Chapter 3 – California Environmental Quality Act (CEQA) Evaluation

The proposed project is a joint project by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) and is subject to state and federal environmental review requirements. Project documentation, therefore, has been prepared in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). FHWA's responsibility for environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 United States Code Section 327 (23 USC 327) and the Memorandum of Understanding dated December 23, 2016, and executed by FHWA and Caltrans. Caltrans is the Lead Agency under CEQA and NEPA.

One of the primary differences between NEPA and CEQA is the way significance is determined. Under NEPA, significance is used to determine whether an Environmental Impact Statement (EIS), or a lower level of documentation, will be required. NEPA requires that an EIS be prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." The determination of significance is based on context and intensity. Some impacts determined to be significant under CEQA may not be of sufficient magnitude to be determined significant under NEPA. Under NEPA, once a decision is made regarding the need for an EIS, it is the magnitude of the impact that is evaluated, and no judgment of its individual significance is deemed important for the text. NEPA does not require that a determination of significant impacts be stated in the environmental documents.

CEQA, on the other hand, does require Caltrans to identify each "significant effect on the environment" resulting from the project and ways to mitigate each significant effect. If the project may have a significant effect on any environmental resource, then an Environmental Impact Report (EIR) must be prepared. Each and every significant effect on the environment must be disclosed in the EIR and mitigated if feasible. In addition, the CEQA Guidelines list a number of "mandatory findings of significance," which also require the preparation of an EIR. There are no types of actions under NEPA that parallel the findings of mandatory significance under CEQA. This chapter discusses the effects of this project and CEQA significance.

3.1 CEQA Environmental Checklist

This checklist identifies physical, biological, social, and economic factors that might be affected by the proposed project. In many cases, background studies performed in connection with the projects will indicate that there are no impacts to a particular resource. A NO IMPACT answer in the last column reflects this determination. The words "significant" and "significance" used throughout the following checklist are related to CEQA, not NEPA, impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

Project Features, which can include both design elements of the Build Alternatives, and standardized measures that are applied to all or most Caltrans projects such as

Best Management Practices (BMPs) and measures included in the Standard Plans and Specifications or as Standard Special Provisions, are considered to be an integral part of the Build Alternatives and have been considered prior to any significance determinations documented below; see Chapters 1 and 2 for a detailed discussion of these features. The annotations to this checklist are summaries of information contained in Chapter 2 in order to provide the reader with the rationale for significance determinations; for a more detailed discussion of the nature and extent of impacts, please see Chapter 2. This checklist incorporates by reference the information contained in Chapters 1 and 2.

3.1.1 Aesthetics

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

The potential for the Build Alternatives (including Design Option B) to result in adverse impacts related to aesthetics was assessed in Section 2.5, Visual/ Aesthetics, in this Initial Study/Environmental Assessment (IS/EA). The following discussion is based on that analysis.

3.1.1.1 CEQA Significance Determinations for Aesthetics

a) Less than Significant Impact. The City of Laguna Hills General Plan Conservation and Open Space Element designates Lake Hills Corporate Park, the Courtyard at La Paz, Mendocino Park, Mandeville Park, and Moulton Ranch Park as scenic vistas. The City of Lake Forest General Plan notes that the Whiting Ranch Wilderness Park, Santa Ana Mountains, the Saddleback Valley floor, as well as trees, creeks, canyons, hillsides, and other open lands provide visual changes in the urban environment that create interest and offer landmarks that communicate a sense of place and location within the community. The Laguna Woods General Plan does not identify scenic vistas within the City's sphere of influence.

The Build Alternatives (including Design Option B) would not block views of City of Laguna Hills-designated scenic vistas. As discussion in Section 2.5, Visual/Aesthetics, the Build Alternatives (including Design Option B) would not result in substantial view obstruction of the Santa Ana Mountains, which are identified as a scenic resource by the City of Lake Forest General Plan. As such, the overall view obstruction of visual resources as seen from the project limits would be less than significant. No mitigation would be required.

b) Less than Significant Impact. According to Caltrans, for a state route to be considered a scenic highway it must be included on the list of highways eligible for scenic highway designation in Streets and Highways Code Section 263. It can then be nominated for official designation by the local governing body. There are no officially designated State Scenic Highways within the vicinity surrounding the project limits. However, the *County of Orange General Plan* designates El Toro Road between Santa Margarita Parkway and Live Oak Canyon Road as a County scenic highway (a Landscape Corridor). Implementation of Alternative 2 would have the potential to remove mature trees and ornamental landscaping along El Toro Road. Although implementation of the Alternative 2 would require the removal of mature trees and vegetation along El Toro Road, measure VIS-2 would ensure the Build Alternatives (including Design Option B) install landscaping that is compatible with the existing landscape along Interstate 5 (I-5) in the project limits and surrounding area. Measure VIS-2 would ensure the Build Alternatives' landscape palettes and concept plans are implemented in consultation with the cities of Lake Forest, Laguna Woods, and Laguna Hills. The landscape concept and plant palette will be determined by the Caltrans District Landscape Architect. Therefore, with implementation of measure VIS-2, the impact of the Build Alternatives (including Design Option B) on scenic resources and historic buildings within a state scenic highway would be less than significant. No mitigation would be required.

c) Less Than Significant. The Build Alternatives (including Design Option B) would construct new transportation features in areas that are currently zoned as commercial and residential uses. Transportation features would include reconstructed soundwalls and new ramp structures that consist of roadway and some landscaping. Existing zoned uses include commercial buildings and a small park area at the end of the cul-de-sac on Bridger Road. The proposed transportation features would be generally compatible with the existing visual scenic quality of current zoned land uses since transportation uses (including I-5 and El Toro Road) represent the more dominant features of the Study Area. Although minor General Plan Amendments would be required as a result of the incorporation of non-transportation General Plan-designated land into the I-5 facility to ensure consistency with land uses as designated in the local General Plans, the Build Alternatives (including Design Option B) are consistent with the purpose and need and with the goals, policies, and objectives identified in the General Plans of Cities of Laguna Hills, Laguna Woods and Lake Forest. As discussed in Section 2.1 Land Use, implementation of minimization measures LU-1 through LU-3 would minimize or avoid the loss of landscaping. In addition, implementation of minimization measure LU-4 would reduce potential effects associated with general plan land use effects. Therefore, the impact of the Build Alternatives (including Design Option B) would be less than significant in relation to the conflict with applicable zoning and other regulations governing scenic quality

d) Less than Significant Impact Implementation of the Build Alternatives (including Design Option B) would relocate existing lighting sources and traffic signals and/or introduce additional safety lighting sources or traffic signals to the project limits. However, based on the highly built-out nature of the project corridor, sensitive viewer groups (i.e., residential uses) in the vicinity around the project limits would generally experience similar sources of lighting as compared to existing conditions. Residential uses are located to the east and west of I-5 and include residential uses along Cavanaugh Road, Gowdy Avenue, and Avenida De La Carlota (Laguna Woods Village, formerly known as Leisure World). The new northbound I-5 on-ramp from Bridger Road proposed under Build Alternatives 2 and Design Option B (Alternative 4) could expose residential uses along Cavanaugh Road and Gowdy Avenue to additional lighting sources in the form of vehicle headlights. However, the existing northbound I-5 noise barrier would be relocated to effectively shield residential uses in the vicinity from any new sources of lighting as a result of vehicle headlights. In addition, residential uses along Avenida De La Carlota would not be exposed to additional sources of lighting as a result of vehicle headlights, because implementation of the Build Alternatives (including Design Option B) would impact the existing soundwalls along southbound Avenida De La Carlota. Motorists traveling along I-5 would experience nominal lighting impacts due to high travel speeds and short duration or exposure.

In addition, the new noise barrier features could result in additional sources of glare from increased hardscape surfaces, particularly in areas along I-5 where existing landscaped soundwalls would be removed and replaced. To soften the hardscape features of the Build Alternatives (including Design Option B) and to reduce glare and radiant heat from the walls, measures VIS-2 requires the planting of vines and landscaping, where feasible, in areas where soundwalls are. As a result, the residential uses adjacent to the project limits would be subject to generally similar sources of light and glare, as compared to existing conditions. Therefore, the impact of light and glare on day and nighttime views would be less than significant. No mitigation would be required.

3.1.2 Agriculture and Forest Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

3.1.2.1 CEQA Significance Determinations for Agriculture and Forest Resources

The potential for the Build Alternatives (including Design Option B) to result in adverse impacts related to Agriculture and Forest Resources was assessed in Section 2.1, Land Use, in this IS/EA. The following discussion is based on that analysis.

a) No Impact. According to the California Department of Conservation, Division of Land Resources Protection (DLRP), Farmland Mapping and Monitoring Program data, no Prime Farmland, Unique Farmland, nor Farmland of Statewide Importance present within the Study Area. Therefore, there would be no conversion of such farmland to non-agricultural uses with implementation of the Build Alternatives (including Design Option B) and no mitigation is required.

b) No Impact. As described in Section 2.1.1, the Build Alternatives (including Design Option B) would not involve the permanent or temporary conversion of land zoned for agricultural use by the local jurisdictions' General Plans of City of Laguna Hills[1], City of Lake Forest[2], City of Laguna Woods[3], and County of Orange.[4] Additionally, based on a review of the Williamson Act Parcels map for Orange County,[5] no land under Williamson Act contract is within the project limits and, therefore, no land

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1 City of Laguna Hills. General Plan 2009. Land Use Element. Figure LU-6 Land Use Map. Website: https://www.ci.laguna-hills.ca.us/DocumentCenter/View/133/Laguna-Hills-General-Plan (accessed September 17, 2018)

2 City of Lake Forest. General Plan rev. 2016. Land Use Element. Figure LU-1 Land Use Map. Website: https://www.lakeforestca.gov/DocumentCenter/View/829/2-Land-Use-Element-revised-September-2016-PDF (accessed September 17, 2018)

3 City of Laguna Woods. General Plan 2017. Land Use Element. Exhibit A: Land Use Map. Website: https://www.cityoflagunawoods.org/wp-content/uploads/2017/09/08-2017-General-Plan-Land-Use-Element-Final.pdf (accessed September 17, 2018)

4 County of Orange. General Plan 2015. Land Use Element Map 2015. Website: https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=58442 (accessed September 17, 2018)

5 State of California DOC. Division of Land Resource Protection. Agricultural Preserves 2004. Williamson Act Parcels, Orange County, California. ftp://ftp.consrv.ca.gov/pub/dlrp/wa/Orange_WA_03_04.pdf (accessed September 17, 2018).

under contract would be impacted. Furthermore, the Build Alternatives (including Design Option B) would not conflict with existing zoning for agricultural use or a Williamson Act contract; therefore, no mitigation is required.

c), d) No Impact. In accordance to the General Plan of City of Laguna Hills, City of Lake Forest, and the County of Orange, the Study Area is not within any timberlands or forest lands. The land use designation for the Study Area is limited to commercial and urban development. The Build Alternatives (including Design Option B) would not conflict with any zoning or re-zoning of timberlands or forest lands due to the lack of these environmental resources in the Study Area. In addition, there would be no loss of forest lands or conversion of forest lands to non-forest land uses due to the lack of forest lands in the Study Area. No timberland or timberland-zoned timberland production areas are within the Study Area. Therefore, the Build Alternatives would not impact or result in the conversion of timberlands or forest lands.

e) No Impact. The Build Alternatives (including Design Option B) do not involve any forest lands or farmlands and is within a highly developed urbanized and residential area. Changes to the existing environment would not result in conversion of farmlands or forest lands to non-agricultural or non-forest uses due to the lack of such land and resources in the Study Area. Therefore, the Build Alternatives would have no impact on farmlands or forest lands and no mitigation is required.

3.1.3 Air Quality

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.				
Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

3.1.3.1 CEQA Determinations for Air Quality

The potential for the Build Alternatives (including Design Option B) to adversely impact air quality was assessed in Section 2.11, Air Quality, in this IS/EA. The following discussion is based on that analysis.

a) Less than Significant Impact. The project limits are located in the South Coast Air Basin and is within the jurisdiction of the South Coast Air Quality Management District (SCAQMD) and the California Air Resources Board (CARB). The SCAQMD is the primary agency responsible for writing the Air Quality Management Plan

(AQMP) in cooperation with the Southern California Association of Governments (SCAG), local governments, and the private sector. The AQMP provides the blueprint for meeting State and Federal ambient air quality standards. The Build Alternatives would improve vehicular traffic operations on the I-5/El Toro Road Interchange. The Build Alternatives are included in SCAG's 2016–2040 Regional Transportation Plan (RTP) and the 2019 Federal Transportation Improvement Program (FTIP), both of which were found to be conforming (see section 2.11, Air Quality). Therefore, the Build Alternatives would not conflict with the AQMP, violate any air quality standard, result in a net increase of any criteria pollutant, or expose sensitive receptors to substantial pollutant concentrations. Impacts for the Build Alternatives would be less than significant. No mitigation is required.

b) Less than Significant Impact. The Build Alternatives (including Design Option B) would not result in a cumulatively considerable net increase of any criteria pollutant for which the region is in nonattainment under an applicable Federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). Impacts for the Build Alternatives would be less than significant. No mitigation is required.

c) Less than Significant Impact. The Build Alternatives (including Design Option B) would not expose sensitive receptors to substantial pollutant concentrations. Any impacts associated with the Build Alternatives would be less than significant. No mitigation is required.

d) Less than Significant Impact. Temporary construction activities including clearing, cut-and-fill activities, grading, and paving could generate fugitive dust from soil disturbance and other emissions from the operation of construction equipment. The Build Alternatives (including Design Option B) would comply with construction standards adopted by the South Coast Air Quality Management District (SCAQMD) as well as Caltrans standardized procedures for minimizing air pollutants during construction. See Section 2.11, of this Draft IS/EA for a list of standardized Project Features (PF-AQ-1 through PF-AQ-3) that would avoid and/or minimize air quality impacts resulting from construction activities. Objectionable odors are not currently present within the project limits and construction activities, including the use of diesel equipment, would be temporary in nature and are not anticipated to emit significant odors. Similarly, impacts from the Build Alternatives would be less than significant with the Project Features listed in Section 2.11. No mitigation is required.

3.1.4 Biological Resources

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service, or NOAA Fisheries?	☐	☐	☒	☐

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

3.1.4.1 CEQA Significance Determinations for Biological Resources

The potential for the Build Alternatives (including Design Option B) to result in adverse impacts to biological resources was assessed in the *NES-MI* (October 2018), 2.13, Animal Species; and 2.14, Invasive Species, in this IS/EA. The following discussions are based on these analyses.

a) Less Than Significant Impact. As discussed in Section 2.0 and shown in Table 2.1, Federal Species Effect Determinations, based on the National Marine Fisheries Service and United States Fish and Wildlife Service species lists acquired for the proposed project, a total of 28 Federally listed and 3 State listed candidate, threatened, or endangered plant and animal species were determined to have a potential to occur in the general vicinity of the Biological Study Area (BSA). However, no Federal or State listed species were observed within the BSA, nor are they expected to occur within the project limits due to the highly developed area, lack of suitable habitat, and known distributions. There are no designated critical habitats within the BSA. A “no effect” determination has been made for all Federally listed species occurring on both the National Marine Fisheries Service and United States Fish and Wildlife Service Species Lists (refer to Table 2.1). Therefore, no impacts would occur and no avoidance, minimization, and/or mitigation measures are required. However, as identified in Section 2.13 Animal Species, the Build Alternatives (including Design Option B) do contain foraging and nesting habitat for two special-status bird species, the white-tailed kite and Cooper’s hawk. Minimization measures BIO-2 to BIO-4 have been provided to address any impacts to foraging and nesting special-status bird species within the BSA. See the Section 2.13 Animal Species for a detailed discussion. With implementation of minimization measures BIO-2 to BIO-4, impacts to special-status bird species would be less than significant.

b) No Impact. The Build Alternatives (including Design Option B) would not affect riparian habitat or other sensitive natural communities. No mitigation is required.

c) No Impact. The Build Alternatives (including Design Option B) would not affect wetlands as defined by Section 404 of the Clean Water Act. No mitigation is required.

d) No Impact. The Build Alternatives (including Design Option B) would not affect any migratory wildlife corridors or the movement of any native resident or migratory fish or wildlife species. The Build Alternatives would not impede the use of native wildlife nursery sites. No mitigation is required.

e) No Impact. The Build Alternatives (including Design Option B) would not conflict with any local policies or ordinances protecting biological resources. No mitigation is required.

f) No Impact. The Build Alternatives (including Design Option B) would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. In addition, the Build Alternatives are considered a covered action and is in conformance with the Orange County Transportation Authority Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP), Implementing Agreement (IA), and the NCCP/HCP Agreement. No mitigation is required.

3.1.5 Cultural Resources

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☒	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

3.1.5.1 CEQA Significance Determination for Cultural Resources

a) and b) Less than Significant. As discussed in Section 2.6, Cultural Resources, there are no historical resources or significant archaeological resources in the Study Area and a "No Historic Properties Affected" finding was determined to be appropriate for the Build Alternatives (including Design Option B). While not anticipated, if cultural resources are encountered during construction activities, impacts on historical resources and/or archaeological resources would be addressed through implementation of PF-CUL-1 and are considered less than significant.

c) Less than Significant. No known human remains are interred in the Study Area. While not anticipated, if human remains are encountered during activities related to

the Build Alternatives (including Design Option B), impacts on human remains would be addressed through implementation of PF-CUL-2 and are considered less than significant level.

3.1.6 Energy

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

3.1.6.1 CEQA Significance Determination for Energy

a) and b) Less than Significant. The energy analysis is based on the methodology described in the Caltrans Standard Environmental Reference, Volume 1, Chapter 13 – Energy. The energy analysis addresses both direct and indirect energy consumption. Direct energy refers to the fuel consumed by vehicles traveling within the Study Area. There are a number of other indirect energy-using phases in the lifecycle of transport systems as well, including the energy required for construction and maintenance of roads, manufacturing and service of vehicles and facilities, and production and distribution of gasoline and diesel. For purposes of this analysis, indirect energy refers to the energy associated with construction and maintenance of the Build Alternatives (including Design Option B).

Direct energy consumption for the Build Alternatives (including Design Option B) was estimated using traffic model forecasts for vehicle miles traveled (VMT) and the EMFAC2014 air quality model, which provides estimated gasoline and diesel fuel consumption rates for years 2030 and 2050 that incorporate adopted energy and conservation measures. Estimated energy consumption in 2050 is considered to be the most conservative (i.e., highest) because population and employment are projected to be higher in that year than in any earlier years. In addition, the analysis reflects approved efficiency and conservation measures in future years although it does not reflect policies that are being considered but not yet adopted. The impact of energy efficiency and conservation measures that are likely to be adopted in the future would result in lower energy consumption than projected in these estimates (i.e., new California Environmental Protection Agency fuel economy standards, transit improvements, and high-occupancy vehicle lanes). Energy consumption factors for the various transportation modes were obtained from the Transportation Energy Data Book (2019) developed by the Oak Ridge National Laboratory. These energy factors were used to calculate energy consumed by the various modes of transportation. The energy consumption of the Build Alternatives (including Design Option B) is compared to the projected 2050 baseline conditions, which assume that limited transportation improvements have occurred, but that the Build Alternatives (including Design Option B) were not implemented. Given average values of energy

consumption for various vehicles based on available data, and knowing the number of VMT, it is possible to determine energy consumption per VMT and ultimately per day or per year.

Indirect or construction energy effects involve the one-time, non-recoverable energy costs associated with construction of roadways and structures, and construction and maintenance of the vehicles using the facility. Indirect energy is calculated by determining the energy equivalent of all of the material products and operations necessary to keep the transportation system operable. The indirect energy analysis converts VMT and construction dollars into energy consumption[1]. The analysis is based on existing data from other roadway improvement projects in the United States, utilizing conversions listed in Table 3.1.1. To determine the construction energy use, the construction costs were multiplied by the indirect energy use factor provided by Caltrans' Energy and Transportation Systems Handbook (1983), which is 2.75 x 104 British thermal units (BTU) per dollar for the Build Alternatives (including Design Option B). Roadway construction energy was based on construction costs. At the time of this analysis, Alternative 2 was estimated to cost $153,858,000, and Alternative 4 (with Design Option B) was estimated to cost $171,447,000 (shown in Table 1.11 in Chapter 1.0).

Table 3.1.1: Construction Energy Consumption Factors

Mode	Factor
Construction	
Automobiles and Trucks (manufacturing)	1,410 BTU/Vehicle Mile
Roadway (construction)	24,520 BTU/2018 dollars
Maintenance	
Automobiles and Trucks	1,400 BTU/Vehicle Mile
Source: Caltrans, 1983 and 2018.	

BTU = British thermal unit

Using the annual direct energy savings and the energy consumed for construction, a payback period was calculated. The energy payback period is the amount of time it takes to recover the quantity of energy expended for construction of the Build Alternatives (including Design Option B). The energy payback period is determined by dividing the construction energy by the annual operational energy savings due to the Build Alternatives (including Design Option B), as with the following:

Example

Construction Energy/Operational Energy Savings = Payback Period
240,000 barrels of oil/31,000 barrels of oil= 7.7 years

If the Build Alternatives would use more operational energy than the Existing Condition, then there is no annual energy savings compared to the Existing Condition, and the payback period would never be met. A payback period of fewer than 5 years is considered an excellent investment, whereas a payback period of

[1] Since design is continually evolving, cost estimates used for emission calculations are based on preliminary cost.

greater than 20 years would generally be beyond the foreseeable future of the Build Alternatives.

Direct Energy Use

Implementation of the Build Alternatives (including Design Option B) would affect the use of energy resources in Orange County. The analysis of these impacts is at the regional level and is therefore, by its nature, an analysis of cumulative impacts. Three main areas of impact have been identified: (1) energy demands for construction; (2) energy demands for operation of the Build Alternatives (including Design Option B); and (3) the cumulative impacts of the growing energy demand associated with implementation of the Build Alternatives (including Design Option B).

Energy used during operation of any alternative is directly related to the gasoline and diesel consumption of automobiles and trucks. Local energy demand for transportation projects typically is dominated by vehicle fuel consumption with fuel consumption being directly related to the VMT. According to EMFAC2014, the annual VMT for vehicles operating within Orange County is forecast to be approximately 31.3 and 33.3 million miles in 2030 and 2050, respectively. The forecast VMT was adjusted to represent VMT related to implementation of the Build Alternatives (including Design Option B). The subsequent energy calculations are based on annual regional (County) VMT for 2030 and 2050.

Table 3.1.2 shows the annual direct energy consumption of the existing conditions of the Study Area in 2017, where Regional VMT is approximately 247 million with 0.22 million barrels of oil consumed and 1.23 million BTU being expended. Forecasted years, 2030 and 2050 includes No Build and the two Build Alternatives, respectively. The VMT range difference between the existing conditions and the forecasted years for the existing, no build and build conditions is presented in Table 3.1.2. Lastly, the barrel consumption range difference between the existing conditions and the forecasted years for the existing, no build and build conditions is also presented in Table 3.1.2.

Table 3.1.2: Annual Direct Energy Consumption

Alternative	Regional VMT (millions)	BTU (millions)	Million Barrels	% Change from Existing/ No Build
2017				
Existing Conditions	247	1.23	0.2154	-
2030				
No Build Alternative	260	1.30	0.2267	5.00%/ -
Alternative 2	266	1.32	0.2316	6.95%/2.08%
Alternative 4	280	1.40	0.2440	11.74%/7.00%
2050				
No Build Alternative	276	1.37	0.2402	10.32%/-
Alternative 2	282	1.40	0.2452	12.15%/2.05%
Alternative 4	284	1.42	0.2476	13.01%/3.00%

Source: LSA Associates Inc., 2019.
Notes:
1. To be able to make a comparison between energy usage of the Build Alternatives (including Design Option B), the VMTs are adjusted as if the length of the Build Alternatives were all the same, equal to 1.9 miles.
2. Regional VMT was obtained using EMFAC2014 for Orange County and adjusted to include project-related VMT.

BTU = British thermal unit
VMT = vehicle miles traveled

No Build Alternative

Under the No Build Alternative, the permanent effects on energy consumption associated with the Build Alternatives would not occur, but permanent energy consumption effects would occur due to forecast traffic (including effects associated with other transportation improvement projects included in the No Build Alternative). Energy use would occur under the No Build Alternative as depicted in Table 3.1.2 and would be greater than shown for the existing condition. Without the improvements proposed in the Build Alternatives (including Design Option B), congested traffic conditions and limitations on mobility would be more prevalent throughout the Study Area. These conditions would contribute to inefficient energy consumption, as vehicles would use extra fuel while idling in stop-and-go traffic or moving at slow speeds through congested mainline lanes, on- and off-ramps and/or local roadways. Under the No Build Alternative, transportation improvement projects would adhere to adopted regulations and policies regarding the currently available fuel energy efficiency. The fuel energy inefficiency would not be the result of actions that are inconsistent with current plans and policies.

Alternative 2

Alternative 2 would result in a regional energy consumption of 0.232 million barrels of crude oil in 2030 and 0.245 million barrels of crude oil in 2050, as shown in Table 3.1.2. That is approximately 7 percent and 12 percent increase, respectively, in crude oil usage compared to the Existing Condition. The approximately 12 percent increase in crude oil usage in Orange County is a small percentage and would not impact regional energy supply.

The project corridor is already highly developed, so it is unlikely that the addition of flyover ramp would change travel patterns in the surrounding areas in such a way that would result in a sizeable increase or decrease in the expenditure of fuel, either within the Study Area or regionally. With this alternative, more vehicles are projected to use the highway in a given period (i.e., increased VMTs), but each vehicle on the flyover ramp would be expected to use less fuel than under the Existing Condition (e.g., fewer idle emissions at existing off-ramps and through several light signals on El Toro Road). With respect to minimizing energy consumption, Alternative 2 would incorporate energy conservation measures such as selecting energy-efficient project features (e.g., lighting, pavement surface), using energy-efficient design (i.e., decrease in out of direction travel, traffic flow improvements), including ramp metering, auxiliary lanes, and other Transportation Systems Management/ Transportation Demand Management (TSM/TDM) measures to further offset increased fuel consumption associated with the projected increase in VMT.

Build Alternative 4 (including Design Option B)

Alternative 4 (including Design Option B) would result in a projected regional energy consumption of 0.244 million barrels of crude oil in 2030 and 0.247 million barrels of crude oil in 2050. That is approximately a 12 and 13 percent increase in crude oil usage compared to the Existing Condition, respectively. The increases in crude oil usage in Orange County are a small percentage of total energy use and would not impact regional energy supply.

The project corridor is already highly developed, so it is unlikely that the addition of two lanes in each direction would change travel patterns in the surrounding areas in such a way that would result in a sizeable increase in the expenditure of fuel, either within the Study Area or regionally. With this alternative, more vehicles are projected to use the highway in a given period, but each vehicle would be expected to use less fuel than under the Existing Condition.

With respect to minimizing energy consumption, Alternative 4 (including Design Option B) would incorporate energy conservation measures such as selecting energy-efficient project features (e.g., lighting, pavement surface), using energy-efficient design (i.e., decrease in out of direction travel, traffic flow improvements), including ramp metering, auxiliary lanes, and other TSM/TDM measures to further offset increased fuel consumption associated with the projected increase in VMT.

Indirect Energy Use

Energy consumed for construction and maintenance is referred to as indirect energy usage. Energy use for maintenance comprises day-to-day upkeep of equipment and systems, as well as the energy embedded in any replacement equipment, materials, and supplies. The indirect energy impacts associated with the construction and maintenance of the Build Alternatives (including Design Option B) are directly related to the total capital cost and maintenance cost.

The indirect energy consumption for the construction of each Build Alternative is summarized in Table 3.1.3 and is discussed below. If a Build Alternative would use more operational energy than the No Build Alternative operational energy, then there would be no annual energy savings compared to the No Build Alternative and the payback period would never be met.

Table 3.1.3: Indirect Energy Consumption – Construction and Maintenance

Description	Alternative 2	Alternative 4 (with Design Option B)
Construction 2030		
Vehicles-Auto BTUs (millions)	374,909	395,121
Roadway BTUs (millions)	3,399,139	4,767,180
Subtotal BTUs (millions)	3,773,994	5,162,226
Subtotal Barrels of Oil	659,559	902,172
Maintenance 2030		
Maintenance (BTUs) (millions)	372,250	392,319
Subtotal Barrels of Oil	64,515	67,993
Total BTUs (millions)	4,146,244	5,554,545
Total Barrels of Oil	724,074	970,165
Operational Direct Energy Savings	No Savings	No Savings
Payback Period	N/A	N/A

Source: LSA Associates Inc., 2019.
BTU = British thermal unit
N/A = not applicable

No Build Alternative

The primary indirect energy consumption associated with the No Build Alternative would be the manufacturing and maintenance of vehicles for use within the study corridor, as well as Caltrans' highway maintenance. Because construction work associated with the Build Alternatives (including Design Option B) would not occur, this alternative would consume the least amount of indirect energy.

Alternative 2

In addition to vehicle manufacturing, construction of structures, roadway, and other improvements, Alternative 2 would increase the short-term indirect energy consumed. Vehicle maintenance would also contribute to the energy consumed for this alternative. The future amount of crude oil use associated with the construction and maintenance of Alternative 2 is estimated to be 724,074 barrels, as shown in Table 3.1.3. There is no energy savings associated with Alternative 2 compared to the Existing Condition, so the payback period for the any of the Build Alternatives is not quantifiable.

Alternative 4 (including Design Option B)

The same factors as in Alternative 2 would result in indirect energy consumption in Alternative 4. The future crude oil consumption for Alternative 4 (with Design Option B) is estimated to be 971,165 barrels, as shown in Table 3.1.3. The overall energy consumption for Alternative 4 would be higher compared to Alternative 2. There is no energy savings associated with Alternative 4 compared to the Existing Condition, so the payback period for the any of the Build Alternatives is not quantifiable.

3.1.6.2 Conclusion

Long-term operational, direct energy impacts would occur if a Build Alternative would place a substantial demand on the regional energy supply or require substantial additional capacity, or considerably increase peak and base period demand on various energy sources. Construction of Alternatives 2 and 4 (with Design Option B) would entail the one-time energy expenditure to manufacture building materials, prepare the surface, and construct the roadway and facilities. This expenditure would be balanced by the improved system efficiency over the design life of the Build Alternatives (including Design Option B). Although Alternatives 2 and 4 (with Design Option B) would result in increased energy usage, when compared to the regional energy use, the increased expenditure related to the Build Alternatives (including Design Option B) is not considered to be substantial or adverse. The aforementioned TSM/TDM measures to be incorporated into each of the build alternatives would be designed and implemented with the intent of improving energy efficiency within the Study Area. The increases in crude oil usage in Orange County for each alternative, as presented in Table 3.1.2, above, are a small percentage of total energy use in the County. The increased energy use under Alternatives 2 and 4 (with Design Option B) would not impact regional energy supply.

3.1.6.3 Avoidance, Minimization and/or Mitigation Measures

Regional energy use would not be significantly affected under Alternatives 2 or 4 (with Design Option B. Therefore, no avoidance, minimization, or mitigation measures would be required.

3.1.7 Geology and Soils

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) 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?	☐	☐	☒	☐
e) Have soils incapable 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?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

3.1.7.1 CEQA Significance Determination for Geology and Soils

The potential for the Build Alternatives to result in impacts related to geology and soils was assessed from the County of Orange General Plan (2005), the California Department of Conservation Geologic Hazards Map (2015), the Preliminary Geotechnical Report (PGR) (July 2018), Paleontological Identification Report and Paleontological Evaluation Report (December 2018) and most current groundwater data from the Structure Preliminary Geotechnical and District Preliminary Geotechnical Reports.

a) i) No Impact. According to the Alquist-Priolo Earthquake Fault Zone map[1], the Study Area is not in an Alquist-Priolo Earthquake Fault Zone, and there are no known active or potentially active faults mapped as crossing or in the immediate vicinity of the Study Area. Because the Study Area is not crossed by a known fault and is not in an Alquist-Priolo Earthquake Fault Zone, the Build Alternatives (including Design Option B) would not expose people or structures to effects associated with fault displacement and ground rupture. No mitigation is required.

a) ii) Less Than Significant Impact. According to the Earthquake Shaking Potential for California Map (2016), majority of Orange County is within a regional classification that experiences lower levels of shaking less frequently. The project limits are not directly over any active faults, but are in close-proximity to pre-quaternary faults. According to the PGR (July 2018), the three most significant faults near the subject site is the San Joaquin Hills Fault, the Newport—Inglewood Fault Zone (S. Los Angeles section-southern), and the Newport—Inglewood Fault (offshore) faults. These three faults have been identified as capable of generating strong ground motion in the Study Area. In the Orange County General Plan (2005) Safety Element the proximity of active faults and degree of urbanization makes loss of life and risk of structural damage considerable from primary seismic hazards of ground shaking. However, with the identified existing seismic risks in Orange County, the Build Alternatives (including Design Option B) will be designed and constructed in compliance with the Caltrans Seismic Design Criteria (2013). Thus, the Build Alternatives would not further the exposure of people to substantial adverse effects resulting in risk of loss, injury, or death that involves strong seismic ground shaking. As a result, the potential for exposing people and structures to strong seismic ground shaking would be less than significant and no mitigation is required.

a) iii) Less Than Significant Impact. According to the California Seismic Hazard Zone Map for Liquefaction, there are identified liquefaction hazard zones throughout Orange County and near the project limits. Identified in the Compilation of Quaternary Surficial Deposits Map the surficial deposits involved within the project limits are Very Old Fan Deposits (Qvof) and Young Axial Channel/Alluvial Valley Deposits (Qya). Alternative 4, would encroach onto the nearby Qya surficial deposit. In addition, Table 1.2 of the Seismic Hazard Zone Report 053 labels the Qvof surficial deposit as not likely to be susceptible to liquefaction, but Qya is identified as being susceptible to liquefaction. According to the PGR (July 2018), the potential for liquefaction and its consequences, if any, should be evaluated based on geotechnical investigations to be performed for the Build Alternatives (including Design Option B). In addition, the proposed improvements are not anticipated to increase seismically induced hazards as they would be designed and constructed in compliance with seismic standards set forth in the Caltrans Seismic Design Criteria (2013); therefore, impacts related to seismically induced hazards are less than significant and no mitigation is required.

a) iv) No Impact. Based on the California Geologic Survey of Seismic Hazard Zones for the San Juan Capistrano Quadrangle, the project limits are not within any

[1] California Geological Survey. 2018, Official Maps of Earthquake Fault Zones: Web Service of Official Maps of Alquist-Priolo Earthquake Fault Zones, Sacramento. Department of Conservation, California Geological Survey. Website: http://maps.conservation.ca.gov/cgs/informationwarehouse/ (accessed September 4, 2018)

Earthquake-Induced Landslide Zones. Design and construction of the Build Alternatives (including Design Option B) would be conducted consistent with the Caltrans Highway Design Manual (2017); therefore, the potential for non-seismic landslides in the project limits would have no impact.

b) Less Than Significant Impact. Construction of the Build Alternatives (including Design Option B) would temporarily disturb soil within the State right-of-way as well as within areas needed Temporary Construction Easements (TCEs). Excavated soil in construction areas would be exposed resulting in increased potential for soil erosion during construction compared to existing conditions. During a storm event, erosion could occur at an accelerated rate due to the exposure of soils during grading activities. During all construction activities for the Build Alternatives, the construction contractor would be required to adhere to the requirements of the General Construction Permit and to implement erosion and sediment control BMPs specifically identified in the Stormwater Pollution Prevention Plan to keep sediment from moving off site into receiving waters and impacting water quality in those waters during construction. During operation, an increase in impervious surface can increase stormwater runoff volume and velocity and lead to downstream erosion. However, the Build Alternatives are linear with many stormwater discharge points that would distribute the additional stormwater runoff to multiple locations, and therefore diffusing potential erosion impacts. Erosion impacts related to water quality are specifically evaluated in Section 2.7, Water Quality and Stormwater Runoff, in this IS/EA. With implementation of Project Features discussed in Section 3.1.10, and Best Management Practices during construction and operation of the Build Alternatives, potential soil erosion or topsoil loss impacts would be less than significant. Implementing BMPs are standard for all Caltrans projects and required for the General Construction Permit. No mitigation is required.

c) Less Than Significant Impact. No issues related to soil instability in the project limits are known at this time. According to the Caltrans Preliminary Geotechnical Report, it has been determined that the embankments of the bridges within the project limits may experience seismically induced lateral deformations depending on the depth, areal extent, and post-liquefaction residual strength of the potentially liquefiable layers. However, as stated in the Preliminary Geotechnical Report such deformations would be minor. The Build Alternatives (including Design Option B) would not increase exposure to seismic hazards in the vicinity of the project limits relating to liquefaction, lateral spreading, and seismic settlement, as these are existing conditions. Design and construction of the Build Alternatives would be consistent with the Caltrans Highway Design Manual (2017); therefore, the potential effects on the structures and facilities proposed in the Build Alternatives related to unstable soils would be less than significant, and no mitigation is required.

d) Less Than Significant Impact. Much of Orange County is covered by soil considered to be expansive according to the Orange County General Plan Safety Element. The potential for impacts associated with expansive soils would be the same as with the existing condition because of the fact that improvements would be designed to address such effects. Design and construction of the Build Alternatives (including Design Option B) would be consistent with the Caltrans Highway Design Manual (2017); therefore, the potential impacts associated with expansive soils would be less than significant and no mitigation is required.

e) No Impact. The Build Alternatives (including Design Option B) would not use septic tanks or alternative methods for disposal of wastewater into subsurface soils and would not connect to existing public wastewater infrastructure. Therefore, the Build Alternatives would not result in impacts related to septic tanks or alternative wastewater disposal methods. No mitigation is required.

f) Less than Significant with Mitigation. Geologic units within the project limits include Holocene to late Pleistocene (less than 126,000 years ago) Young Axial Channel Deposits and Young Alluvial Fan Deposits, middle to early Pleistocene (126,000 years ago – 2.588 Million Years Ago [Ma]) Very Old Axial Channel Deposits and Very Old Alluvial Fan Deposits, the Pliocene (2.588–5.333 Ma) Niguel Formation, and the late to middle Miocene (5.333–15.97 Ma) Monterey Formation. Although not mapped, Artificial Fill was also noted in many portions of the Study Area during the pedestrian survey. Because of its disturbed context, Artificial Fill does not have the potential to contain scientifically significant paleontological resources. The upper 10 feet of the Young Alluvial Fan Deposits are unlikely to contain scientifically significant paleontological resources because of their young age (likely less than 4,200 years). However, the older sediments of the Young Axial Channel Deposits and the Young Alluvial Fan Deposits below a depth of 10 feet may be old enough to contain scientifically significant paleontological resources. The Very Old Axial Channel Deposits, the Very Old Alluvial Fan Deposits, the Niguel Formation, and the Monterey Formation may contain scientifically significant paleontological resources. Excavation during construction of Build Alternatives (including Design Option B) may extend below a depth of 10 feet and, therefore, may have the potential to impact paleontological resources. Measure PAL-1, provided in Section 2.9.4, requires preparation and implementation of a Paleontological Mitigation Plan in the event paleontological resources are encountered during excavation related to Build Alternatives (including Design Option B). Adherence to the PMP during construction would reduce potential impacts to less than significant.

3.1.8 Greenhouse Gas Emissions

<table>
<tr><th>Would the project:</th><th>Significant and Unavoidable Impact</th><th>Less Than Significant with Mitigation Incorporated</th><th>Less Than Significant Impact</th><th>No Impact</th></tr>
<tr><td>a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?</td><td colspan="4" rowspan="2">Caltrans has used the best available information based to the extent possible on scientific and factual information, to describe, calculate, or estimate the amount of greenhouse gas emissions that may occur related to this project. The analysis included in the climate change section of this document provides the public and decision-makers as much information about the project as possible. It is Caltrans' determination that in the absence of statewide-adopted thresholds or GHG emissions limits, it is too speculative to make a significance determination regarding an individual project's direct and indirect impacts with respect to global climate change. Caltrans remains committed to implementing measures to reduce the potential effects of the project. These measures are outlined in the climate change section that follows the CEQA checklist and related discussions.</td></tr>
<tr><td>b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?</td></tr>
</table>

3.1.9 Hazards and Hazardous Materials

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) 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?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d) 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?	☐	☐	☒	☐
e) 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 or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

3.1.9.1 CEQA Significance Determinations for Hazards and Hazardous Materials

The potential for the Build Alternatives (including Design Option B) to result in significant impacts related to hazards and hazardous materials was assessed in the *Initial Site Assessment* (ISA; October 2018) and section 2.10 Hazardous Waste/Materials. The following discussions are based on that analysis.

a) Less Than Significant Impact. As discussed in Section 2.10, Hazardous Waste/Materials, operation and maintenance of the facilities proposed as part of the Build Alternatives (including Design Option B) would continue to provide for existing transport of hazardous waste/materials associated with vehicles currently using I-5 within the project limits. No new permanent hazardous waste/materials impacts (direct or indirect) beyond existing conditions related to hazardous materials are anticipated.

Implementation of Project Features PF-HAZ-1 through PF-HAZ-4 would address any potential hazardous materials releases that may affect the public or the environment

during construction. Therefore, impacts to the public or environment through the routine transport, use, or disposal of hazardous materials during construction of the Build Alternatives would be considered less than significant.

b) Less Than Significant Impact. Please see response to VIII a). Impacts to the public or the environment through reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment would be considered less than significant.

c) Less Than Significant Impact. One private school is within 0.25 mile of the alignment of the Build Alternatives (including Design Option B): Escalade Academy at 23832 Rockfield Boulevard # 180, Lake Forest. No schools are known to be planned within 0.25 mi of the alignment of the Build Alternatives. As discussed in Responses 3.1.9.1 a) and b) above, routine hazardous materials such as paint, solvents, and fuel would be used, handled, stored, disposed of, and transported during construction of the Build Alternatives in accordance with applicable local, State, and federal regulations. Also, as previously discussed, operation of the Build Alternatives do not involve the reasonably foreseeable potential for release of hazardous emissions or handling of acutely hazardous materials, as transport of hazardous materials is subject to strict regulation beyond what occurs today. Refer also to Responses 3.1.9 a) and b) above. Routine maintenance activities during operation of the Build Alternatives would comply with applicable regulations with respect to the use, storage, handling, transport, and disposal of potentially hazardous materials. Therefore, operation of the Build Alternatives would result in less than significant impacts related to the emissions or handling of hazardous waste or materials near existing or proposed schools. No mitigation is required.

d) Less Than Significant Impact. According to the State Water Resource Control Board and the Department of Toxic Substances Control database, there are five hazardous waste sites located within the Study Area; these properties are proposed to be either fully or partially acquired for the Build Alternatives (including Design Option B). With implementation of measure HAZ-1, the Build Alternatives (including Design Option B) would have less than significant impact related to the acquisition of known hazardous waste sites. As a result, these sites would not create a significant hazard to the public or the environment.

e) No Impact. The Build Alternatives (including Design Option B) are not within 2 miles of a public airport or a private airstrip, and the Study Area is not located in any airport land use plan area. Therefore, the Build Alternatives would not result in an airport-related safety hazard for people residing, accessing, or working within the project limits and no mitigation is required.

f) Less Than Significant Impact. Operation of the Build Alternatives (including Design Option B) would benefit any existing adopted emergency response plan or emergency evacuation plan because the Build Alternatives would help ease congestion along the I-5 mainline and reduce travel time. Therefore, the construction of the Build Alternatives (including Design Option B) would result in an overall net benefit. However, temporary ramp closures during construction of the Build Alternatives may interfere with existing adopted emergency response plans or emergency evacuation plans. As discussed in Chapter 1 and Section 2.4, Project Feature PF-TRA-1 will include developing a Transportation Management Plan (TMP)

that would reduce effects consisting of alternate routes and detours for emergency vehicles during construction activities. Therefore, impacts from temporary closures and construction would be considered less than significant.

g) No Impact. The Build Alternatives (including Design Option B) are not within or adjacent to existing wildlands that could expose people or structures to a significant risk of loss, injury, or death involving wildland fires. Therefore, no impacts are anticipated.

3.1.10 Hydrology and Water Quality

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
(iv) impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

3.1.10.1 CEQA Significance Determination for Hydrology and Water Quality

The potential for the Build Alternatives (including Design Option B) to adversely impact hydrology and water quality was assessed in the *Water Quality Assessment Report* (November 2018), *Local Hydraulic Study Memo (2018)*, *Water Quality Assessment Report Addendum* (December 2018) and Section 2.7, Water Quality and Stormwater Runoff, of this IS/EA.

a) Less Than Significant Impact. The Build Alternatives (including Design Option B) would reconstruct the I-5/El Toro Road Interchange within the project limits by reconfiguring or realigning off-ramps/ on-ramps and/or the construction of new on- and off-ramps and/or new intersections. The Build Alternatives would include the construction of retaining walls, noise barriers, and structures. The Build Alternatives would have a Disturbed Soil Area (DSA) that ranges from 9.79 acres (ac) to 17.48 acres.

Temporary impacts to water quality anticipated during construction of the Build Alternatives include possible sediment transport caused by soil disturbing activities such as excavation and trenching, soil compaction, cut and fill activities, grading, demolition, and bridge construction. The Build Alternatives may also have temporary water quality impacts from concrete waste created from the proposed structures (retaining wall/bridges/soundwalls), trash from workers and construction waste, petroleum products from construction equipment and/or vehicles, sanitary wastes from portable toilets and any other chemicals used for construction such as coolants used for equipment and/or concrete curing compounds.

The Build Alternatives (including Design Option B) would be required to comply with the State Water Resource Control Board, National Pollutant Discharge Elimination System (NPDES) Construction General Permit, and prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) and determine a Risk Level based on potential erosion and transport to receiving waters. The SWPPP will identify temporary BMPs to address the potential temporary impacts to water quality (identified in Project Feature PF-WQ-3). The BMPs identified in the SWPPP will include measures such as temporary soil stabilization measures, linear sediment barriers (i.e. silt fence, gravel bag berms, fiber rolls), and construction site waste management (i.e. concrete washout, construction materials storage, litter/ waste management).

The Build Alternatives (including Design Option B) consist of new mainline, ramp and local roadway improvements that would result in an increase in impervious surface therefore, an increase in storm water runoff. The increase in impervious surface would also result in long-term impacts that involve alteration in drainage patterns on the roadways as well as long-term discharges of pollutants typically generated by the operation of a transportation facility. Pollutants typically generated during the operation of a transportation facility include sediment/ turbidity, nutrients, trash and debris, bacteria and viruses, oxygen-demanding substances, organic compounds, oil and grease, pesticides and metals. The Build Alternatives would create a new impervious surface that ranges from 3.0 acres to 6.32 acres.

Currently runoff from the project limits discharges to the receiving water bodies untreated. The Build Alternatives will include Caltrans approved post construction treatment BMPs to remove pollutants that have entered stormwater runoff prior to discharge off site. These BMPs include but are not limited to biofiltration swales, design pollution prevention (DPP) infiltration areas, detention and infiltration devices, media filters, pervious pavement, multichamber treatment train, Wet Basin and/or Open Graded Friction Course.

To address long-term impacts of the Build Alternatives, the Build Alternatives will incorporate Caltrans approved treatment BMPs and/or evaluate Low Impact

Development (LID) strategies consistent with the Caltrans Statewide NPDES permit as outlined in Project Features (PF-WQ-1 and PF-WQ-5) which address permanent impacts to water quality.

With the implementation of the Project Features (PF-WQ-1 through PF-WQ-6), the Build Alternatives would not substantially degrade water quality either during construction or operation of the proposed improvements.

b) Less Than Significant Impact. It is anticipated that the Build Alternatives (including Design Option B) would not encounter groundwater during construction. The Build Alternatives would not 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 level. If the Build Alternatives require the discharge of groundwater encountered/extracted during construction of structures (i.e., bridges, retaining walls, noise barriers, sign foundations) the discharge must comply with General Waste Discharge Requirements (WDRs) from the San Diego Regional Water Quality Control Board. These WDRs addresses temporary dewatering operations during construction. Dewatering BMPs must be used to control sediment and pollutants, and the discharges must comply with the WDRs issued by the San Diego Regional Water Quality Control Board. Project Feature PF-WQ-6 addresses temporary impacts due to the discharge of groundwater to surface water during construction.

c) i) Less Than Significant Impact. Potential temporary impacts to water quality anticipated during construction of the Build Alternatives (including Design Option B) include possible sediment transport caused by Disturbed Soil Areas created by construction activities such as excavation and trenching, soil compaction, cut and fill activities, grading, demolition, and bridge construction. Any erosion and siltation that may occur during construction would be from Disturbed Soil Areas created by the excavation/grading. The potential erosion/siltation would be addressed by the installation and implementation of temporary BMPs identified in the SWPPP as part of Project Feature PF-WQ-3. Postconstruction erosion/siltation is addressed by the installation of permanent soil stabilization BMPs as part of Project Feature PF-WQ-4.

c) ii) Less than Significant Impact. The Build Alternatives (including Design Option B) would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite. The Build Alternatives would increase the impervious surface between 3.0 acres to 6.32 acres based on the Build Alternative.

c) iii) Less than Significant Impact. The Build Alternatives (including Design Option B) would not exceed the capacity of the existing or planned stormwater drainage systems. As indicated previously, the Build Alternatives may contribute additional sources of pollutants during construction. Potential temporary impacts to water quality that can be anticipated during construction include sediments from grading and excavation operations, trash from workers and construction waste, petroleum products from construction equipment and/or vehicles, concrete waste, sanitary wastes from portable toilets and any other chemicals used for construction such as coolants used for equipment and/or concrete curing compounds.

The Build Alternatives may contribute additional sources of pollutants upon completion of construction. Pollutants typically generated during the operation of a transportation facility include sediment/ turbidity, nutrients, trash and debris, bacteria and viruses, oxygen-demanding substances, organic compounds, oil and grease, pesticides and metals. The Build Alternatives will incorporate Design Pollution Prevention (source control) BMPs and evaluate postconstruction treatment BMPs as required by the Caltrans NPDES permit to ensure that adequate measures are included to minimize any potential long-term impacts.

With the implementation of a SWPPP and selected temporary BMPs during construction as part of Project Feature PF-WQ-3 as well as evaluating and implementing post construction BMP strategies as part of Project Features PF-WQ-PF-4 and PF-WQ-5, the Build Alternatives would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide additional sources of polluted runoff.

c) iv) No Impact. All flood flows would be intercepted by the existing and proposed drainage inlets, and directed to the same downstream storm drain systems. Therefore, there is no impacts to impede or redirect flood flows.

d) No Impact. The Build Alternatives (including Design Option B) are not located within the floodplain (100-year flood zone). Therefore, there is no impacts related to inundation as a result of the Build Alternatives (including Design Option B).

e) No Impact. Proposed drainage designs are coordinated with Caltrans NPDES Unit to accommodate NPDES BMPs and to avoid conflicts with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

3.1.11 Land Use and Planning

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

3.1.11.1 CEQA Significance Determinations for Land Use and Planning

The potential for the Build Alternatives to result in adverse impacts related to land use and planning was assessed in Sections 2.1, Land Use, and 2.2, Community Impacts, in this IS/EA. The following discussions are based on those analyses.

a) No Impact. The project limits consist of an existing freeway with interchanges/ ramps, retaining walls, noise barriers, and other structural features. The areas adjacent to both sides of the project limits are developed with residential and

nonresidential urban uses. The existing land uses immediately adjacent to I-5 to the east, consist primarily of single and multi-family residential, commercial, and a local park and recreation facility. Similarly, existing land uses immediately west of I-5 consist of single and multi-family residential, commercial, and a church. Construction of the Build Alternatives would require TCEs on nonresidential properties in the project limits but would not on land currently being used for residences. Because most of the TCEs would be on land currently being used for landscaping and parking lots adjacent to the existing I-5 right-of-way, the temporary use of such land for construction activities would not adversely affect community character, divide existing land uses or existing communities, or create barriers between existing communities. No mitigation is required.

b) Less than Significant Impact. The Build Alternatives (including Design Option B) are included in the 2016 RTP, which was found to be conforming by the FHWA/FTA in June 2016. The Build Alternatives (including Design Option B) are included in Amendment #19-03 of the 2019 FTIP (Project ID: ORA131105) which was found to be conforming by the FHWA/FTA in March 2019. The design concept and scope of the Build Alternatives are consistent with the project description in the 2016–2040 RTP/SCS and 2019 FTIP and is intended to meet the traffic needs in the area based on local land use plans. Thus, the Build Alternatives are consistent with these regional and federal transportation plans.

Although minor General Plan Amendments would be required as a result of the incorporation of non-transportation General Plan-designated land into the I-5 facility to ensure consistency with land uses as designated in the local General Plans, the Build Alternatives (including Design Option B) are consistent with the purpose and need and with the goals, policies, and objectives identified in the General Plans of Cities of Laguna Hills, Laguna Woods and Lake Forest. Therefore, the Build Alternatives would not change the existing land use patterns along I-5 because I-5 is an existing transportation facility in a highly developed area, and the Build Alternatives would result in limited amount of property acquisition. As discussed in Section 2.1 Land Use, implementation of minimization measures LU-1 through LU-3 would minimize or avoid the loss of landscaping. In addition, implementation of minimization measure LU-4 would reduce potential effects associated with general plan land use effects.

3.1.12 Mineral Resources

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

3.1.12.1 CEQA Significance Determinations for Mineral Resources

The potential for the Build Alternatives (including Design Option B) to result in adverse impacts related to mineral resources was assessed based on information from the Orange County General Plan (2005).

a) and b) No Impact. The Resources Element of the Orange County General Plan[1] identifies significant construction aggregate resources are available in undisclosed portions of San Juan Creek, Trabuco Canyon, and the Santa Ana River. A review of the Surface Mining and Reclamation Act of 1975 maps[2] indicates that there are no aggregate production areas in the Study Area. In addition, Figure VI-3 in the Resources Element of the Orange County General Plan does not display any mineral resource areas near the project limits. The Build Alternatives (including Design Option B) are confined to primarily disturbed areas and previously paved areas with no mineral resources available in the vicinity. Therefore, there would be no impact to mineral resources from the Build Alternatives.

3.1.13 Noise

Would the project result in:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or 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 expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

3.1.13.1 CEQA Significance Determinations for Noise

The potential for the Build Alternatives (including Design Option B) to result in significant noise impacts was assessed in Noise Study Report (December 2018), Noise Abatement Decision Report (February 2019) and Section 2.12, Noise, in this IS/EA. The following discussion is based on that analysis.

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1 County of Orange General Plan. 2013. Chapter VI. Resources Element. Website: https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=40235 (accessed September 4, 2018).

2 California Geological Survey. 2012. Aggregate Sustainability in California. Website: http://www.conservation.ca.gov/cgs/information/publications/ms/Documents/MS_52_2012.pdf (accessed September 4, 2018).

a) Less Than Significant Impact. As discussed in Section 2.12, Noise, short-term, construction-related noise impacts would occur as a result of construction of the Build Alternatives (including Design Option B). However, construction of the Build Alternatives (including Design Option B) would be in compliance with Caltrans Standard Specifications Section 14-8.02, as outlined in Project Feature PF-N-1. Therefore, temporary impacts are considered less than significant. Many of the residents within the Study Area are currently, and would continue to be exposed to, traffic noise approaching or exceeding Caltrans noise abatement criteria (NAC) and noise standards in the General Plans of the Cities of Lake Forest, Laguna Hills, and Laguna Woods. However, as summarized in Tables 2.12.6 and 2.12.7, as the Build Alternatives would not result in any substantial noise level increases in the Study Area, no significant noise impact would occur under CEQA. Noise abatement measures, including noise barriers, have been evaluated to address noise impacts. Therefore, long-term impacts are considered less than significant.

b) Less Than Significant Impact. During construction, property owners and non-owner occupants of nearby receptors have the potential to be exposed to excessive vibration due to groundborne vibration and groundborne noise levels. However, no structures are expected to be exposed to vibration levels reaching a peak particle velocity (PPV) of 0.5 inch per second from transient sources and 0.25 inch per second from continuous/frequent intermittent sources. Vibration levels resulting from the Build Alternatives (including Design Option B), would not result in potential damage to nearby structures. Vibration levels from pile drivers, jackhammers, vibratory rollers, bulldozers, and other construction equipment that may produce vibration levels would potentially be perceptible by adjacent residents and would result in a temporary annoyance; however, compliance with Caltrans Standard Specifications Section 14-8.02 as outlined in Project Feature PF-N-1 would minimize vibration impacts. In addition, groundborne vibration levels from vehicles that will use the roadway facilities of the future improvements would not result in any measurable changes in vibration level compared to the existing and no-build conditions. Therefore, vibration impacts are considered less than significant.

c) No Impact. The project limits are not located within an airport land use plan and is not located within 2 miles of a public airport that would expose people or workers within the project limits to excessive noise levels. No impact would occur and no mitigation is required.

3.1.14 Population and Housing

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

3.1.14.1 CEQA Significance Determinations for Population and Housing

The potential for the Build Alternatives (including Design Option B) to result in adverse impacts related to population and housing was assessed in the Community Impact Analysis (March 2019) and Section 2.2, Community Impacts, in this IS/EA. The following discussion is based on that analysis.

a) No Impact. The Build Alternatives (including Design Option B) consist of on/off-ramp reconfigurations to I-5 from El Toro Road and would not increase capacity or population growth. The Build Alternatives would not construct new homes or businesses. New road configurations and on/off-ramp extensions would serve to reduce traffic congestion and improve traffic flow. Therefore, the Build Alternatives would not directly or indirectly induce substantial population growth.

b) No Impact. The Build Alternatives (including Design Option B) would require right-of-way acquisition. As shown in Tables 2.2.11 through 2.2.14, the right-of-way acquisition from the Build Alternatives would not displace existing housing or residents or result in the need for replacement housing, and no mitigation is required. Therefore, existing housing would not be permanently impacted and would not necessitate replacement or relocation of residents.

3.1.15 Public Services

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
i. Fire protection?	☐	☐	☒	☐
ii. Police protection?	☐	☐	☒	☐
iii. Schools?	☐	☐	☒	☐
iv. Parks?	☐	☐	☒	☐
v. Other public facilities?	☐	☐	☒	☐

3.1.15.1 CEQA Significance Determinations for Public Services

The potential for the Build Alternatives (including Design Option B) to impact public services and facilities is assessed in Sections 2.1, Land Use; 2.3, Utilities and Emergency Services, Appendix A, Section 4(f), and 2.4, Traffic and Transportation, of this IS/EA. The following discussions are based on those analyses.

a) i) and ii) Less Than Significant Impact. Fire protection and emergency medical/paramedic services in the Cities of Lake Forest, Laguna Woods and Laguna

Hills are provided by the Orange County Fire Authority under contract to those cities. The Orange County Sheriff's Department is responsible for providing law enforcement protection within unincorporated areas of Orange County, as well as incorporated cities such as Lake Forest and Laguna Woods, that contract with the Orange County Sheriff's Department for protection. During operation, the Build Alternatives (including Design Option B) would help ease congestion along the I-5 mainline and reduce travel time allowing fire and other emergency vehicles to decrease their response times. Therefore, completion of the Build Alternatives would result in an overall net benefit to emergency responders within and adjacent to the project limits. However, during construction, some impairment to the delivery of emergency services, including fire response times, may occur due to construction activities and detours. These temporary effects would be addressed through implementation of Project Feature PF-TRA-1. Therefore, temporary impacts to accessibility of fire and police protection services are considered less than significant.

a) iii) Less Than Significant Impact. Students travelling to and from the St. George's Episcopal Church preschool and Escalade Academy, which are within 0.25 mile from the project limits, would experience temporary traffic delays due to construction activities and detours. However, Project Feature PF-TRA-1 will address school access and circulation needs in order to remain fully operational during construction. Hence, temporary impacts to schools are considered less than significant. In addition, because the Build Alternatives (including Design Option B) are not considered growth inducing, they would not require construction of additional schools and no impacts are anticipated.

a) iv) Less Than Significant Impact. The Build Alternatives (including Design Option B) would result in the permanent partial acquisition of Cavanaugh Mini Park, but the existing outdated and limited facilities would be replaced with upgraded park equipment in the adjoining open space area. Currently, as discussed in Appendix A, the park facilities, being limited and outdated, are seldom used. Hence, temporary closure of the Cavanaugh Mini Park would not result in significant impacts with the implementation of minimization measures LU-5 (REL-1), LU-6 (Section 4f-1), and LU-7 (Section 4f-2). In addition, with the implementation of minimization measure LU-8 (Section 4f-3), if feasible, Caltrans would also recommend constructing the new park facilities in the proposed location in advance of the actual impacts to Cavanaugh Mini Park. This would allow the community to continue the use of the park facilities during construction and impacts to parks would be less than significant.

Additionally, the Build Alternatives are not growth inducing and would not require additional park facilities. Therefore, no impacts are anticipated.

a) v) Less Than Significant Impact. No other public facilities are located within the Study Area, and the Build Alternatives (including Design Option B) are not growth inducing Therefore, no impacts are anticipated to other public facilities.

3.1.16 Recreation

	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

3.1.16.1 CEQA Significance Determinations for Recreation

The potential for the Build Alternatives (including Design Option B) to adversely impact recreation resources was assessed in Sections 2.1, Land Use, and 2.2, Community Impacts, and Appendix A, Section 4(f), in this IS/EA. The following discussions are based on those analyses.

a) Less than Significant Impact. The Build Alternatives (including Design Option B) in themselves would not result in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur. However, both Build Alternatives (including Design Option B) would require permanent partial acquisition of land at Cavanaugh Mini Park for additional ROW along the existing I-5. Caltrans and the City of Lake Forest (entity with jurisdiction over Cavanaugh Mini Park) have been in close coordination regarding the acquisition and the City is in agreement with the Build Alternatives and the acquisition. Through coordination with the City of Lake Forest, the Build Alternatives propose to incorporate minimization measure LU-6 (Section 4f-1) to relocate the facilities of the mini park to the adjacent open space. This would provide for an opportunity to enhance and upgrade the mini park, as well as enabling the community to enjoy the facilities in the same general area. Currently, the park has outdated facilities and is seldom used. Furthermore, it is anticipated that an upgrade of the relocated mini park equipment may potentially attract more visitors than the existing park. If feasible, Caltrans would also incorporate minimization measure, LU-8 (Section 4f-3) and recommend constructing the new park facilities in the proposed location in advance of the actual impacts to Cavanaugh Mini Park, which would allow the community to continue the use of the park facilities throughout the construction phase.

In addition, according to the City of Lake Forest's Recreation and Resources Element (Element), based on the City's parkland standard (5 acres per 1,000 population standard), with existing and planned park facilities, there is a shortfall of 144 acres within the city, even with the removal of approximately 0.32 acres that is Cavanaugh Mini Park. However, the Element concludes that this deficit in the city will be offset by the recreational opportunities offered by Limestone Canyon Regional Park and Whiting Ranch Wilderness Park, other nearby regional parks, private parks,

and schools in the Planned Communities. It also concluded that due to the existing deficits, property designated for open space uses will only be allowed to change to non-open space use on certain conditions. The Build Alternatives (including Design Option B) would satisfy these conditions as Caltrans will compensate the City of Lake Forest (REL-1), in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as Amended.

With implementation of minimization measures discussed above, impacts to the Cavanaugh Mini Park are considered less than significant.

b) Less than Significant Impact. Although the Build Alternatives (including Design Option B) would not include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment, the facilities of the mini park will be relocated to the adjacent open space. This may result in minor inconveniences to the surrounding community; however, Project Feature PF-TRA-1 has been included as part of the Build Alternatives to reduce the effects of the temporary closure of the park. If feasible, Caltrans would also incorporate minimization measure, LU-8 (Section 4f-3) and recommend constructing the new park facilities in its new proposed location in advance of the actual impacts to Cavanaugh Mini Park, which would allow the community to continue the use of the park facilities throughout the construction phase

3.1.17 Transportation/Traffic

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b)) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)? NOTE: While public agencies may immediately apply Section 15064.3 of the updated Guidelines, statewide application is not required until July 1, 2020. In addition, uniform statewide guidance for Caltrans projects is still under development. The PDT may determine the appropriate metric to use to analyze traffic impacts pursuant to section 15064.3(b). Projects for which an NOP will be issued any time after December 28th, 2018 should consider including an analysis of VMT/induced demand if the project has the potential to increase VMT (see page 20 of OPR's updated SB 743 Technical Advisory), particularly if the project will be approved after July 2020.	☐	☐	☐	☒
c) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

3.1.17.1 CEQA Significance Determinations for Transportation/Traffic

The potential for the Build Alternatives (including Design Option B) to result in transportation/traffic impacts was assessed in the Traffic Volumes Report (March 2018), Traffic Study Report (August 2018), Addendum to the Traffic Study Report (January 2019), and the Section 2.4, Traffic and Transportation/Pedestrian and Bicycle Facilities of this IS/EA. The following discussion is based on those analyses.

a) Less Than Significant Impact. Construction of the Build Alternatives (including Design Option B) would temporarily impact traffic circulation and pedestrian and bicycle access in the vicinity of the project limits along and immediately adjacent to I-5. Those impacts would include short-term closures of freeway and arterial facilities as summarized in Table 2.4.12 in Section 2.4 in this IS/EA, and modifications to the existing facilities. Temporary closures are not expected to be long term and will be limited to overnight (between 10 PM and 5 AM) closures. Temporary modifications to connector and ramp facilities and arterial streets could include narrowing the widths of the travel lanes and shoulders, and reductions in the number of available travel lanes and speed limits. These temporary modifications would allow for traffic to pass through the project limits at these locations, but those travelers would be expected to experience some delays as they travel on those facilities. To minimize inconvenience to the traveling public, no two consecutive on- or off-ramps in the same direction would be closed at the same time, and temporary ramp closures are not expected to be long term at any given ramp.

The temporary closures of arterial roads would include closure of the sidewalks. The detours for vehicular traffic to travel around the closed arterials would also be signed for use by pedestrians and bicyclists. This would result in a longer travel path for both pedestrians and bicyclists and would substantially increase their travel times. However, the arterials would be closed only overnight and for very limited periods, which would minimize the effects of the closures on pedestrians and bicyclists.

Temporary mainline, ramp, and arterial closures and the temporary detours associated with those closures would not affect the Aliso Creek Bikeway, a Class I bike path. As a result, those closures under the Build Alternatives would not impact the Class I bike path and the pedestrians and bicyclists using the bike path.

Temporary impacts on motorists, pedestrians, and bicyclists would be avoided and/or minimized based on implementation of the TMP during construction as required in Measure T-1. The TMP would address short-term traffic and transportation impacts during construction. No mitigation is required.

Tables 2.4.13 through 2.4.17 in Section 2.4 in the IS/EA show the levels of service, travel times, and travel speeds for the Build Alternatives (including Design Option B) and the No Build Alternative in the AM and PM peak hours in 2030 and 2050. As shown, for most segments and ramps, the Build Alternatives perform better than the No Build Alternative in both 2030 and 2050. No mitigation is required.

The Build Alternatives are consistent with the applicable local General Plans and regional transportation plans to reduce congestion and improve operation within the project limits. In addition to the improvements on the I-5 mainline, ramps, and

intersections, the Build Alternatives would improve the intersections between the freeway ramps and the local arterial streets including accommodating pedestrians and bicycles. No mitigation is required.

b) No Impact. A uniform statewide guidance to evaluate VMT/induced demand for Caltrans projects is currently under development. Section 15064.3 of the updated Guidelines, statewide application is not required until July 1, 2020.

c) Less Than Significant Impact. The Build Alternatives (including Design Option B) would be designed, constructed, and operated consistent with the Caltrans Highway Design Manual and other applicable standards and specifications for freeways, ramps, arterial intersections, retaining walls, noise barriers, drainage features, and utility relocations/modifications. The Build Alternatives would not include hazardous design features. Farm equipment, pedestrians, and bicyclists would not be allowed to operate on the I-5 mainline and ramps. Pedestrians and bicyclists would be allowed to use arterial streets at their crossings with I-5. Therefore, the Build Alternatives would not include any hazardous design features or incompatible uses. No mitigation is required.

d) Less Than Significant Impact. As described earlier in responses to checklist questions “a i” and “a ii” in Section XIV, Public Services, construction of the Build Alternatives (including Design Option B) would result in temporary impacts to traffic circulation, including emergency services. Those impacts would be avoided and/or minimized based on implementation of the TMP during construction as required in Measure PF-TRA-1. The TMP would specifically address requirements for coordination with emergency service providers and accommodation of emergency travel routes and access to, through, and around active construction areas. In addition, Project Features PF-UES-1 and PF-UES-2, provided in Section 2.3 in the IS/EA, requires the coordination of detour plans with law enforcement, fire protection, and emergency medical service providers to minimize temporary delays in emergency response times. No mitigation is required.

In the long term, the Build Alternatives would reduce traffic congestion and travel times along the I-5 mainline and in the vicinity of the I-5/El Toro Road Interchange. The improvements as a result of the Build Alternatives are expected to improve emergency response times in the vicinity of the I-5/El Toro Road Interchange. Therefore, the Build Alternatives would not result in adverse effects on the access of emergency services in the long term.

3.1.18 Tribal Cultural Resources

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

3.1.18.1 CEQA Significance Determinations for Tribal Cultural Resources

The potential for the Build Alternative (including Design Option B) to result in impacts to Tribal Cultural Resources was assessed through Native American consultation per Assembly Bill 52 during research for the *Historic Property Survey Report* (2019) and accompanying studies. The following determinations are based on the results of the consultation process.

a) and b) No Impact. As discussed in Section 2.6, no tribal cultural resources were identified during the Assembly Bill 52 Native American consultation process for the project. No tribal cultural resources listed or eligible for listing in the California Register of Historical Resources (or local registers) would be impacted by the Build Alternatives (including Design Option B), and no tribal cultural resources determined significant by the lead agency would be impacted by the Build Alternatives (including Design Option B). No mitigation is required.

3.1.19 Utilities and Service Systems

Would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a)) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c) (originally (e)) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) (originally (g)) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

3.1.19.1 CEQA Significance Determinations for Utilities and Service Systems

The potential for the Build Alternatives (including Design Option B) to adversely impact utilities and service systems was assessed in Sections 2.3, Utilities and Emergency Services, and 2.7, Water Quality, in this IS/EA. The following discussions are based on those analyses.

a) Less Than Significant Impact: Refer to Responses to Hydrology and Water Quality (Section 3.1.10) for a discussion of the existing stormwater drainage facilities that would be extended or modified for the Build Alternatives (including Design Option B), and Section 2.3 Utilities and Emergency Facilities, for discussion of any electrical power, natural gas, or telecommunications facilities that would be relocated and/or modified for the Build Alternatives (including Design Option B). The Build Alternatives (including Design Option B) would result in the relocation or construction of new or expanded water, or wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities; however, the Build Alternatives (including Design Option B) would not substantially alter the existing drainage pattern of the site or area and appropriate resource/regulatory agency permitting would be conducted. With the incorporation of Project Features PF-WQ1 through PF-WQ6, impacts to water resources and water quality will not be significant. The Build Alternatives (including Design Option B) would result in the relocations and/or modifications of electrical power, natural gas and telecommunications facilities. However, in addition to PF-UES-1 and PF-UES-2, UES-1 would reduce impacts to less than significant and no mitigation is required.

b) No Impact. The use of water during construction of the Build Alternatives (including Design Option B) would be limited to water trucked to the site for dust control. The amount of water used during construction would be minimal. The amount of water used during operation of the Build Alternatives (including Design Option B) would be nominal and limited to areas in which revegetation requires short-term watering while the plant material becomes established. As a result, the Build Alternatives (including Design Option B) would not require the water districts serving the project limits to provide new levels or expanded entitlements of sufficient water supply available to serve the Build Alternatives and reasonably foreseeable future development during normal, dry and multiple dry years. Therefore, no impact would occur.

c) No Impact. The Build Alternatives (including Design Option B) would not result in the need for a determination by a wastewater treatment provider that it has adequate capacity to serve the Build Alternatives (including Design Option B). Therefore, no impact would occur.

d) Less Than Significant Impact. During construction of the Build Alternatives (including Design Option B), waste materials would be collected including vegetation, other plant material, and some excess soils; and solid waste such as concrete, asphalt, and wood. The waste collected during construction would be properly disposed of at an existing landfill or recycled. The amount of waste that would be generated during the construction of the Build Alternatives (including Design Option B) would be limited and would occur only during the construction period. That amount of waste generated during construction of the Build Alternatives (including Design Option B) would be nominal when compared to the total waste disposed of or recycled at area recycling facilities and landfills, on both a daily and annual basis. Therefore, the amount of waste generated during construction of the Build Alternatives (including Design Option B) is anticipated to be accommodated by the existing recycling and landfill facilities in Orange County.

The waste collected during operation of the Build Alternatives (including Design Option B) would be properly disposed of at an existing landfill or recycled and would be only incrementally, if at all greater, than what is generated during existing conditions. The amount of waste generated during the operation of the Build Alternatives (including Design Option B) would be nominal when compared to the total waste disposed of or recycled at area recycling facilities and landfills, on both a daily and annual basis. Therefore, the amount of waste generated during operation of the Build Alternatives (including Design Option B) is anticipated to be accommodated by the existing recycling and landfill facilities in Orange County.

Because the amount of waste generated during construction and operation of the Build Alternatives (including Design Option B), is anticipated to be accommodated by the existing recycling and landfill facilities in Orange County and impacts associated with solid waste disposal would be less than significant under the Build Alternatives; no mitigation is required.

e) Less Than Significant Impact. Waste materials generated during construction and operation of the Build Alternatives (including Design Option B) would be disposed of in accordance with Federal, State, and local regulations related to recycling, which would minimize the amount of waste material entering local landfills. Impacts associated with solid waste would be less than significant under the Build Alternative (including Design Option B), and no mitigation is required.

3.1.20 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒

c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

3.1.20.1 CEQA Significance Determinations for Wildfire

The potential for wildfires to adversely impact the Build Alternatives (including Design Option B) was assessed based on the information reviewed in the General Plans for the Cities of Laguna Hills, Lake Forest, and Laguna Woods.

a), b), c) and d) No Impact. Wildland fires occur in geographic areas that contain the types and conditions of vegetation, topography, weather, and structure density susceptible to risks associated with uncontrolled fires that can be started by lightning, improperly managed camp fires, cigarettes, sparks from automobiles, and other ignition sources. After reviewing the City of Laguna Woods General Plan Safety Element (November 2013), City of Laguna Hills General Plan Safety Element (July 2009) and City of Mission Viejo Public Safety Element (February 2009), the Build Alternatives (including Design Option B) are not within a fire hazard zone, and the project limits and the surrounding areas are located in highly urban areas and do not include brush- and grass-covered areas typically found in areas susceptible to wildfires. As a result, the Build Alternatives (including Design Option B) would not expose people or structures to a significant risk of loss, injury, or death associated with wildland fires. No mitigation is required.

3.1.21 Mandatory Findings of Significance

	Significant and Unavoidable Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

3.1.21.1 CEQA Significance Determinations for Mandatory Findings of Significance

a) Less Than Significant Impact. As discussed in greater detail in Section 3.1.4, Biological Resources, the Build Alternatives (including Design Option B) would not degrade the quality of environment or permanently impacts any animal or plant species or associated habitat. The Build Alternatives would potentially result in impacts to Cooper's hawk and white-tailed kite during construction; however, California Fish and Game Codes 3503, 3503.5, 3511, 3513, the Migratory Bird Treaty Act (1918), and the Caltrans 2018 Standards 14-6.03B (BIO-2 to BIO-4), will be implemented during construction. Therefore, with incorporation of the minimization measures described in Section 3.1.4, no impacts to Cooper's hawk or white-tailed kite are expected, and the impacts of the Build Alternatives (including Design Option B) are not considered cumulatively considerable and are less than significant.

b) Less Than Significant Impacts. As discussed in Section 2.15, Cumulative Impacts, some transportation and development projects may be under construction and operation at the same time as the Build Alternatives (including Design Option B). However, the Build Alternatives would result in improved operating conditions along I-5 within the project limits compared to the Existing Conditions and would not contribute to cumulative adverse effects to other resource areas. Therefore, with incorporation of minimization measures BIO-1 through BIO-4 described in Sections 2.13.3 and 2.14.4, the impacts of the Build Alternatives are not considered cumulatively considerable and are less than significant.

c) Less Than Significant Impact. As discussed throughout Chapter 2 of this IS/EA, the Build Alternatives (including Design Option B) would not result in environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly. Furthermore, the Build Alternatives would reduce traffic congestion and travel times within the project limits. This would reduce traffic delay, thereby reducing travel time and improving the human environment.

3.2 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gas (GHG) emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity,

including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (1,1,1,2-tetrafluoroethane), and HFC-152a (difluoroethane).

In the United States, the main source of GHG emissions is electricity generation, followed by transportation.[1] In California, however, transportation sources (including passenger cars, light-duty trucks, other trucks, buses, and motorcycles) are the largest contributors of GHG emissions.[2] The dominant GHG emitted is CO_2, mostly from fossil fuel combustion.

Two terms are typically used when discussing how we address the impacts of climate change: "greenhouse gas mitigation" and "adaptation." Greenhouse gas mitigation covers the activities and policies aimed at reducing GHG emissions to limit or "mitigate" the impacts of climate change. Adaptation, on the other hand, is concerned with planning for and responding to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels).

3.2.1 Regulatory Setting

This section outlines Federal and State efforts to comprehensively reduce GHG emissions from transportation sources.

3.2.1.1 Federal

To date, no national standards have been established for nationwide mobile-source GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level.

NEPA (42 United States Code [USC] Part 4332) requires federal agencies to assess the environmental effects of their proposed actions prior to making a decision on the action or project.

The FHWA recognizes the threats that extreme weather, sea-level change, and other changes in environmental conditions pose to valuable transportation infrastructure and those who depend on it. FHWA therefore supports a sustainability approach that assesses vulnerability to climate risks and incorporates resilience into planning, asset management, project development and design, and operations and maintenance practices.[3] This approach encourages planning for sustainable highways by addressing climate risks while balancing environmental, economic, and social values—"the triple bottom line of sustainability."[4] Program and project

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1 United States Environmental Protection Agency. 2017. U.S. Greenhouse Gas Inventory Report: 1990-2014 (last updated February 23, 2017.) Website: https://www.epa.gov/ghgemissions/us-greenhouse-gas-inventory-report-1990-2014.

2 California Air Resources Board (ARB). California Greenhouse Gas Emission Inventory. 2017 Edition. Website: https://www.arb.ca.gov/cc/inventory/data/data.htm.

3 Federal Highway Administration (FHWA). 2017. Sustainability (last updated October 19, 2017). Website: https://www.fhwa.dot.gov/environment/sustainability/resilience/.

4 FHWA. Sustainable Highways Initiative. Website: https://www.sustainablehighways.dot.gov/overview.aspx.

elements that foster sustainability and resilience also support economic vitality and global efficiency, increase safety and mobility, enhance the environment, promote energy conservation, and improve the quality of life. Addressing these factors up front in the planning process will assist in decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision-making.

Various efforts have been promulgated at the Federal level to improve fuel economy and energy efficiency to address climate change and its associated effects.

- The Energy Policy Act of 1992 (EPACT92, 102nd Congress H.R.776.ENR): With this act, Congress set goals, created mandates, and amended utility laws to increase clean energy use and improve overall energy efficiency in the United States. EPACT92 consists of 27 titles detailing various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings. Title III of EPACT92 addresses alternative fuels. It gave the United States Department of Energy administrative power to regulate the minimum number of light-duty alternative fuel vehicles required in certain Federal fleets beginning in fiscal year 1993. The primary goal of the program is to cut petroleum use in the United States by 2.5 billion gallons per year by 2020.

- Energy Policy Act of 2005 (109th Congress H.R.6 (2005–2006): This act sets forth an energy research and development program covering: (1) energy efficiency; (2) renewable energy; (3) oil and gas; (4) coal; (5) the establishment of the Office of Indian Energy Policy and Programs within the Department of Energy; (6) nuclear matters and security; (7) vehicles and motor fuels, including ethanol; (8) hydrogen; (9) electricity; (10) energy tax incentives; (11) hydropower and geothermal energy; and (12) climate change technology.

- Energy Policy and Conservation Act of 1975 (42 USC Section 6201) and Corporate Average Fuel Standards: This act establishes fuel economy standards for on-road motor vehicles sold in the United States. Compliance with federal fuel economy standards is determined through the Corporate Average Fuel Economy (CAFE) program on the basis of each manufacturer’s average fuel economy for the portion of its vehicles produced for sale in the United States.

The United States Environmental Protection Agency’s (USEPA) authority to regulate GHG emissions stems from the U.S. Supreme Court decision in Massachusetts v. EPA (2007). The Supreme Court ruled that GHGs meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could reasonably be anticipated to endanger public health or welfare. Responding to the Court’s ruling, the USEPA finalized an endangerment finding in December 2009. Based on scientific evidence, it found that six GHGs constitute a threat to public health and welfare. Thus, it is the Supreme Court’s interpretation of the existing Act and USEPA’s assessment of the scientific evidence that form the basis for EPA’s regulatory actions.

USEPA in conjunction with the National Highway Traffic Safety Administration (NHTSA) issued the first of a series of GHG emission standards for new cars and light-duty vehicles in April 2010[1] and significantly increased the fuel economy of all new passenger cars and light trucks sold in the United States. The standards required these vehicles to meet an average fuel economy of 34.1 miles per gallon by 2016. In August 2012, the Federal government adopted the second rule that increased fuel economy for the fleet of passenger cars, light-duty trucks, and medium-duty passenger vehicles for model years 2017 and beyond an average fuel economy of 54.5 miles per gallon by 2025. In March 2017, President Trump ordered EPA to reopen the review and reconsider the mileage target. On August 2, 2018, the federal government proposed a new rule, Safer Affordable Fuel-Efficient Vehicle Rule, which would amend the existing NHTSA's CAFE standards and tailpipe carbon dioxide emissions standards for passenger cars and light trucks and establish new standards covering model years 2021 through 2026 (NHTSA 2018). The proposal would retain the model year 2020 standards for both programs through model year 2026 (NHTSA 2018).

NHTSA and USEPA issued a Final Rule for "Phase 2" for medium- and heavy-duty vehicles to improve fuel efficiency and cut carbon pollution in October 2016[2]. The agencies estimate that the standards will save up to two billion barrels of oil and reduce CO_2 emissions by up to 1.1 billion metric tons over the lifetimes of model year 2018–2027 vehicles.

3.2.1.2 State

With the passage of legislation including State Senate and Assembly bills and executive orders, California has been innovative and proactive in addressing GHG emissions and climate change.

- Assembly Bill 1493, Pavley Vehicular Emissions: Greenhouse Gases, 2002: This bill requires the California Air Resources Board (ARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year.

- Executive Order S-3-05 (June 1, 2005): The goal of this executive order is to reduce California's GHG emissions to: (1) year 2000 levels by 2010, (2) year 1990 levels by 2020, and (3) 80 percent below year 1990 levels by 2050. This goal was further reinforced with the passage of Assembly Bill 32 in 2006 and SB 32 in 2016.

- Assembly Bill 32 (AB 32), Chapter 488, 2006: Núñez and Pavley, The Global Warming Solutions Act of 2006: Assembly Bill 32 codified the 2020 GHG emissions reduction goals as outlined in State Executive Order S-3-05, while

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1 National Highway Traffic Safety Administration (NHTSA). 2018. Website: https://one.nhtsa.gov/Laws-&-Regulations/CAFE-%E2%80%93-Fuel-Economy.

2 Federal Register. Volume 81, No. 206. Tuesday, October 25, 2016. Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium and Heavy Duty Engines and Vehicles – Phase 2. Website: https://www.govinfo.gov/content/pkg/FR-2016-10-25/pdf/2016-21203.pdf

further mandating that ARB create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." The Legislature also intended that the statewide GHG emissions limit continue in existence and be used to maintain and continue reductions in emissions of GHGs beyond 2020 (Health and Safety Code Section 38551(b)). The law requires ARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG reductions.

- Executive Order S-20-06 (October 18, 2006): This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.

- Executive Order S-01-07 (January 18, 2007): This order sets forth the low carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels must be reduced by at least 10 percent by the year 2020. ARB re-adopted the low-carbon fuel standard regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low-carbon fuel adoption necessary to achieve the governor's 2030 and 2050 GHG reduction goals.

- Senate Bill 97, Chapter 185, 2007, Greenhouse Gas Emissions: This bill requires the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

- Senate Bill 375, Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires ARB to set regional emissions reduction targets for passenger vehicles. The Metropolitan Planning Organization for each region must then develop a "Sustainable Communities Strategy" that integrates transportation, land-use, and housing policies to plan how it will achieve the emissions target for its region.

- Senate Bill 391, Chapter 585, 2009, California Transportation Plan: This bill requires the State's long-range transportation plan to meet California's climate change goals under Assembly Bill 32.

- Executive Order B-16-12 (March 2012) ordered State entities under the direction of the governor, including the ARB, the California Energy Commission, and the Public Utilities Commission, to support the rapid commercialization of zero-emission vehicles. It directs these entities to achieve various benchmarks related to zero-emission vehicles.

- Executive Order B-30-15 (April 2015) established an interim statewide GHG emission reduction target of 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. It further orders all state agencies with jurisdiction over sources of GHG emissions to implement measures, pursuant to statutory authority, to achieve reductions of GHG emissions to meet the 2030 and 2050 GHG emissions reductions targets. It also directs the ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of

carbon dioxide equivalent ($MMTCO_2e$). Finally, it requires the Natural Resources Agency to update the State's climate adaptation strategy, Safeguarding California, every 3 years, and to ensure that its provisions are fully implemented.

- Senate Bill 32, (SB 32) Chapter 249, 2016, codifies the GHG reduction targets established in Executive Order B-30-15 to achieve a mid-range goal of 40 percent below 1990 levels by 2030.

3.2.2 Environmental Setting

In 2006, the Legislature passed the California Global Warming Solutions Act of 2006 (AB 32), which created a comprehensive, multi-year program to reduce GHG emissions in California. AB 32 required the ARB to develop a scoping plan that describes the approach California will take to achieve the goal of reducing GHG emissions to 1990 levels by 2020. The scoping plan was first approved by ARB in 2008 and must be updated every 5 years. The second updated plan, *California's 2017 Climate Change Scoping Plan*, adopted on December 14, 2017, reflects the 2030 target established in State Executive Order B-30-15 and Senate Bill 32.

The AB 32 Scoping Plan and the subsequent updates contain the main strategies California will use to reduce GHG emissions. As part of its supporting documentation for the updated scoping plan, ARB released the GHG inventory for California.[1] ARB is responsible for maintaining and updating California's GHG Inventory per Health and Safety Code Section 39607.4. The associated forecast/projection is an estimate of the emissions anticipated to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented.

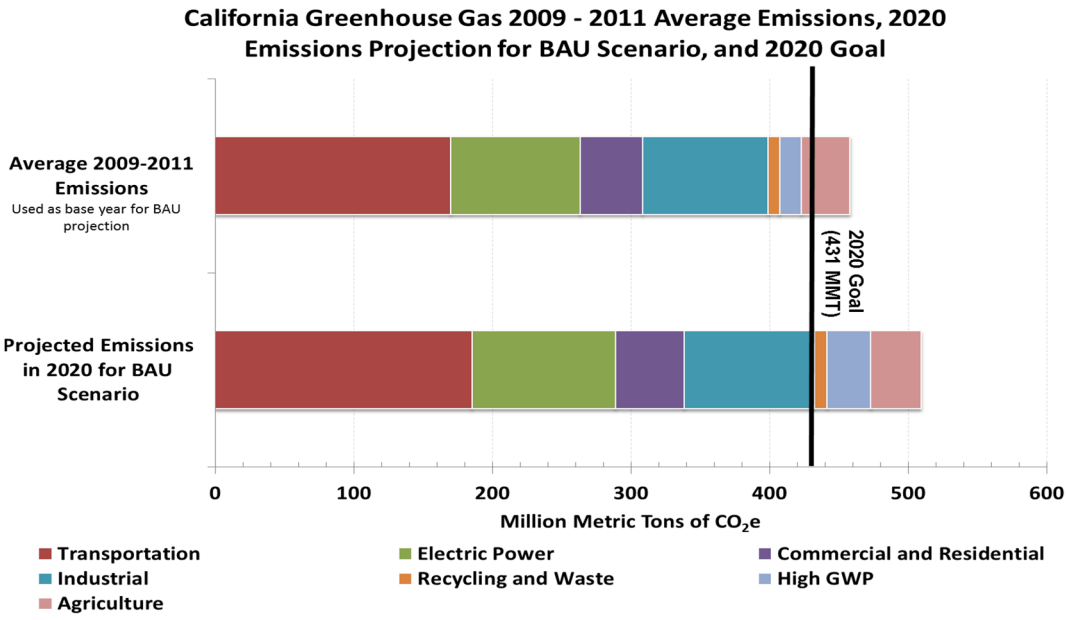
An emissions projection estimates future emissions based on current emissions, expected regulatory implementation, and other technological, social, economic, and behavioral patterns. The projected 2020 emissions provided in Figure 3-1 represent a business-as-usual (BAU) scenario assuming none of the Scoping Plan measures is implemented. The 2020 BAU emissions estimate assists ARB in demonstrating progress toward meeting the 2020 goal of 431 $MMTCO_2e$.[2] The 2018 edition of the GHG emissions inventory found total California emissions of 429 $MMTCO_2e$ for 2016, showing progress towards meeting the AB 32 goals.

The 2020 BAU emissions projection was revisited in support of the First Update to the Scoping Plan (2014). This projection accounts for updates to the economic forecasts of fuel and energy demand as well as other factors. It also accounts for the effects of the 2008 economic recession and the projected recovery. The total emissions expected in the 2020 BAU scenario include reductions anticipated from Pavley I and the Renewable Electricity Standard (30 $MMTCO_2e$ total).

1 ARB 2018 Edition of the GHG Emission Inventory (June 2018): Website: https://www.arb.ca.gov/cc/inventory/data/data.htm.

2 The revised target using Global Warming Potentials (GWP) from the International Panel on Climate Change Fourth Assessment Report (AR4).

Figure 3-1: 2020 Business as Usual (BAU) Emissions Projection 2014 Edition



Website: https://www.arb.ca.gov/cc/inventory/data/bau.htm

With these reductions in the baseline, estimated 2020 statewide BAU emissions are 509 $MMTCO_2e$.

3.2.2.1 Project Analysis

The Build Alternatives (including Design Option B) do not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may contribute to a potential impact through its *incremental* change in emissions when combined with the contributions of all other sources of GHG.[1] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable" (CEQA Guidelines Sections 15064(h)(1) and 15130). To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects.

[1] This approach is supported by the Association of Environmental Professionals: *Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the South Coast Air Quality Management District (Chapter 6: The CEQA Guide, April 2011) and the United States Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).

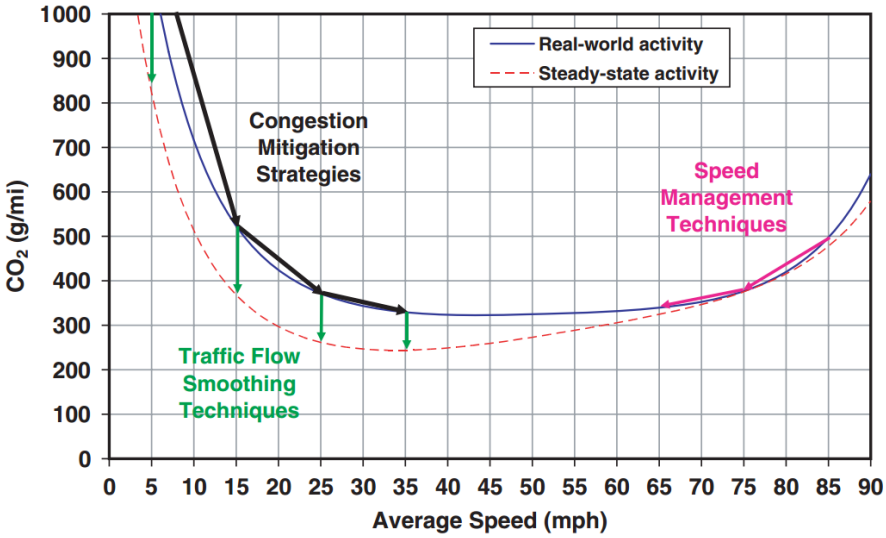
GHG emissions for transportation projects can be divided into those produced during operations and those produced during construction. The following represents a best faith effort to describe the potential GHG emissions related to the Build Alternatives (including Design Option B).

3.2.2.2 Operational Emissions

Four primary strategies can reduce GHG emissions from transportation sources: (1) improving the transportation system and operational efficiencies, (2) reducing travel activity, (3) transitioning to lower GHG-emitting fuels, and (4) improving vehicle technologies/efficiency. To be most effective, all four strategies should be pursued concurrently.

FHWA supports these strategies to lessen climate change impacts, which correlate with efforts that the State of California is undertaking to reduce GHG emissions from the transportation sector.

Figure 3-2: Possible Use of Traffic Operation Strategies In Reducing On-Road Co_2 Emissions



Source: Matthew Barth and Kanok Boriboonsomsin, University of California, Riverside, May 2010. Website: https://www.researchgate.net/publication/46438207

The highest levels of CO_2 from mobile sources such as automobiles occur at stop-and-go speeds (0–25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0–25 miles per hour (see Figure 3-2 above). To the extent that a Build Alternative relieves congestion by enhancing operations and improving travel times in high-congestion travel corridors, GHG emissions—particularly CO_2—may be reduced.

SCAG's 2016 RTP/SCS complies with the emission reduction targets established by the ARB and meets the requirements of Senate Bill 375 as codified in Government Code §65080(b) et seq. by achieving per-capita GHG emission reductions relative to 2005 of 8 percent by 2020 and 18 percent by 2035, which meets or exceeds targets

set by ARB. As required by Senate Bill 375, the SCS outlines growth strategies that better integrate land use and transportation planning and help reduce the State's GHG emissions from cars and light trucks. The Build Alternatives are listed in the 2016 RTP/SCS (project ID: 2M0717), which can be found in Appendix A of the *Revised Air Quality Report* (March 2019). The Build Alternatives will assist the region with its overall goals to reduce vehicle-related GHGs by relieving congestion and improving traffic flow, thereby reducing emissions. This is consistent with the RTP/SCS's identified strategies to manage congestion by maximizing the current system and ensuring it operates with maximum efficiency and effectiveness.

The 2016 RTP/SCS commits $6.9 billion toward TDM strategies and $9.2 billion for TSM improvements in the region. As described in Section 1.5.4.2, both TSM and TDM elements may be incorporated into the Build Alternatives. Together, congestion management, TDM, and TSM strategies will all help the region achieve its goals of VMT and vehicle hours traveled reduction. Specifically, TSM and TDM measures may provide the following benefits: lessen the number of trips, lessen peak-hour travel, conserve energy, and provide more travel alternatives. As a result, these strategies may reduce GHG emissions.

Quantitative Analysis

The Build Alternatives (including Design Option B) involve reconfiguration of the existing I-5/El Toro Road Interchange. While construction GHG emissions would be unavoidable, SCAQMD staff is recommending that construction emissions be amortized over a 30-year project lifetime, so that GHG reduction measures will address construction GHG emissions as part of the operational GHG reduction strategies.

The VMT for the Existing (2017), No Build Alternative, and Build Alternatives (including Design Option B) were estimated using the daily traffic volumes included in the *Traffic Volume Report* (March 2018). The VMT data, along with the Caltrans Emissions Factor Model (CT-EMFAC2014) emission rates, were used to calculate and compare the CO_2 emissions for the 2017, 2030, and 2050 regional conditions.

The results of the modeling were used to calculate the CO_2 emissions listed in Table 3.1.4. This table shows that both the future No Build and Build Alternatives would result in a net decrease in CO_2 emissions in 2030 and 2050, compared to the existing (2017) condition. The Build Alternatives (including Design Option B) in both opening and horizon years would result in an increase in CO_2 emissions in the region when compared to the No Build Alternative in each year. The CO_2 emissions numbers in Table 3.1.4 are only useful for a comparison between project alternatives. The numbers are not necessarily an accurate reflection of what the true CO_2 emissions would be, because CO_2 emissions are dependent on other factors that are not part of the model (e.g., the fuel mix [EMFAC model emission rates are only for direct engine-out CO_2 emissions, not full fuel cycle; fuel cycle emission rates can vary dramatically depending on the amount of additives such as ethanol and the source of the fuel components], rate of acceleration, and the aerodynamics and efficiency of the vehicles).

Table 3.1.4: Modeled Annual CO_2 Emissions and Vehicle Miles Traveled by Alternative

Alternative	Annual VMT[1]	CO_2 Emissions (MT/yr)	CH_4 Emissions (MT/yr)[2]	CO_2e Emissions (MT/yr)
Existing (2017)	247,330,664	98,277	3.40	98,362
Opening Year 2030				
No Build	260,354,933	70,238	1.87	70,285
Build Alternative 2	265,893,097	73,052	2.01	73,102
Build Alternative 4 (including Design Option B)	280,227,947	74,037	2.05	74,089
20-Year Horizon/Design Year 2050				
No Build	275,781,073	69,312	1.83	69,358
Build Alternative 2	281,538,847	71,886	1.94	71,935
Build Alternative 4 (including Design Option B)	284,320,720	72,812	1.97	72,861

Source: Compiled by LSA Associates, Inc. using CT-EMFAC2014 (2019).
[1] Annual VMT values derived from Daily VMT values multiplied by 347, per ARB methodology (ARB 2008).
[2] Methane (CH4) has a GWP value of 25 based on IPCC 4th Assessment Report (IPCC 2007). Total CO_2e emission is the sum of CO_2 emissions x GWP of 1 and CH_4 emissions x GWP of 25 (i.e., CH_2e = {CO_2 x 1} + {CH_4 x 25}).
ARB = California Air Resources Board
CH_4 = methane
CO_2 = carbon dioxide
MT/yr = metric tons per year
VMT = vehicle miles traveled

The Build Alternatives show decreases in long-term regional vehicle GHG emissions compared to the Existing Condition. However, under both Build Alternatives, emissions would be higher than under the No Build Alternative in both opening and design years. As the table shows, VMT would also be higher under the Build Alternatives compared to the no-build scenario. As previously mentioned, the TSM and TDM measures may provide the following benefits: lessen the number of trips, lessen peak-hour travel, conserve energy, and provide more travel alternatives for the Build Alternatives.

Limitations and Uncertainties with Modeling

EMFAC

Although EMFAC can calculate CO_2 emissions from mobile sources, the model does have limitations when it comes to accurately reflecting changes in CO_2 emissions due to impacts on traffic. According to the National Cooperative Highway Research Program report, *Development of a Comprehensive Modal Emission Model* (April 2008) and a 2009 University of California study[1], brief but rapid accelerations, such as those occurring during congestion, can contribute significantly to a vehicle's CO_2 emissions during a typical urban trip. Current emission-factor models do not distinguish the emission of such modal events (i.e., acceleration, deceleration) in the operation of a vehicle and instead estimate emissions by average trip speed. It is difficult to model this because the frequency and rate of acceleration or deceleration that drivers chose to operate their vehicles depend on each individual's human behavior, their reaction to other vehicles' movements around them, and their

[1] Matthew Barth, Kanok Boriboonsomsin. 2009. *Energy and emissions impacts of a freeway-based dynamic eco-driving system.* Transportation Research Part D: Transport and Environment Volume 14, Issue 6, August 2009, Pages 400–410

acceptable safety margins. Currently, the USEPA and the ARB have not approved a modal emissions model that is capable of conducting such detailed modeling. This limitation is a factor to consider when comparing the model's estimated emissions for various project alternatives against a baseline value to determine impacts.

Other Variables

With the current understanding, project-level analysis of GHG emissions has limitations. Although a GHG analysis is included for the Build Alternatives (including Design Option B), there are numerous external variables that could change during the design life of the Build Alternatives (including Design Option B) and, thus, would change the projected CO_2 emissions.

First, vehicle fuel economy is increasing. The USEPA's annual report, "Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2016,"[1] which provides data on the fuel economy and technology characteristics of new light-duty vehicles including cars, minivans, sport utility vehicles, and pickup trucks, confirms that average fuel economy improves each year with a noticeable rate of change beginning in 2005. CAFE standards remained the same between model years 1995 and 2003, subsequently increasing to higher fuel economy standards for future vehicle model years. The USEPA estimates that light duty fuel economy rose by 29 percent from model year 2004 to 2015, attributed to new technology that improved fuel economy while keeping vehicle weight relatively constant. Table 3.1.5 shows the increases in required fuel economy standards for cars and trucks between Model Years 2012 and 2025, from the NHTSA for the 2012–2016 and 2017–2025 CAFE Standards.

Table 3.1.5: Average Required Fuel Economy (miles per gallon)

	2012	2013	2014	2015	2016	2017	2018	2020	2025
Passenger Cars	33.3	34.2	34.9	36.2	37.8	39.6-40.1	41.1–41.6	44.2–44.8	55.3–56.2
Light Trucks	25.4	26	26.6	27.5	28.8	29.1-29.4	29.6–30.0	30.6–31.2	39.3–40.3
Combined	29.7	30.5	31.3	32.6	34.1	35.1-35.4	36.1–36.5	38.3–38.9	48.7–49.7

Sources: USEPA and NHTSA 2010, 2012. Website: https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-passenger-cars-and

Second, new lower-emission and zero-emission vehicles will come into the market within the expected design life of the Build Alternatives (including Design Option B). According to the 2013 Annual Energy Outlook (AEO 2013):

> "LDVs that use diesel, other alternative fuels, hybrid-electric, or all-electric systems play a significant role in meeting more stringent GHG emissions and CAFE standards over the projection period. Sales of

[1] Website: https://www.epa.gov/fueleconomy/light-duty-automotive-technology-carbon-dioxide-emissions-and-fuel-economy-trends-1975-1.

> such vehicles increase from 20 percent of all new LDV sales in 2011 to 49 percent in 2040 in the AEO2013 Reference case."[1]

The greater percentage of lower-emissions and zero-emissions vehicles on the road in the future will reduce overall GHG emissions compared to scenarios in which vehicle technologies and fuel efficiencies do not change.

Third, California adopted a low-carbon transportation fuel standard in 2009 to reduce the carbon intensity of transportation fuels by 10 percent by 2020. The regulation became effective on January 12, 2010 (codified in title 17, California Code of Regulations, Sections 95480-95490). Beginning January 1, 2011, transportation fuel producers and importers must meet specified average carbon intensity requirements for fuel in each calendar year.

Limitations and Uncertainties with Impact Assessment

Figure 3-3 illustrates how the range of uncertainties in assessing greenhouse gas impacts grows with each step of the analysis, as noted in the *National Highway Traffic Safety Administration Final EIS for MY2017–2025 CAFE Standards* (NHTSA 2012):

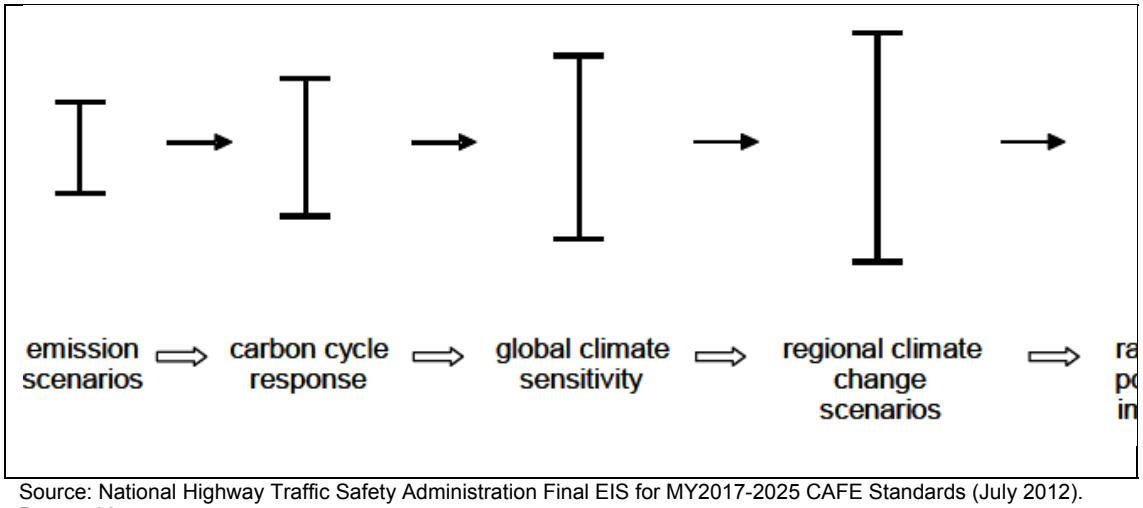
> Moss and Schneider (2000) characterize the 'cascade of uncertainty' in climate change simulations (Figure 3-3). As indicated in Figure 3-3, the emission estimates … have narrower bands of uncertainty than the global climate effects, which are less uncertain than regional climate change effects. The effects on climate are, in turn, less uncertain than the impacts of climate change on affected resources (such as terrestrial and coastal ecosystems, human health, and other resources …). Although the uncertainty bands broaden with each successive step in the analytic chain, all values within the bands are not equally likely; the mid-range values have the highest likelihood.[2]

Much of the uncertainty in assessing an individual project's impact on climate change surrounds the global nature of climate change. Even assuming that the target of 1990 levels of emissions is met, there is no regulatory or other framework in place that would allow for a ready assessment of what any modeled increase in CO_2 emissions would mean for climate change given the overall California GHG emissions inventory of approximately 430 million tons of carbon dioxide equivalent (CO_2e). This uncertainty only increases when viewed globally. The International Panel on Climate Change has created multiple scenarios to project potential future global greenhouse gas emissions as well as to evaluate potential changes in global temperature, other climate changes, and their effect on human and natural systems. These scenarios vary in terms of the type of economic development, the amount of overall growth, and the steps taken to reduce greenhouse gas emissions. Non-mitigation International Panel on Climate Change scenarios project an increase in

[1] Website: http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf.
[2] Website: http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FINAL_EIS.pdf. page 5-21.

global greenhouse gas emissions by 9.7 billion to 36.7 billion metric tons CO_2 from 2000 to 2030, which represents an increase of between 25 and 90 percent.[1]

Figure 3-3: Cascade of Uncertainty in Climate Change Simulations



Source: National Highway Traffic Safety Administration Final EIS for MY2017-2025 CAFE Standards (July 2012). Page 5-22.

The assessment is further complicated by the fact that changes in GHG emissions can be difficult to attribute to a particular project, because the projects often cause shifts in the locale for some type of GHG emissions, rather than causing "new" GHG emissions. It is difficult to assess the extent to which any project-level increase in CO_2 emissions represents a net global increase, reduction, or no change; there are no models approved by regulatory agencies that operate at the global—or even statewide—scale.

3.2.2.3 Construction Emissions

Construction GHG emissions would result from material processing, on-site construction equipment, and traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the GHG emissions produced during construction can be offset to some degree by longer intervals between maintenance and rehabilitation activities.

An estimate of the construction emissions was conducted using the Road Construction Emissions Model that was developed by the Sacramento Metropolitan Air Quality Management District. The results were used to quantify GHG emissions

[1] Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Science Basis: Summary for Policy Makers*. February 2007. Website: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/spm.html.

generated by construction of the Build Alternatives (including Design Option B) and are presented in Table 3.1.6. The Sacramento Metropolitan Air Quality Management District Road Construction Emission Model (RCEM) is included in the models

Table 3.1.6: Construction Greenhouse Gas Emissions for the Build Alternatives (including Design Option B)

Project Phases	CO_2 (tons/phase)	CH_4 (tons/phase)	N_2O (tons/phase)	CO_2e (MT/phase)
Alternative 2				
Grubbing/Land Clearing	115.21	0.02	0.00	105.32
Grading/Excavation	1,376.66	0.35	0.01	1,260.57
Drainage/Utilities/Sub-Grade	605.09	0.10	0.01	552.89
Paving	204.36	0.03	0.00	186.87
Maximum	1,376.66	0.35	0.01	1,260.57
Total (tons/construction project)	**2,301.32**	**0.50**	**0.02**	**2,105.65**
Alternative 4				
Grubbing/Land Clearing	111.32	0.02	0.00	101.74
Grading/Excavation	1,359.19	0.35	0.01	1,244.47
Drainage/Utilities/Sub-Grade	603.70	0.10	0.01	551.55
Paving	202.52	0.03	0.00	185.16
Maximum	1,359.19	0.35	0.01	1,244.47
Total (tons/construction project)	**2,276.74**	**0.50**	**0.02**	**2,082.93**

Source: Compiled by LSA Associates, Inc. using RCEM version 8.1.0 (2018).
CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
MT/phase = metric tons per phase
N_2O = nitrous oxide
tons/phase = tons per phase

recommended by SCAQMD for roadway projects.[1] GHG emissions related to the roadway widening would be mainly from CO_2, nitrous oxide (N_2O), and methane (CH_4) (reported together as CO_2e) contained in exhaust from off-road diesel construction equipment/vehicles (e.g., idling and operation of backhoes, cranes, and drilling rigs), from on-road trucks used by vendors (to deliver materials to the site) and on-site workers, and from use of portable equipment (e.g., generators). Construction is expected to start in early 2023 and would continue for 24 to 36 months. Total GHG emissions from construction would be between 1,216.25 and 1,260.57 metric tonnes CO_2e per year, totaling between 2,036 and 2,106 metric tonnes CO_2e for the construction period for Build Alternatives 1 through 4 (including Design Option B). The Roadway Construction Emissions Model spreadsheet is included in Appendix K.

Implementation of the following standardized measures, some of which may also be required for other purposes, will reduce climate change impacts resulting from construction activities.

PF-AQ-2 All construction vehicles both on and off site shall be prohibited from idling in excess of 5 minutes.

[1] Sacramento Metropolitan Air Quality Management District. *Air Quality Modeling.* Website: http://www.aqmd.gov/home/regulations/ceqa/air-quality-modeling (accessed February 20, 2017).

PF-AQ-3 The construction contractor must comply with Caltrans Standard Specifications in Section 14-9, Air Quality, which specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.

Construction equipment and vehicles will be properly tuned and maintained. All construction equipment will use low sulfur fuel as required by California Code of Regulations Title 17, Section 93114.

A TMP to reduce congestion and idling during construction will be developed and implemented. To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.

3.2.2.4 CEQA Conclusion

Although the Build Alternatives would result in a slight increase in GHG emissions during construction, it is anticipated that the Build Alternatives (including Design Option B) would show decreases in long-term regional GHG emissions compared to the Existing Condition due to improvements in motor vehicle fuel efficiency and engine technologies. However, estimated GHG emissions would be greater under the Build Alternatives than under the No-Build Alternative. This is likely due to the increases in population and VMT anticipated in the RTP/SCS. Nevertheless, the emissions from the Build Alternatives (including Design Option B) were accounted for in the conforming RTP/SCS and would not prevent the region from meeting its GHG reduction goal. In addition, as discussed above, there are also limitations with EMFAC and with assessing what a given CO_2 emissions increase means for climate change. Therefore, it is Caltrans' determination that in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a determination regarding significance of the Build Alternatives' direct impact and their contribution on the cumulative scale to climate change. However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the Build Alternatives. These measures are outlined in the following section.

3.2.2.5 Greenhouse Gas Reduction Strategies

Statewide Efforts

In an effort to further the vision of California's GHG reduction targets outlined an AB 32 and Senate Bill 32, then-Governor Jerry Brown identified key climate change strategy pillars (concepts). These pillars highlight the idea that several major areas of the California economy will need to reduce emissions to meet the 2030 GHG emissions target. As illustrated in Figure 3-4, these pillars are (1) reducing today's petroleum use in cars and trucks by up to 50 percent; (2) increasing from one-third to 50 percent our electricity derived from renewable sources; (3) doubling the energy efficiency savings achieved at existing buildings and making heating fuels cleaner; (4) reducing the release of methane, black carbon, and other short-lived climate pollutants; (5) managing farm and rangelands, forests, and wetlands so they can store carbon; and (6) periodically updating the State's climate adaptation strategy, *Safeguarding California*.

Figure 3-4: The Governor's Climate Change Pillars: 2030 Greenhouse Gas Reduction Goals

The transportation sector is integral to the people and economy of California. To achieve GHG emission reduction goals, it is vital that Californians build on our past successes in reducing criteria and toxic air pollutants from transportation and goods movement activities. GHG emission reductions will come from cleaner vehicle technologies, lower-carbon fuels, and reduction of vehicle miles traveled. One of Governor Brown's key pillars sets the ambitious goal of reducing today's petroleum use in cars and trucks by up to 50 percent by 2030.

Governor Brown called for support to manage natural and working lands, including forests, rangelands, farms, wetlands, and soils, so they can store carbon. These lands have the ability to remove CO_2 from the atmosphere through biological processes, and to then sequester carbon in above- and below-ground matter.

Caltrans Activities

Caltrans continues to be involved on the Governor's Climate Action Team as the ARB works to implement State Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. State Executive Order B-30-15, issued in April 2015, and Senate Bill 32 (2016), set a new interim target to cut GHG emissions to 40 percent below 1990 levels by 2030. The following major initiatives are underway at Caltrans to help meet these targets.

California Transportation Plan (CTP 2040)

The California Transportation Plan (CTP) is a statewide, long-range transportation plan to meet our future mobility needs and reduce GHG emissions. The CTP defines performance-based goals, policies, and strategies to achieve

our collective vision for California's future statewide, integrated, multimodal transportation system. It serves as an umbrella document for all of the other statewide transportation planning documents.

Senate Bill 391 (Liu 2009) requires the CTP to meet California's climate change goals under AB 32. Accordingly, the CTP 2040 identifies the statewide transportation system needed to achieve maximum feasible GHG emission reductions while meeting the state's transportation needs.

While metropolitan planning organizations have primary responsibility for identifying land use patterns to help reduce GHG emissions, CTP 2040 identifies additional strategies in Pricing, Transportation Alternatives, Mode Shift, and Operational Efficiency.

Caltrans Strategic Management Plan

The Strategic Management Plan, released in 2015, creates a performance-based framework to preserve the environment and reduce GHG emissions, among other goals. Specific performance targets in the plan that will help to reduce GHG emissions include:

- Increasing percentage of non-automobile mode share
- Reducing VMT per capita
- Reducing Caltrans' internal operational (buildings, facilities, and fuel) GHG emissions

Funding and Technical Assistance Programs

In addition to developing plans and performance targets to reduce GHG emissions, Caltrans also administers several funding and technical assistance programs that have GHG reduction benefits. These include the Bicycle Transportation Program, Safe Routes to School, Transportation Enhancement Funds, and Transit Planning Grants. A more extensive description of these programs can be found in *Caltrans Activities to Address Climate Change* (2013).

Caltrans Director's Policy 30 (DP-30) Climate Change (June 22, 2012) is intended to establish a department policy that will ensure coordinated efforts to incorporate climate change into departmental decisions and activities.

Caltrans Activities to Address Climate Change (April 2013) provides a comprehensive overview of activities undertaken by Caltrans statewide to reduce GHG emissions resulting from agency operations.

Project-Level Greenhouse Gas Reduction Strategies

The following measures will also be implemented in the Build Alternatives (including Design Option B) to reduce GHG emissions and potential climate change impacts from the Build Alternatives (including Design Option B).

The Build Alternatives (including Design Option B) are designed to improve traffic flow and traffic signal optimization, and to reduce freeway ramp queuing and congestion at local street intersections. The proposed improvements will improve existing and future regional mobility and traffic flow to and from the local street

network. Reducing delays and congestion will help reduce GHG emissions from idling traffic.

PF-AQ-1 through PF-AQ-3 will be implemented in the Build Alternatives (including Design Option 4) to reduce GHG emissions and potential climate change impacts from the Build Alternatives.

Adaptation Strategies

"Adaptation strategies" refer to how Caltrans and others can plan for the effects of climate change on the State's transportation infrastructure and strengthen or protect the facilities from damage—or, put another way, planning and design for resilience. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and their intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damage to roadbeds from longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. These types of impacts to the transportation infrastructure may also have economic and strategic ramifications.

Federal Efforts

At the Federal level, the Climate Change Adaptation Task Force, co-chaired by the Council on Environmental Quality, the Office of Science and Technology Policy, and the National Oceanic and Atmospheric Administration (NOAA), released its interagency task force progress report on October 28, 2011[1], outlining the federal government's progress in expanding and strengthening the nation's capacity to better understand, prepare for, and respond to extreme events and other climate change impacts. The report provided an update on actions in key areas of federal adaptation, including: building resilience in local communities, safeguarding critical natural resources such as fresh water, and providing accessible climate information and tools to help decision-makers manage climate risks.

The Federal Department of Transportation issued *U.S. DOT Policy Statement on Climate Adaptation* in June 2011, committing to "integrate consideration of climate change impacts and adaptation into the planning, operations, policies, and programs of DOT in order to ensure that taxpayer resources are invested wisely and that transportation infrastructure, services and operations remain effective in current and future climate conditions."[2]

To further the DOT Policy Statement, on December 15, 2014, the FHWA issued Order 5520 (*Transportation System Preparedness and Resilience to Climate Change*

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1 The White House President Barack Obama Council on Environmental Quality, Climate Change Resilience. Website: https://obamawhitehouse.archives.gov/administration/eop/ceq/initiatives/resilience.

2 United States Department of Transportation FHWA Office of Planning, Environment, & Realty (HEP) Sustainability, Resilience. Updated September 6, 2018. Website: https://www.fhwa.dot.gov/environment/sustainability/resilience/policy_and_guidance.

and Extreme Weather Events).[1] This directive established FHWA policy to strive to identify the risks of climate change and extreme weather events to current and planned transportation systems. The FHWA will work to integrate consideration of these risks into its planning, operations, policies, and programs in order to promote preparedness and resilience; safeguard Federal investments; and ensure the safety, reliability, and sustainability of the nation's transportation systems.

The FHWA has developed guidance and tools for transportation planning that fosters resilience to climate effects and sustainability at the Federal, State, and local levels.[2]

State Efforts

On November 14, 2008, then-Governor Arnold Schwarzenegger signed State Executive Order S-13-08, which directed a number of State agencies to address California's vulnerability to sea-level rise caused by climate change. This executive order set in motion several agencies and actions to address the concern of sea-level rise and directed all State agencies planning to construct projects in areas vulnerable to future sea-level rise to consider a range of sea-level rise scenarios for the years 2050 and 2100, assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea-level rise. Sea-level rise estimates should also be used in conjunction with information on local uplift and subsidence, coastal erosion rates, predicted higher high-water levels, and storm surge and storm wave data.

Governor Schwarzenegger also requested that the National Academy of Sciences prepare an assessment report to recommend how California should plan for future sea-level rise. The final report, *Sea-Level Rise for the Coasts of California, Oregon, and Washington* (Sea-Level Rise Assessment Report)[3] was released in June 2012 and included relative sea-level rise projections for the three states, taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates; and the range of uncertainty in selected sea-level rise projections. It provided a synthesis of existing information on projected sea-level rise impacts to state infrastructure (such as roads, public facilities, and beaches), natural areas, and coastal and marine ecosystems; and a discussion of future research needs regarding sea-level rise.

In response to State Executive Order S-13-08, the California Natural Resources Agency (Resources Agency), in coordination with local, regional, State, Federal, and public and private entities, developed *The California Climate Adaptation Strategy* (Dec 2009),[4] which summarized the best available science on climate change impacts to California, assessed California's vulnerability to the identified impacts, and outlined solutions that can be implemented within and across State agencies to promote resiliency. The adaptation strategy was updated and rebranded in 2014 as *Safeguarding California: Reducing Climate Risk* (Safeguarding California Plan).

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1 Website: https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm.
2 Website: https://www.fhwa.dot.gov/environment/sustainability/resilience/.
3 *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (2012) Website: http://www.nap.edu/catalog.php?record_id=13389.
4 State of California. California Climate Change, California Climate Adaptation Strategy. 2011-2018. Website: http://www.climatechange.ca.gov/adaptation/ strategy/index.html.

Then-Governor Jerry Brown enhanced the overall adaptation planning effort by signing State Executive Order B-30-15 in April 2015, requiring State agencies to factor climate change into all planning and investment decisions. In March 2016, sector-specific Implementation Action Plans that demonstrate how State agencies are implementing State Executive Order B-30-15 were added to the Safeguarding California Plan. This effort represents a multi- agency, cross-sector approach to addressing adaptation to climate change-related events statewide.

State Executive Order S-13-08 also gave rise to the *State of California Sea-Level Rise Interim Guidance Document* (SLR Guidance), produced by the Coastal and Ocean Working Group of the California Climate Action Team, of which Caltrans is a member. First published in 2010, the document provided "guidance for incorporating sea-level rise (SLR) projections into planning and decision making for projects in California," specifically, "information and recommendations to enhance consistency across agencies in their development of approaches to SLR."[1]

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation, and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. Caltrans is actively engaged in in working towards identifying these risks throughout the State and will work to incorporate this information into all planning and investment decisions as directed in State Executive Order B-30-15.

To assess whether SLR would potentially impact an individual project, a three-part screening criterion has been developed by the Caltrans Climate Change Workgroup, and the HQ Divisions of Transportation Planning, Design, and Environmental Analysis.[2]

The screening involves examination for the following three questions:

1. Is the project located on the coast or in an area vulnerable to SLR?
2. Will the project be impacted by the stated SLR?
3. Is the design life of the project beyond year 2030?

The *State of California Sea-Level Rise Guidance Document 2018 Update*[3] developed by the California Ocean Protection Council shows a maximum projected SLR of 61 centimeters (2 feet) between the baseline year of 2000 and 2050 in the project vicinity. The design year of the project is 2050. Based on SLR maps shown on the Cal-Adapt website[4] and the NOAA Sea Level Rise Viewer,[5] the proposed

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1 Website: https://coast.noaa.gov/slr

2 Caltrans. 2011. *Guidance on Incorporating Sea Level Rise*. Website: http://www.dot.ca.gov/ser/downloads/sealevel/guide_incorp_slr.pdf, accessed December 2017.

3 The Coastal and Ocean Resources Working Group for the Climate Action Team (CO-CAT). 2013. *State of California Sea-Level Rise Guidance Document*. Website:http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf (accessed December 2017). Website: http://www.climatechange.ca.gov/adaptation/strategy/index.html. Website: http://www.opc.ca.gov/2013/04/update-to-the-sea-level-rise-guidance-document/.

4 Cal-Adapt. 2017. Sea Level Rise. Website: http://cal-adapt.org/tools/slr-calflod-3d/ (accessed December 2017).

project would be outside the areas affected by SLR of 61 centimeters and areas inundated between 0 and 4 meters (13 feet) during a 100-year storm. Therefore, the Build Alternatives would not be affected by the stated SLR and do not warrant further consideration of SLR.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding, the increased frequency and intensity of storms and wildfires, rising temperatures, and rising sea levels.

The Build Alternatives (including Design Option B) would have a low-risk aversion and direct impacts due to projected flooding, storms and wildfires, high temperatures, and SLR are not expected.

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