2.13 Air Quality

2.13.1 Regulatory Setting

The Federal Clean Air Act (FCAA) of 1970 (42 United States Code [USC] 7401 et seq.), as amended, is the primary Federal law that governs air quality while the California Clean Air Act (CCAA) is its companion State law. These laws, and related regulations by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB), set standards for the concentration of pollutants in the air. At the Federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and State ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), and sulfur dioxide (SO_2). In addition, national and State standards exist for lead (Pb), and State standards exist for visibility-reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and State standards are set at levels that protect public health with a margin of safety, and are subject to periodic review and revision. Both State and Federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics in their general definition.

Federal air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA). In addition to this environmental analysis, a parallel “Conformity” requirement under the FCAA also applies.

2.13.1.1 Conformity

The conformity requirement is based on FCAA Section 176(c), which prohibits the U.S. Department of Transportation (USDOT) and other Federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to the State Implementation Plan (SIP) for attaining the NAAQS. “Transportation Conformity” applies to highway and transit projects and takes place on two levels: the regional—or planning and programming) level and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and “maintenance” (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. EPA regulations at 40 Code of Federal Regulations (CFR) 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/ attainment areas for NAAQS and do not apply at all for State standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O_3, particulate matter (PM_{10} and $PM_{2.5}$), and in some areas (although not in California), SO_2. California has nonattainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for Pb; however, Pb is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on emission analysis of Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years (for the RTP), and four years (for the FTIP). RTP and FTIP conformity uses travel demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the FCAA and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA), make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept and scope and the "open-to-traffic" schedule of a proposed transportation project are the same as described in the RTP and FTIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and Transportation Improvement Program (TIP); the project has a design concept and scope[1] that has not changed significantly from those in the RTP and TIP; project analyses have used the latest planning assumptions and EPA-approved emissions models; and in PM areas, the project complies with any control measures in the SIP. Furthermore, additional analyses (known as hot-spot analyses)

[1] "Design concept" refers to the type of facility that is proposed, such as a freeway or arterial highway. "Design scope" refers to those aspects of the project that would clearly affect capacity and thus any regional emissions analysis, such as the number of lanes and the length of the project.

may be required for projects located in CO and PM nonattainment or maintenance areas to examine localized air quality impacts.

2.13.2 Affected Environment

This section is based on the *Air Quality Assessment Report* (March 2017) prepared for the project.

2.13.2.1 Climate

The project site is located within the South Coast Air Basin (Basin), which includes Orange County and the nondesert portions of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the Basin is administered by the South Coast Air Quality Management District (SCAQMD), a regional agency created for the Basin.

The Basin climate is determined by its terrain and geographical location. The Basin is a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern boundary, and high mountains surround the rest of the Basin. The region lies in the semipermanent high pressure zone of the eastern Pacific. The resulting climate is mild and tempered by cool ocean breezes. This climatological pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, and Santa Ana wind conditions do occur in the Basin.

The annual average temperature varies little throughout the Basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. Within the project vicinity, the Cities of Irvine and Tustin experience fairly mild weather, with average temperatures typically ranging from 43°F in the winter to 85°F in the summer. On average, the warmest month is August, and the coolest month is generally December.

The majority of annual rainfall in the Basin occurs between November and April. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern part of the Basin along the coastal side of the mountains. The project vicinity experiences the greatest amount of precipitation in the month of February.[1]

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[1] The Weather Channel. 2016. Monthly Averages for Irvine and Tustin. Website: https://weather.com/weather/monthly/l/92618:4:US (accessed October 5, 2016).

The Basin experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed from midafternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Inversion layers have a substantial role in determining O_3 formation. Ozone and its precursors will mix and react to produce higher concentrations under an inversion. The inversion will also simultaneously trap and hold directly emitted pollutants such as CO. PM_{10} is both directly emitted and created indirectly in the atmosphere as a result of chemical reactions. Concentration levels are directly related to inversion layers due to the limitation of mixing space.

Surface or radiation inversions are formed when the ground surface becomes cooler than the air above it during the night. The earth's surface goes through a radiative process on clear nights, when heat energy is transferred from the ground to a cooler night sky. As the earth's surface cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air; this heating stimulates the ground level air to float up through the inversion layer.

The combination of stagnant wind conditions and low inversions produces the greatest concentration of pollutants. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are from CO and oxides of nitrogen (NO_X) because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

2.13.2.2 Monitored Air Quality

The SCAQMD operates several air quality monitoring stations within the Basin. The air quality monitoring station closest to the project site is the Mission Viejo Monitoring Station, and its air quality trends are representative of the ambient air quality in the project area. The pollutants monitored at this station are CO, O_3, NO_2, PM_{10} and $PM_{2.5}$. The closest air quality monitoring site that monitors NO_2 is the Anaheim-Loara School Monitoring Station, and its air quality trends are also representative of the ambient air quality in the project area. Air quality trends identified from data collected at both air quality monitoring stations between 2011 and 2015 are listed in Table 2.13.1.

2.13.2.3 Sensitive Receptors

Sensitive populations (sensitive receptors) are more susceptible to the effects of air pollution than the general population. Sensitive populations in proximity to localized sources of toxics and CO are of particular concern. According to the SCAQMD, a sensitive receptor is a person in the population who is particularly susceptible to health effects due to exposure to an air contaminant. Land uses that are considered sensitive receptors include residences, hotels, schools, playgrounds, childcare centers, athletic facilities, long-term healthcare facilities, rehabilitation centers, convalescent centers, and retirement homes. The closest sensitive receptors to the proposed project include residential uses that are along Interstate 5 (I-5) within the Cities of Irvine and Tustin.

2.13.2.4 Criteria Pollutant Attainment/Nonattainment Status

As noted earlier, the six criteria pollutants are O_3, CO, PM (including both $PM_{2.5}$ and PM_{10}), NO_2, SO_2, and lead. The primary standards for these criteria pollutants are shown in Table 2.13.2 along with a brief description of the health effects associated with exposures to these pollutants and the typical sources of these pollutants. The NAAQS are two-tiered: primary, to protect public health, and secondary, to prevent degradation to the environment (e.g., impairment of visibility, and damage to vegetation and property).

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the EPA to identify regions as “attainment,” “nonattainment,” or “maintenance,” depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of nonattainment (e.g., marginal, moderate, serious, severe, and extreme) are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. The Basin’s attainment status for each of the criteria pollutants is listed in Table 2.13.2.

Table 2.13.1: Local Air Quality Levels

Pollutant	Primary Standard		Year	Maximum Concentration[1]	Number of Days State/ Federal Standard Exceeded
	California	Federal			
Carbon Monoxide (CO)[2] (1 hr)	20.0 ppm for 1 hr	35 ppm for 1 hr	2011	1.38 ppm	0 / 0
			2012	1.52 ppm	0 / 0
			2013	2.21 ppm	0 / 0
			2014	0.12 ppm	0 / 0
			2015	0.10 ppm	0 / 0
Carbon Monoxide (CO)[2] (8 hrs)	9.0 ppm for 8 hrs	9 ppm for 8 hrs	2011	1.03 ppm	0 / 0
			2012	0.79 ppm	0 / 0
			2013	NM	NM / NM
			2014	NM	NM / NM
			2015	NM	NM / NM
Ozone (O_3) [2] (1 hr)	0.09 ppm for 1 hr	N/A	2011	0.094 ppm	0 / N/A
			2012	0.096 ppm	2 / N/A
			2013	0.104 ppm	2 / N/A
			2014	0.115 ppm	4 / N/A
			2015	0.099 ppm	2 / N/A
Ozone (O_3) [2] (8 hrs)	0.07 ppm for 8 hrs	0.070 ppm for 8 hrs	2011	0.083 ppm	5 / 2
			2012	0.079 ppm	6 / 1
			2013	0.082 ppm	5 / 2
			2014	0.088 ppm	10 / 5
			2015	0.088 ppm	8 / 3
Nitrogen Dioxide[3] (NO_2) (1 hr)	0.18 ppm for 1 hr	0.100 ppm for 1 hr	2011	0.074 ppm	0 / 0
			2012	0.067 ppm	0 / 0
			2013	0.082 ppm	0 / 0
			2014	0.076 ppm	0 / 0
			2015	0.059 ppm	0 / 0
Particulate Matter (PM_{10})[2,4] (24 hr)	50 $\mu g/m^3$ for 24 hrs	150 $\mu g/m^3$ for 24 hrs	2011	48.0 $\mu g/m^3$	0 / 0
			2012	37.0 $\mu g/m^3$	0 / 0
			2013	51.0 $\mu g/m^3$	0 / 0
			2014	41.0 $\mu g/m^3$	0 / 0
			2015	49.0 $\mu g/m^3$	0 / 0
Fine Particulate Matter ($PM_{2.5}$)[2,5] (24 hr)	N/A	35 $\mu g/m^3$ for 24 hrs	2011	33.4 $\mu g/m^3$	N/A / 0
			2012	27.6 $\mu g/m^3$	N/A / 0
			2013	28.0 $\mu g/m^3$	N/A / 0
			2014	25.5 $\mu g/m^3$	N/A / 0
			2015	31.5 $\mu g/m^3$	N/A / 0

Source: *Air Quality Assessment Report* (March 2017).

1 Maximum concentration is measured over the same period as the California standard.
2 Measurements taken at the Mission Viejo Monitoring Station, located at 26081 Via Pera, Mission Viejo, California 92691.
3 Measurements taken at the Anaheim-Loara School Monitoring Station, located at 1630 Pampas Lane, Anaheim, California 92802.
4 PM_{10} exceedances are based on State thresholds established prior to amendments adopted on June 20, 2002.
5 PM_{10} and $PM_{2.5}$ exceedances are derived from the number of samples exceeded, not days.

$\mu g/m^3$ = micrograms per cubic meter
EPA = United States Environmental Protection Agency
hr/hrs = hour/hours
N/A = not applicable
NM = not measured
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ppm = parts per million

Table 2.13-2: State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3] California Standard	Basin Attainment Status[3] Federal Standard	Principal Health and Atmospheric Effects	Typical Sources
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m^3)	Revoked	Non-Attainment	---	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from ROG or VOC and NO_X in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Non-Attainment	Designation Pending[4]		
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	150 µg/m^3	Non-Attainment	Attainment / Maintenance	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources (wind-blown dust, ocean spray).
	Annual	20 µg/m^3	Revoked	Non-Attainment	---		
Fine Particulate Matter ($PM_{2.5}$)	24-hour	---	35 µg/m^3	---	Non-Attainment (Serious)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical (including photochemical) reactions involving other pollutants including NO_X, SO_X, ammonia, and ROG.
	Annual	12 µg/m^3	12.0 µg/m^3	Non-Attainment	Non-Attainment (Serious)		
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Attainment	Attainment / Maintenance	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical O_3.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.
	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Attainment	Attainment / Maintenance		

Table 2.13-2: State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3] California Standard	Basin Attainment Status[3] Federal Standard	Principal Health and Atmospheric Effects	Typical Sources
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	Attainment	Unclassifiable / Attainment	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain. Part of the "NO_X" group of O_3 precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.
	Annual	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Attainment	Attainment / Maintenance		
Lead (Pb)	30-day average	1.5 µg/m^3	---	Attainment[5]	---	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from gasoline may exist in soils along major roads.
	Rolling 3-month average[6]	---	0.15 µg/m^3	---	Non-Attainment (Partial)[7]		
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	Attainment[5]	Designation Pending[8]	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.
	3-hour[9]	---	0.5 ppm (1,300 µg/m^3)	---	Designation Pending[8]		
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm	Attainment[5]	Undesignated		
Hydrogen Sulfide (H_2S)	1-hour	0.03 ppm (42 µg/m^3)	---	Attainment	---	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m^3)	---	Attainment	---	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes
Sulfates	24-hour	25 µg/m^3	---	Attainment	---	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.

Table 2.13-2: State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Period	California Standard[1]	Federal Standard[2]	Basin Attainment Status[3]		Principal Health and Atmospheric Effects	Typical Sources
				California Standard	Federal Standard		
Visibility-Reducing Particles	---	Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70%)	---	Unclassified[5]	---	Reduces visibility. Produces haze. Note: not related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other "Class I" areas.	See particulate matter above.

Sources: *Air Quality Assessment Report* (March 2017).

1 California standard levels obtained from ARB CAAQS webpage. Website: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm (accessed February 2017).

2 Federal standard levels obtained from the EPA NAAQS Table. Note that some Federal standards include a level (such as the concentrations shown in the Table) and a form (often a statistical form or based on excluding a certain number of exceedances of the standard level over a given number of years). Exceedances of the standard level are not necessarily violations or exceedances of the standard. Website: https://www.epa.gov/criteria-air-pollutants/naaqs- table (accessed February 2017).

3 Attainment status obtained from SCAQMD NAAQS and CAAQS Attainment Status for the South Coast Air Basin. Website: http://www.aqmd.gov/docs/default- source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf?sfvrsn=2 (accessed February 2017).

4 Designation is pending; Non-Attainment (Extreme) classification is expected.

5 Attainment status obtained from ARB Area Designation Maps. Website: http://www.arb.ca.gov/desig/adm/adm.htm (accessed February 2017).

6 Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

7 According to the ARB website, the Los Angeles County portion of the South Coast Air Basin is designated "Nonattainment" only for near-source monitors. Expect to remain in attainment based on current monitoring data.

8 Designation is pending; Unclassifiable/Attainment classification is expected.

9 This is a secondary standard. Not to be exceeded more than once per year.

µg/m3 = micrograms per cubic meter
ARB = California Air Resources Board
Basin = South Coast Air Basin
CAAQS = California Ambient Air Quality Standards
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
NAAQS = National Ambient Air Quality Standards
NO_X = oxides of nitrogen
ppm = parts per million
ROG = reactive organic gases
SCAQMD = South Coast Air Quality Management District
SO_X = sulphur oxides
VOC = volatile organic compounds

2.13.3 Environmental Consequence

2.13.3.1 Short-Term Impacts

Build Alternative (Alternative 2A and Alternative 2B [Preferred Alternative] With and Without Design Option 3)[1]

Construction Air Quality Conformity

Construction activities will not last for more than five years at one general location, so construction-related emissions do not need to be included in regional and project-level conformity analysis (40 CFR 93.123(c)(5)).

Construction Emissions

During construction, short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other construction activities. Emissions from construction equipment are expected and would include CO, NO_X, volatile organic compounds (VOCs), directly-emitted particulate matter (PM_{10} and $PM_{2.5}$), and toxic air contaminants such as diesel exhaust particulate matter. Ozone is a regional pollutant that is derived from NO_X and VOCs in the presence of sunlight and heat.

Site preparation and roadway construction typically involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, building bridges, and paving roadway surfaces. Construction-related effects on air quality from most highway projects would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils to and from the site. These activities could temporarily generate PM_{10}, $PM_{2.5}$, and small amounts of CO, SO_2, NO_X, and VOCs and cause concern. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site could deposit mud on local streets, which could be an added source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment in operation. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Construction activities for large development projects are estimated by the EPA to add 1.2 tons of fugitive dust per acre of soil disturbed per month of activity. If water

[1] Alternative 2B without Design Option 3 has been selected as the Preferred Alternative.

or other soil stabilizers are used to control dust, the emissions can be reduced by up to 50 percent. The SCAQMD Rule 403 regarding fugitive dust minimization requirements would reduce potential dust emissions during construction. Project Features PF-AQ-1 and PF-AQ-2 will address temporary air quality impacts.

PF-AQ-1 The Contractor must comply with the California Department of Transportation (Caltrans) Standard Specifications for Construction (2015) Section 14. Prior to the issuance of grading permits or approval of grading plans, a dust control plan shall be a part of the construction contract standard specifications, which shall include measures to meet the requirements of the South Coast Air Quality Management District (SCAQMD) Rules 402 (Nuisance) and 403 (Fugitive Dust) (Section [d2] and Table 1).

PF-AQ-2 Water or dust palliative will be applied to the site and equipment as often as necessary to control fugitive dust emissions. Fugitive dust emissions must meet a "no visible dust" criterion either at the point of emissions or at the right-of-way line, depending on local regulations.

- Soil binder will be spread on any unpaved roads used for construction purposes, and on all project construction parking areas.
- Trucks will be washed as they leave the right-of-way as necessary to control fugitive dust emissions.
- A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely revegetation of disturbed slopes as needed to minimize construction impacts to existing communities.
- Equipment and materials storage sites will be located as far away from residential and park uses as practicable. Construction areas will be kept clean and orderly.
- Track-out reduction measures, such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic, will be used.
- All transported loads of soils and wet materials will be covered before transport, or adequate freeboard (space from the top of the materials to the top of the truck) will be provided to minimize the emission of dust (particulate matter) during transportation.

- Dust and mud that are deposited on paved, public roads due to construction activity and traffic will be promptly and regularly removed to decrease particulate matter.
- Mulch will be installed or vegetation planted as soon as practical after grading to reduce windblown particulate in the area.

In addition to dust-related PM_{10} emissions, heavy-duty trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, VOCs, and some soot particulate (PM_{10} and $PM_{2.5}$) in exhaust emissions. Project Feature PF-AQ-3 will address this impact.

PF-AQ-3 In order to further minimize construction-related emissions, all construction vehicles and construction equipment would be required to be equipped with the State-mandated emission control devices pursuant to State emission regulations and standard construction practices.

If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles are delayed. However, based on the insignificant amount of daily work trips required for project construction, construction worker trips are not anticipated to significantly contribute to or affect traffic flow on local roadways and are, therefore, not considered significant.

SO_2 is generated by oxidation during combustion of organic sulfur compounds contained in diesel fuel. Under California law and ARB regulations, off-road diesel fuel used in California must meet the same sulfur and additional standards as on-road diesel fuel (not more than 15 parts per million [ppm] sulfur), and as such, SO_2-related issues due to diesel exhaust would be minimal.

Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving site(s). Such odors would quickly disperse to below detectable thresholds as distance from the site(s) increases.

The estimated peak-day construction emissions for the Build Alternative are summarized in Table 2.13.3. There would be no additional peak-day construction emissions as a result of Design Option 3.

Table 2.13.3: Estimated Daily Construction Emissions

Construction Phase	Pollutant[1] (lbs/day)				
	ROG	CO	NO_X	PM_{10}[2,3]	$PM_{2.5}$[2,3]
Alternative 2A					
Grubbing/Land Clearing	2.68	22.63	22.55	101.08	21.71
Grading/Excavation	10.37	90.38	98.67	104.56	24.86
Drainage/Utilities/Sub-Grade	6.20	63.05	52.73	102.48	23.06
Paving	3.41	40.93	28.38	1.46	1.28
Maximum	*10.37*	*90.38*	*98.67*	*104.56*	*24.86*
Alternative 2B (Preferred Alternative)					
Grubbing/Land Clearing	2.68	22.63	22.55	101.08	21.71
Grading/Excavation	7.29	64.80	68.11	103.22	23.63
Drainage/Utilities/Sub-Grade	6.32	63.32	54.23	102.58	23.15
Paving	2.92	33.70	23.66	1.23	1.07
Maximum	*7.29*	*64.80*	*68.11*	*103.22*	*23.63*

Source: *Air Quality Assessment Report* (March 2017).
Note: Emissions are based on a conservative assumption of 200 cubic yards of earthwork per day representing a maximum amount, and on most days earthwork would be lower. These maximum emissions include minor variances possible under Design Option 3.
[1] Emissions were calculated using the Roadway Construction Emissions Model (RCEM) (Version 8.1.0) developed by the Sacramento Metropolitan Air Quality Management District (SMAQMD).
[2] PM_{10} and $PM_{2.5}$ estimates assume control of fugitive dust from watering and associated dust control measures.
[3] Emissions include the sum of exhaust and fugitive dust.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases

Naturally Occurring Asbestos

According to the California Geological Survey (formerly the California Division of Mines and Geology [CDMG])[1], the proposed project is not located in an area where naturally occurring asbestos (NOA) is likely to be present. Therefore, the impact from NOA during construction of the project would be minimal to none.

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 and, therefore, would not result in temporary impacts to air quality.

[1] California Geological Survey (formerly the California Division of Mines and Geology [CDMG]). 2000. *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos Report.* August.

2.13.3.2 Permanent Impacts

Build Alternative (Alternative 2A and Alternative 2B [Preferred Alternative], Design Option 3)[1]

Regional Air Quality Conformity

The Build Alternative is listed in the Southern California Association of Governments (SCAG) *2016–2040 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS), which was found to conform to the SIPs by the FHWA and the FTA on June 1 and 2, 2016. The Build Alternative is also included in SCAG's financially constrained 2017 FTIP, which was determined to conform to the SIP by the FHWA and the FTA on December 16, 2016. The design concept and scope of the Build Alternative is consistent with the Project Description in the 2016–2040 RTP/SCS and the 2017 FTIP, and the traffic assumptions of SCAG's regional emissions analysis. The listings of the I-5 project in the 2016–2040 RTP/SCS and the 2017 FTIP are provided in Appendix D.

Project Level Conformity

Because the project limits are within an attainment/maintenance area for CO and PM_{10} and a nonattainment area for federal $PM_{2.5}$ federal standards, local hot-spot analyses for CO, $PM_{2.5}$, and PM_{10} are required for conformity purposes. The results of these hot-spot analyses are provided below.

Carbon Monoxide

The methodology required for a CO local analysis is summarized in the California Department of Transportation (Caltrans) *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol), Sections 3 (Determination of Project Requirements) and 4 (Local Analysis). In Section 3, the CO Protocol provides two conformity requirement decision flowcharts that are designed to assist project sponsors in evaluating the requirements that apply to specific projects. The flowchart in Figure 1 of the Caltrans CO Protocol (provided as Exhibits 5 and 6 in the *Air Quality Assessment Report* [March 2017]) applies to new projects and was used in this local analysis conformity decision. Below is a step-by-step explanation of the flow chart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the project. The flowchart begins with Section 3.1.1:

- **3.1.1. Is this project exempt from all emissions analyses?**

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[1] Alternative 2B without Design Option 3 has been selected as the Preferred Alternative

NO.

Table 1 of the CO Protocol is Table 2 of 40 CFR 93.126. Section 3.1.1 is inquiring if the project is exempt. Such projects appear in Table 1 of the CO Protocol. The Build Alternative does not appear in Table 1, as it involves a freeway widening. It is not exempt from all emissions analyses.

- **3.1.2. Is the project exempt from regional emissions analyses?**
  NO.

  Table 2 of the CO Protocol is Table 3 of 40 CFR 93.127. Although the Build Alternative is included in the 2017 FTIP, it is not exempt since it involves freeway widening, which is not included in Table 2 of the CO Protocol. As a result, it is not exempt from regional analyses.

- **3.1.3. Is the project locally defined as regionally significant?**
  YES.

  The Build Alternative includes widening of I-5 and is considered regionally significant, as it is included in the 2016 RTP/SCS and the 2017 FTIP modeling of SCAG's transportation network.

- **3.1.4. Is the project in a federal attainment area?**
  NO.

  The Build Alternative is within the South Coast Air Basin, which is designated as attainment/maintenance for the federal CO standards as of June 11, 2007. Additionally, the Basin is nonattainment for other transportation-related criteria pollutants ($PM_{2.5}$ and O_3).

- **3.1.5. Is there a currently conforming RTP and TIP?**
  YES.

  The Build Alternative is located in the SCAG region, which has a currently conforming RTP and TIP. SCAG's currently conforming RTP is entitled *2016–2040 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS), and was adopted on April 7, 2016. FHWA and FTA determined the RTP to conform to the SIP on June 1 and 2, 2016. Additionally, SCAG has prepared the 2017 FTIP to implement projects and programs listed in the RTP. FHWA determined the FTIP to conform to the SIP on December 16, 2016.

- **3.1.6. Is the project included in the regional emissions analysis supporting the currently conforming RTP and TIP?**
  YES.

  The Build Alternative is included in the regional emissions analysis conducted by SCAG for the conforming 2016 RTP/SCS (RTP ID ORA130302) and the 2017 FTIP (FTIP ID ORA130302). The design concept and scope of the Build Alternative is consistent with the Project Description in the 2016 RTP/SCS and the 2017 FTIP. Therefore, the individual projects contained in the plan are conforming projects, and will have air quality impacts consistent with those identified in the SIP.

- **3.1.7. Has the project design concept and/or scope changed significantly from that in the regional analysis?**
  NO.

  The project design concept refers to the type of facility identified by the Build Alternative. The project design scope refers to the design aspects that affect the proposed facility's impact on emissions, usually as they relate to carrying capacity and control. The design concept and scope of the Build Alternative is consistent with the Project Description in the 2016 RTP/SCS and the 2017 FTIP and the assumptions in the SCAG regional emissions analysis.

- **3.1.9. Examine local impacts.**
  Section 3.1.9 of the flowchart directs the project evaluation to Section 4 (Local Analysis) of the CO Protocol. This includes Figure 1.

Section 4 contains Figure 3 (Local CO Analysis). This flowchart is provided as Exhibits 7 and 8 in the *Air Quality Assessment Report* (March 2017) and used to determine the type of CO analysis required for the Build Alternative. Below is a step-by-step explanation of the flowchart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the Build Alternative. The flowchart begins at Level 1:

- **Level 1. Is the project in a CO non-attainment area?**
  NO.

  As stated in 3.1.4, the proposed project is within the South Coast Air Basin, which is designated as an attainment/maintenance area for the federal CO standards.

- **Level 1 (cont.). Was the area redesignated as "attainment" after the 1990 Clean Air Act?**
  YES.

  The project is located in the South Coast Air Basin, under the jurisdiction of the SCAQMD, and was classified nonattainment after the 1990 FCAA. The South Coast Air Basin was granted Federal redesignation to attainment/maintenance on June 11, 2007.

- **Level 1 (cont.). Has "continued attainment" been verified with the local Air District, if appropriate?**
  YES.

  As stated above, the South Coast Air Basin was redesignated as an attainment/ maintenance area for the Federal CO standards effective June 11, 2007. (Proceed to Level 7.)

- **Level 7. Does the project worsen air quality?**
  NO.

  Although the Basin is designated as attainment/maintenance for CO, it is necessary to determine project contributions to local air quality. Intersections where air quality may be getting worse are of primary concern. Section 4.7.1 of the CO Protocol provides criteria to determine whether a project is likely to worsen air quality. These criteria include increases in vehicles operating in cold start mode, increases in traffic volumes and a worsening of traffic flow.

  Increases in Vehicles Operating in Cold Start Mode. The Build Alternative does not involve parking lots, and therefore, would not increase the number of vehicles operating in cold start mode.

  Increases in Traffic Volumes. As described above, Table 7 depicts the Design Year traffic volumes. The proposed improvements would accommodate future growth and would not induce additional growth in the area. The Build Alternative would not cause traffic volumes to increase substantially.

  Worsening of Traffic Flow. As previously noted in Table 9, implementation of the Build Alternative would provide better traffic flow for both truck traffic and general traffic traveling through the project area.

As a result, the Build Alternative has sufficiently addressed the CO impact, and no further analysis is needed.

Particulate Matter (PM_{10} and $PM_{2.5}$)

The proposed project is within a maintenance area for federal PM_{10} standards and nonattainment area for federal $PM_{2.5}$ standards. Therefore, per 40 CFR Part 93, analyses are required for conformity purposes. However, the EPA does not require hot-spot analyses (either qualitative or quantitative) for those that are not listed in Section 93.123(b)(1) as a project of air quality concern (POAQC). The EPA defines a POAQC as the following:

i. New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;

ii. Projects affecting intersections that are Level of Service (LOS) D, E, or F with a significant number of diesel vehicles, or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;

iii. New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;

iv. Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; or

v. Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The Build Alternative would not involve a significant amount of diesel truck traffic, as truck volumes would be approximately 5.5 percent of the total vehicles on I-5, and is in compliance with the RTP/FTIP. Additionally, the Build Alternative would improve overall performance, reduce congestion, increase ramp and mainline capacity, and improve operational deficiencies at merge and diverge locations within the project limits. Therefore, the Build Alternative meets the Clean Air Act requirements and is not a project of air quality concern under 40 CFR 93.123(b)(1) and would not cause or contribute to a violation of NAAQS for $PM_{2.5}$. Therefore, the Build Alternative would not be considered a POAQC under 40 CFR 93.123(b)(1).

Furthermore, the Build Alternative was submitted to stakeholders at a Transportation Conformity Working Group (TCWG) meeting on June 28, 2016, pursuant to the interagency consultation requirement of 40 CFR 93.105 (c)(1)(i). EPA, ARB, SCAQMD, and other interagency consultation participants concurred that the Build Alternative is not a POAQC (refer to the TCWG meeting minutes in Appendix B of the *Air Quality Assessment Report* [March 2017]). Therefore, the Build Alternative would not be considered a POAQC under 40 CFR 93.126 as it would not create a new or worsen an existing $PM_{2.5}$ violation.

The *Air Quality Conformity Analysis* for the project was sent to the FHWA on April 25, 2019, for conformity determination. Approval was received on June 3, 2019 (refer to Chapter 4, for a copy of this determination).

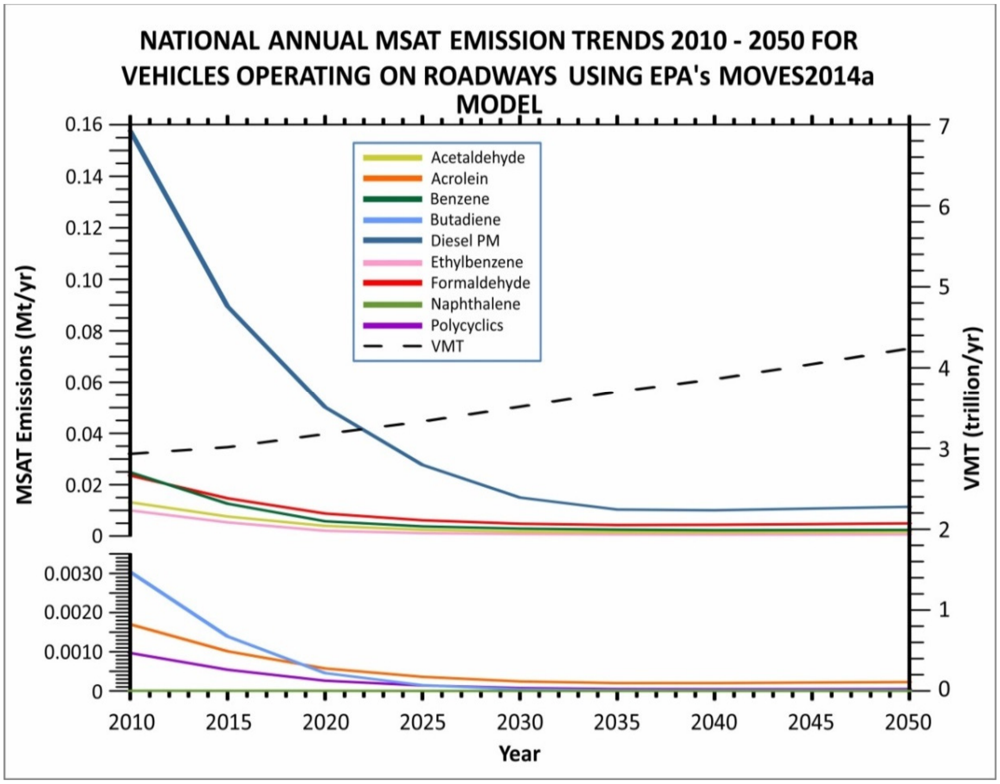
Mobile-Source Air Toxics

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, nonroad mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources and identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (IRIS). In addition, the EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from its 2011 National Air Toxics Assessment (NATA). These are acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel particulate matter, diesel exhaust organic gases (DEOG), formaldehyde, naphthalene, and polycyclic organic matter (POM). While the FHWA considers these the priority Mobile Source Air Toxics (MSATs), the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOVES2010a model, even if the vehicle miles traveled (VMT) increases by 45 percent from 2010 to 2050 as forecasted, a combined reduction of 91 percent in the total annual emissions for the priority MSATs is projected for the same time period, as shown in Figure 2.13-1. The projected reduction in MSAT emissions would be slightly different in California due to the use of the EMFAC2014 emission model in place of the MOVES model.

Figure 2.13-1: National MSAT Emission Trends



Source: Federal Highway Administration. *Website:* https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/ msat/.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, the EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the federal government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. NEPA requires, and FHWA is committed to, the examination and avoidance of potential impacts to the natural and human environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, we must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest. The FHWA policies and procedures for implementing NEPA are contained in regulations at 23 CFR Part 771.

In October 2016, FHWA issued a memorandum titled *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*[1] to advise FHWA division offices as to when and how to analyze MSATs in the NEPA process for highways. This document is an update to the previous guidance released in December 2012. The guidance is described as interim because MSAT science is still evolving. As the science progresses, FHWA will update the guidance. This analysis follows the FHWA guidance.

Information that is Incomplete or Unavailable

According to FHWA, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

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1 Federal Highway Administration (FHWA). 2016. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. October 18. Website: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_ guidance/msat/ (accessed February 2017).

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. It is the lead authority for administering the Clean Air Act and its amendments and has specific statutory obligations with respect to hazardous air pollutants and MSAT emissions. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. It maintains the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSATs, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents* (2016). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts; each step in the process builds on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevent a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70-year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel particulate matter. The EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk."[1]

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the FCAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires the EPA to determine an "acceptable" level of risk due to emissions from a particular source, which is generally no greater than approximately 100 in one million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with a risk of less than one in one million due to emissions from that source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than one in one million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in one million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld the EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the

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[1] United States Environmental Protection Agency (EPA). *Diesel Engine Exhaust, II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure.* Website: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/ 0642.htm#quainhal (accessed November 20, 2016).

impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Quantitative Project-Level MSAT Analysis

As previously discussed, the Build Alternative would not result in a significant increase in truck ADT between the No Build and Build scenarios. The Build Alternative does not involve a truck route, would not add diesel truck capacity, or be a major truck traffic generator. Additionally, according to the *Final Traffic/ Circulation Impact Report* (March 2017) prepared for the project, vehicle hours traveled (VHT) would improve during Build conditions resulting in less congestion and vehicle idling in the project area. MSAT emissions under the Build scenario would be offset somewhat compared to the No Build scenario due to traffic flow improvements. According to the emission factors (EMFAC) model, emissions of all of the priority MSATs (with the exception of diesel particulate matter) decrease as speed increases. The extent to which these speed-related emissions decreases offset MSATs cannot be reliably projected due to the inherent deficiencies of technical models. Additionally, emissions would likely be lower than present levels in the design year as a result of the EPA's national control programs that are projected to reduce annual MSAT emissions by 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the Study Area are likely to be lower in the future in nearly all cases.

Tables 2.13.4 and 2.13.5 depict the MSAT emissions during existing, No Build, and Build conditions for the Opening Year and Horizon Year. Overall, the Build condition would result in lower MSAT emissions than the No Build conditions. As indicated in Tables 2.13.4 and 2.13.5, Alternative 2A and Alternative 2B (Preferred Alternative) would result in a slightly greater reduction in MSAT emissions during the Build condition.

Table 2.13.4: 2030 MSAT Emissions

Toxic Air Contaminant	Existing Emissions (lbs/day)	2030 No Build Emissions (lbs/day)	2030 Build		
			Emissions (lbs/day)	Existing Percent Change	No Build Percent Change
Alternative 2A and Alternative 2B (Preferred Alternative)					
Benzene	44.4	16.1	16.1	-63.8%	-0.1%
Acrolein	2.0	0.7	0.7	-63.6%	0.0%
Acetaldehyde	30.2	10.4	10.3	-66.1%	-1.0%
Formaldehyde	74.6	25.9	25.7	-65.5%	-0.8%
Butadiene	9.5	3.4	3.4	-63.8%	0.0%
Naphthalene	1.3	0.5	0.5	-63.8%	-0.3%
POM	2.0	0.6	0.6	-68.4%	-0.2%
Diesel PM	124.9	8.3	8.2	-93.4%	-0.2%
DEOG	314.0	105.5	104.1	-66.8%	-1.3%

Source: *Air Quality Assessment Report* (March 2017).
Note: Emissions calculated based on VMT data provided by AECOM (November 16, 2016) and calculated with CT-EMFAC2014.
DEOG = diesel exhaust organic gas
lbs/day = pounds per day
MSAT = Mobile Source Air Toxics
PM = particulate matter
POM = polycyclic organic matter
VMT = vehicle miles traveled

Table 2.13.5: 2050 MSAT Emissions

Toxic Air Contaminant	Existing Emissions (lbs/day)	2050 No Build Emissions (lbs/day)	2050 Build		
			Emissions (lbs/day)	Existing Percent Change	No Build Percent Change
Alternative 2A and Alternative 2B (Preferred Alternative)					
Benzene	44.4	14.9	14.9	-66.5%	-0.2%
Acrolein	2.0	0.7	0.7	-66.6%	0.1%
Acetaldehyde	30.2	10.1	10.0	-66.9%	-1.1%
Formaldehyde	74.6	24.9	24.7	-66.9%	-0.9%
Butadiene	9.5	3.2	3.2	-66.4%	0.0%
Naphthalene	1.3	0.5	0.5	-64.9%	-0.3%
POM	2.0	0.5	0.5	-74.1%	-0.3%
Diesel PM	124.9	6.5	6.5	-94.8%	-0.3%
DEOG	314.0	103.2	101.6	-67.6%	-1.5%

Source: *Air Quality Assessment Report* (March 2017).
Note: Emissions calculated based on VMT data provided by AECOM (November 16, 2016) and calculated with CT-EMFAC2014.
DEOG = diesel exhaust organic gas
lbs/day = pounds per day
MSAT = Mobile Source Air Toxics
PM = particulate matter
POM = polycyclic organic matter
VMT = vehicle miles traveled

Long-Term Regional Vehicle Emissions Impacts

The potential impact of the proposed I-5 project on regional vehicle emissions was calculated using regional traffic data and emission rates from CT-EMFAC (Version 6.0).[1] Brake and tire wear emissions were estimated using EMFAC2014 (project level) and are both included in the total reported PM mass. Similarly, re-entrained dust, as a fraction of total PM mass, is calculated using the EPA AP-42 methodology.

Daily mobile source emissions in the Study Area are depicted in Table 2.13.6. Table 2.13.6 provides the emissions that occur from vehicles on the I-5 freeway mainline, high-occupancy vehicle (HOV) lanes, ramps, and the arterials in the surrounding area/project Study Area. As indicated in Table 2.13.6, ROG, NO_X, and CO emissions would decrease in future years despite increases in VMT from anticipated growth. These decreases are attributed to improvements in vehicle emissions over time. PM emissions (both PM_{10} and $PM_{2.5}$) would only increase slightly despite a significant increase in VMT over existing conditions. PM emissions are composed of exhaust, brake- and tire-wear, and re-entrained road dust emissions. Although exhaust emissions will decrease in the future due to improvements in engine and emission control technologies, re-entrained road dust emissions make up a higher fraction of PM. As such, PM emissions become a stronger function of VMT and vehicle distribution. However, the Build Alternative would add capacity and result in increased VMT. The combination of the two effects would result in nominal increases in regional PM emissions (ranging from 0.13 to 0.15 percent) depending on the Alternative and year, as shown in Table 2.13.6. As compared to the Build Alternative, there is only a nominal difference in daily emissions as a result of Design Option 3.

[1] CT-EMFAC was first developed by University of California, Davis, with support from Caltrans and ARB. Versions 3.0 and later were developed by Sonoma Technology, Inc., with permission from University of California, Davis, and with support from Caltrans and the San Diego Association of Governments.

Table 2.13.6: Study Area Daily Vehicle Emissions

Emissions Source	Pounds per Day				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Existing Conditions	1,307	9,805	34,257	4,122	1,326
Opening Year (2030) Emissions					
No Build	480	1,993	12,506	4,562	1,376
Alternative 2A and Alternative 2B (Preferred Alternative)	480	1,985	12,457	4,567	1,378
- Net Change from No Build to Build	-1	-8	-49	5	1
- Percent Change from 2030 No Build Alternative	*-0.16%*	*-0.41%*	*-0.39%*	*0.11%*	*0.10%*
Horizon Year (2050) Emissions					
No Build	442	1,404	10,029	4,883	1,463
Alternative 2A and Alternative 2B (Preferred Alternative)	441	1,394	9,995	4,890	1,465
- Net Change from No Build to Build	-1	-9	-34	7	2
- Percent Change from 2050 No Build Alternative	*-0.17%*	*-0.67%*	*-0.34%*	*0.15%*	*0.14%*

Source: *Air Quality Assessment Report* (March 2017).
Note: Traffic data provided by AECOM (November 16, 2016). Emissions rates from CT-EMFAC and EMFAC2014.
CO = carbon monoxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases

Table 2.13.7 depicts the existing, Opening Year, and Horizon Year daily vehicle emissions that would occur throughout the Orange County region. Table 2.13.7 compares the emissions associated with the No Build and Build Alternative during the existing, Opening Year, and Horizon Year time frames. As indicated in Table 2.13.7, criteria pollutant emissions would decrease with implementation of the Build Alternative. These decreases are attributed to improvements in vehicle emissions over time, fleet turnover, and improvements in regional VMT and travel times.

Table 2.13.7: Region-Wide Daily Vehicle Emissions

Emissions Source	Pounds per Day				
	ROG	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Existing Conditions	60,928	367,460	1,343,320	144,343	46,992
Opening Year (2030) Emissions					
No Build	23,314	104,743	502,590	159,299	48,317
Alternative 2A and Alternative 2B (Preferred Alternative)	23,296	104,602	502,194	159,238	48,298
- Net Change from No Build to Build	-18	-141	-396	-61	-19
- Percent Change from 2030 No Build Alternative	*-0.08%*	*-0.13%*	*-0.08%*	*-0.04%*	*-0.04%*
Horizon Year (2050) Emissions					
No Build	21,634	88,900	406,285	170,286	51,185
Alternative 2A and Alternative 2B (Preferred Alternative)	21,617	88,753	405,935	170,209	51,162
- Net Change from No Build to Build	-17	-148	-350	-77	-23
- Percent Change from 2050 No Build Alternative	*-0.08%*	*-0.17%*	*-0.09%*	*-0.05%*	*-0.05%*

Source: *Air Quality Assessment Report* (March 2017).
Note: Traffic data provided by AECOM (November 16, 2016). Emissions rates from CT-EMFAC and EMFAC2014.
CO = carbon monoxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases

As shown in those tables, the Build Alternative would result in very small increases or decreases in the regional emissions (less than one percent) when compared to the No Build Alternative. As compared to the Build Alternative, there is only a nominal difference in regional daily emissions as a result of Design Option 3. Therefore, the Build Alternative would not contribute substantially to regional vehicle emissions.

No Build Alternative (Alternative 1)

The No Build Alternative would not result in any improvements to I-5 in the project area. As shown in Tables 2.13.6 and 2.13.7, the No Build Alternative would result in more regional emissions than either Alternative 2A or Alternative 2B (Preferred Alternative).

2.13.4 Avoidance, Minimization, and/or Mitigation Measures

Because the Preferred Alternative will incorporate the project features outlined above in Section 2.13.3.1, and the following avoidance and minimization measures, no adverse air quality impacts related to construction activities would occur.

AQ-4 Project grading plans shall show the duration of construction. Ozone precursor emissions from construction equipment vehicles shall be controlled by maintaining equipment engines in good condition and in proper tune per manufacturers' specifications, to the satisfaction of the Resident Engineer, which may include periodic inspections of construction equipment.

AQ-5[1] To further reduce construction emissions from nitrogen oxides (NO_X), particulate matter less than 10 microns in size (PM_{10}), and particulate matter less than 2.5 microns in size ($PM_{2.5}$), and to reduce health impacts to sensitive receptors, Caltrans will require the use of 2010 model year diesel haul trucks that conform to the 2010 U.S. Environmental Protection Agency (EPA) truck standards or newer diesel haul trucks (e.g., material delivery trucks and soil import/export) during construction. If Caltrans determines that 2010 model year or newer diesel haul trucks are not feasible, Caltrans will use trucks that meet EPA 2007 model year NO_X emissions requirements, at a minimum. Successful contractor(s) must demonstrate the ability to

[1] This minimization measure was previously a project features (PF-AQ-5). The text of the measure has not changed.

supply the compliant diesel haul trucks for use prior to any ground-disturbing and construction activities. Caltrans will require periodic reporting and provision of written documentation by contractors, and conduct regular inspections to the maximum extent feasible to ensure compliance.

During operation, no avoidance, minimization, and/or mitigation measures are required, as the Build Alternative would not produce substantial operational air quality impacts.

2.13.5 Climate Change

Neither the EPA nor the FHWA has issued explicit guidance or methods to conduct project-level greenhouse gas analysis. The FHWA emphasizes concepts of resilience and sustainability in highway planning, project development, design, operations, and maintenance. Because there have been requirements set forth in California legislation and executive orders on climate change, the issue is addressed in the California Environmental Quality Act (CEQA) chapter of this document. The CEQA analysis may be used to inform the NEPA determination for the project.

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