4.3 CLIMATE CHANGE

This section evaluates the existing climate change conditions and greenhouse gas (GHG) emission levels in the project area, and the potential impacts from construction of the tunneling method alternatives compared to the Project. The analysis only addresses GHG emissions during construction as operations and the associated climate change impacts would be nearly identical under the Project and the tunneling method alternatives.

Regional vehicle miles travelled (VMT) reductions from implementation of the Project and the tunneling method alternatives would result from increased transit ridership and a corresponding reduction in miles travelled from single occupancy vehicles. These reductions in regional VMT would not be substantially impacted by implementation of either of the tunneling method alternatives, which represent variations in construction method only. For the two tunneling method alternatives, the regional reduction in GHG emissions due to traffic congestion relief is greater than the new emissions associated with operation of the Project and the tunneling method alternatives. The environmental analysis assumes a conservative, worst-case, condition when determining potential impacts. Section 4.6, Climate Change, of the Final EIS describes GHG emissions from existing regional transportation sources in the Project Area and analyzes the potential climate change impacts of the Project. The Final EIS determined that no adverse climate change impacts would be associated with the Project since a regional decrease of GHG emissions will result from its implementation.

4.3.1 Affected Environment

The following analysis identifies existing GHG emission levels generated by the transportation sector based on 2014 forecasted VMT within the Los Angeles region. Data on VMT in the region and emission factors from the EMFAC2007 model were used to estimate emissions of GHG. Since the EMFAC model only generates emissions of carbon dioxide (CO_2) and methane (CH_4), the California Climate Action Registry (CCAR) General Reporting Protocol was used to estimate emissions of nitrous oxide (N_2O). Table 4.3-1 summarizes the results of existing, regional GHG emissions from the transportation sector.

Table 4.3-1: Existing (2014) Conditions – GHG Emissions from Regional Traffic

Regional Vehicle Miles Travelled (VMT/yr)[1]	GHG Emission Factor (grams per mile)			GHG Emissions (Metric Tons per year)			Total ($MTCO_2e$/Yr)
	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	
147,037,695,000	365.21	0.028	0.173	53,699,637	4,117	25,438	53,729,191
Global Warming Potential =				1	21	310	61,671,726

Note:
[1] Regional VMT data obtained from the SCAG's 2012-2035 Regional Transportation Plan, Transportation Conformity Analysis Appendix Table 11 (2014 data for SCCAB and SCAB). Available at: http://rtpscs.scag.ca.gov/Documents/2012/final/SR/2012fRTP_TransportationConformityReport.pdf .
Source: AECOM, 2014

4.3.2 Environmental Consequences

The following discussion summarizes the evaluation of potential climate change adverse effects for each of the tunneling method alternative. Construction of the alternatives and the Project would result in GHG emissions predominately in the form of carbon dioxide (CO_2) during operation of construction equipment, excavation materials haul trucks, and worker commuting. Construction emissions were estimated using the California Air Resources Board's (CARB's) OFFROAD and EMFAC emissions model, for diesel and gasoline mobile source emission factors, respectively, and the proposed construction schedule. The GHG emissions from construction are presented for the construction duration of the tunneling method for Alternative A and Alternative B compared to the Project and amortized over the operational lifetime of the project assumed to be 30-years in duration as recommended by the SCAQMD.

4.3.2.1 Alternative A – EPBM/Open Face Shield/SEM Project Profile

4.3.2.1.1 Construction Impacts

Analysis of potential climate change and GHG-related construction impacts from Alternative A was based on estimated GHG emissions from operation of construction equipment, excavation material haul trucks, and workers commuting to and from the project site. Estimated GHG emissions that may occur during construction of Alternative A are presented in Table 4.3-2.

Table 4.3-2: Alternative A – Construction GHG Emissions (2014-2017)

GHG Emission Source	Annual GHG Emissions (MTCO2e/yr)				Total Project (MTCO2e/Project)	Amortized Emissions (MTCO2e/30-yr Project Lifetime)
	2014	2015	2016	2017		
Construction Equipment	2,373	16,277	7,663	8,658	34,971	1,166
Construction Worker Commuting	20	148	86	94	348	11
Excavation Materials Haul Trucks	0	119	288	305	712	24
Total =	**2,393**	**16,544**	**8,037**	**9,057**	**36,031**	**1,201**

Source: AECOM, 2014
Note: SCAQMD recommends for construction-related GHG emissions to be amortized over the operational lifetime of the project, which is recommended by SCAQMD as 30-years in duration

Construction of Alternative A along the Flower Street segment would result in a net increase in GHG emissions over a finite period (less than four years). For this analysis, amortized construction-related GHG emissions were compared to SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr to determine impact significance. As presented in Table 4.3-2, construction of Alternative A would result in approximately 36,031 metric tons of carbon dioxide equivalent ($MTCO_2e$), which

would result in an amortized value of 1,201 $MTCO_2e$. Therefore, GHG emissions generated during construction of Alternative A would not have an adverse effect on climate change.

In addition, the CEQ recommends a reference point of 25,000 MT per year of direct GHG emissions as a "useful indicator" of when federal agencies should evaluate climate change impacts in their NEPA documents. The amortized construction emissions for Alternative A would also not exceed the GHG emissions threshold by the CEQ for evaluation of climate change impacts. Therefore, this impact would not be adverse.

In summary, operation of Alternative A would result in a net decrease in regional GHG emissions. Temporary construction-related GHG emissions, as presented in Table 4.3-2, would be offset by long-term reductions in regional VMT and associated GHG emissions, as presented in Section 4.6, Climate Change, of the Final EIS. Furthermore, amortized construction-related GHG emissions for Alternative A would be less than the SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr. Therefore, project-related GHG emissions resulting from implementation of Alternative A would not have an adverse effect on climate change.

4.3.2.2 Alternative B – EPBM/SEM Low Alignment

4.3.2.2.1 Construction Impacts

Analysis of potential climate change and GHG-related construction impacts from Alternative B was based on estimated GHG emissions from operation of construction equipment, excavation material haul trucks, and worker commuting to and from the project site. Estimated GHG emissions that may occur during construction of Alternative B are presented in Table 4.3-4.

Table 4.3-3: Alternative B Construction GHG Emissions (2014-2017)

GHG Emission Source	Annual GHG Emissions (MTCO2e/yr)				Total Project (MTCO2e/Project)	Amortized Emissions (MTCO2e/30-yr Project Lifetime)
	2014	2015	2016	2017		
Construction Equipment	0	9,093	10,058	4,383	23,534	784
Construction Worker Commuting	0	81	335	262	678	23
Excavation Materials Haul Trucks	0	118	508	305	931	31
Total =	**0**	**9,292**	**10,901**	**4,950**	**25,143**	**838**

Source: AECOM, 2014

Note: SCAQMD recommends for construction-related GHG emissions to be amortized over the operational lifetime of the project, which is recommended by SCAQMD as 30-years in duration

Construction of Alternative B along the Flower Street segment would result in a net increase in GHG emissions over a finite period (three years). For this analysis, amortized construction-related GHG emissions were compared to SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr to determine impact significance. As presented in Table 4.3-3, construction of Alternative B would result in approximately 25,143 metric tons of carbon dioxide equivalent ($MTCO_2e$/), which would result in an amortized value of 838 $MTCO_2e$. Therefore, GHG emissions generated during construction of Alternative B would not have an adverse effect on climate change.

In addition, the CEQ recommends a reference point of 25,000 MT per year of direct GHG emissions as a "useful indicator" of when federal agencies should evaluate climate change impacts in their NEPA documents. The amortized construction emissions for Alternative B would also not exceed the GHG emissions threshold by the CEQ for evaluation of climate change impacts. Therefore, this impact would not be adverse.

operation of Alternative B would result in a net decrease in regional GHG emissions. Temporary construction-related GHG emissions, as presented in Table 4.3-3, would be offset by long-term reductions in regional VMT and associated GHG emissions, as presented in Section 4.6, Climate Change, of the Final EIS. Furthermore, amortized construction-related GHG emissions for Alternative B would be less than the SCAQMD's proposed threshold for industrial projects of 10,000 $MTCO_2e$/yr. Therefore, project-related GHG emissions resulting from implementation of Alternative B would not have an adverse effect on climate change

4.3.3 Mitigation Measures

Mitigation measures identified in the Final EIS, under air quality, including use of newer, more efficient off-road vehicles during construction would result in GHG emission reductions. As described in the analysis above, the long-term reduction in GHG emissions and regional VMT from implementation of the Regional Connector project would result in a net benefit to the regional GHG emissions inventory and associated climate change impacts. Therefore, potential construction-related impacts from the Project or the tunneling method alternatives would not be adverse.