

As shown in Table 4-20, ground-borne vibration and noise impacts were identified for four receptors between Martin Luther King Jr. and Exposition Boulevards. MOS-King would eliminate these impacts.

No ground-borne vibration or noise impacts were identified at the at-grade and aerial segments eliminated under MOS-Century. MOS-Century would result in the same effects as the LPA.

4.6.2.3 Design Options

Partially Covered LAX Trench Option. The Partially-Covered LAX Trench Option would result in three sections of uncovered trench area where noise would travel upwards. The trench is located adjacent to an airport runway that experiences a large volume of takeoffs and landings. Any noise generated within this area would be masked by the noise generated by the high amount of airplane activity. In addition, this noise source would still be located below grade and there are no sensitive receptors within the FTA screening distance. This design option would continue to be located in a trench and would not change ground-borne vibration levels. No sensitive receptors are present along this stretch and no additional analysis is necessary. Therefore, no adverse effects are anticipated.

Below-Grade Crossing at Centinela Option. The Below-Grade Crossing at Centinela Avenue as opposed to an at-grade crossing would move the above grade noise source to below grade. Passby noise would be less than presented for the LPA and no passby noise impact was identified near Centinela Avenue. Although a warning signal noise impact was not identified for the LPA, it is noteworthy the Below-Grade Crossing would eliminate warning signal noise associated with an at-grade crossing.

Table 4-21 shows the ground-borne vibration and noise analysis completed for the Below-Grade Crossing at Centinela. Similar to the LPA, adverse vibration impacts to the Briercrest Inglewood Healthcare Center and a residential land use located along La Colina Drive would result. In addition, the Below-Grade Crossing at Centinela would result in adverse ground-borne noise impacts at these same receptors as the LPA.

Table 4-21. Ground-Borne Noise and Vibration Analysis: Below-Grade Crossing at Centinela

Receptor ID	Street Location	Building Type	Distance to Track (Feet)	Train Speed (mph)	FTA Vibration Criteria (VdB)	Predicted Vibration Levels (VdB)	FTA Ground-Borne Noise Criteria (dBA)	Predicted Noise Levels (dBA)
13	Florence	333 La Colina	64	55	72	73	35	38
14	Florence	Briercrest Inglewood Healthcare Center	72	55	65	71	35	36
15	Florence	St. John's Chrystostom Church and School	200	55	75	61	40	26

Source: TAHA, 2011



Optional Crenshaw/Vernon Station. The below-grade station at Vernon Avenue in Lemiert Park would not generate new passby noise as activity would be below grade. There would be a potential ventilation structure near the intersection of Crenshaw Boulevard and 48th Street. As shown in Table 4-22, ventilation shaft noise would not result in an adverse impact.

Table 4-22. Ventilation Shaft Noise – Optional Crenshaw/Vernon Station

Location	Distance (feet)	FTA Noise Category	L _{eq} , L _{dn} (dBA)				
			Existing	Project Noise ²	Moderate Impact	Sever Impact	Impact?
Crenshaw Blvd and 48th St	Adjacent	2	72	59	66-71	>71	No

Source: TAHA, 2011.

Ground-borne vibration at the optional Crenshaw/Vernon Station would be less than the LPA as trains would travel at slower speeds in and out of the station. No additional analysis is necessary and there would be no adverse effects.

Optional Aviation/Manchester Station. The presence of a station typically decreases passby noise as the trains slow down to enter the station. Regardless, no receptors have been indentified within the FTA screening distance and no additional analysis is necessary. Ground-borne vibration at the optional Aviation/Manchester Station would be less than the LPA as trains would travel at slower speeds in and out of the station. Also, no receptors have been indentified within the FTA screening distance. No additional analysis is necessary and there would be no adverse effects.

Alternate Southwest Portal at Crenshaw/King Station. This design option would not change passby activity, special trackwork, wheel squeal, vent shafts, ancillary facilities, warning signals, or park and ride facility noise levels. No additional analysis is necessary. This design option alters pedestrian activity and would not change ground-borne vibration levels. No additional analysis is necessary and there would be no adverse effects.

Mitigation Measures

The following mitigation measures address severe noise and vibration impacts. The only feasible mitigation measure to reduce the moderate passby impacts would be the inclusion of a sound wall adjacent to La Colina Drive. This mitigation measure would significantly reduce sight lines at the Centinela at-grade crossing and increase the potential safety risk to both vehicles and pedestrians. Therefore, this mitigation measure was not included.

- N1 Warning device noise levels shall not exceed 103 dBA at 50 feet, subject to approval by the California Public Utilities Commission.
- N2 Further site-specific testing shall be performed during the Final Design where potential for adverse vibration and ground-borne effects has been identified. Where adverse vibration and ground-borne effects are still predicted, the vibration and ground-borne energy transmitted into the ground shall be

decreased using design features such as, but not limited to high-resilience fasteners, ballast mats, or floating slab trackbed. Vibration- and ground-borne-reducing design specifications for the track sections shall be determined in consultation with a qualified vibration scientist or engineer during the design phase. The features shall reduce the vibration and ground-borne levels below the FTA thresholds identified in Table 4-19, Table 4-20 and Table 4-21.

4.6.3 CEQA Determination

The CEQA determination compares the effects of the proposed project, design options and MOSs with the existing conditions described in the affected environment/existing conditions section. In accordance with Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact related to noise if it would:

- Expose persons or generate noise in levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Expose people to or generate excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; and/or
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The FTA *Transit Noise and Vibration Impact* (May 2006) document provides guidance for the methodology used in preparing and reviewing the noise and vibration sections of environmental analyses. The manual sets forth the methods and procedures for determining the level of noise and vibration impacts resulting from most transit projects and for determining what can be done to mitigate such impacts. The FTA guidance requires the use of existing noise measurements as the basis for evaluation effects. Similar to the NEPA analysis, the FTA guidance has been applied to the CEQA analysis to determine significant impacts. Metro has established its significance threshold as the FTA severe threshold for noise and the FTA threshold for vibration and ground-borne noise.

4.6.3.1 No-Build Alternative

The only substantial source of future noise levels under the No-Build Alternative would be increased automobile traffic on local arterials. Changes in the automobile traffic are not expected to change the existing 24-hour (L_{dn}) noise levels along the segments. Peak-hour noise levels are not expected to increase because traffic in the area is already at or above road capacity. Under these conditions, traffic speeds would be significantly reduced and noise levels would be correspondingly low. Ground vibration levels from the increased number of rubber-tired vehicles would still be below the threshold of human perception because tires and shocks isolate vehicle vibrations from the roadway surface. Therefore, no noise and vibration impacts are anticipated for the No-Build Alternative.

4.6.3.2 LPA

The LPA would generate noise from passby activity, special trackwork, wheel squeal, vent shafts, ancillary facilities, warning signals, and park and ride facilities. Below grade alignments would generate ground-borne noise and vibration. The LPA would result in passby noise, vibration, and ground-borne noise impacts at multiple receptors. Therefore, without mitigation, the LPA would result in a significant impact related to noise at one location (severe impact from warning signal noise at Crenshaw Boulevard and 57th Street) and vibration at 26 locations (see Table 4-19 and Table 4-20).

MOS-King would eliminate the four ground-borne vibration impacts (between receptors 91 and 96) between Martin Luther King Jr. and Exposition Boulevards, as shown in Table 4-20. Noise impacts from MOS-King would result in the same impacts as those associated with the LPA. MOS-Century would result in impacts as those associated with the LPA.

4.6.3.3 Design Options

Partially-Covered LAX Trench Option. This design option would not generate additional noise or ground-borne vibration impacts.

Below-Grade Crossing at Centinela. Similar to the LPA, the Below-Grade Crossing at Centinela would result in significant vibration impacts to the Briercrest Inglewood Healthcare Center and a residential land use located along La Colina Drive. In addition to the LPA, the Below-Grade Crossing at Centinela would result in significant ground-borne noise impacts at these same receptors.

Optional Below-Grade Crenshaw/Vernon Station. The below grade station at Vernon Avenue in Lemiert Park would not generate additional noise or ground-borne vibration impacts.

Optional Aviation/Manchester Station. The Aviation/Manchester Station would not generate additional noise or ground-borne vibration impacts.

Alternate Southwest Portal at Crenshaw/King Station Option. The Alternate Southwest Portal at Crenshaw/King Station would not generate additional noise or ground-borne vibration impacts.

4.6.4 Impacts Remaining After Mitigation

Mitigation Measure N1 would reduce warning signal noise levels shown in Table 4-18 by 6 dBA. Warning signal noise at the 57th Street grade crossing would be reduced to 62.1 dBA, which would be less than the 63 dBA FTA impact threshold for this location. Warning signal noise at the West Boulevard grade crossing would also be reduced to 62.1 dBA, which would be less than the 64 dBA FTA impact threshold for this location. Mitigation Measure N1 would eliminate the unmitigated warning signal adverse impacts. Therefore, a less-than-significant impact would occur after mitigation.

Mitigation Measure **N2** would reduce ground-borne vibration and noise levels up to 15 VdB. Final type, location, and extent of such mitigations will be determined in Final Design. The specific locations where vibration mitigations are expected to be required are listed in Table 4-23. The mitigation measures will reduce ground-borne vibration and noise between 2 and 15 VdB. Mitigation Measure **N2** would eliminate the unmitigated ground-borne vibration and noise adverse impacts under both the LPA and the Below-Grade Crossing at Centinela. Therefore, a less-than-significant impact would occur after mitigation.

Table 4-23. Anticipated Vibration Mitigation Locations

Receptor Address	Receptor Type	Location of Impacts	Mitigation Locations (Civil Stations)
338 Beach	Residential	North of Tracks	218+00
333 - 423 La Colina	Residential	North of Tracks	221+00 to 224+00
301 Centinela	Convalescent Hospital	North of Tracks	225+00
6613, 6601 and 6531 Crenshaw	Residential	West of Tracks	290+00
6419 Crenshaw	Residential	West of Tracks	296+00
6345 Crenshaw	Cornett Motel	West of Tracks	297+00
6340 Crenshaw	Hyde Park Motel	East of Tracks	298+00
6332 and 6326 Crenshaw	Residential	East of Tracks	299+00
6303 Crenshaw	Crenshaw Inn Motel	West of Tracks	300+00
3413 63rd	Residential	West of Tracks	303+00
6215 Crenshaw	Residential	West of Tracks	303+00
6207 Crenshaw	Residential	West of Tracks	304+00
6203 Crenshaw	Residential	West of Tracks	305+00
6121 Crenshaw	Residential	West of Tracks	306+00
6131 Crenshaw	Residential	West of Tracks	305+00
4601 Crenshaw	Harrison-Ross Mortuary	West of Tracks	372+00
4434 Crenshaw	Tavis Smiley Foundation	East of Tracks	376+00
4309 Crenshaw	2 Down Front Entertainment and Laq Records	West of Tracks	385+00
4225 Crenshaw	Maverick's Flat	West of Tracks	395+00
3964 Crenshaw	Residential	East of Tracks	414+00 to 421+00
3875 and 3773 Crenshaw	Angelus Funeral Home and Lulu Washington Dance Theater	West of Tracks	420+00
3677 Crenshaw	Jim Eve Records	West of Tracks	444+00

Source: TAHA, 2011.

4.7 Ecosystems/Biological Resources

This section addresses the potential impacts of the project on ecosystems and biological resources. Sensitive species are bird or plant species which rely on specific habitat conditions and are protected under governmental regulations. A discussion of the regulatory framework governing the protection of biological resources, existing ecosystems and biological resources is described in Appendix F, Regulatory Framework. This section describes the existing conditions of the project corridor, followed by an analysis of potential impacts of the project on these resources. Due to the urbanized nature of the project area, ecosystems and biological resources are not expected to be adversely affected by the project.

4.7.1 Affected Environment/Existing Conditions

This section identifies areas within 0.25 mile of either side of the proposed alignment and stations that may be considered to have biological resources. In general, the proposed alignment and stations are located within a highly developed and urbanized area and potential biological resources are limited to a few small parks. These parks are primarily landscaped areas and wildlife species utilizing the parks are mostly those adapted to living in an urban environment. Native plant species are mainly limited to those few, such as California Sycamore, preserved within public parks.

With the exception of the small pond located within the Inglewood Park Cemetery, there are no wetland areas within 0.25 mile of either side of the proposed alignments, stations, and maintenance and operations facility sites. Vegetation around this pond is non-native, landscaped vegetation, but waterfowl were observed utilizing the small amount of open water there. No wildlife corridors exist within this area to support movement of wildlife species other than birds. There are no Habitat Conservation Plans (HCPs) for this area. There are no Significant Ecological Areas (SEAs) located within 0.25 mile of either side of the proposed alignment and station areas.

Visual surveys were conducted on January 9, 2008 and May 14, 2008. The surveys consisted of visual observation and photographic documentation of all parks and open space areas within 0.25 mile of either side of the proposed alignments, stations and maintenance and operations facility sites. During the surveys, mature trees existing in roadway medians directly within the proposed alignments were also observed. During the visual observations, there were only a handful of native tree species along the alignment that have the potential to be affected. However, there was a rough approximation of 50 non-native tree species along the alignment that could support birds during nesting season.

Refer to Section 4.12 Parklands and Community Facilities for the location of the parks described in the following subsections.

4.7.1.1 Harbor Subdivision

There are no designated or sensitive biological resources located along the Harbor Subdivision portion of the project. In the southernmost segment of the Harbor Subdivision portion of the project, to the east of Aviation Boulevard between approximately Century Boulevard and Arbor Vitae Street, is an area known as

Manchester Square. This area includes several parcels that the LAWA has purchased over the years as part of a voluntary residential relocation program (in lieu of sound-proofing) associated with the operation of LAX. Although No-Buildings remain on these vacant parcels, which vary in size from one lot to multiple lots, there are fenced areas that have grassy vegetation and trees. Although these lots could provide food and cover for urban wildlife, no vegetation exists that would support sensitive biological resources.

Within 0.25 mile of the Harbor Subdivision, immediately adjacent to the alignment, are the City of Inglewood's Edward Vincent Jr. Park and nearby Inglewood Park Cemetery. The Edward Vincent Jr. Park is a 55-acre park that consists of several playgrounds, soccer fields, tennis courts, a swimming pool, an amphitheater, and landscaped grounds. Mature trees, including sycamores, pines, palms, and carob trees exist in the park. Located across Florence Avenue from Edward Vincent Jr. Park, the Inglewood Park Cemetery comprises approximately 300 acres and contains the largest amount of open space within 0.25 mile of the Harbor Subdivision Alignment. Established in 1905, the Inglewood Park Cemetery supports biological resources including large open grassy areas, mature trees, and a pond. Although, the pond is an aesthetic feature of the cemetery, it could provide potential support for birds, including raptors.

Mature palm trees line both sides of Florence Avenue in the area of the Edward Vincent Jr. Park and Inglewood Park Cemetery. These palms could provide potential roosting and nesting sites for birds, including raptors.

Also located within 0.25 mile south of Harbor Subdivision portion of the project, just west of La Brea Avenue, at the corner of Manchester Boulevard and Grevillea Avenue, is the Grevillea Park. Grevillea Park is a small narrow landscaped area with no equipment or buildings. The park consists of landscaping, including a couple of large mature California sycamore trees, along with a mural (the Helen Lundeberg History of Transportation mural). The large mature California sycamore trees could provide potential roosting and nesting sites for birds, including raptors.

In addition, Rogers Park is located within 0.25 mile of the Harbor Subdivision portion of the project, just north of Florence Avenue and west of La Brea Avenue. Rogers Park consists of a playground, various playing fields, a wading pool, a picnic area, and a multi-purpose recreation building. Vegetation within this park does not support sensitive biological resources.

4.7.1.2 Crenshaw Boulevard

There are no designated or sensitive biological resources located along the Crenshaw Boulevard portion of the project. There is one park located within 0.25 mile of the Crenshaw Boulevard portion of the alignment. The Leimert Park is located at the intersection of Crenshaw Boulevard/Vernon Avenue/Leimert Boulevard. This park consists of landscaped vegetation that does not support sensitive biological resources.

4.7.2 Environmental Impacts/Environmental Consequences

This section addresses the potential impacts of the project on ecosystems and biological resources. Potential impacts of the project on landscaping and landscaped areas, which

are not special ecosystems nor contain significant biological resources, are further addressed above in Section 4.4, Visual Quality. The primary areas where biological resources do occur, and which could be potentially impacted by the operation of the project, are located immediately adjacent to the project. Parks, such as Leimert Park and Edward Vincent Jr. Park, are located directly within and adjacent to the project alignment.

No-Build Alternative

The No-Build Alternative would not result in substantial physical impacts to ecological or biological resources. Therefore, there would be no adverse impacts to sensitive species or habitat.

LPA

As described above, there are currently no sensitive species or habitat located directly within the project area. Due to lack of suitable habitat, none of the sensitive species listed by the California Natural Diversity Database (CNDDB) are anticipated to occur. Because of the lack of suitable habitat, no formal consultation with the United States Fish and Wildlife Service (USFWS) was required. Therefore, no adverse effects pursuant to the Endangered Species Act would occur.

Although there is a small pond located within the Inglewood Park Cemetery that is located 0.25-miles from the alignment, there are no designated wetland areas within 0.25-mile of either side of the LPA. Because no wetlands exist within the proposed project alignments, no adverse effects pursuant to Executive Order 11990 (Wetlands Protection) would occur.

The proposed project would involve the construction and operation of a Light Rail Transit system along already existing transportation infrastructure within a heavily urbanized area. The implementation of the project would not introduce any invasive species into the surrounding environment and no adverse effects to pursuant Executive Order 13112 (Invasive Species) would occur.

The LPA is not located within any coastal zones and would have no adverse effects pursuant to the Coastal Zone Management Act.

The LRT alignment options within the proposed project area are not located within areas containing any rivers listed in the National Wild and Scenic Rivers System. Therefore, no adverse effects pursuant to the Wild and Scenic Rivers Act would occur for the proposed project.

The LPA would require the removal or disturbance of mature trees along Crenshaw Boulevard. Removal or disturbance of vegetation during the nesting season could affect the habitat and bird species that are present. Mitigation measure **EB1**, described below, would be implemented to ensure no adverse impact would occur. In addition, compliance with the City of Los Angeles Native Tree Ordinance would ensure that no adverse impact would occur. If the project requires pruning or removal of native tree species, mitigation measure **EB2**, as described below, would be implemented to ensure that the pruning would not damage or adversely impact the trees and that the removal of the trees would be adequately mitigated.

Operation of the LPA would be along a defined corridor within a highly urbanized area, and with compliance with existing applicable ordinances and implementation of mitigation measures, the LPA is not anticipated to have an adverse impact on biological resources.

Similar to the LPA, the MOSs would not result in substantial impacts to biological resources.

Design Options

Similar to the LPA, the design options are unlikely to result in substantial impacts to biological resources. Mitigation measure **EB1**, described below, would be implemented to ensure no adverse impact to biological resources would occur. If trees are to be pruned or removed include native trees, compliance with the City of Los Angeles Native Tree Ordinance would be required to ensure no adverse impact would occur. Mitigation Measure **EB2**, as described below, would be implemented to ensure that the pruning or removal would not damage or adversely impact the trees.

4.7.3 Mitigation Measures

To avoid violations of federal and State migratory bird protections and prevent impacts to bird species that may utilize trees located within the proposed alignments, stations, or maintenance facility sites, project construction will be timed to occur outside the breeding bird season, which occurs generally from March 1st through August 31st and as early as February 1st for raptors. However, if construction must occur during the nesting season, the following mitigation measure would be implemented:

- EB1** Two biological surveys shall be conducted, one 15 days prior and a second 72 hours prior to construction that would remove or disturb suitable nesting habitat. The surveys shall be performed by a biologist with experience conducting breeding bird surveys. The biologist shall prepare survey reports documenting the presence or absence of protected native bird in the habitat to be removed and other such habitat within 300 feet of the construction work area (within 500 feet for raptors). If a protected native bird is found, surveys will be continued in order to locate nests. If an active nest is located, construction within 300 feet of the nest (500 feet for raptor nests) will be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting.
- EB2** If construction of the project requires pruning of native tree species on non-Metro-owned land, the pruning shall be performed in a manner that does not cause permanent damage or adversely affect the health of the trees. If construction of the project requires the removal of a native tree species, the affected tree species shall be relocated or replaced in consultation with appropriate jurisdiction.

4.7.4 CEQA Determination

The *CEQA Guidelines* state that a project would normally have a significant impact on biological resources if it would:

- Result in the loss of individuals, or the reduction of existing habitat, of a state or federal listed endangered, threatened, rare, protected, or candidate species, or a Species of Special Concern or federally listed critical habitat;
- Result in the loss of individuals or the reduction of existing habitat of a locally designated species or a reduction in a locally designated natural habitat or plant community;
- Interfere with wildlife movement/migration corridors that may diminish the chances for long-term survival of a sensitive species;
- Result in the alteration of an existing wetland habitat; and/or
- Interfere with habitat such that normal species behaviors are disturbed (e.g., from the introduction of noise, light) to a degree that may diminish the chances for long-term survival of a sensitive species.

The CEQA determination compares the effects of the proposed project, design options and MOSs with the existing conditions described in the affected environment/existing conditions section. Because no wildlife corridors or wetlands exist within the proposed alignments, the thresholds described in the third and fourth bullets above are not applicable. However, because species of concern have the potential to occur within 0.25 mile of the proposed alignment, and because locally protected trees are known to exist, potential impacts to these biological resources were evaluated for each of the project alternatives.

No-Build Alternative

The No-Build Alternative would not result in physical impacts to ecological and biological resources. Therefore, no impacts to sensitive species, habitat, or locally protected trees are anticipated.

LPA

As previously discussed, the LPA would require removal or disturbance of mature trees located along the proposed alignment and/or stations. Removal or disturbance of mature trees during the nesting season could affect this habitat and the present bird species.

Operation of the LPA would be along a defined corridor within an urbanized area. Compliance with existing ordinances and implementation of mitigation measures would result in a less-than-significant impact on sensitive species, habitat, or locally protected trees biological resources for the LPA. However, if vegetation were to be removed or disturbed during the nesting season, impacts to birds and habitat could occur. Mitigation measure **EB1** would be implemented to ensure that impacts to these biological resources are less than significant. In addition, if trees to be removed include native trees, compliance with the City of Los Angeles Native Tree Ordinance would be required. Although the ordinance does not require a permit for the pruning of protected trees, if the project requires pruning of native tree species, mitigation measure **EB2** would be implemented to ensure that impacts from pruning would remain less than significant.

Similar to the LPA, the MOSs are unlikely to result in substantial impacts to biological resources.

Design Options

Similar to the LPA, the design options are unlikely to result in significant impacts to biological resources.

4.7.5 Impacts Remaining After Mitigation

Mitigation measure **EB1** would be implemented to further reduce impacts to biological resources. Although the ordinance does not require a permit for the pruning of protected trees, if the project requires pruning of native tree species, mitigation measure **EB2** would be implemented to ensure that the pruning would not damage or significantly impact the trees. Implementation of mitigation measures **EB1** and **EB2** would ensure that impacts to biological resources would remain less than significant.

4.8 Geotechnical/Subsurface/Seismic/Hazardous Materials

This section describes the existing geologic conditions of the Crenshaw/LAX Transit Corridor study area and an analysis is presented evaluating the LPA, design options, and MOSs.

4.8.1 Existing Conditions/Affected Environment

4.8.1.1 Regional Setting

The study area ranges in elevation across its length from approximately 220 feet above mean sea level (amsl) at Wilshire Boulevard to approximately 120 feet amsl at Rodeo Road, to approximately 180 feet amsl near the junction with Slauson Avenue, and to an approximate elevation of 160 feet amsl near the junction with the Harbor Subdivision. It has an approximately 170 feet amsl near the Inglewood Park Cemetery (where it crosses the southern portion of the Baldwin Hills), and an approximately 100 feet amsl at the southern end near its terminus east of Los Angeles International Airport. Local surface-water sheet flow is generally toward the south-southeast along the portion of the alignment north of Florence Avenue. South of Florence Avenue, sheet flow is generally toward the south, as indicated on the Venice, California 7.5 Minute Quadrangle Topographic Map (U.S. Geological Survey [USGS], 1964).

4.8.1.2 Regional Geology

The project alignment traverses the Los Angeles Basin. The Los Angeles Basin, a structural trough, is a northwest-trending, alluvium lowland plain that is approximately 50 miles long and 20 miles wide. The Los Angeles Basin, located at the northerly terminus of the Peninsular Ranges, is the site of active sedimentation and the strata is interpreted to be as much as 31,000 feet thick in the center of the synclinal trough of the Central Block of the Los Angeles Basin. The project alignment traverses the southern portion of the Central Block, the Newport-Inglewood Fault Zone (NIFZ), and the northern portion of the Southwestern Block of the Los Angeles Basin.

4.8.1.3 Regional Hazardous Materials

The study area traverses urbanized areas containing small commercial buildings, parking lots, gasoline stations, and interspersed residential developments. The potential for encountering pre-existing hazardous waste material is present during construction project, particularly within an urban area. Since the proposed alignment traverses current or historic oil production areas, including two oil fields, it is likely that some hazardous substances, such as hazardous natural soil gases and petroleum-contaminated soil and groundwater, could be encountered. These hazardous substances could be encountered during construction of underground segments and foundation excavations. The numerous potential sources of petroleum-based contamination and the migration of the contaminant, via groundwater flow, could make it difficult to precisely determine the impacted areas.

4.8.1.4 Specific Geologic Setting Crenshaw Boulevard

This portion of the project alignment begins at Exposition Boulevard in the north, trends southward along Crenshaw Boulevard, travels through the northeastern alluvial slopes of

the Baldwin Hills area, and to 67th Street (immediately south of the Harbor Subdivision). This portion of the alignment is within the Central Block of the Los Angeles Basin.

Harbor Subdivision

This portion of the project alignment begins at 67th Street, trends southwest along the Harbor Subdivision, turning south at Manchester Boulevard, and continuing to proceed south along Aviation Boulevard to its terminus at the Imperial Highway (east of the LAX). This alignment is within the western portion of the Central Block, the NIFZ in the Baldwin Hills area, and the Southwestern Block of the Los Angeles Basin. The Southwestern Block bounds the steep southwest flank of the central synclinal trough, from which the Southwestern Block is separated by the northwest-trending NIFZ of deformation.

The Baldwin Hills lie across and are an expression of the NIFZ which comprises a complex system of faults and folds that extends from West Los Angeles, southeast through the Inglewood-Long Beach areas of Los Angeles County, into Orange County, and offshore toward San Diego.

4.8.1.5 Subsurface Gases

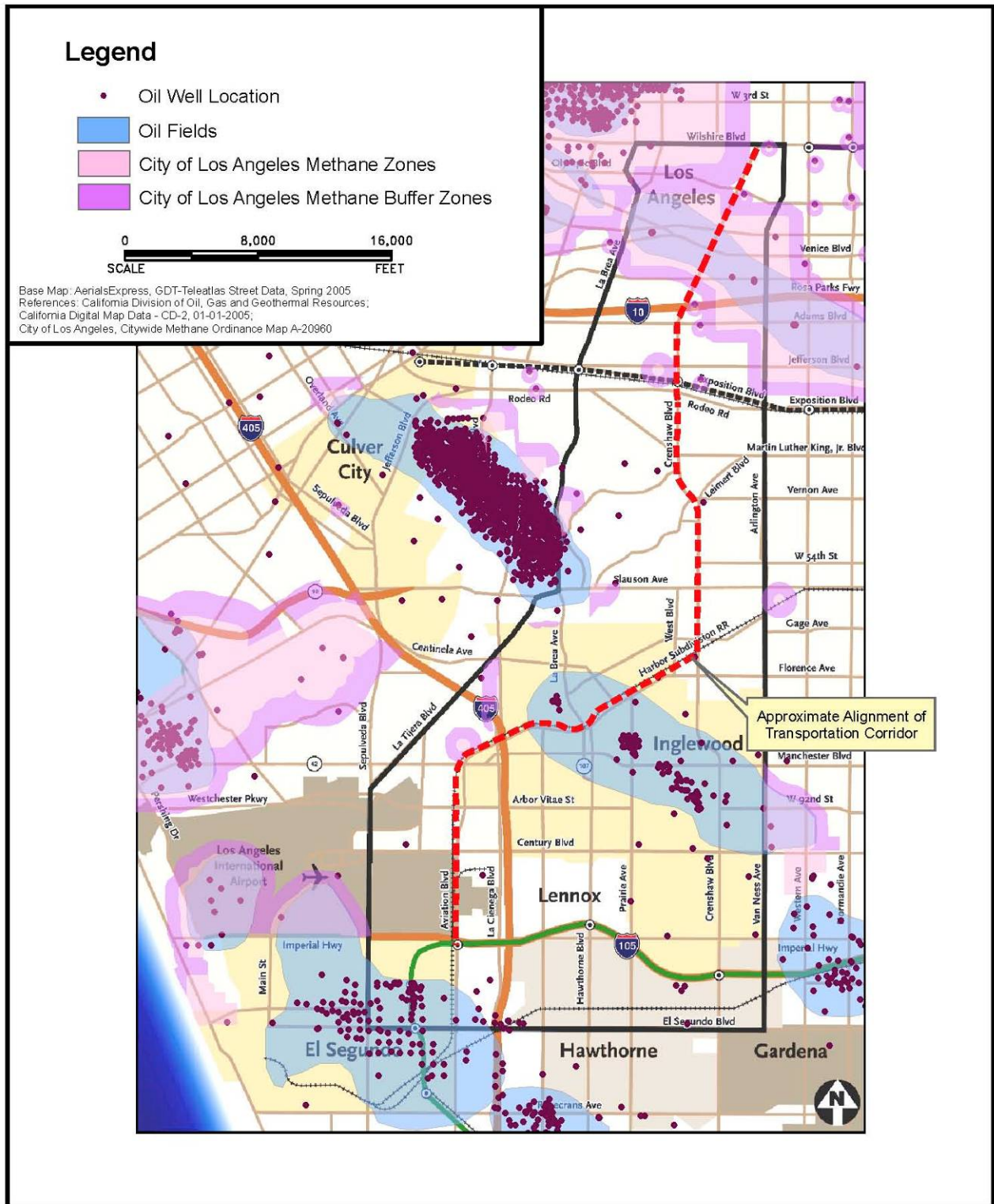
The proposed alignment traverses one oil field, Inglewood. Common problems associated with oil field properties include the release of methane and hydrogen sulfide soil gas, oil seepage, contaminated soils, leaking wells, and wells not plugged and abandoned to current standards. Small areas of the proposed alignment are within the City of Los Angeles Methane and Methane Buffer Zones. The location of the study area in relation to oil fields and the City of Los Angeles Methane and Methane Buffer Zones is presented in Figure 4-38, Oil Field Hazard Map.

4.8.1.6 Faults and Seismicity

The NIFZ is a northwest-trending, approximately 2- to 4-mile wide belt of anticline folds¹ and faults disrupting early Holocene to Late Pleistocene-age and older deposits. The NIFZ is characterized by trends related to right-lateral shearing at depth (Moody and Hill, 1956). The zone defines the boundary between the western basement complex of Catalina-type schist and related rocks to the southwest, and the eastern basement complex of metasedimentary, metavolcanic, and plutonic rocks to the northeast. Right-lateral, strike-slip displacement of 3,000 to 5,000 feet has been measured in Lower Pliocene strata along the NIFZ (Dudley, 1954; Hill, 1954; Poland, et al., 1959). Apparent vertical offset across faults of the NIFZ ranges from 4,000 feet at the basement interface, to 1,000 feet in the Pliocene strata, and 200 feet at the Plio-Pleistocene boundary (Yerkes, et al., 1965). It has been inferred that movement along this structural zone was initiated during Middle Miocene period (circa 15 million years ago), with seismic activity continuing to the present time. There is abundant seismic evidence that the zone is tectonically active; thus, the surrounding metropolitan area is subject to certain seismic risks. At least five earthquakes of magnitude 4.8 or larger have been associated with the NIFZ since 1920.

¹ Anticlinal folds are folds in a rock body from which the strata dip away in opposite directions. The core of the folds contains the oldest rocks, which convex upwards.

Figure 4-38. Oil Fields Map



Source: Parsons Brinckerhoff.

Based on the current understanding of the geologic framework of the area, the seismic hazard expected to have the highest probability of impacting the project alignment is ground shaking resulting from an earthquake occurring along several major active and potentially active faults in Southern California. Known regional active faults that could produce significant ground shaking along the project alignments include the Newport-Inglewood fault, the Santa Monica fault, the Puente Hills Blind Thrust, the Upper Elysian Park Blind Thrust, the Hollywood fault, and the Raymond fault, among others. The closest of these is the Newport-Inglewood fault, with a surface projection of potential rupture area located in the southern central section of the study area adjacent to the Florence Avenue/La Brea Avenue intersection. The location of the study area in relation to known faults is shown in Figure 4-39.

4.8.1.7 Ground Shaking

Seismic hazards that could affect the site include ground shaking resulting from an earthquake occurring along one of several major active faults in the region. The design criteria set by Metro requires that for important structures, such as those comprising the project, special earthquake protection criteria be followed.

4.8.1.8 Liquefaction

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during severe ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine- to medium-grained, cohesion-less soils. Effects of severe liquefaction can include sand boils, excessive settlement, bearing capacity failures, and lateral spreading.

A review of the Seismic Hazard Zones Map for the Inglewood, Hollywood, and Venice 7.5 Minute Quadrangles (CDMG, 1999) indicates that the portion of the project alignment along Crenshaw Boulevard south of Exposition Boulevard to Vernon is in an area mapped as being susceptible to liquefaction (Figure 4-39). The portion of the project alignment along the Harbor Subdivision is also adjacent to an area identified as being susceptible to liquefaction, as depicted in Figure 4-39.

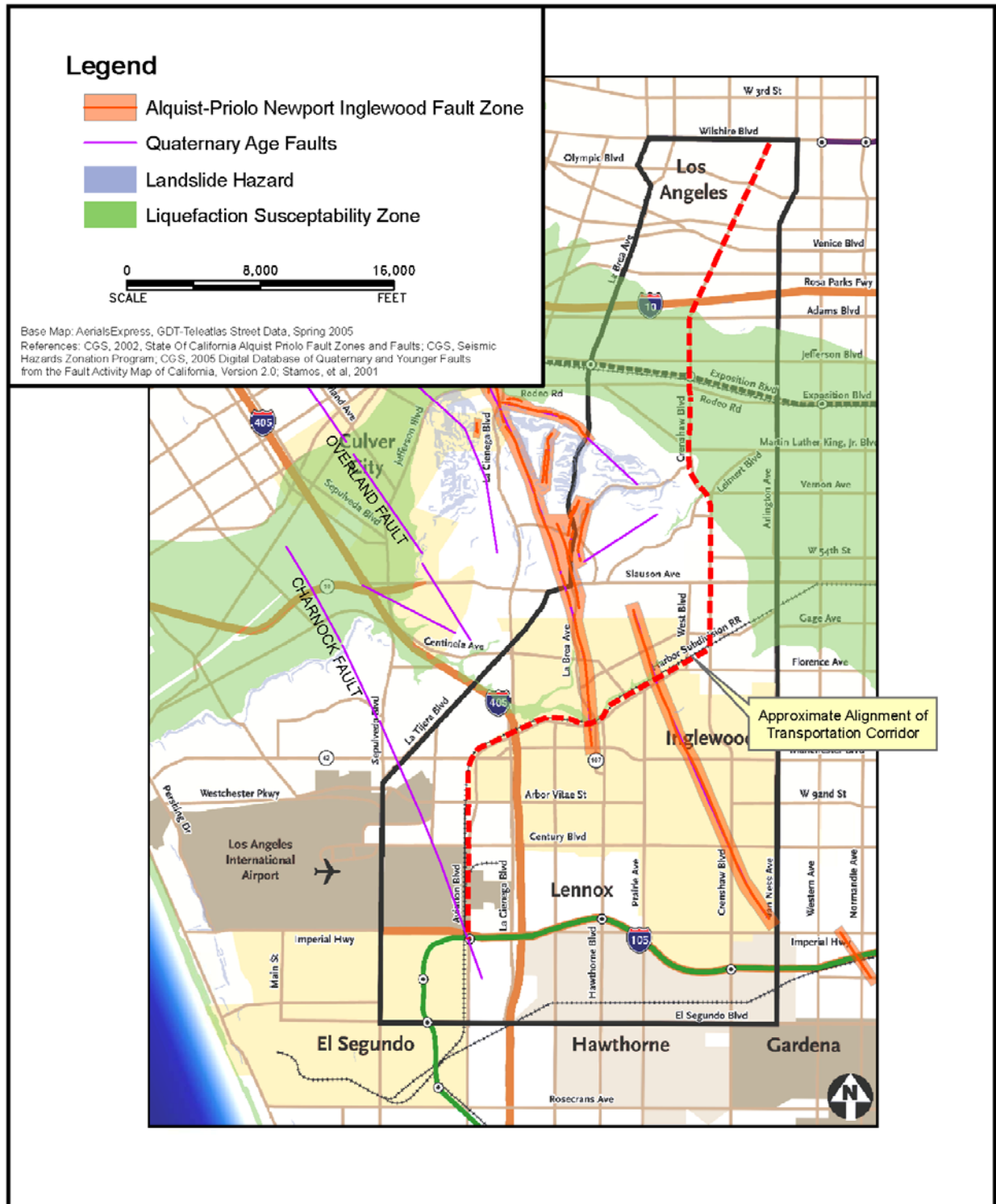
4.8.1.9 Seismically-Induced Settlement

Seismically-induced settlement consists of dry dynamic settlement (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within loose to moderately dense sandy soil, due to a reduction in volume during and shortly after an earthquake event. Much of the artificial fill along the proposed alignment is expected to be uncemented. Also, substantial portions of the sandy alluvium along the alignment are anticipated to be loose or medium dense. Accordingly, the proposed alignment is deemed susceptible to seismically-induced settlement.

4.8.1.10 Landslides

According to the Los Angeles County Seismic Safety Element (1990) and the City of Los Angeles Safety Element (1996), the study area is not within an area identified as having a potential for slope instability. Additionally, the study area is not located within an area identified as having a potential for seismic slope instability (CDMG, 1999). There are no

Figure 4-39. Geologic and Seismic Hazards Map



known landslides near the project alignments, nor are they in the path of known or potential landslides. The topography of the alignment is relatively flat; therefore, the potential of landslides is considered low.

4.8.1.11 Flooding

Earthquake-induced flooding can be caused by the failure of dams or other water-retaining structures, as a result of an earthquake. Due to the absence of such structures near the project alignments, the potential for earthquake-induced flooding is considered low.

4.8.1.12 Seiches and Tsunamis

According to the City of Los Angeles Safety Element (1996) and the Los Angeles Seismic Safety Element (1990), the study area is not within a potential inundation area (potential flood area) for an earthquake-induced dam failure from nearby dams.

4.8.1.13 Mineral Resources

Regarding loss of mineral resources, the study area traverses areas underlain by geologic materials, such as sand and gravel, that may be considered mineral resources and which could be used as construction aggregate. However, these materials have not been previously mined in the area. Therefore, mining the material is considered uneconomical. There is a potential for re-use of the excavated materials for fills.

4.8.1.14 Hazardous Materials

This section identifies current locations along the proposed transportation alignments that have the potential for contamination from hazardous materials or from the migration of contaminants from adjacent sites with known or suspected subsurface impacts.

A Phase I Environmental Site Assessment (ESA) of the proposed alignment sections for the transit improvements within the Crenshaw/LAX Transit Corridor was conducted. The purpose of the ESA was to identify, to the extent feasible pursuant to the processes prescribed in American Society for Testing and Materials International (ASTM), recognized environmental conditions (RECs) in connection with the subject property. The scope of work for the Phase I ESA included: records review; site reconnaissance; interviews; and report preparation. The Phase I ESA is available upon request.

Table 4-24 summarizes the environmental concerns identified onsite, or associated with the affected parcels, that have classification criteria of Moderate or High.

Table 4-25 shows the offsite facilities have classification criteria of Moderate and High based on the current site usage, former site usage, observed hazards, and/or known releases to the subsurface.

Table 4-24. On-site Identified Areas of Concern and Potential Hazardous Materials

Facility Name/Location	Concern Observed	Hazard
East and West of the Harbor Subdivision railroad from Imperial Hwy to near Regent St	Former agricultural usage, possible pesticides	High
Vacant lot, 5600 Arbor Vitae	Monitoring wells east and west of railroad tracks	High
West of railroad tracks and south of Manchester Blvd	55-gallon drum tipped over with 1 quart oil cans spilled on ground, some soil staining	High
West of railroad tracks between Manchester Blvd and Westchester Pkwy	Fenced storage area with various retail chemical containers such as strippers, paint thinner, and paint. No soil staining observed	Moderate
Harbor Subdivision railroad	Railroad usage, possible lead arsenates and/or pesticides for weed control. Likely creosote treated railroad ties	High
Adjacent to railroad tracks, west of Cedar Ave	Asphalt debris pile	Moderate
Directly north of railroad tracks, near La Colina Rd	Two buckets of oily water near railroad right-of-way	Moderate
Railroad tracks and East of Victoria Ave	Staining along railroad tracks	High
East and west of Crenshaw Blvd between Exposition Blvd and Vernon Ave	Former agricultural usage, possible pesticides	High
Former Gulf Oil, 3630 & 3644 Crenshaw Blvd	Former gas station, USTs formerly located fronting Crenshaw Blvd	High

Source: Leighton Consulting, Inc., 2008.

Table 4-25. Off-site Identified Areas of Concern and Potential Hazardous Materials

Facility Name/Address	LRT Configuration/Hazard
North American Aviation, Inc., Airplane factory, 5601 Imperial Hwy	Aerial to Below-Grade/Moderate
Numerous manufacturing facilities including aircraft parts (9632), 9630-9998 Bellanca Ave	Aerial/Moderate
King Delivery (currently vacant lot), 5600 Arbor Vitae	At-Grade/High
Formerly Freight Forwarders/Union Bank/Estate of Joseph Collin/Bodycote Hinderliter/Inglewood Suppliers/Sunsetting Auto Body, 9007 – 9121 Aviation Blvd	At-Grade/Moderate
Princeland Properties, 1237 Arbor Vitae	At-Grade/Moderate
Industrial facilities: electronic manufacturing (8700); plastic manufacturing (8900), auto parts manufacturing (8924), and aircraft tool manufacturing and polishing and plating (9030), 8700-9030 Bellanca Ave; Manchester Blvd to Arbor Vitae, west of railroad tracks	At-Grade/Moderate
Rho-Chem, 425 Isis Ave	At-Grade/Moderate
Unocal/76 Gas Station, 8600 Aviation Blvd	Aerial /Moderate
Former metal spinning (1315), machine shop (1319), dry cleaning plant (1325), and the American Bitumuls & Asphalt Company (1401), 1315-1401 Aviation Blvd	Aerial/Moderate
Budget Truck Rental, 5560 Manchester Blvd	Aerial/High

Table 4-25. Off-site Identified Areas of Concern and Potential Hazardous Materials (continued)

Facility Name/Address	LRT Configuration/Hazard
Shell Gas Station, 1135 Manchester Blvd	At-Grade/Moderate
Isis Electrical Substation, 8331 Isis Ave	At-Grade/Moderate
Zephyr Manufacturing, 201 Hindry Ave	At-Grade/Moderate
Former Circuit Board Manufacturing and Machine Shop, 8331-8341 Hindry Ave	At-Grade/Moderate
Charles Caine Co., 8325 Hindry Ave	At-Grade/Moderate
LAX Equipment, 830 Florence Ave	Aerial to At-Grade /Moderate
Mobil Gas Station, formerly Golden Star Laundry, 8307 La Cienega Blvd	Aerial/High
Former Standard Oil Co. of California and Inglewood Foundry, 401-417 Florence Ave	At-Grade/Moderate
Blue Diamond Materials (441), Cemex (505), formerly - Foundry (401); Salvage Yard (431); Metal Salvage and Melting (441), 401-505 Railroad Pl	At-Grade/Moderate
Former Kroehler Manufacturing, 301 Florence Ave	At-Grade/Moderate
Former Smoot Holman, 311 Florence Ave	At-Grade/Moderate
So Cal Edison Electrical Substation, 201 Florence Ave	Below-Grade /Moderate
Fujita Corporation, 230 La Brea Ave	Below-Grade/Moderate
Manufacturing facilities, including plastic and metal manufacturing, machine shop, and plating works, 200-330 Beach Ave	At-Grade/Moderate
So Cal Gas Company, Inglewood Manufactured Gas Plant, 700 Warren Ln	At-Grade/Moderate
Enderlo Vault Co., 827 Redondo Blvd	At-Grade/Moderate
Salvage yard, 6745 Victoria Ave	Below-Grade /Moderate
Former Crenshaw Collision Center, 6530 Crenshaw Blvd	Below-Grade/Moderate
Shell Gas Station, 6805 Crenshaw Blvd	At-Grade/Moderate
Lula Washington Dance Theatre, 3773 Crenshaw Blvd	Below-Grade /Moderate to High
Cameo Cleaners, 3650 Crenshaw Blvd	Below-Grade /Moderate
Former Gulf Oil, 3630 & 3644 Crenshaw Blvd	Below-Grade /High
Shell Gas Station, 3645 Crenshaw Blvd	Below-Grade /Moderate
West Angeles Cathedral (formerly 20th Century Plastics), 3628 Crenshaw Blvd	Below-Grade/Moderate

Source: Leighton Consulting, Inc., 2008.

4.8.2 Environmental Impacts/Environmental Consequences

4.8.2.1 Methodology

The method for assessing impacts involves examining the Crenshaw/LAX Transit Corridor Project for known geologic hazards and hazardous materials. If stations or structures are located within or directly adjacent to geologic hazard areas or areas that are impacted by hazardous pollutants, there would be a potential for an impact that would require additional geotechnical investigations and may require enhanced design to eliminate or mitigate the potential impact.

4.8.2.2 Subsurface Gases

The project alignment will traverse the Las Cienega oil field south of Olympic Boulevard and east of La Brea Avenue and will traverse a portion of the Inglewood oil field when crossing the southern Baldwin Hills. Portions of the alignment are within the City of Los Angeles Methane and Methane Buffer Zones.

No-Build Alternative

The No-Build Alternative would not result in subsurface excavation. Therefore, the No-Build Alternative would not result in adverse effects related to subsurface gases.

LPA

Exploratory borings were conducted during the advanced conceptual engineering phase at 19 locations along the alignment at varying depths to examine whether ground disturbances during excavation activities may potentially encounter subsurface gases. The exploratory borings found that the subsurface gases were well below the screening levels which require further testing or mitigation. The possibility of discovering subsurface gases could still occur in the areas of the proposed below-grade segments. However, based on the exploratory borings, the discovery of elevated volumes of subsurface gases is not anticipated and no adverse effects would occur.

Similar to the LPA, exploratory borings near the design options did not reveal elevated concentrations of subsurface gases and no adverse effects are anticipated.

Design Options

Similar to the LPA, exploratory borings near the design options did not reveal elevated concentrations of subsurface gases and no adverse effects are anticipated.

4.8.2.3 Faults, Seismicity, and Ground Shaking

The proposed alignment traverses the Newport-Inglewood fault, near the intersection of Florence Avenue and La Brea Avenue, which has the potential to induce ground deformation by rupturing the ground surface.

No-Build Alternative

Given the proximity of the Newport-Inglewood fault to the study area, the potential would remain for fault rupture. Therefore, the No-Build Alternative would potentially result in an adverse effect related to active or potentially active faults.

LPA

The LPA crosses the Newport-Inglewood fault at La Brea Avenue. During the advanced conceptual engineering for the project, the aerial crossing over La Brea Avenue was changed to a below-grade crossing to minimize the potential risk from ground deformation from seismic activity. The Florence/La Brea Station was also moved east near Market Street in accordance with regulations with designated Alquist Priolo Zones which prohibit facilities which involve the congregation of people from being located directly adjacent to a fault.

Despite these measures to minimize risk, there would be a potential for ground deformation to have an adverse effect for the LPA.

The termini for the MOSs are not located near designated fault zones. Therefore, no increased risk from seismic-related ground deformation would occur in comparison to the LPA.

Design Options

None of the design options for the LPA are located near designated fault zones. Therefore, no increased risk from seismic-related ground deformation would occur in comparison to the LPA.

4.8.2.4 Liquefaction

No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to liquefaction. Therefore, no adverse effects on liquefaction are anticipated.

LPA

The LPA is susceptible to liquefaction in two areas. The first area mapped as being susceptible to liquefaction is south of the I-10 Freeway, along the eastern slopes of the Baldwin Hills. The second area is the portion of the LPA along the Harbor Subdivision. Therefore, there would be a potential for liquefaction in these areas.

MOS-King would result in a lower potential for liquefaction than the LPA because the eliminated segment from King Boulevard to Exposition Boulevard is located in one of the two areas mapped as susceptible to liquefaction. MOS-Century would result in the same potential for liquefaction as the LPA.

Design Options

Similar to the LPA, these design options would be susceptible to liquefaction in two areas and there would be a potential for liquefaction and for lateral spreading in these areas.

4.8.2.5 Seismically-Induced Settlement

No-Build Alternative

The No-Build Alternative would not include activities that would result in the potential for risk of seismically-induced settlement. Therefore, no adverse effects are anticipated for the No-Build Alternative.

LPA

Structures and improvements planned along the proposed alignment may be susceptible to seismically-induced settlement. Therefore, a potential for adverse effects would be anticipated for the LPA and MOSs.

Design Options

Similar to the LPA, these design options would be susceptible to seismically-induced settlement and a potential for adverse effects would be anticipated.

4.8.2.6 Landslides No-Build Alternative

The No-Build Alternative would not include activities that would result in the potential for risk of landslides. Therefore, no adverse effects are anticipated for the No-Build Alternative.

LPA

The LPA and MOSs are not located in areas mapped as susceptible of landslides. The alignment is relatively flat and the potential for landslides along the alignment would be remote. Therefore, no adverse effects related to landslides are anticipated.

Design Options

The design options are not located in areas mapped as susceptible of landslides. The alignment is relatively flat and the potential for landslides along the alignment would be remote. Therefore, no adverse effects related to landslides are anticipated for these design options.

4.8.2.7 Flooding No-Build Alternative

The No-Build Alternative would not include activities that would result in the potential for risk of flooding. Therefore, no adverse effects are anticipated for the No-Build Alternative.

LPA

The LPA and MOSs are not located within any 100 or 500 year flood zones and, therefore, no modifications to any established floodplains would result from the implementation of the proposed project. No adverse effects to Executive Order 11988 (Flood Plain Management) would occur. The alignment is located in an area already developed with impervious surfaces as well as well-developed drainage infrastructure and would not increase the risk of flooding. Therefore, no adverse effects related to flooding are anticipated.

Design Options

Similar to the LPA, the design options are not located in areas mapped as susceptible to flooding. Therefore, no adverse effects related to flooding are anticipated for the design options.

**4.8.2.8 Seiches and Tsunamis
No-Build Alternative**

The No-Build Alternative would not include activities that would result in the potential for risk of seiches and tsunamis. Therefore, no adverse effects are anticipated for the No-Build Alternative.

LPA

The LPA and MOSs are not located in an area susceptible to inundation from seiches and tsunamis. The nearest section of the alignment is located approximately three 3.5 miles from the Santa Monica Bay and is not located within a tsunami zone. The potential for a risk of tsunami is remote and the LPA would not increase the risk of occurrence or the number of people that would potentially be exposed to a tsunami. In addition, there are no reservoirs nearby, which would result in risk from seiches. Therefore, no adverse effects related to seiches and tsunamis are anticipated.

Design Options

Similar to the LPA, the design options are located in areas where the potential for a risk of tsunami is remote and would not increase the risk of occurrence or the number of people that would potentially be exposed to a tsunami. Therefore, no adverse effects related to seiches and tsunamis are anticipated for these design options.

**4.8.2.9 Hazards and Hazardous Materials
No-Build Alternative**

There are no elements of the No-Build Alternative that are anticipated to have long-term hazardous materials impacts. Operations of facilities and services created under the alternative would be conducted in accordance with all federal and State regulatory requirements that are intended to prevent or manage hazards. Therefore, the No-Build Alternative would not result in adverse effects related to hazardous materials.

LPA

Operation of the LPA would occur along existing transportation infrastructure and would not result in an increase risk from hazards. The LPA is located near the eastern limit of LAX Runways 7L/25R and 7R/25L. The alignment is located in an area currently used as a freight transportation corridor by the BNSF railroad, as well as general automobile traffic, buses, rental car shuttles, and freight-forwarding trucks and trailers using Aviation Boulevard. These current operations are at-grade adjacent to the airport runways. While the LPA alignment is within Metro-owned right-of-way located to the west of Aviation Boulevard, it is within the designated runway protection zone (RPZ) of LAX. Location within this zone requires coordination between Metro, LAWA and the FAA. Based on this coordination, the Advanced Conceptual Engineering design that requires maximum investment for the LPA in this area entails that the light rail alignment is depressed in a fully covered trench. This configuration is designed to address FAA and LAWA concerns regarding both the potential for interference with airport navigational equipment, as well as the for those conditions when planes using these runways would take off or land in an west to east direction (which typically occurs

during the late night time hours) and could potentially overshoot the runway. Based on the alignment, the FAA will require completion of the form 7460 process, which is an analysis that evaluates airspace and potential obstructions. Based in this evaluation, the FAA will make specific findings and determinations.

Operation of the LPA would not result in the risk of exposure to hazardous materials. Sixty five soil samples were collected along the alignment and tested for hazardous materials (metals, volatile organic compounds, petroleum hydrocarbons). One area near the Harbor Subdivision and Crenshaw Boulevard was found to contain an elevated level of arsenic at approximately 10 feet. However, the level of arsenic (28mg/kg) is still considered non-hazardous because it is below ten times the screening threshold limit (50mg/kg). Operations of facilities and services created under the LPA would be conducted in accordance with all federal and State regulatory requirements that are intended to prevent or manage hazards. Therefore, the LPA would not result in adverse effects related to hazardous materials.

The MOS-King Alternative would result in similar risks of exposure to hazards and hazardous materials as described for the LPA. The MOS-Century Alternative would not contain the segment from Century Boulevard to the Metro Green Line that runs adjacent to the south runway at LAX. Therefore, the risk of exposure to hazards from airport operations would be less than described for the LPA. Therefore, these MOSs would not result in adverse effects related to hazards and hazardous materials.

Design Options

Similar to the LPA, the design options would not result in the risk of exposure to hazards and hazardous materials. Operations of facilities and services created under these design options would be conducted in accordance with all federal and State regulatory requirements that are intended to prevent or manage hazards. There is an option for a partially-covered trench configuration that would be fully covered directly in front of the runway and partially covered as the alignment extends away from the runways. The FAA will require a hazards analysis and will make specific findings and determinations for this type of configuration. Because the alignment would be fully covered in front of the runway, it would not create any additional hazard from planes overshooting the runway or from interference with aviation instruments. FAA review based on the submittal of Form 7460-1 for a partially-covered trench cover will be required as part of the process to ensure the project does not have an effect on airport operations. This analysis is anticipated to be completed in the Summer of 2011. Therefore, these design options would not result in adverse effects related to hazards and hazardous materials.

Mitigation Measures

GEO1 A soil mitigation plan shall be prepared after final construction plans are prepared showing the lateral and vertical extent of soil excavation during construction. The soil mitigation plan shall establish soil reuse criteria, establish a sampling plan for stockpiled materials, describe the disposition of materials that do not satisfy the reuse criteria, and specify guidelines for imported materials. The soil mitigation plan shall include a provision that during grading or excavation activities, soil shall be screened for contamination by visual

observations and field screening for volatile organic compounds with a photo ionization detector (PID). Soil samples that are suspected of contamination based on field observations and PID readings shall be analyzed for suspected chemicals by a California certified laboratory. If contaminated soil is found, it shall be removed, transported to an approved disposal location, and remediated or disposed according to guidance identified in proven technologies and remedies of site cleanup prescribed by the Department of Toxic Substance Control.

- GEO2** All hazardous materials, drums, trash, and debris shall be removed and disposed of in accordance with regulatory guidelines. Waste would be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms. A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- GEO3** A health and safety plan shall be developed for sensitive receptors with potential exposure to the constituents of concern identified in the preliminary Geotechnical Report contained in Appendix H.
- GEO4** Historical and present site usage along the many areas of the proposed alignment included businesses that stored hazardous materials and/or waste and used USTs, from at least the 1920s to the present. It is possible that areas with soil and/or groundwater impacts may be present that were not identified in this report, or were considered a low potential to adversely impact the subject property. In general, observations should be made during future development activities for features of concern or areas of possible contamination such as, but not limited to, the presence of underground facilities, buried debris, waste drums, tanks, soil staining or odorous soils. Further investigation and analysis may be necessary, should such materials be encountered.
- GEO5** Best Management Practices (BMPs) identified in Appendix F, required as part of the National Pollutant Discharge Elimination System (NPDES) permit and application of SCAQMD Rule 403, shall be implemented for the proposed project to not only reduce potential soil erosion, but also to maintain soil stability and integrity during grading, excavation, below grade construction, and installation of foundations for aerial structures, and maintenance and operations facilities. BMPs would comply with applicable Uniform Building Codes and include, but are not limited to, scheduling excavation and grading activities during dry weather, covering stockpiles of excavated soils with tarps or plastic sheeting, and debris traps on drains.
- GEO6** The design of the project shall adhere to the design specifications of the geotechnical study for maintaining structural integrity under static and seismic loading and operational demands.

4.8.3 CEQA Determination

The CEQA determination compares the effects of the proposed project, design options and MOSS with the existing conditions described in the affected environment/existing

conditions section. In accordance with Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact related to geology and soils if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving:
 - ▶ Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issues by the State Geologist for the area or based on other substantial evidence of a known fault
 - ▶ Strong seismic ground shaking
 - ▶ Seismic-related ground failure, including liquefaction
 - ▶ Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property;
- Have soils capable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water;
- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment
- Emit hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area
- For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; and/or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where

residences are adjacent to urbanized areas or where residences are intermixed with wildlands.

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or
- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

No-Build Alternative

Elements of the No-Build Alternative have the potential to create construction period impacts. However, it is assumed that all projects would be implemented in accordance with all federal and State requirements and permits during the construction process. Therefore, impacts would be less than significant.

LPA

The previous Mitigation Measures section provides the appropriate methods for safely approaching the potentially hazardous situations and reducing this potential impact to less-than-significant levels. It is assumed that the project would be implemented in accordance with all federal and State requirements and permits during the construction process. Due to the great body of experience and techniques for remediation, it is anticipated that impacts would be less than significant.

There are numerous schools, day care facilities, as well as the Los Angeles International Airport located with 0.25 mile of the corridor. The potential for exposure to contaminated materials would be limited to the confines of the project right-of-way. The mitigation measures provide for the proper disposal of contaminated substances and thus ensure the safety of individuals at nearby schools and the airport. As discussed above, the preliminary indications from discussions between Metro, FAA and LAWA have found that there will be no adverse effects from operation of the LRT alignment in the current LPA design of a depressed fully covered trench adjacent to the LAX south runways. FAA review on the form 7460 process, which is an analysis that evaluates airspace and potential obstructions will be required as part of the project.

The project would not prohibit emergency responsiveness and may potentially increase response time and evacuation efforts should it be necessary provide a way to efficiently move people in the case of emergency evacuation situations. Therefore, a less-than-significant impact is anticipated related to an emergency response plan.

The study area is located within an entirely developed area and there are no wildlands in the vicinity that could increase exposure to fires. Therefore, a less-than-significant impact is anticipated related to wildfires.

The possibility of discovering subsurface gases could occur in the areas of the proposed below-grade segments. However, based on the exploratory borings, the discovery of elevated volumes of subsurface gases is not anticipated and less-than-significant impacts would occur.

The project traverses the Newport-Inglewood Fault Zone, near La Brea Avenue, as well as a potential liquefaction zone. The LPA is susceptible to liquefaction in two areas. Therefore, a significant impact would occur for liquefaction. The project would not result in an increased exposure to the risk associated with fault lines, nor would it exacerbate pre-existing seismic conditions. However, it would be more vulnerable to damage from ground shaking during an earthquake, especially in aerial portions such as the station at Century Boulevard and the Manchester Avenue crossing. During the advanced conceptual engineering process, the aerial crossing and station at La Brea was reconfigured to a below grade crossing and the station was shifted to the east to avoid seismic building constraints required by being located within an Alquist-Priolo-designated fault zone. This would be a potentially significant impact; however, the mitigation measures described above would reduce impacts to less-than-significant levels. Structures and improvements planned along the proposed alignment may be susceptible to seismically-induced settlement. Therefore, a significant impact would be anticipated for the LPA.

The LPA is not located in areas mapped as susceptible of landslides. The alignment is relatively flat and the potential for landslides or lateral spreading along the alignment is remote. Therefore, no adverse effects related to landslides are anticipated for the LPA.

The LPA is in a flat, highly urbanized area, with an extensive drainage system and impervious surfaces. The project area is not subject to high levels of wind or rain, factors that may contribute to soil erosion. The LPA would not affect the existing drainage system and would not contribute to the loss of topsoil during operation. The LPA would not be located on expansive soil, which would create substantial risks to life or property.

In addition, the use of septic tanks or alternative wastewater disposal systems is not anticipated with the LPA due to the location of the project site in a developed area where existing sewer lines would be utilized. Implementation of Mitigation Measure **GE05** would ensure that the potential for soil erosion and soil instability would remain less-than-significant. Therefore, less-than-significant impacts related to the loss of topsoil, erosion, expansive soils, and the support of the use of septic tanks or alternative wastewater disposal systems, are anticipated.

Operation of the LPA would not result in the risk of exposure to hazardous materials. Operations of facilities and services created under the LPA would be conducted in accordance with all federal and State regulatory requirements that are intended to prevent or manage hazards. Therefore, the LPA would result in a less-than-significant impact to hazardous materials.

Impacts for the MOSs would be similar to those described for the LPA. The MOSs would not result in an increased risk to effects from geotechnical/subsurface/seismic/hazardous materials. Therefore, less-than-significant impacts are anticipated for the MOSs.

Design Options

Impacts for the design options would be similar to those described for the LPA. The design options would not result in an increased risk to effects from geotechnical/subsurface/seismic/hazardous materials. Therefore, less-than-significant impacts are anticipated for the design options.

4.8.4 Impacts Remaining After Mitigation

Implementation of the Mitigation Measures **GEO1** through **GEO6** would ensure that the all structures for the project would be designed according to the soil integrity along the alignment and would reduce the impacts related to liquefaction, settlement and ground shaking during the construction and operational phases of the project to less-than-significant levels.

4.9 Water Resources

This section evaluates the potential for changes in water quality to occur as a result of the proposed project and identifies measures to avoid, minimize, or mitigate potential water quality impacts, if applicable. The information in this section is based primarily on information readily available from the Los Angeles County Department of Public Works (DPW) and the Los Angeles Regional Water Quality Control Board (RWQCB).

4.9.1 Existing Conditions/Affected Environment

4.9.1.1 Municipal Water Supply

The LPA is within the boundaries of the Cities of Los Angeles, Inglewood, El Segundo, as well as unincorporated areas in Los Angeles County including View Park, Windsor Hills, and Lennox. The Cities of Los Angeles and Inglewood, as well as the Southern California Water Company and California American Water Company provide municipal water to these areas.

4.9.1.2 Flooding

Figure 4-40 shows the Federal Emergency Management Agency (FEMA) 100-year floodplain and current drainage conveyance structures within the study area. A FEMA 500-year floodplain is located at the northern end of the alignment along Crenshaw Boulevard between West Martin Luther King Jr. Boulevard and West Jefferson Avenue (FIRM 0601370080D, February 1987), as well as in the vicinity of the intersection of Crenshaw Boulevard and 71st Street (FIRM 0601370086C, December 1980). With the exception of the FEMA 500-year floodplains, there are no known areas where improper drainage currently exists and causes excessive flooding or ponding.

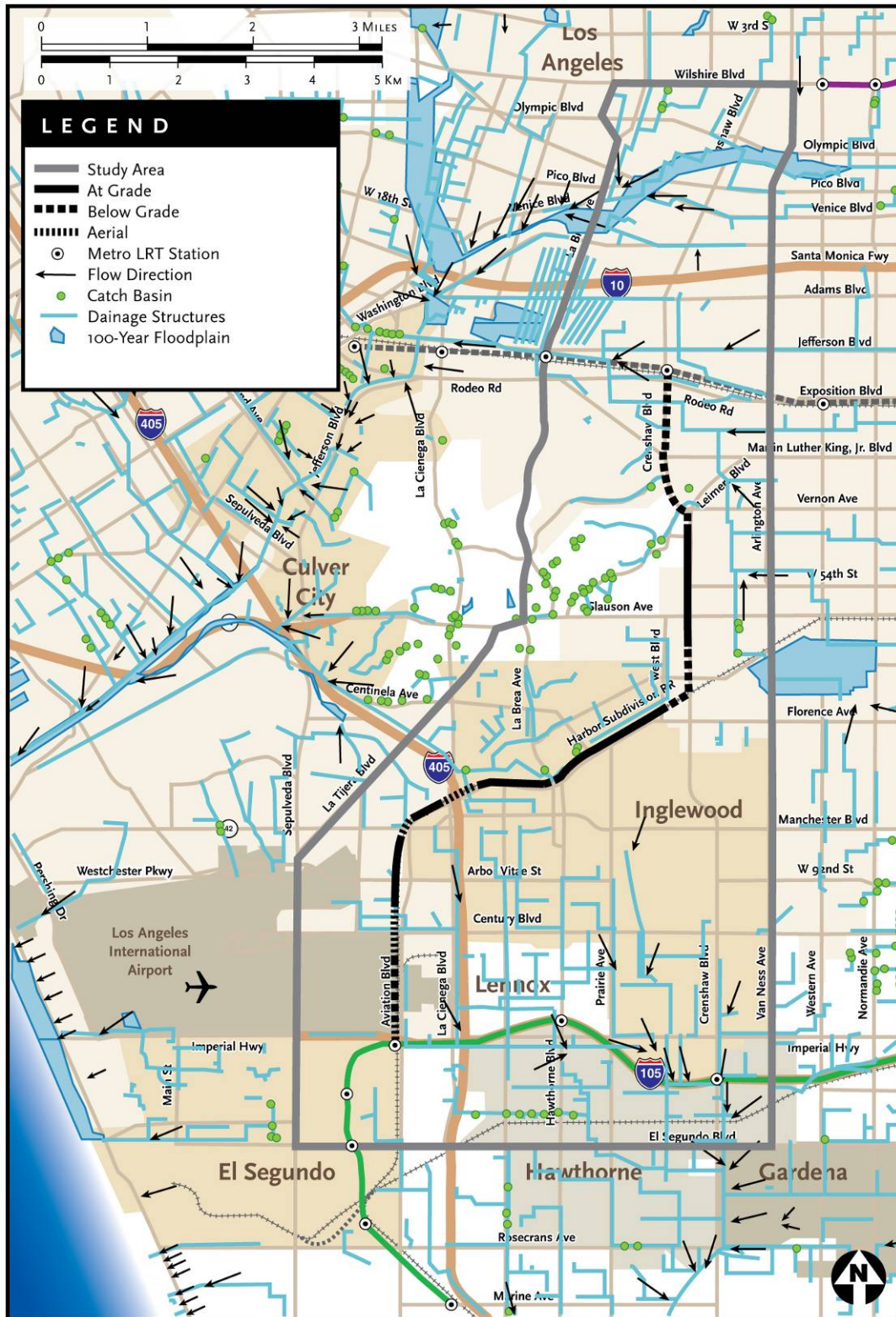
4.9.1.3 Local Surface Water Bodies

The project study area is highly developed with few natural areas or natural drainage features. The nearest streams to the project area are Dominguez Creek (0.9 miles east of the study area), Inglewood Cemetery (0.22 miles south), and Ballona Creek (1.4 miles west). There is also a manmade water body within Hollywood Park located 0.8 miles east of project study area. There are no waters of the U.S. or natural drainage features that cross the project corridor.

4.9.1.4 Groundwater

According to the DPW and Los Angeles RWQCB, groundwater levels range from approximately 30 to 100 feet below the ground surface between Florence Avenue and the I-105 Freeway and between Crenshaw Avenue and Aviation Boulevard. Between Slauson Avenue and Martin Luther King Jr. Boulevard, groundwater is estimated to be 175 feet below the ground surface. Between Exposition Boulevard and the I-10 Freeway, groundwater is approximately 17 feet below the ground surface. From the I-10 Freeway to Wilshire Boulevard, groundwater is estimated between seven and 30 feet below the ground surface.

Figure 4-40. Water Resources



Source: Parsons Brinckerhoff, 2010.

The project study area is within the Central Subbasin and West Coast Subbasin of the Coastal Plain of the Los Angeles Groundwater Basin. The beneficial uses of these subbasins include: Municipal and Domestic Supply (MUN), Industrial Service Supply (IND), Industrial Process Supply (PROC), Agricultural Supply (AGR), and Aquaculture (AQUA).

4.9.1.5 Local Drainage Basins

The study area is a highly urbanized environment with mostly impervious surfaces conveying runoff to storm drains. Most of the drainage networks are controlled by structural flood control measures, including debris basins, storm drains, underground culverts, and open concrete channels. There are multiple storm drains and features within the study area. Figure 4-40 shows the location of current drainage conveyance structures and the direction of flow throughout the study area. However, most of the proposed alignment is along a major arterial with curb and gutter features. The proposed project alignments do not cross major drainage features that are above ground. The project study area drains indirectly to Ballona Creek and Dominguez Creek through the Municipal Separate Storm Sewer System (MS4). Areas north of Manchester Boulevard drain to Ballona Creek Watershed, and southern areas drain to the Dominguez Creek Watershed. Also, a major storm drain inlet exists in Centinela Park outside of the proposed alternative alignments.

4.9.1.6 Water Quality

The Ballona Creek Watershed has a Total Maximum Daily Load (TMDL) for trash and metals. Ballona Creek is a 303(d) listed impaired water body for cadmium (sediment), coliform bacteria, copper, Dominguez Creek Watershed has a TMDL for trash at Machado Lake. Dominguez Creek (lined portion above Vermont Avenue) is a 303(d) listed impaired waterbody for Ammonia, Copper, Dieldrin (tissue), Indicator bacteria, Lead (tissue), Sediment Toxicity, and Zinc (sediment).

4.9.2 Environmental Impacts/Environmental Consequences

Methodology

The following section addresses the adverse effects of the proposed project and alternatives based on an analysis of the components of water resources described in the preceding section. The analysis below determined the potential effects of project alternatives, as well as the proposed maintenance and operations facility sites on the water resources of the project corridor.

4.9.2.1 Municipal Water Supply No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects to municipal water supply.

LPA

The LPA may include restroom facilities or irrigation systems for landscaping; however, with the implementation of standard water conservation measures such as water saving devices for irrigation, lavatories, and other water-using facilities, the effect of the project

on the municipal water supply would be negligible. Therefore, no adverse impacts are anticipated related to water supply.

The MOSs would have a negligible effect on the municipal water supply. Therefore, no adverse impacts related to water supply are anticipated.

Design Options

The design options would have a negligible effect on the municipal water supply. Therefore, no adverse impacts related to water supply are anticipated.

4.9.2.2 Flooding No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to flooding.

LPA

The corridor contains areas mapped under the 100-year floodplain, however, the LPA alignment does not travel through these areas. Facilities may include additional track or roadway pavement, security barriers, and equipment to accommodate the LRT guideway; however, no stations would be located within the 100-year floodplain. Drainage would be properly conveyed away from the site so as not to induce ponding or flooding on adjacent properties. With the implementation of a drainage control plan, no adverse effects due to flooding would occur.

The MOSs would not be located in a designated 100-year floodplain and drainage would be properly conveyed away from the sites. With the implementation of a drainage control plan, no adverse effects due to flooding would occur.

Design Options

The design options would not be located in a designated 100-year floodplain and drainage would be properly conveyed away from the sites. With the implementation of a drainage control plan, no adverse effects due to flooding would occur.

4.9.2.3 Local Surface Water Bodies No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to surface water bodies.

LPA

No local surface water bodies are located in the immediate vicinity of the corridor. Therefore, no adverse effects are anticipated related to surface water bodies for the LPA or MOSs.

Design Options

The design options contain no local surface water bodies. Therefore, no adverse effects related to surface water bodies are anticipated.

4.9.2.4 Groundwater Resources No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to groundwater resources.

LPA

The project area has been highly urbanized, and consists of mostly impervious surfaces with drainage structures. The LPA would require excavation below the surface level. Los Angeles RWQCB records indicate a potential for a high groundwater table around Exposition Boulevard. The below-grade segment for the LPA, which is approximately 50 feet below the ground surface, is located within a liquefaction zone that spans along Crenshaw Boulevard from the I-10 Freeway in the north to Vernon Avenue in the south. Areas of liquefaction are known to have high water tables which add to the instability of the soil. Groundwater levels at Exposition Boulevard are as high as 16 feet below ground surface and gradually decline to more than 75 feet at Vernon Avenue. Dewatering activity would likely be required along this segment.

The LPA would involve the construction of aerial structures along the Harbor Subdivision across the I-405 Freeway, Manchester Avenue, Century Boulevard, and the Metro Green Line connection. These structures would require more excavation below the surface for support columns and foundations and there would be an additional risk of encountering groundwater during excavation. Groundwater levels within two miles of these aerial structures range from 36 to 170 feet below ground surface. The highest ground water level (36 feet below ground surface) is located within two miles of the Manchester Avenue and Harbor Subdivision intersection.

Uncontaminated groundwater that is collected during dewatering operations can be treated with a small-scale treatment facility and pumped back into the groundwater table or pumped to the sewer or storm drain system or used onsite for dust control purposes. Permission from the Los Angeles RWQCB is required if groundwater is to be pumped back or discharged to the storm drain system. Contaminated groundwater is prohibited from being discharged to the storm drain system and is not anticipated to be encountered. With compliance with applicable regulations, no long-term or adverse impacts related to groundwater resources are anticipated.

The MOSs would have less excavation below the surface level than described for the LPA. Similar to the LPA, no long-term or adverse impacts related to groundwater resources are anticipated for the MOSs with compliance with applicable regulations.

Design Options

All design options would require excavation below the surface level which would have the potential to encounter groundwater. If groundwater is encountered for the design

options, during tunneling or excavation, and dewatering is necessary, a dewatering permit is required from the Los Angeles RWQCB prior to construction. With compliance with applicable regulations, no long-term or adverse impacts related to groundwater resources are anticipated.

4.9.2.5 Local Drainage Basin No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to the local drainage basin.

With the implementation of a drainage control plan, no adverse effects related to the local drainage basin would occur.

LPA

The LPA would require the new facilities for the fixed guideway, new stations, and support facilities. The LPA would also include a maintenance and operations facility and communications and signaling (C&S) buildings. C & S buildings house train control and communications for LRT operations in a central facility at each station. Each facility is an enclosure located within the station site area, typically adjacent to a station platform. There are several catch basin or storm drain structures that may require relocation or temporary closure. There are three catch basins located at the intersection of Leimert Boulevard and Crenshaw Boulevard. There are also two catch basins located along Florence Avenue at the North La Brea Avenue intersection and at the Centinela Avenue intersection. For the LPA, a station will be built at the intersection of La Brea Avenue and Florence Avenue, where a catch basin may be affected. The proposed project would relocate or resize drainage conveyance features appropriately so that flooding or ponding is not induced on the project site or on adjacent properties. With the implementation of a drainage control plan, no adverse effects related to the local drainage basin would occur.

The MOSs contain either below grade alignments, or below-grade stations, which have the potential to affect catch basins or storm drain structures in the area. Similar to the LPA, no adverse effects related to the local drainage basin would occur with the implementation of a drainage control plan.

Design Options

The design options contain either below grade alignments, or below-grade stations, which have the potential to affect catch basins or storm drain structures in the area. If drainage facilities would be affected by these design options, drainage structures would be relocated or resized appropriately so that flooding or ponding is not induced on the alignment or on adjacent properties. With the implementation of a drainage control plan, no adverse effects related to the local drainage basin would occur.

4.9.2.6 Water Quality No-Build Alternative

The No-Build Alternative would not include activities that would result in adverse effects related to water quality.

LPA

The LPA is not anticipated to adversely affect water resources. The LPA would include construction of new stations and installation of a track for the fixed guideway. During operation, storm runoff from station platforms and fixed guideway would be conveyed to permanent treatment. Best Management Practice (BMP) controls listed in Appendix F would be used to treat storm water runoff before it is discharged off-site. In addition, implementation of Mitigation Measures **WQ1** through **WQ5** would ensure that no significant long term impacts to drainage patterns or surface water or groundwater quality. The LPA and MOSs would have a negligible effect on the municipal water supply within the project area no adverse effects to the Safe Drinking Water Act would occur. No adverse effects related to water quality are anticipated.

Design Options

The design options would convey storm runoff from station platforms and fixed guideways to permanent treatment BMP controls to treat storm water runoff before it is discharged off of the alignment. No adverse effects related to water quality are anticipated.

4.9.3 Mitigation Measures

The project alternatives must comply with Title III and Title IV of the Clean Water Act and NPDES standards during and following construction. To comply with the NPDES General Construction Permit, a Notice of Initiation would be filed with the Los Angeles RWQCB prior to construction. The project alternatives would include preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes the identification and implementation of applicable BMPs to control erosion and to ensure that dirt, construction materials, pollutants or other human-associated materials are not discharged from the project area into surface waters or into areas that would eventually drain to storm drains. The SWPPP also includes a monitoring program to ascertain the effectiveness of the prescribed BMPs. Upon completion of construction, a Notice of Termination would be filed with the Los Angeles RWQCB. The construction and permanent BMPs included as part of the proposed project shall be developed and implemented in compliance with the Los Angeles RWRCB, Metro storm water standards and shall be developed in cooperation with the Cities of Los Angeles, Inglewood, and the County of Los Angeles. Prior to approval of grading permits, an appropriate drainage control plan, such as a Standard Urban Stormwater Mitigation Plan (SUSMP) in accordance with City of Los Angeles standards, that controls construction and operational on-site and off-site runoff and drainage in a manner acceptable to Metro and Los Angeles RWQCB for the specific project site shall be implemented.

No substantial water quality or resource related impacts would result from the proposed project. In addition to the standard BMPs required for compliance with NPDES to be included as part of the proposed project, the following mitigation measures are recommended for incorporation into the project:

- WQ1** During project construction and operation, remediation should be required at maintenance facilities and vehicle storage areas, where a potential exists for grease and oil contamination to flow into storm drains. Various types of ditch

structures, including grease traps, sediment traps, detention basins, and/or temporary dikes may be used to control possible pollutants. These facilities shall be constructed pursuant to guidance published in Section 402 of the Clean Water Act and shall follow the most current guidance within the NPDES program.

- WQ2** The flood capacity of existing drainage or water conveyance features within the project study corridor shall not be reduced in a way that causes ponding or flooding during storm events. A drainage control plan shall be developed during project design to ensure that drainage is properly conveyed from the study area and does not induce ponding on adjacent properties.
- WQ3** A dewatering permit shall be required if groundwater is encountered during tunneling operations. If contaminated groundwater is encountered during construction, the contractor shall stop work in the vicinity of the suspect find, cordon off the area, and contact the appropriate hazardous waste coordinator and maintenance hazardous spill coordinator at Metro and immediately notify the Certified Unified Program Agencies (City of Los Angeles Fire Department, County of Los Angeles Fire Department, and Los Angeles RWQCB) responsible for hazardous materials or waste incidents. Coordination with the Los Angeles RWQCB shall be initiated immediately to develop an investigation plan and remediation plan for expedited protection of public health and environment. Contaminated groundwater is prohibited from being discharged to the storm drain system. The contractor shall properly treat or dispose of hazardous or toxic materials, according to local, state, and federal regulations. Potential treatment methods include, but are not limited to, extraction, treatment and reinjection, bioremediation, recirculating wall technology, deep well treatment, vapor extraction, and natural attenuation. The appropriate method of treatment and monitoring would be subject to the responsible agency determined in the Mitigation Monitoring Reporting Program.
- WQ4** The study area currently drains indirectly to Ballona Creek and Dominguez Creek through the MS4. Treatment control BMPs shall be incorporated into the project design. The project shall consider placing the treatment BMPs in series or in a complimentary system to increase the control of pollutants to the maximum extent practicable. The systems shall be designed to efficiently and effectively handle and treat dry and wet weather flows to the maximum extent practicable. A SUSMP and appropriate drainage control plan shall be implemented to select and place appropriate permanent treatment BMPs.
- WQ5** During construction of the Project, on-site integrated management strategies that employ green infrastructure strategies to capture runoff and remove pollutants shall be implemented to the extent feasible and cost effective. Green infrastructure strategies include, but are not limited to, a variety of physical, chemical, and biological processes that focus on conveying runoff to bioretention areas, swales, or vegetated open spaces.

4.9.4 CEQA Determination

The CEQA determination compares the effects of the proposed project, design options and MOSs with the existing conditions described in the affected environment/existing conditions section. In accordance with Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact related to hydrology and water quality if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; and/or
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

No-Build Alternative

There would be no impacts to water resources under the No-Build Alternative.

LPA

The study corridor is in an urbanized area in which much of the runoff does not seep into the ground. However, the LPA could result in a source of polluted runoff that could affect water quality. Therefore, a significant impact would occur to water quality.

Based on the existing groundwater levels and project design depths, the LPA would not substantially deplete groundwater supplies or interfere with recharge. The LPA would include removal of landscaping and an increase in impervious surfaces. The increase of impervious surfaces due to the construction of the proposed project would not alter the drainage or increase the amount of runoff significantly. The project would not contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems. Therefore, the LPA would result in less-than-significant impacts to depletion of groundwater supplies, and increased runoff which would affect the alteration of drainage patterns or exceed the capacity of drainage systems.

The MOSs would result in a shorter segment than the LPA and would result in less excavation than described for the LPA. Therefore, the MOSs would result in similar impacts associated with the LPA.

Design Options

The design options would involve excavation and which could create runoff and have the potential to affect water quality. Therefore, the design options would result in similar impacts associated with the LPA.

Impacts Remaining after Mitigation

The LPA, MOSs, and design options would affect existing water resources and are required to comply with NPDES permit requirements during construction. Compliance with these permitting requirements and implementation of Mitigation Measures **WQ1** through **WQ5** would ensure that no significant long term impacts to drainage patterns or surface water or groundwater quality. Therefore, with implementation of the proposed mitigation measures, a less-than-significant impact is anticipated for the LPA, MOSs and design options.

4.10 Energy

This section outlines the affected environment related to energy. A discussion of the regulatory framework is described in Appendix F, Regulatory Framework. This section describes energy use and resources in the study area and larger region, as well as a discussion of existing and future energy requirements and implications.

4.10.1 Energy Requirements

The proposed alternatives' energy needs are measured in petroleum and equivalent British Thermal Units (BTU). A BTU is the quantity of heat required to raise the temperature of water one degree Fahrenheit at sea level. Other units of energy can all be converted into equivalent BTU units and thus, the BTU is used as the basis for comparing energy consumption associated with different resources. Table 4-26 shows comparisons of various types of energy and their equivalent BTU units.

Table 4-26. Energy Comparisons

Energy Type	Energy Unit	Equivalent BTU Units
Electrical	Kilowatt-Hour (kWh)	3,412
Natural Gas	Cubic Foot	1,034
Crude Oil	Barrel (42 Gallons)	5,800,000
Gasoline	Gallon	125,000

Source: California Energy Commission, 2007.

Energy resources for transportation include petroleum, natural gas, electricity, liquefied petroleum gas, hydrogen, and biofuels such as ethanol. Currently, California's gasoline and diesel markets are characterized by increasing demands, tight supplies, and volatile and record high prices. California imports more than 50 percent of its crude oil and over 15 percent of its refined products. The state's dependence on this increasingly expensive energy resource continues to grow. Moreover, fossil fuel based transportation of products and people are a major contributor of carbon dioxide, the principal catalyst to climate change. Changes in energy supply and demand are affected by factors such as energy prices, United States' economic growth, advances in technologies, changes in weather patterns, and future public policy decisions.

Energy consumption in California continues to be dominated by growth in passenger vehicles, where 40 percent of all energy consumed in the State is used for transportation. California is the second largest consumer of transportation fuels in the world (behind the United States as a whole); more than 16 billion gallons of gasoline and four billion gallons of diesel fuels are consumed each year. California's population is estimated to exceed 44 million by 2020, which would result in substantial increases in transportation fuel demand for the State. Table 4-27 outlines the 149 million barrel increase in transportation fuel demand through 2020. California must address its petroleum infrastructure problems to secure transportation fuels to meet the needs of a growing population by adjusting choices of transportation, land use policies, and alternative fuels.

Table 4-27. California Transportation Fuel Demand

Year	Barrels (Million/year)
2005	553
2010	617
2015	661
2020	702

Source: California Energy Commission, 2007
Integrated Energy Policy Report, 2007.

Transportation energy consumption reflects the types and numbers of vehicles, the extent of their use (VMT), and their fuel economy (miles per gallon). Implementation of the proposed alternatives is expected to result in changing the dynamics of all vehicle classes with regard to VMT. Changes in VMT, in turn, would affect energy consumption. VMT is also important in determining the demand for infrastructure improvements. Urban growth patterns have caused California’s VMT to increase at a rate of over three percent a year between 1975 and 2004. In 2005, SCAG data showed automobile VMT in California at 372 million, which is equivalent to 2.14 trillion BTUs or 368,966 barrels of oil.

SCAG estimates the VMT for transportation plans. SCAG projections show a 29 percent increase in VMT from 2008 to 2035. The number of VMT is directly related to energy use and is the main contributor to air pollutants in the SCAG region. A reduction in VMT through alternative modes of transportation would lower energy needs and reduce pollutant emissions.

Table 4-28 displays the energy requirements for various modes of transportation including automobile, bus, light rail transit (LRT) vehicle, and commuter rail vehicle as provided by the Oak Ridge National Laboratory. The Oak Ridge National Laboratory has only provided one level of energy intensity for transit buses regardless of the fuel type (e.g., compressed natural gas or diesel). The LRT transport mode energy intensity does account for electric use.

Table 4-28. Transportation Energy Intensity

Transport Mode	BTU/mile
Passenger Vehicles	5,489
Transit Bus (all vehicle types)	38,275
LRT	25,591

Source: Oak Ridge National Laboratory, *Transportation Energy Book: Edition 27-2008*, 2008; Sound Transit, *Regional Transit Long-Range Plan Final SEIS*, June 2005.

Table 4-29 shows the energy usage associated with motor vehicles within Los Angeles County. Currently, energy usage within the County of Los Angeles is approximately 788 billion BTUs. Energy usage associated with motor vehicles within the County of Los Angeles could approach 911 billion BTUs by 2030.

Table 4-29. Motor Vehicle Energy Usage within Los Angeles County

Scenario	BTU
2008 Existing	787,906,800,000
2030 Future No Project	910,854,000,000

Source: EMFAC2007.

4.10.2 Energy Implications

Considering the data and information presented regarding the existing energy conditions, the implementation of public transit projects such as the proposed alternatives would help to remove excess vehicles from roadways and freeways, easing the increase in VMT and the usage of fuels. Lower VMT would also result in a reduction of vehicle emissions. As such, the proposed alternatives would likely have beneficial implications with regard to the region’s energy resources.

4.10.3 Environmental Impacts/Environmental Consequences

4.10.3.1 Methodology

Energy use for each alternative was calculated on the BTU per passenger-mile rate shown in Table 4-28. The passenger-miles for each alternative were obtained from the transportation model.

4.10.3.2 Energy No-Build Alternative

The No-Build Alternative would not include physical changes to the corridor. This alternative would not result in new activity and would not have an adverse energy impact.

LPA

The LPA provides for new LRT services in the corridor. The new services would be operated by high-floor articulated vehicles electrically powered by an overhead wire operating along a new bi-directional, fixed guideway located in a combination of exclusive and semi-exclusive rights-of-way. The alternative would include six stations, park-and-ride and bus transfer facilities at stations, a vehicle maintenance and operations facility, and traction power substations. The LPA would reduce automobile VMT by 167,384 and increase bus and light rail VMT by 3,632 in the transportation system. As shown in Table 4-30, the LPA would decrease transportation BTU consumption compared to No Build conditions by approximately 1 billion BTUs per day. This decrease would be partially offset by energy use associated with stations (479,452 BTUs per day per station) and the Maintenance and Storage Facility (88,625,726 BTUs per day). The total decrease in daily energy consumption would be approximately 736 million BTU. The LPA would result in less energy consumption than baseline conditions and, as such, would result in a beneficial energy impact.

Table 4-30. Estimated Energy Consumption (Billions BTU per day)

Source	No-Build Alternative	LPA
Transportation	2,531.3	2,530.6
Stations	--	0.003
Maintenance and Storage Facility	--	0.09
Total	2,531.3	2,530.7

Source: TAHA, 2011.

Existing with project conditions would decrease energy consumption by 42 million BTUs per day when compared to existing conditions. The Existing Plus Project scenario would result in less energy consumption than existing conditions and, as such, would also result in a beneficial energy impact. The change in energy use for existing condition is much less because it does not take into account the enhanced regional connectivity from additional rail projects that would occur in the future baseline year.

The MOSs would result in shorter segments and would not directly connect to the Expo or Green Lines. Compared to the LPA, the shorter segments would result in 35 percent fewer passenger boardings. The total decrease in daily energy consumption would be approximately 424 million BTU. Similar to the LPA, the MOSs would result in less energy consumption than No-Build conditions and, as such, would result in a beneficial energy impact.

Design Options

Partially-Covered LAX Trench Option. This design option would not increase the estimated energy consumption and may reduce it due to lower power consumption for ventilation.

Below-Grade Crossing at Centinela Option. The Below-Grade Crossing at Centinela Option would neither increase nor decrease the estimated energy consumption.

Optional Aviation/Manchester Station. The Optional Aviation/Manchester Station would result in an additional 479,452 BTUs per day of energy use. This represents less than one percent of the 736 million BTUs in energy savings obtained from changes in transportation patterns. Similar to the LPA, Optional Aviation/Manchester Station would result in a beneficial energy impact.

Optional Below-Grade Crenshaw/Vernon Station. The Below-Grade Crenshaw/Vernon Station Option would result in an additional 479,452 BTUs per day of energy use. This represents less than one percent of the 736 million BTUs in energy savings obtained from changes in transportation patterns. Similar to the LPA, Below-Grade Crenshaw/Vernon Station Option would result in a beneficial energy impact.

Alternate Southwest Portal at Crenshaw/King Station Option. A station portal at the southwest corner of the Crenshaw/Martin Luther King Jr. Boulevard intersection would neither increase nor decrease the estimated energy consumption.

4.10.4 Mitigation Measures

No mitigation measures are required.

4.10.5 CEQA Determination

The CEQA determination compares the effects of the proposed project, design options and MOSs with the existing conditions described in the affected environment/existing conditions section. The project would result in a significant impact if it would result in wasteful or inefficient consumption of energy. Existing with project conditions would decrease energy consumption by 42 million BTUs per day when compared to existing conditions. The LPA, design options, and MOSs would result in reduced regional energy consumption when compared with existing conditions. Therefore, a less-than-significant energy impact would result.