Section 4(f) resources that are potentially significant. A complete inventory and assessment of these resources would need to occur to determine which of these areas are considered Section 4(f) resources. Impacts to Section 4(f) resources could be considered adverse.

If the operations of Alternative 2 involve resources that are considered Section 4(f) resources, impacts would be considered adverse. Should the operations of the alignments impact the use of the resources or substantially impact the function of the public use, impacts would be considered adverse. Increased noise and visual intrusion could also adversely impact the setting of public lands and be considered a constructive use impact to the Section 4(f) resources. Operations impacts could be considered adverse.

1.2.4.6 Mitigation Measures/Regulatory Process/Permits and Approval
Consultation with the Department of the Interior would be required to confirm the definition and associated impacts to Section 4(f) resources, and to identify suitable measures or alternatives to satisfactorily mitigate direct and indirect use impacts. Mitigation measures identified elsewhere in this document as related to the types of resources of concern under Section 4(f), such as public parks and recreation areas, wildlife refuges, and historic sites, would be taken into consideration in the formulation and evaluation of mitigation measures for Section 4(f) impacts. In particular, mitigation measures for potential impacts to the Quino checkerspot butterfly, flat-tailed horned lizard and Peninsular bighorn sheep and potential impacts to historic, archaeological, and Native American resources could also apply to the mitigation of potential Section 4(f) impacts for the alignment alternatives.

Consultation with the State Historic Preservation Officer would be required for all historic sites and archaeological resources. Should any of the publicly owned land be confirmed as being purchased through LWCF, the Director of the Interior would need to be consulted to determine if the project would be allowed to change the use of the lands. Impacts to Section 4(f) resources could be minimized through the construction process by allowing use of the Section 4(f) resources throughout construction. Once operational, additional mitigation measures could be formulated to minimize impacts to the Section 4(f) resources by allowing use of the resources and/or through the purchase of additional Section 4(f) resources to be used in place of the impacted resources. If the construction of the utilities could avoid disturbance to archaeological sites on or eligible for the National Register of Historic Places that warrant preservation in place or harm the purposes of a publicly owned park, adverse impacts to significant resources could be avoided. If these publicly used lands were allowed to maintain their original use, permanent adverse impacts could be avoided.
1.2.5 Environmental Justice

An environmental justice impact would occur if a proposed alignment alternative were to result in disproportionately high and/or adverse human health or environmental effects on low-income and minority populations. Environmental justice impacts can arise as a result of the use of hazardous materials and generation of hazardous waste. Impacts may also occur to geology and soils, water resources, air quality, noise, and biological and cultural resources, as a result of Maglev construction and operations. Therefore, construction and operation of the proposed Maglev link could potentially have disproportionate impacts on low-income and minority populations. The analysis of alignment alternatives is a generalized discussion of potential impacts.

1.2.5.1 Alternative 1A

Construction and operation of Alignment 1A could have disproportionate impacts on low-income and minority populations. Further research and analysis will be needed to determine if there are low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

1.2.5.2 Alternative 1B

Construction and operation of Alignment 1B could have disproportionate impacts on low-income and minority populations. Further research and analysis will be needed to determine if there are low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

1.2.5.3 Alternative 2

Construction and operation of Alignment 2 could have disproportionate impacts on low-income and minority populations. Further research and analysis will be needed to determine if there are low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

1.2.5.4 Alternative 3

Alignment 3 is a tunnel from the Santa Fe Depot to the Imperial Valley desert site. A tunnel will not disproportionately impact low-income and minority populations.

1.2.5.5 Alternative 4

Construction and operation of Alignment 4 could have disproportionate impacts on low-income and minority populations. Further research and analysis will be needed to determine if there are low-income or minority populations that would be affected by the proposed project, using information from the 2000 Census of Populations and Housing.

1.2.5.6 Mitigation Measures/Regulatory Process/Permits and Approvals

Mitigation measures, regulatory processes, and permits and approvals related to the types of impacts associated with environmental justice are the mitigation measures of the respective affected resources, including hazardous materials, geology and soils, water resources, air quality, noise, and biological and cultural resources.
1.3 Potential Mitigation Measures and Costs

As part of the alternatives analysis, mitigation measures are identified that would serve to reduce environmental impacts associated with implementation of the alignment alternatives under consideration. The purpose of this section is to describe the overall mitigation strategy associated with implementation of Alternative 1A, Alternative 1B, Alternative 2, Alternative 3, or Alternative 4 and to provide an order-of-magnitude estimate of the costs associated with implementation of the identified mitigation measures. These costs are in addition to construction costs, which are evaluated separately.

1.3.1 Method

Environmental mitigation consists of measures that have been identified that can reduce the environmental impacts associated with implementation of the alignment alternatives under consideration. In many cases, measures that could reduce environmental impacts would be incorporated into the overall project design as a matter of course. These measures are not included in the overall mitigation strategy or environmental mitigation cost estimate. Rather, for purposes of this analysis, environmental mitigation measures are considered to be measures that are undertaken solely for the purpose of reducing the environmental impacts associated with the proposed alignments.

A variety of methodologies were used to determine environmental mitigation costs associated with each of the environmental impacts. The specific method used for each mitigation measure is identified below. Costs are provided as total costs, where possible, and as unit costs, if total costs cannot be quantified at this time. Costs are identified by alignment alternative only where they would vary between the alignments.

1.3.2 Environmental Mitigation Cost Estimates

1.3.2.1 Biology

Impacts of the Maglev train on sensitive biological resources will require a variety of compensation actions commonly referred to as mitigation measures. Mitigation measures for vegetation generally take the form of vegetation creation, enhancement or preservation. Furthermore, depending on the overall value of the impacted vegetation, compensation ratios may range from 0.5:1 to as high as 5:1. Creation involves creating vegetation where no other significant vegetation type already exists. Enhancement involves improving the quality of an area with a similar vegetation type already exists. Preservation involves acquiring and preserving good quality vegetation of the same type as that which is lost.

Mitigation for upland habitat is generally accomplished by preservation and/or creation. Unlike uplands, wetland mitigation is required to include creation at a minimum ratio of 1:1 because of “no net loss” policies established by state and federal agencies. The balance of the mitigation ratio applied to wetlands can be satisfied through restoration.

Due to the preliminary nature of the information upon which impacts are based, mitigation requirements have been generalized according to whether the impacted vegetation is associated with wetland or upland communities. For upland communities, the mitigation ratios are
generally based on sensitivity levels. No such distinction is made for wetlands as they are all considered to have a high sensitivity level.

Table 5-6 identifies the impacted vegetation, mitigation ratios and estimated costs per acre. The costs are based on estimates made in the Ricondo study. Because the cost of the land will depend on its location the cost varies greatly. This is important because typically the agencies desire to see the mitigation occur in the same area as the loss. Since land in the coastal and urban areas is typically more valuable, this land establishes the high end of the range while the land in the desert areas would be expected to represent the lower end of the range. Mitigation ratios vary with the quality of the vegetation and the rarity of the subgroup.

Table 0-6: Mitigation Ratios and Per Unit Cost

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Mitigation Ratio Range</th>
<th>Creation</th>
<th>Restoration</th>
<th>Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>2:1 to 4:1</td>
<td>$125 - $250</td>
<td>$75 - $200</td>
<td>NA</td>
</tr>
<tr>
<td>Uplands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1:1 to 4:1</td>
<td>NA</td>
<td>NA</td>
<td>$30 - $120</td>
</tr>
<tr>
<td>Moderate</td>
<td>0:5 to 2:1</td>
<td>NA</td>
<td>NA</td>
<td>$30 - $120</td>
</tr>
</tbody>
</table>

1 Includes base land cost, planning, implementation and monitoring but not long-term management or permitting cost.

Table 5-7 on the following page presents estimated mitigation cost for each alignment based on the ratio and per unit cost identified in Table 5-6 and the impacts for each sensitivity level contained in Table 5-5.
### Table 0-7: Comparison of Mitigation Cost by Alignment

<table>
<thead>
<tr>
<th>Vegetation Sensitivity</th>
<th>Alignment Cost ($ in thousands)</th>
<th>1A</th>
<th>1B</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland(^1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>2,800 – 14,000</td>
<td>1,400 – 7,000</td>
<td>3,600 – 15,300</td>
<td>NA</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Upland(^2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>19,110 – 305,760</td>
<td>41,970 – 671,520</td>
<td>15,690 – 125,520</td>
<td>NA</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>1,575 – 25,200</td>
<td>29,175 – 466,800</td>
<td>15,240 – 243,840</td>
<td>NA</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23,485 – 344,960</td>
<td>72,545 – 1,145,320</td>
<td>34,530 – 384,660</td>
<td>NA</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Assumes creation at a ratio of 1:1 with the balance being restoration.

\(^2\) Assumes mitigation ratios all met through preservation.

### 1.3.2.2 Architectural, Archeological and Native American Resources

Development of all of the alignment alternatives is anticipated to require mitigation of impacts to, architectural, archaeological and Native American resources. The following discussion addresses the types of expenses that would be incurred to identify these resources and provide mitigation of impacts.

The cost estimate for architectural resources includes the costs to conduct surveys, evaluation, HABS/HAER documentation, and curation. The cost estimate for archaeological resources includes the costs to conduct surveys, testing and evaluation, curation, data recovery, and consultation. Archaeological survey costs are estimated on an acreage basis. Testing and evaluation costs are estimated by assuming that density of resources (i.e., number of resources per acre) for each of the alignments would be consistent with the density of resources identified through previous surveys. Curation costs are estimated based on the estimated number of artifacts to be curated.

#### Architectural and Archeological Resources

**Survey**

For this scope, adequate surveys are those conducted within the last 5 years and greater than 10 acres. Virtually the entire alignment alternative outside of existing rights-of-way would require intensive survey at 15 m intervals. It is assumed that each alignment alternative would involve 4,500 acres of pedestrian survey. Based on the topography of the alignments, it is estimated that one person could survey approximately 10 acres per day. Individual alignments would require approximately 450 one-person survey days. Using a 5-person survey crew, the survey could be accomplished in 90 days, at a cost (including report preparation) of $290,000.

**Testing and Evaluation**
Previous investigations have identified an expected density of 0.05 resources an acre. On a scale of high to low complexity, there are eight high, three moderate, and eight low, plus one isolate. High complexity resources include rock art sites, habitation sites and ranches. Moderate complexity resources include sites with bedrock milling features, trail segments, temporary camps, refuse deposits, and historic buildings. Low complexity resources include lithic scatters, ceramic scatters and refuse scatters.

At the current ratio of identification, the survey could expect to encounter 225 resources: 87 high complexity, 33 moderate complexity, 87 low complexity, and 18 isolates. It is unlikely that 87 high complexity resources would be encountered, and more likely that 25 percent of this number would be encountered. Due to the unsurveyed historic rural heritage of the area, an additional 25 percent of “resources likely to be encountered” is calculated. Lithic scatters, low complexity resources, are estimated at a minimum under the California Archaeological Resource Identification and Data Acquisition Program (CARIDAP) for sparse lithic scatters.

The estimated total for “resources likely to be encountered” is 201 resources: 28 high complexity, 41 moderate complexity, 109 low complexity, and 23 isolates. For cost estimating purposes, it is assumed that all high and moderate complexity resources would be evaluated. A total of 75 percent of low complexity resources would be evaluate, while isolates would not be evaluated. The estimated cost of evaluation for high complexity resources is $50,000, the estimated cost for moderate complexity resources is $30,000 and the estimated cost for low complexity resources is $10,000. The total number of resources to be tested is 151 at an estimated cost of $23,000 per resource, or a total cost$3,473,000.

_Curation of Tested Materials_
It is assumed that one box of artifacts would be curated for each resource tested, at an estimated cost of $113,000.

_Data Recovery_
It is estimated that 50 percent of the high and moderate complexity resources tested would be evaluated as eligible for the National Register of Historic Places and/or the California Register of Historical Resources and would require data recovery for a total of 14 high complexity resources and 21 moderate complexity resources. The estimated cost of data recovery for high complexity resources is $250,000 and the estimated cost for moderate complexity resources is $75,000, for an estimated total cost of $5,075,000.

_Curation of Recovered Materials_
It is assumed that three boxes of artifacts would be curated for each resource excavated, at an estimated cost of $79,000.

_Consultation_
Consultation with Native American representatives and other interested parties would be required. A total of 41 parties have been identified thus far. Consultation costs are estimated to be $410,000.

_Native American Resources_
There is one identified Native American sacred site associated with Alternatives 1A and 1B, three identified Native American sacred sites associated with Alignment 2, and two identified Native American sacred sites associated with Alternative 4. Costs for processing Native American sacred site are estimated to be $25,000 a site.

Summary
The total estimated cost for mitigation of architectural, archaeological and Native American resources is estimated to be $9,465,000 for Alignments 1A and 1B, $9,515,000 for Alternative 2, $0 for Alignment 3, and $9,490,000 for Alternative 4.

1.3.2.3 Visual Quality/Aesthetics
Implementation of any Maglev alignment alternative would result in visual impacts to offsite receptors. General measures have been identified that would be integrated into site design to reduce potential impacts on visual resources, such as incorporating setbacks into site design, concealing certain facilities from surrounding views, and designing facilities to blend in with the surrounding landscape. For cost estimating purposes, these costs are considered to be site preparation and facility-related costs. No additional measures have been identified to address impacts to visual resources. Therefore, for purposes of this analysis, there are no costs associated with environmental mitigation for visual impacts.

1.3.2.4 Section 4(f)
Impacts to Section 4(f) resources are likely to be unavoidable. Although agency consultation would be required to address these impacts, no specific mitigation measures have been identified at this level of planning. Therefore, for purposes of this analysis, there are no costs associated with environmental mitigation pertaining to Section 4(f) resources.

1.3.2.5 Environmental Justice
It is not known at this time, whether or not construction and operation of a Maglev link between San Diego and the Imperial Valley desert site would result in disproportionately high and/or adverse human health or environmental effects on low-income and minority populations. General mitigation measures for hazardous materials, geology and soils, water resources, air quality, and noise would be integrated into site design to reduce potential impacts to these resources, such as implementation of a hazardous materials management plan, if appropriate, proper engineering, implementation of a storm water pollution prevention plan with construction and post-construction best management practices, and noise attenuation barriers. For cost estimating purposes, these costs are considered to be site preparation and facility-related costs. Cost estimates for mitigation of impacts to biological and cultural resources are presented above.
APPENDIX C: STAKEHOLDER WORKING GROUP
MEETING NOTICE
AND AGENDA

SANDAG MAGLEV STUDY PHASE 1
STAKEHOLDERS WORKING GROUP

The SWG may take action on any item appearing on this agenda.

Wednesday, January 11, 2006
10 a.m. – 12 noon
Conference Rooms C & D
County Executive Offices
County Administration Center
940 W. Main Street, Suite 208
El Centro, CA 92243

SANDAG Staff Contact: Leslie Blanda
Project Development Program Manager
(619) 699-1905
lbl@sandag.org

AGENDA HIGHLIGHTS

- MAGLEV STUDY SCOPE OF SERVICES
1. WELCOME AND INTRODUCTIONS

2. MAGLEV STUDY OVERVIEW
   Conceptual engineering and design analysis for a magnetic levitation system (Maglev) in San Diego and Imperial Counties. In Phase I, the study will address East-West alignments for Maglev linking San Diego to the potential regional airport site in the Imperial Valley known as the Desert Site.

3. ROLE OF STAKEHOLDERS WORKING GROUP
   The role of the Stakeholders Working Group for the Maglev Study Phase 1 will be discussed.

4. MAGLEV STUDY SCOPE OF SERVICES
   The scope of services involves 13 tasks related to providing conceptual engineering and design analysis for a Maglev system linking San Diego to the potential regional airport site in Imperial Valley.

5. EXISTING INFORMATION AND DATA SHARING
   Review of existing data and studies provided by local agencies in support of the Maglev Study Phase 1 effort. Discussion about what other information is available that could be beneficial to the study effort.

6. MAGLEV STUDY EXPECTATIONS
   Interactive discussion among the Stakeholders Working Group members about their expectations for the Maglev Study Phase 1 effort. Identify concerns and issues. State any needs and desires with respect to the Maglev system. List the possible benefits of developing a Maglev system.

7. NEXT MEETING DATE AND LOCATION
   Thursday, February 9, 2006, in San Diego.

+ next to agenda item indicates an attachment
MAGLEV STUDY PHASE 1
STAKEHOLDERS WORKING GROUP

January 11, 2006

AGENDA ITEM NO.: 4

Action Requested: REVIEW AND COMMENT

MAGLEV STUDY SCOPE OF SERVICES

This scope of work outlines HNTB’s approach to conducting conceptual engineering and design analysis for a magnetic levitation system (Maglev) in San Diego and Imperial Counties. In Phase I, the study will address East-West alignments for Maglev linking San Diego to the potential airport site in the Imperial Valley known as the Desert Site. In the future, Phase II will study North-South Maglev alignments within San Diego and Imperial Counties linking to the air-rail Maglev network being studied by the Southern California Association of Governments (SCAG) region to the North.

PHASE I STUDY: EAST-WEST ALIGNMENT SAN DIEGO TO IMPERIAL VALLEY

1.0 PROJECT DEFINITION

1.1 Project Definition Statement

A project definition statement will be developed using information from past studies, related studies, federal legislation, and input from key stakeholders including, but not limited to, SANDAG, San Diego County Regional Airport Authority (SDCRAA), Imperial Irrigation District (IID), Imperial County, and Caltrans. The project definition statement will be developed to define the objectives of the study and to guide the development, refinement, and presentation of alternatives.

1.2 Study Area

The study boundaries encompass an area generally paralleling the Interstate 8 Freeway Corridor from San Diego downtown/Lindberg Field to a potential airport site in the Imperial Valley known as the Desert Site. A preliminary map will be developed which identifies major features of the transportation network, including: airports, highway system, railroad, and utility corridor rights-of-way. Once the boundaries of the Phase I study area are set, more detailed base maps will be developed as outlined below.

1.3 Base Map Generation

Geographic Information System (GIS) data within the project limits will be compiled into a database from which base maps for plan and profile sheets will be generated. The database will include the following elements:
• Digital color aerial orthographic imagery,
• 30 meter grid DEM produced by the USGS,
• Habitat, vegetation, and biological coverage from SANGIS or SANDAG,
• Floodplain coverage from SANGIS or SANDAG,
• Jurisdictional Boundaries, i.e.: cities, county, BLM, forests, parks, Indian reservations, etc.,
• Land parcel coverage and ownership data from SANGIS or SANDAG.

1.4 Data Collection

This subtask involves the collection, assembly, and analysis of relevant existing information that is beneficial in conducting this study. This information will include, but not be limited to, major utility maps, relevant planning studies, and environmental documents.

2.0 MAGLEV TECHNOLOGY

Using information from related technical studies (for example: SCAG Maglev Studies, Florida High Speed Rail Authority Reports, SDCRAA High Speed Transit System Briefing Paper) and a survey of existing and planned Maglev systems around the world, technology and modal characteristics of Maglev systems will be defined. Additionally, data on Maglev technology will be obtained from published sources, operators, and equipment suppliers. Information to be summarized in the report will include:

• Performance
  o Maximum Design Speed
  o Maximum Commercial Speed
  o Dynamic Envelope
  o Maximum Grade and Curvature (Tilt and Non-Tilt)
• Vehicle Dimensions and Weight
• Maximum Axle Load
• Passenger Capacity
• Cargo Capability and Capacity
• Facility Requirements
• Fixed Guideway Requirements
• Right-of-Way Requirements
• Train Control and System Requirements
  o Signaling
  o Communications
• Safety Regulations
• Security Requirements
• Design Criteria/Standards (U.S. and International)
• Cost (Capital, Operating, and Maintenance).

3.0 ALTERNATIVES DEFINITION

3.1 Route Alignment

The primary objectives of this task are to develop alignment alternatives and prepare conceptual plan, profile, and typical cross-section drawings. The development of alignments will focus on three corridors or some combination thereof, including:
• I-8 Freeway Corridor,
• SDG&E Utility Corridor,
• San Diego & Arizona Eastern (SD&AE) Railroad Corridor.

Alternatives will be refined through the evaluation of variables such as grade, curvature, and fixed-guideway requirements to develop a set of screened alternatives that represent a range of performance and cost parameters. Conceptual layout plans with appropriate scale for this study then will be developed. Conceptual profiles will illustrate the variations in grade and identify surface, subsurface (trench or tunnel), and elevated fixed guideway alignments. Conceptual typical sections will be developed to illustrate the field conditions and corridor compatibility of the alignments. Each alternative route alignment will be studied for the following engineering criteria:

- Design Standards (design speed, vertical grade, horizontal alignment, vertical and horizontal clearances),
- Right-of-Way Requirements,
- Major Utility Impacts.

3.2 Station Locations

Station location alternatives in Phase I on the East-West alignments will be developed for the origin station (Downtown San Diego or Lindberg Field), an intermediate station (South of MCAS Miramar near the County’s population centroid), and a destination station at the potential Desert Site airport in Imperial Valley being studied by SDCRAA.

3.3 Additional Infrastructure

Other infrastructure requirements will be defined, including maintenance facilities, train control, and traction power systems.

3.4 Conceptual Maglev Operations

Maglev technology specific train performance for both passenger and freight operations will be determined over the defined routes using a simulation program or spreadsheet calculator. Operating plans, including train schedules, will be developed for each screened fixed guideway alternative to establish a basis for ridership, revenue, fleet requirements, and O&M cost estimates.

4.0 COST ESTIMATES

4.1 Capital Costs

Order of magnitude capital cost estimates will be prepared for screened alternatives. The capital cost estimate will provide order of magnitude costs for major items of work, including civil work, fixed guideway, structures, station locations, right-of-way, train control and traction power systems, maintenance facilities, and vehicles. Unit costs will be based upon information available for Maglev technology.

4.2 Operations and Maintenance Costs

O&M cost estimates will be prepared on the basis of the conceptual Maglev operations developed in task 3.4 above, using current operating data where available and estimates as reported in other recent studies.
5.0 ENVIRONMENTAL

A very preliminary assessment of potential environmental factors will be undertaken, based upon available GIS mapping data and existing documentation (e.g., existing reports and aerial photographs). Potential environmental constraints will be identified and evaluated. As archeological and biological resources are expected to be the most important environmental factors relative to implementing the proposed Maglev system, the evaluation will be limited to these two areas. The results will be summarized in a matrix which will facilitate the comparison of environmental constraints associated with the various alternative alignments. The narrative also will contain discussion of the potential mitigation measures available to reduce potential impacts to archaeology and biology resources, including a discussion of relative costs.

6.0 RIDERSHIP STUDIES AND ANALYSIS

6.1 Maglev Service Characteristics

Maglev service characteristics will be developed for the screened alternative alignments by:

- Identifying station locations,
- Estimating station-to-station run times based upon proposed alignments,
- Specifying service frequencies during peak and off-peak hours,
- Specifying station-to-station fares,
- Specifying boarding restrictions (if any), such as non-airport trips.

6.2 Airport Passenger Demand

Airport person trip demand will be provided by:

- Working with SDCRAA to obtain air passenger forecasts for the potential Desert Site Airport in Imperial Valley and Lindberg Field (if in operation),
- Converting air passenger demand into average weekday ground access and employee person trips.

6.3 Transportation Model

SANDAG will run the transportation models to produce preliminary Maglev ridership forecasts by:

- Coding transit networks to represent the Maglev service characteristics provided in Task 1,
- Modifying transit access procedures to represent long distance Maglev auto access connections,
- Modifying 2030 trip generation by TAZ to include the airport person trip forecasts from Task 2,
- Running the trip distribution model with the revised person trip forecasts,
- Running the standard mode choice model based upon Maglev transit networks and treating Maglev as conventional urban rail,
- Running the transit assignment model to produce Maglev ridership and station boardings.

6.4 Ridership Forecasts

Preliminary ridership forecasts will be evaluated against high-level rail ridership at other airports by:

- Identifying airports inside and outside the U.S. with existing or planned high-level rail service,
- Obtaining actual or forecasted airport rail station boardings and the non-transferring air passenger demand at those airports,
• Translating rail ridership experience elsewhere into low- and high-end expected Maglev ridership at the potential Desert Site Airport in Imperial Valley,
• Recommending changes to SANDAG’s preliminary ridership forecasts based upon experience elsewhere.

6.5 Calibrate Transportation Model

SANDAG will run the transportation models with revised ridership forecasts, by:
• Modifying the mode choice model to match low- and high-end ridership targets,
• Running transit and highway assignment models to produce performance measures and other model outputs such as maps of forecasted highway and transit volumes.

7.0 INSTITUTIONAL ISSUES AND ADVOCACY

Suggestions will be developed on strategies and approaches to pursue with local, state, and federal decision makers that would support future policies and funding to support integrated air-rail transportation networks. This will include input/recommendations for advocacy of institutional policy reforms and identification of funding strategies for future work, including partnerships with other stakeholders.

8.0 COMPARATIVE ANALYSIS

A brief comparative analysis will be developed to summarize information on the characteristics of highway, high speed rail, and Maglev modes of travel. Information on highway characteristics will be compiled to describe the existing and future highway network in the region and the different types of transportation that use the highway network. Information on high speed rail and Maglev system characteristics will be compiled using available information from related technical studies to summarize technology and modal characteristics. Data/statistics relevant for comparison of all three mode alternatives will be incorporated into comparison tables to include:
• Travel distances/times/costs by mode/vehicle type,
• Traffic congestion and delay,
• Air Quality and Noise,
• Capital Cost per Mile,
• System Operating and Maintenance Costs,
• Cargo Capability,
• System Coverage and Unmet Demand.

9.0 TECHNICAL WORKING GROUP

SANDAG will form a technical working group for this project. This group will meet monthly. Meeting will be held at sites in both San Diego and El Centro. HNTB will be responsible for the preparation of meeting announcements, meeting agendas, and meeting summary notes.

10.0 PRESENTATIONS

PowerPoint presentations and technical handouts will be prepared for use in briefing the technical working group and stakeholders. Up to 12 briefings are anticipated for the Phase I study, with one-half in San Diego and one-half in Imperial County. It is expected that the basic presentation materials developed will be adaptable for the presentations to multiple groups.
11.0 DRAFT REPORT

HNTB will prepare the draft report summarizing the information developed through the course of the study, including:

- Project Definition Statement,
- Study Area Base Maps,
- Maglev Technology Information,
- Discussion of the development, refinement, and presentation of alternative alignments, station locations, and additional infrastructure needs.
- Conceptual Maglev Operations,
- Cost estimates for capital requirement as well as operations and maintenance,
- Ridership Modeling Results,
- A comparative analysis of Maglev against highway and conventional high speed rail modes.

The draft report will include the conceptual design drawings of the alternatives and other pertinent information included as attachments to the report. An administrative draft will be prepared for review by SANDAG prior to submittal to other agencies.

12.0 FINAL REPORT

HNTB will prepare the final report incorporating SANDAG and other stakeholder comments. A meeting will be held to discuss the comments and ensure the appropriate actions will be taken. This step reduces the opportunity for misunderstanding and provides a clear direction toward the development of the final report. Once concurrence has been reached on all outstanding issues, the final report will be submitted to SANDAG.

13.0 PROJECT MANAGEMENT AND COORDINATION

- Prepare Project Work Plan and Schedule,
- Submit monthly invoices and project status reports,
- Attend meetings and prepare meeting notices, meeting agendas, and meeting summaries,
  - SANDAG Project Management (two meetings per month),
  - Project Team (two meetings per month),
- Conduct QA/QC Review.
SANDAG Maglev Study Phase I  
Stakeholders Working Group  

Meeting Summary  
Wednesday, January 11, 2006  

Attendance  
Those in attendance were:  

- Leslie Blanda, SANDAG  
- Ryan Hall, SDCRAA  
- Rudy Maldonado, IID  
- Mike Kraman, HNTB  
- Greg Humora, La Mesa  
- Oscar Cano, IMIP  
- Charlie Quandel, HNTB  
- Jacob Armstrong, Caltrans  
- Elias Paez Frias, IMIP  
- Michele DiFrancia, HNTB  
- Bob Ham, County of Imperial  
- Eduardo Raya, IMIP  

Welcome and Introductions  
Those in attendance introduced themselves.  

Maglev Study Overview  
The Stakeholders Working Group (SWG) received an overview of the SANDAG Maglev Study Phase 1 with the aid of a PowerPoint presentation. SAFETEA-LU includes an $800,000 earmark sponsored by Congressman Bob Filner to fund the study of a Maglev link between San Diego and the potential airport site in Imperial Valley. The study is to include a brief comparative analysis of dedicated highway lanes, high speed rail, and Maglev. SANDAG is undertaking this study.  

SANDAG staff reported that estimated budget for the study totals $400,000 with 80 percent of the funds provided by the federal earmark and local matching funds provided by the Imperial Irrigation District, the County of Imperial and SANDAG. The study schedule was reviewed noting that it is critical to conclude the Phase 1 study in February 2006 so the findings can be shared with the San Diego Regional Airport Authority in early March. The results of the study could have an impact on the Airport Authority’s recommendation of an airport site.  

Role of Stakeholders Working Group  
HNTB staff discussed the role of the Stakeholders Working Group (SWG). Due to the short timeframe for the study, only two or possibly three meetings will be held. The second meeting is scheduled to be held in San Diego on February 9, 2006. The role of the SWG is to provide input into the technical process of the study.  

HNTB staff explained that a peer review panel will be established to review this study. The peer review is scheduled to be conducted in February prior to the submission of the final report.  

Maglev Study Scope of Services  
HNTB staff provided an overview of the 13 tasks included in the scope of service for the study. Maglev project highlights were provided for projects under deployment in the U.S. and for the Shanghai, China project which is the only Maglev project in commercial operation in the world. Images of the Shanghai project showed a section of the alignment, a station, the guideway and supporting columns.
Existing Information and Data Sharing

HNTB staff explained that the data included in three U.S. maglev studies would be used as a resource for the SANDAG Maglev Study. The three U.S. maglev studies include: Baltimore-Washington, DC; Pittsburgh, PA; and Primm-Las Vegas, NV. The San Diego County Regional Airport Authority (SDCRAA) recently commissioned a similar study of a maglev system between San Diego and the proposed regional airport site in Imperial Valley. The SDCRAA is providing this study to SANDAG to use as a resource. SANDAG will use the SDCRAA study as a base and will advance the study through further analysis and refinements to the studied alignments and costs. The SDCRAA study focused on three alignments, the I-8 alignment, the SR-94 alignments and a straighter alignment aimed at minimizing travel time. The SANDAG study will also focus on these three alignments and will review at least one other alignment. Draft alignment maps for the SANDAG study were reviewed with the SWG.

Maglev Study Expectations

HNTB staff facilitated an interactive discussion among the SWG members regarding their expectations, concerns, issues, needs and desires related to the study and the proposed Maglev system. HNTB staff responded to questions and comments (coded as “Q” and “C” below) and recorded notes on flip charts.

Q: Speed and Ridership
Once the Maglev vehicle clears the urban area, it needs to reach the top speed of 310 mph, with 10 minute headways, 100 passengers per car, with 4 to 8 cars per consist in order to reach maximum ridership and revenue potential.

Q: Travel Time
The travel times for each alignment have not yet been calculated by HNTB staff. Estimated average travel times consistent with the level of conceptual engineering will be developed as part of the operating plan.

Q: Speed Restriction in Urban Area
HNTB staff explained that the operating speed of the maglev system would be restricted in urban areas due to the horizontal and vertical curves necessitated by the urban landscape and related passenger comfort levels. HNTB staff noted that it takes approximately 13 miles for the maglev to reach maximum operating speed of 310 mph. The maglev system would need 48,000 ft. vertical crest to maintain maximum speed according to research data.

As part of this study, a 10-mile urban area sample (e.g., highway right of way, elevated guideway) will be evaluated for costs, travel time, land acquisition requirements, environmental impacts, and the trade-offs associated with them. Three options will be considered: 1) curved, existing right of way; 2) straightened right of way; 3) tunnel.

Q: Highway Right-of-Way Requirements
With the understanding that there is not much highway median available, HNTB staff will look at elevated guideway.

C: Extension of Proposed Maglev System
It was stated that it is Congressman Filner’s intention for the Maglev system to eventually be extended to Yuma, Phoenix, and Texas.

C: Needs and Desires
- Divert auto travel to Maglev
- Divert cargo containers in region from truck to Maglev/air freight
- Serve Mexicali (one million residents)
- Encourage telecommunications/fiber optics along corridor
- Encourage associated development and facilities
• Explore alternative airport site as the current Desert Site is located in an environmentally sensitive area, known as “Pinto Wash”
• Connect to Mexico’s proposed and evolving high speed rail network
• Provide freight relief to the Ports of San Diego and Los Angeles by moving freight east
• Provide capacity to San Diego’s problems with growth and limited airport capacity

C: Political Momentum
Political momentum has been building over the last year or two. The first phase of Maglev system development would be from San Diego to Yuma; the second phase would be from Yuma to Phoenix/Tucson; the third phase would be further east along the southern region of the U.S. The proposed system is envisioned to replace an aging rail infrastructure and to provide a connection to Mexico. The advocacy community has been successfully organized and was able to secure federal funding for the study in nine months.

C: San Diego Airport Authority Interests
The SDCRAA is most interested in the ridership forecasts that will be generated as part of this study. The Airport Authority is also interested in security and remote check-in, especially post 9-11, and the feasibility of providing a mix of “secure” and “non-secure” trains into the Desert Airport Site.

C: Right-of-Way Constraints
There are no plans to widen the I-8 in San Diego or Imperial Counties over the next 20 to 30 years, according to regional transportation plans. Even though there are grades of 6% in gorges along I-8, the proposed Maglev system should be able to meet up to 10% grades.

C: City of La Mesa
The City of La Mesa had a relatively positive experience with the construction of the elevated Mission Valley East through its community, with little community disruption. The City’s concerns would be related to construction noise, right-of-way takes and having two elevated rail systems operating through the city.

C: Cargo
The proposed Maglev system could transport light weight cargo, similar to air freight. Transrapid has developed concepts to transport seaborne containers. However, it was noted that these are concepts that will impact systems and guideway design. El Centro could serve as a point of entry to the region. Cargo could also be another source of revenue for the Maglev system. A joint powers authority between San Diego, Imperial County, Mexico, and Yuma could be created regarding cargo transport.

C: Mexicali
There is demand from Mexicali to San Diego for jobs, shopping, etc. There are also residents who travel to the casinos in eastern San Diego; perhaps a mid-point station at the casinos could be considered. Exploring a connection to Tijuana may also be warranted.

C: Travel Time
Maglev travel time needs to be low (e.g., 20 to 30 minutes), especially given access time.

C: Broader Transit Network
The proposed Maglev system should be viewed as part of an interconnected transit network, also serving other uses such as commuter and recreational. Access and egress modes for the system should also be considered.

Q: SWG Input on Alignments
HNTB staff noted that a range of options will be presented in the final report, with capital costs developed for each option based on existing data, e.g., guideway, land acquisition, systems, power, stations. Caltrans has provided right-of-way maps.

SDG&E needs another transmission alignment between San Diego and Imperial Counties, which may coincide with this study.
The SR-94 alignment may have cultural and environmental issues associated with it. The SDA&E alignment has border/security issues associated with it.

C: Fares
Fares in the range of $20 to $30 are being considered, particularly as an input to the ridership forecast model. A fare of $20 would be preferable. May want to also explore a monthly pass option and the distinction between a commuter and recreational/airport travelers. Airport travelers should pay more of a premium fare, especially with remote check-in.
MEETING NOTICE
AND AGENDA

SANDAG MAGLEV STUDY PHASE 1
STAKEHOLDERS WORKING GROUP
The SWG may take action on any item appearing on this agenda.

Thursday, February 9, 2006
9:00am – 11:00pm
SANDAG, Conference Room
401 B Street, Suite 800
San Diego, CA 92101-4231

SANDAG Staff Contact: Leslie Blanda
Project Development Program Manager
(619) 699-1905
lbl@sandag.org

AGENDA HIGHLIGHTS

• MAGLEV TECHNOLOGY
• ALIGNMENTS FROM SAN DIEGO TO IMPERIAL VALLEY
• RIDERSHIP ANALYSIS STATUS

SANDAG offices are accessible by public transit.
Phone 1-800-COMMUTE or see www.sdcommute.com for route information.

In compliance with the Americans with Disabilities Act (ADA), SANDAG will accommodate persons who require assistance in order to participate in SANDAG meetings. If such assistance is required, please contact SANDAG at (619) 699-1900 at least 72 hours in advance of the meeting.

To request this document or related reports in an alternative format, please call (619) 699-1900, (619) 699-1904 (TTY), or fax (619) 699-1905.
## SANDEG MAGLEV STUDY PHASE 1
### STAKEHOLDERS WORKING GROUP
#### Thursday February 9, 2006

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>ACTION</th>
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<tbody>
<tr>
<td>1.</td>
<td>WELCOME AND INTRODUCTIONS</td>
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<tr>
<td>+2.</td>
<td>MEETING SUMMARY</td>
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<td>The meeting summary for the January 11, 2006 meeting is attached. SWG is asked to review and approve the meeting summary.</td>
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<td>3.</td>
<td>MAGLEV TECHNOLOGY (Charlie Quandel)</td>
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<td>Several information items on Maglev technology including a video from the Japanese Railway Corporation on superconductor Maglev and a discussion of General Atomics Maglev work in San Diego.</td>
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<td>4.</td>
<td>AIR-RAIL CONNECTIONS (Peggy Ducey)</td>
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<td>Examples of successful air-rail projects internationally, and discussion of challenges faced for projects in the United States</td>
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<td>5.</td>
<td>ALIGNMENT ALTERNATIVES FROM SAN DIEGO TO IMPERIAL VALLEY (Keyvan Pirbazari)</td>
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<td>Description of Maglev alignments being used in the study. Includes work developed for the desert site airport analysis by SDCRAA and information being further developed in the SANDAG study.</td>
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<td>6.</td>
<td>MAGLEV OPERATIONS (Charlie Quandel)</td>
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<td>Discussion of the challenges presented by the San Diego to Imperial Valley alignments and the resultant Maglev operations.</td>
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<td>7.</td>
<td>CAPITAL COST CHALLENGES (Charlie Quandel)</td>
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<td>Definition of components of overall program costs for development of a Maglev system. Discussion of specific impacts to project costs that are a result of site specific considerations of the San Diego to Imperial Valley alignments.</td>
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<td>8.</td>
<td>MAGLEV STATION CONCEPTS (Charlie Quandel)</td>
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<td>Presentation of station locations used in the study and descriptive examples of air-rail station from other high-speed rail studies.</td>
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| 9.     | DISCUSSION | **ENVIRONMENTAL ISSUES (Bruce McIntyre)**  
GIS overview of the study area and alternative alignments with a high level identification of possible environmental issues to be considered. |
| 10.    | DISCUSSION | **RIDERSHIP ANALYSIS STATUS (Ron Siecke)**  
Discussion of the ridership model and process used to develop an estimate of passengers who would use Maglev to/from San Diego to a desert site airport in Imperial Valley. How this system compares with ridership and fare information developed in other studies and with some actual data. |
| 11.    | DISCUSSION | **NEXT STEPS FOR THE SWG (Charlie Quandel)**  
Process and schedule for the SWG to provide comments on the Administrative Working Draft of the Phase 1 Maglev Study. |
SANDAG Maglev Study Phase I
Stakeholders Working Group

Meeting Summary
Wednesday, February 9, 2006

Attendance

Those in attendance were:

Leslie Blanda, SANDAG
Mike Kraman, HNTB
Charlie Quandel, HNTB (via phone)
Ron Siecke, HNTB
Michele DiFrancia, HNTB
Bruce McIntyre, PDC
Keyvan Pirbazari, PBS&J
Peggy Ducey, Ducey & Associates

Ryan Hall, SDCRAA
Jacob Armstrong, Caltrans
Bob Ham, County of Imperial
Greg Humora, La Mesa
Oscar Cano, IMIP
Rosa Lopez, Imperial Valley Association of Govts.
Humberto Peraza, Congressman Filner’s Office
Mario Lopez, Congressman Filner’s Office
Orlando Foote, Imperial County observer
Carrie Downey, City of Coronado
Rudy Maldonado, IID (via phone)

Welcome and Introductions

Those in attendance introduced themselves.

Meeting Summary

The SWG approved the meeting summary from the January 11, 2006 SWG meeting. One suggestion was to add a footnote regarding right-of-way constraints and that neither San Diego County nor Imperial County has plans over the next 20-30 years to widen Interstate 8.

Maglev Technology

There are two types of Maglev technology: electromagnetic and superconductor. Transrapid International and General Atomics are developing the electromagnetic technology, and the Central Japanese Railway Company is developing the superconductor technology.

A video of the Central Japanese Railway Company Maglev technology was presented.

Air-Rail Connections

Air-rail integration represents a synergy between the air and rail operators. The Frankfurt Airport in Germany was cited as a successful example of air-rail integration. Frankfurt freed up air capacity by providing the high speed rail (HSR) connection between Frankfurt and Koln, where the travel time is 47 minutes by train and 55 minutes by plane. The freed-up air space is now used for long-haul flights, while the short-haul trips tend to be made more by rail.

Other items such remote check-in services, on-board rail services, baggage handling and security, and locked baggage containers and compartments were presented.
Questions about security check were posed. The security checks for air passengers vs. rail passengers would be different, since the security checks for rail passengers occur on-board the train en route to the airport.

There are efficiencies/economies of scale to be gained with air-rail connections. For example, in the L.A. Basin, there is a $6 billion expansion plan that includes HSR linkages with LAX to two other regional airports with excess capacity, as compared to the $15 billion Master Plan for LAX expansion only.

Alignment Alternatives from San Diego to Imperial Valley
Plan and profile maps of the five alignment alternatives being developed by the study team were presented and discussed. The alternatives are as follows:

- Alternative 1A: I-8 Corridor (Santa Fe Depot – MCAS Miramar – Desert Site)
- Alternative 1B: I-8 Corridor (Santa Fe Depot – Qualcomm – Desert Site)
- Alternative 3: Tunnel Alignment (Santa Fe Depot – MCAS Miramar – Desert Site)
- Alternative 4: SD&AE Alignment (Santa Fe Depot – Desert Site)

Questions/comments included the following:

- Tunnel vs. aerial costs are about the same.
- Maglev noise levels are minor compared to surrounding noises such as those from the highway.
- Desert Site is not ideal location. It was selected 15 years ago by San Diego and Imperial Counties.
- What is the future of the Qualcomm stadium? It was noted as an important intermodal station with the San Diego Trolley and potential HSR.
- The length of the SD&AE alignment in Mexico is approximately 30-40 miles. At the time, the geographic/topographic data was not available for this section in Mexico.
- Travel times for each alternative will be developed in the next couple of weeks.
- Aerial structures can be as high as 100 - 126 feet.
- “At-grade” for the system will still be off the ground due to operations.

Maglev Operations
Maglev operations will be based on the ridership forecasts. The equipment needs will be based on the operating headways. The number of train sections will be based on passenger and baggage requirements during peak hours. The preliminary operations plan includes 10-minute peak headways and 20-minute off-peak headways. A challenge will be to estimate operating and maintenance (O&M) costs, but the team will use information from the Baltimore-Washington DC and Pittsburgh, PA projects. The Shanghai Maglev system is difficult to use as a comparison for O&M costs since it is in a different country and under a different cost structure.

Capital Cost Challenges
Capital cost estimates from other planned U.S. Maglev projects were presented.

Cost challenges include:

- Guideway: Large proportion will be high level guideways and/or tunnels.
- Power Distribution: More units will be required for grade requirements of system.
- Land Acquisition: Urban areas equal high costs.
- Environmental: More studies will be required to determine impact.

Maglev guideway types were presented, as well as O&M cost estimates from other U.S. Maglev projects.

Questions/comments included the following:

- There are also opportunities associated with costs such as shared costs with telecommunication/fiberoptic uses or a new aqueduct.
- The variance is station costs ranges from $132 million for an urban station in Washington DC for the Baltimore-Washington project to $10 million for a greenfield site for the Las Vegas project.
• Other projects such as Baltimore-Washington and Pittsburgh will be looked at for estimating energy requirements and costs.
• Potential funding from the federal government should not be overlooked or underestimated.

Maglev Station Concepts
Four potential station sites have been considered in the study:
• Downtown San Diego (Santa Fe Depot)
• County Centroid (Miramar MCAS)
• Qualcomm Stadium
• Imperial County Desert Site

Station design considerations include:
• Platform configuration (one-center or two-sided platform)
• Ticketing lobby
• Passenger circulation and waiting areas
• Vehicle, pedestrian and bike access (passenger drop off/pick up, commercial vehicle curb, parking/car rental)

A typical station plan view from the Florida HSR project and a conceptual station from the Pittsburgh Maglev project were presented.

Questions/comments included the following:
• There could be thru-tickets on the train, as they do in other cities like Frankfurt, so that the passenger would have a ticket for both the flight and train ride.
• Providing remote baggage check-in increases ridership, as seen in Europe.
• A comment was made about the potential for transit oriented development with the Maglev stations.

Environmental Issues
Five main areas of environmental issues were presented as follows:
• Biology (vegetation, wildlife, R&E species)
• Cultural (prehistoric camps and villages, sacred lands, historic buildings)
• Visual (scenic degradation, view blockage)
• Parks (4f) (loss of use, recreational experience degradation)
• Environmental Justice (Indian reservations, low income populations)

Ridership Analysis Status
Comparable Maglev service characteristics of other planned U.S. Maglev projects were presented, including headways, travel times, and fares. Similar characteristics for the year 2030 were developed for the SANDAG project, including:
• Headways: peak 10 minutes; off-peak 20 minutes
• Average travel speeds: downtown-Miramar 80 mph; Miramar-Desert Site 175 mph; downtown-Desert Site 163 mph
• Route length: downtown-Miramar 13 miles; Miramar-Desert Site 90 miles; downtown-Desert Site 103 miles
• Travel time: downtown-Miramar 10 minutes; Miramar-Desert Site 30 minutes; downtown-Desert Site 40 minutes
• Average fare per passenger: downtown-Miramar $5.00; Miramar-Desert Site $20.00; downtown-Desert Site $25.00
• Average fare per passenger mile: downtown-Miramar $0.76; Miramar-Desert Site $0.22; downtown-Desert Site $0.24

Using the SANDAG model, ridership forecasts resulted in approximately 85,000 airport passengers per day, with 14,000 being potential airport employees. Average speeds were based on the I-8 alignment.
alternative; the speeds are preliminary with more refined alignment data and speeds anticipated. Air-rail mode shares in U.S. cities tend to be 8-10% (Chicago, New York, Washington DC). There is a 7% mode share in Shanghai due to socio-economic conditions. There is a 35-40% air-rail mode share in other international cities (Oslo, Tokyo). The San Diego County Regional Airport Authority (SDCRAA) is considering a 25% mode share to be on the conservative side. Access times also need to be factored into the equation.

Next Steps
The schedule is to present the study final report to the SANDAG Transportation Committee on March 17, 2006 and to the SDCRAA Board on March 27, 2006. An administrative draft report will be sent to the SWG for “internal” use. A peer review panel will be convened in the next few weeks. It was requested that the report also be presented to the Imperial Valley Association of Governments (March 22nd meeting). Another SWG meeting may be scheduled, to be determined.