2.15 Energy

2.15.1 Regulatory Setting

The National Environmental Policy Act (NEPA) (42 United States Code [USC] Part 4332) requires the identification of all potentially significant impacts to the environment, including energy impacts.

The California Environmental Quality Act (CEQA) Guidelines, Section 15126.2(b) and Appendix F, Energy Conservation, require an analysis of a project's energy use to determine if the project may result in significant environmental effects due to wasteful, inefficient, or unnecessary use of energy, or wasteful use of energy resources.

2.15.2 Affected Environment

This section is based on the *Energy Analysis Report* (April, 2023) prepared for the proposed Project.

2.15.2.1 Existing Energy Use

The Project area includes lighting along the freeway, as well as transportation system management (TSM) elements such as ramp metering, changeable message signs (CMS), cameras, and traffic speed detection systems. Additional details regarding existing conditions in the Project area that affect energy usage, such as existing traffic conditions and vehicle mix, are included below.

Existing Roadway and Traffic Conditions

The southern Project limit is the section of Interstate (I) 5 that intersects with Red Hill Avenue south of State Route (SR) 55 in Tustin. I-5 continues north through the cities of Santa Ana, Orange, Anaheim, Fullerton, Buena Park, La Mirada, and Santa Fe Springs, and includes three major freeway-to-freeway interchanges at SR-55, SR-22/SR-57, and SR-91, as shown on Figure 1-1 (provided in Chapter 1). The northern Project limit is 0.5 mile north of the Orange/Los Angeles County line in La Mirada. The existing high-occupancy vehicle (HOV) direct connectors link the I-5 HOV facility with the SR-55, SR-57, and SR-91 HOV facilities. The first HOV lanes on I-5 opened in 1992 with HOV 2+ requirements and have been highly utilized. There are several HOV Direct-Access Ramps (DARs) within the proposed Project limits at Grand Avenue, Gene Autry Way, Disney Way, and Disneyland Drive.

I-5 currently has at least one HOV lane in each direction within the proposed Project limits that is separated with limited ingress/egress buffer openings. In mid-2021, the construction of an additional HOV lane in each direction and removal of the existing northbound and southbound DARs at Main Street was completed within the section of I-5 south of SR-55 at Red Hill Avenue and SR-57. Table 2.15.1 shows the existing traffic conditions for northbound and southbound I-5 traffic.

Table 2.15.1 Existing Traffic Conditions

Scenario/ Analysis Year	Location	AADT		% Truck	VMT (mi/day)	Average Speed During Peak Travel (mph)	Average Speed During Off-Peak Travel (mph)
		Total	Truck				
Existing/ Baseline Year 2022	Northbound I-5 Mainline	173,358	14,447	7.0%–9.5%	2,123,880	42	59
	Northbound I-5 HOV	22,923	0	0%	450,953	52	60
Existing/ Baseline Year 2022	Southbound I-5 Mainline	170,445	14,204	7.0%–9.5%	2,063,228	42	59
	Southbound I-5 HOV	22,662	0	0%	384,967	52	60

Source: *Traffic Operations Analysis Report* (May 2023), AADT shown is the peak rate throughout the Project Study Area, truck percentages from Caltrans census traffic data for 2019.
AADT = annual average daily traffic
HOV = high-occupancy vehicle
I = Interstate
mi = miles
mph = miles per hour
VMT = vehicle miles traveled

The truck percentages are based on truck traffic information from the California Department of Transportation (Caltrans) traffic data website for 2019 and are as follows:

- The daily truck percentage for Red Hill Avenue to SR-22/SR-57 is 7 percent.
- The daily truck percentage for SR-22/SR-57 to SR-91 is 8.5 percent.
- The daily truck percentage for SR-91 to Artesia Boulevard is 9.5 percent.

These truck percentages were used for all scenarios.

2.15.3 Environmental Consequence

The purpose of the Build Alternatives is to improve the overall movement of people and goods along this section of I-5 by improving the managed lanes (ML) network operations, improving mobility and trip reliability, maximizing person throughput by

facilitating the efficient movement of bus and rideshare users, and applying technology to help manage traffic demand. The Build Alternatives would result in direct but temporary fuel usage during construction as well as the direct operational fuel consumption (i.e., vehicles using the facility).

2.15.3.1 Short-Term Impacts

Build Alternatives (Alternatives 2, 3, and 4)

Direct Energy (Construction)

Construction of the Build Alternatives would primarily consume diesel and gasoline through operation of heavy-duty construction equipment, material deliveries, and debris hauling.

The construction emissions were estimated for the Build Alternatives using the Caltrans California Construction Emissions Tools 2020 (CAL-CET2020), Version 1.0, which is consistent with the guidance provided by Caltrans for evaluating construction impacts from roadway projects. This evaluation includes the two proposed park-and-ride facilities that would be constructed within the existing freeway right-of-way. There are no changes planned to the existing park and ride facilities. The CAL-CET2020 results were used to quantify construction-related energy usage generated by construction of the Build Alternatives and are presented in Tables 2.15.2, 2.15.3, and 2.15.4. The energy usage presented below is based on the best information available at the time of calculations and specify the following build schedules for the Build Alternatives:

- **Alternative 2:** Anticipated to take approximately 11 months beginning in 2026.
- **Alternative 3:** Anticipated to take approximately 36 months beginning in 2026.
- **Alternative 4:** Anticipated to take approximately 36 months beginning in 2026.

Table 2.15.2 Annual Construction Fuel Consumption for Alternative 2

Construction Year	Fuel Consumption (gallons)	
	Diesel Equipment	Gasoline Equipment
2026	4,969	1,187
2027	2,103	550
Total	**7,072**	**1,737**

Source: *Energy Analysis Report* (April 2023).
CAL-CET2020 = Caltrans California Construction Emissions Tools 2020

Table 2.15.3 Annual Construction Fuel Consumption for Alternative 3

Construction Year	Fuel Consumption (gallons)	
	Diesel Equipment	Gasoline Equipment
2026	130,133	38,016
2027	173,813	42,509
2028	95,070	17,355
2029	35,696	12,949
Total	**434,712**	**110,830**

Source: *Energy Analysis Report* (April 2023).
CAL-CET2020 = Caltrans California Construction Emissions Tools 2020

Table 2.15.4 Annual Construction Fuel Consumption for Alternative 4

Construction Year	Fuel Consumption (gallons)	
	Diesel Equipment	Gasoline Equipment
2026	145,277	42,453
2027	194,036	47,466
2028	106,120	19,367
2029	39,852	14,461
Total	**485,284**	**123,746**

Source: *Energy Analysis Report* (April 2023).
CAL-CET2020 = Caltrans California Construction Emissions Tools 2020

As indicated above, energy use associated with Alternative 2 is estimated to result in the short-term consumption of 7,072 gallons from diesel-powered equipment and 1,737 gallons from gasoline-powered equipment. Alternative 3 is estimated to result in the short-term consumption of 434,712 gallons from diesel-powered equipment and 110,830 gallons from gasoline-powered equipment. Alternative 4 is estimated to result in the short-term consumption of 485,284 gallons from diesel-powered equipment and 123,746 gallons from gasoline-powered equipment. These energy use estimates represent a small demand on local and regional fuel supplies that would be easily accommodated, and this demand would cease once construction is complete. Moreover, construction-related energy consumption would be temporary and not a permanent new source of energy demand, and demand for fuel would have no noticeable effect on peak or baseline demands for energy. In addition, implementation of the following Project Feature, will address energy impacts resulting from construction activities.

PF-AQ-1 The Contractor shall comply with the California Department of Transportation (Caltrans) Standard Specifications in Section 14-9 (2022) for reducing impacts from construction activities. Section 14-9.02 specifically requires compliance by the contractor with all applicable air-pollution-control rules, regulations, ordinances

related to air quality, including air quality management district rules and regulations.

Therefore, the Build Alternatives would not result in an inefficient, wasteful, and unnecessary consumption of energy.

No Build Alternative (Alternative 1)

The No Build Alternative would not result in the construction of any improvements to I-5 in the Project Area except for ongoing and planned projects and, therefore, would not result in temporary impacts to energy.

2.15.3.2 Permanent Impacts

Build Alternatives (Alternative 2, 3, and 4)

Direct Energy (Mobile Sources)

The primary purpose of the proposed Project is to improve the overall movement of people and goods along the section of I-5 from Red Hill Avenue to the Orange/Los Angeles County line. Annual fuel consumption was estimated using traffic data for the proposed Project region and emission rates from the Caltrans Emissions Factors Model (CT-EMFAC2017) version 1.0.3.0, which uses emission factors developed by CARB in its Emission Factor Model, Version 2017 (EMFAC2017). The emission factor data for scenario years 2022, 2035, and 2055 were utilized with the corresponding traffic data for the 2022 No Build Condition (Existing Condition), 2035 Opening Year, and 2055 Future Year scenarios.

The regional VMT for the Existing (2022), No Build Alternative, and Build Alternatives were estimated using the daily traffic volumes included in the *I-5 Managed Lanes Project (Red Hill Ave to Orange/Los Angeles County Line) Draft Traffic Operations Analysis Report* (April 2023). The VMT data, along with the CT-EMFAC2017 data, were used to calculate and compare the annual diesel and gasoline fuel consumption for the 2022, 2035, and 2055 regional conditions.

The results–f the modeling were used to calculate the annual fuel consumption listed in Table 2.15.5, which shows that the future No Build condition would result in an increase in fuel consumption in 2035 and 2055 compared to the Existing (2022) condition. In addition, all Build Alternatives would result in an increase in diesel fuel consumption when compared to the Existing (2022) condition, but would result in a decrease in diesel fuel consumption when compared to the future No Build condition and also in a decrease in gasoline fuel consumption compared to the No Build and Existing (2022) condition in both the opening and future years.

Table 2.15.5. Annual VMT, Vehicle Percentages, and Operational Fuel Consumption

Analysis Year	Annual VMT[1]	Truck Percentage[2]	Annual Fuel Consumption (gallons)[3]	
			Diesel	Gasoline
Opening Year 2035				
Existing (2022)	1,742,990,490	7.0%	399,494	53,369,695
No Build Alternative	1,830,225,725	7.0%	448,950	38,660,007
Change from Existing	*87,235,235*	7.0%	*49,456*	*-14,709,687*
Alternative 2	1,690,134,558	7.0%	417,108	35,970,069
Change from Existing	*-52,855,932*	7.0%	*17,614*	*-17,399,626*
Change from No Build	*-140,091,167*	7.0%	*-31,842*	*-2,689,938*
Alternative 3	1,737,652,373	7.0%	428,835	36,704,573
Change from Existing	*-5,338,117*	7.0%	*29,341*	*-16,665,122*
Change from No Build	*-92,573,352*	7.0%	*-20,115*	*-1,955,434*
Alternative 4	1,787,640,305	7.0%	441,172	38,045,223
Change from Existing	*44,649,815*	7.0%	*41,677*	*-15,324,472*
Change from No Build	*-42,585,420*	7.0%	*-7,779*	*-614,785*
Future Year 2055				
Existing (2022)	1,742,990,490	7.0%	372,292	35,061,353
No Build Alternative	1,964,437,696	7.0%	536,133	35,846,723
Change from Existing	*221,447,206*	7.0%	*163,841*	*785,370*
Alternative 2	1,784,746,094	7.0%	496,156	33,321,292
Change from Existing	*41,755,604*	7.0%	*123,864*	*-1,740,061*
Change from No Build	*-179,691,601*	7.0%	*-39,977*	*-2,525,431*
Alternative 3	1,852,783,427	7.0%	515,070	34,591,552
Change from Existing	*109,792,937*	7.0%	*142,778*	*-469,801*
Change from No Build	*-111,654,269*	7.0%	*-21,063*	*-1,255,171*
Alternative 4	1,907,536,046	7.0%	530,291	35,613,786
Change from Existing	*164,545,556*	7.0%	157,999	552,433
Change from No Build	*-56,901,650*	7.0%	*-5,841*	*-232,937*

Source: *Compiled by LSA using CT-EMFAC2017 (2022).*

[1] Annual VMT values derived from Daily VMT values multiplied by 347, per CARB methodology (CARB 2008).

[2] Truck volume is 7%, based on Caltrans Truck AADT (2019).

[3] I fuel consumption is based on speeds during peak travel and during off-peak travel.

AADT = average annual daily traffic
Caltrans = California Department of Transportation
CARB = California Air Resources Board
CT-EMFAC2017 = Caltrans Emissions Factors Model
VMT = vehicle miles traveled

Although annual diesel fuel consumption for the Build Alternatives is higher than existing conditions, the Build Alternatives would result in a decrease in diesel fuel consumption when compared to the No Build Alternative. Similarly, although annual gas fuel consumption for the Build Alternatives is higher than existing conditions, the Build Alternatives would result in a decrease in diesel fuel consumption when compared to the No Build Alternative. The Build Alternatives are expected to improve the overall movement of people and goods along this section of I-5 by

improving the ML network operations, improving mobility and trip reliability, maximizing person throughput by facilitating the efficient movement of bus and rideshare users, and applying technology to help manage traffic demand and reduce energy consumption. As such the Build Alternatives would not result in a wasteful, inefficient, or unnecessary consumption of energy.

The Build Alternatives are included in the 2023 Federal Transportation Improvement Program (FTIP) under ID No. ORA210604 and are proposed for funding from the COVID Relief Funds – State Transportation Improvement Program (STIP), State Highway Operation and Protection Program (SHOPP) Advance Construction (–C) - Mobility, and STIP AC Interregional Improvement Program (IIP) programs. The Build Alternatives are currently included in the future commitments section of SCAG's *2020–2045 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability, and High Quality of Life* (2020–2045 RTP/SCS). However, the Build Alternatives are not captured in future regional models and efforts to incorporate the Build Alternatives into such models are being taken. Per Measure LU-1 (refer to Section 2.1 of this EIR/EA), once updated later in 2023 the 2020–2045 RTP/SCS and the FTIP will capture the Build Alternatives in regional models.

Once Measure LU-1 has been implemented, the Build Alternatives would be consistent with regional, State, and local energy conservation plans. The Connect SoCal 2020 RTP/SCS includes information about efforts to encourage energy efficiency and renewable energy use. Regional plans for renewable energy and energy efficiency would not be impacted from the construction and operation of the Build Alternatives. Energy-efficient building development is not applicable to this Project, and renewable energy policies are encouraged for all Caltrans projects where applicable and feasible. Additionally, Measure GHG-2 would require the use of highly efficient light-emitting diodes (LEDs), which would reduce energy consumption.

The result of the Build Alternatives will not conflict with or obstruct regional plans for renewable energy or energy efficiency.

No Build Alternative (Alternative 1)

As shown in Table 2.15.5, above, annual diesel fuel consumption for the No Build Alternative would be higher than existing conditions and would result in an increase in diesel fuel consumption compared to the Build Alternatives and an increase in

gasoline fuel consumption compared to the Existing (2022) condition and Build Alternatives in both opening and future years.

Other current or planned projects are subject to discretionary review to ensure that long-term energy impacts would be evaluated and appropriate Project Features and avoidance, minimization, and/or mitigation measures would be incorporated into Project design. Therefore, the No Build Alternative would not result in permanent adverse energy impacts.

2.15.4 Avoidance, Minimization, and/or Mitigation Measures

The Build Alternatives will incorporate PF-AQ-1, as outlined above in Section 2.15.3.1 to help address potential long-term energy impacts. In addition, measure GHG-2 would be incorporated as a minimization measure:

PF-GHG-2 Replacement of light fixtures with highly efficient light-emitting diodes (LEDs), including new safety lighting.