4.1 Air Quality and Human Health Risk

4.1.1 Air Quality

This air quality analysis examines air quality emissions that would result from construction associated with the proposed project. The proposed project would modernize the existing T2 and T3 at LAX.

Impacts related to human health risks from inhalation of toxic air contaminant emissions are addressed following this section, in Section 4.1.2, Human Health Risk Assessment. Greenhouse gas emissions are discussed separately in Section 4.2, *Greenhouse Gas Emissions*.

Appendix B.1 provides details on methods, assumptions and backup data for both the air quality and health risk assessment.

Prior to the preparation of this EIR, an Initial Study (included in Appendix A of this EIR) was prepared using the CEQA Environmental Checklist Form to assess potential environmental impacts on air quality. For one of these screening thresholds, the Initial Study found that the proposed project would have a “less than significant impact,” and thus, no further analysis of this topic in an EIR was required. The following Initial Study screening criterion related to air quality does not require any additional analysis in this EIR:

- Potential impacts related to creation of objectionable odors were evaluated and determined to have a “Less than Significant Impact” in the Initial Study. As discussed therein, the proposed project would not include facilities typical of odor sources (e.g., sanitary landfills, wastewater treatment plants, composting facilities, chemical manufacturing facilities, auto body shops, etc.). The use of diesel equipment during construction would generate near-field odors that are considered to be a nuisance. Due to the distance of the project site from sensitive receptors (the closest sensitive receptors to the project site are the residential areas 3,200 feet to the north within the community of Westchester and the Hyatt Hotel on Century Boulevard approximately 2,000 feet to the east), odors from construction-related diesel exhaust would not affect a substantial number of people. Therefore, this issue is not addressed any further within this section.

As discussed in Section 2.6, in Chapter 2, *Project Description* of this EIR, the proposed project would not increase aircraft operations or passenger volumes beyond what would occur without the project, so aircraft and ground support equipment emissions are not analyzed in this EIR. However, because the proposed project includes an increase in operational square footage, operational energy-related emissions were evaluated.

The air quality impact analysis presented below includes development of emission inventories for the proposed project (i.e., the quantities of specific pollutants, typically expressed in pounds per day or tons per year) based on emissions modeling. The analysis also includes an assessment of localized concentrations of air pollutants associated with the proposed project (i.e., the concentrations of specific pollutants within ambient air, typically expressed in terms of micrograms per cubic meter ($\mu g/m^3$)) based on dispersion modeling. The criteria pollutant emissions inventories and localized concentrations were developed using standard, generally accepted industry software/models and federal, State, and locally approved methodologies. Results of the emission inventories were compared to daily emissions significance thresholds established by the South Coast Air Quality Management District (SCAQMD) for the South Coast Air Basin (Basin).[30] Results of the ambient concentrations were compared to SCAQMD concentration significance thresholds. This section is based in part on the detailed information contained in Appendix B of this EIR.

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[30] South Coast Air Quality Management District, CEQA Air Quality Handbook, April 1993, as updated by SCAQMD Air Quality Significance Thresholds, March 2015, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2, accessed August 23, 2016.

4.1.1.1 Pollutants of Interest

Six criteria pollutants were evaluated for the proposed project: ozone (O_3) using as surrogates volatile organic compounds (VOCs)[31] and oxides of nitrogen (NO_X), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), respirable particulate matter or particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), and fine particulate matter or particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$). In addition, these six criteria pollutants are considered to be pollutants of concern based on the type of emission sources associated with construction of the proposed project, and are thus included in this assessment.

Although lead (Pb) is a criteria pollutant, it was not evaluated in this section because the proposed project would not use any fuels or coatings with lead additives; therefore, the project would have no impacts on Pb levels in the Basin. The only source of Pb emissions from Los Angeles International Airport (LAX)[32] is from aviation gasoline (AvGas) associated with piston-engine general aviation aircraft; however, only 0.04 percent of aircraft operations at LAX are piston engine aircraft, AvGas is no longer stored at the fuel farm operated by LAXFUELS, and the proposed project would not change LAX aircraft operations.[33]

Sulfate compounds (e.g., ammonium sulfate) are generally not emitted directly into the air but are formed through various chemical reactions in the atmosphere; thus, sulfate is considered a secondary pollutant. All sulfur emitted by airport-related sources included in this analysis was assumed to be released and to remain in the atmosphere as SO_2. No sulfate inventories or concentrations were estimated since the relative abundance of sulfates from fuel combustion is much lower than that of SO_2,[34] and since very little sulfur is emitted from project sources.

Following standard professional practice, the evaluation of O_3 was conducted by evaluating emissions of VOCs and NO_x, which are precursors in the formation of O_3. O_3 is a regional pollutant and ambient concentrations can only be predicted using regional photochemical models that account for all sources of precursors; regional photochemical O_3 modeling is beyond the scope of this analysis, and is not used for project-level reviews. Therefore, no photochemical O_3 modeling was conducted. Additional information regarding the six criteria pollutants that were evaluated in the air quality analysis is presented below.[35]

Ozone (O_3)[36]

O_3, a component of smog, is formed in the atmosphere rather than being directly emitted from pollutant sources. O_3 forms as a result of VOCs and NO_X reacting in the presence of sunlight in the atmosphere. O_3 levels are highest in warm-weather months. VOCs and NO_X are termed "O_3 precursors" and their emissions are regulated in order to control the creation of O_3. O_3 damages lung tissue and reduces lung function. Scientific evidence indicates that ambient levels of O_3 not only affect people with impaired respiratory systems (e.g., asthmatics), but also healthy

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31 The emissions of volatile organic compounds (VOC) and reactive organic gases (ROG) are essentially the same for the combustion emission sources that are considered in this EIR. This EIR will typically refer to organic emissions as VOC.

32 Section VIII.a-b of the Initial Study (included in Appendix A of this EIR) discusses procedures to minimize generation of lead emissions from lead-based paint during demolition activities associated with the proposed project, As discussed therein, prior to issuance of any permit for the demolition or alteration of any existing structure(s), a lead-based paint survey would be performed following protocols of the Los Angeles Department of Building and Safety designed to detect all lead-based paint. Should lead-based paint materials be identified, standard handling and disposal practices would be implemented pursuant to Occupational Safety and Health Act (OSHA) and California Occupational Safety and Health Act (CalOSHA) regulations to limit worker and environmental risks. Compliance with existing federal, state and local regulations and routine precautions would reduce the potential for hazards to the public or the environment through the routine disposal or accidental release of hazardous building materials. Therefore, lead emissions from lead-based paint during demolition activities associated with the proposed project would be less than significant.

33 City of Los Angeles, Los Angeles World Airports, Los Angeles International Airport (LAX) 2012 Airport-Wide Emissions Inventory Final, Appendix A, CDM Smith Inc., April 2015.

34 Seinfeld and Pandis, Atmospheric Chemistry and Physics – From Air Pollution to Climate Change, John Wiley & Sons, Inc., New York, 1998, p. 59.

35 California Air Resources Board, Glossary of Air Pollution Terms, Available: http://www.arb.ca.gov/html/gloss.htm, Accessed July 19, 2016.

36 U.S. Environmental Protection Agency, Ozone Pollution, Available: https://www.epa.gov/ozone-pollution, accessed August 23, 2016.

children and adults. O_3 can cause health effects such as chest discomfort, coughing, nausea, respiratory tract and eye irritation, and decreased pulmonary functions.

Nitrogen Dioxide (NO_2)[37]

NO_2 is a reddish-brown to dark brown gas with an irritating odor. NO_2 forms when nitric oxide reacts with atmospheric oxygen. Most sources of NO_2 are man-made; the primary source of NO_2 is high-temperature combustion. Significant sources of NO_2 at airports are boilers, aircraft operations, and vehicle movements. NO_2 emissions from these sources are highest during high-temperature combustion, such as aircraft takeoff mode. NO_2 may produce adverse health effects such as nose and throat irritation, coughing, choking, headaches, nausea, stomach or chest pains, and lung inflammation (e.g., bronchitis, pneumonia).

Carbon Monoxide (CO)[38]

CO is an odorless, colorless gas that is toxic. It is formed by the incomplete combustion of fuels. The primary sources of this pollutant in Los Angeles County are automobiles and other mobile sources. The health effects associated with exposure to CO are related to its interaction with hemoglobin once it enters the bloodstream. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity, and impaired mental abilities.

Particulate Matter (PM_{10}) and Fine Particulate Matter ($PM_{2.5}$)[39]

Particulate matter consists of solid and liquid particles of dust, soot, aerosols, and other matter small enough to remain suspended in the air for a long period of time. PM_{10} refers to particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (microns, um, or μm) and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers. Particles smaller than 10 micrometers (i.e., PM_{10} and $PM_{2.5}$) represent that portion of particulate matter thought to represent the greatest hazard to public health.[40] PM_{10} and $PM_{2.5}$ can accumulate in the respiratory system and are associated with a variety of negative health effects. Exposure to particulate matter can aggravate existing respiratory conditions, increase respiratory symptoms and disease, decrease long-term lung function, and possibly cause premature death. The segments of the population that are most sensitive to the negative effects of particulate matter in the air are the elderly, individuals with cardiopulmonary disease, and children. Aside from adverse health effects, particulate matter in the air causes a reduction of visibility and damage to paints and building materials.

A portion of the particulate matter in the air comes from natural sources such as windblown dust and pollen. Man-made sources of particulate matter include fuel combustion, automobile exhaust, field burning, cooking, tobacco smoking, factories, and vehicle movement on, or other man-made disturbances of, unpaved areas. Secondary formation of particulate matter may occur in some cases where gases like sulfur oxides (SO_X)[41] and NO_X interact with other compounds in the air to form particulate matter. In the Basin, both VOCs and ammonia are also

37 U.S. Environmental Protection Agency, Nitrogen Dioxide, Available: https://www3.epa.gov/airquality/nitrogenoxides, accessed, August 23, 2016.

38 U.S. Environmental Protection Agency, Carbon Monoxide, Available: https://www3.epa.gov/airquality/carbonmonoxide, accessed August 23, 2016.

39 U.S. Environmental Protection Agency, Particulate Matter (PM) Pollution, Available: https://www.epa.gov/pm-pollution, accessed August 23, 2016.

40 U.S. Environmental Protection Agency, Particle Pollution and Your Health, September 2003.

41 The term SO_x accounts for distinct but related compounds, primarily SO_2 and, to a far lesser degree, sulfur trioxide. As a conservative assumption for this analysis, it was assumed that all SO_x is emitted as SO_2, therefore SO_x and SO_2 are considered equivalent in this document and only the latter term is used henceforth.

considered precursors to $PM_{2.5}$. Fugitive dust generated by construction activities is a major source of suspended particulate matter.

The secondary creators of particulate matter, SO_X and NO_X, are also major precursors to acidic deposition (acid rain). While SO_X is a major precursor to particulate matter formation, NO_X has other environmental effects. NO_X reacts with ammonia, moisture, and other compounds to form nitric acid and related particles. Human health concerns include effects on breathing and the respiratory system, damage to lung tissue, and premature death. Small particles penetrate into sensitive parts of the lungs and can cause or worsen respiratory disease. NO_X has the potential to change the composition of some species of vegetation in wetland and terrestrial systems, to create the acidification of freshwater bodies, impair aquatic visibility, create eutrophication of estuarine and coastal waters, and increase the levels of toxins harmful to aquatic life.

Sulfur Dioxide (SO_2)[42]

Sulfur oxides are formed when fuel containing sulfur (typically, coal and oil) is burned, and during other industrial processes. The term "sulfur oxides" accounts for distinct but related compounds, primarily SO_2 and sulfur trioxide. As a conservative assumption for this analysis, it was assumed that all SO_X are emitted as SO_2; therefore, SO_X and SO_2 are considered equivalent in this document. Higher SO_2 concentrations are usually found in the vicinity of large industrial facilities.

The physical effects of SO_2 include temporary breathing impairment, respiratory illness, and aggravation of existing cardiovascular disease. Children and the elderly are most susceptible to the negative effects of exposure to SO_2.

4.1.1.2 Scope of Analysis

The air quality analysis conducted for the proposed project addresses construction-related emissions. Construction emissions were quantified for each year of construction, occurring primarily between 2017 and 2023. The proposed project would take approximately 76 months (six years, four months) to construct. The basic steps involved in the scope of analysis are listed below.

The scope of the evaluation of construction emissions was conducted to:

- Identify construction-related emissions sources;
- Develop peak daily construction emissions inventories for the identified sources;
- Compare emissions inventories for each year of construction with appropriate CEQA significance thresholds for construction;
- Conduct dispersion modeling for both 2020, the estimated peak construction year, and May 2020, the estimated peak construction month, of project-related construction emissions;
- Obtain background concentration data from SCAQMD and estimate future concentrations resulting from construction of the proposed project;
- Compare peak concentration results with appropriate CEQA significance thresholds and ambient air quality standards to determine the significance of project impacts;
- Determine level of significance of project impacts; and
- Identify construction-related mitigation measures.

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[42] U.S. Environmental Protection Agency, Sulfur Dioxide (SO2) Pollution, Available: https://www.epa.gov/so2-pollution, accessed August 23, 2016.

4.1.1.3 Methodology

4.1.1.3.1 Emission Source Types

Construction-related criteria pollutant emissions were quantified for CO, VOC, NO_X, SO_2, PM_{10}, and $PM_{2.5}$ for the proposed project's constituent construction activities (project components). Sources of construction emissions evaluated in the analysis include off-road and on-road construction equipment, on-road delivery vehicles, on-site hauling and worker vehicles, as well as fugitive dust (PM_{10} and $PM_{2.5}$) from demolition, material handling, and vehicle travel on silted roadways, and fugitive VOCs from coating and painting.

The basis for the construction emissions analysis is the construction schedule, provided in Appendix B.1.1, that included approximate durations and activities for each project component that together constitute the proposed project. Construction activity estimates were developed for each project component, from which monthly emissions were quantified. Daily emissions were calculated by dividing monthly emissions by the number of work days in the given month, based on a 5-day-per-week workweek. Annual and quarterly emissions, as applicable, were based on the monthly emissions estimates.

Emissions estimates for the proposed project's construction activities included the application of emission reduction measures required by SCAQMD, including compliance with Rule 403 for fugitive dust control and use of ultra-low sulfur fuel. See Section 4.1.1.4.2.

As further described in Chapter 2, *Project Description*, construction of the proposed project would occur over approximately 76 months, projected to begin in approximately the fourth quarter 2017 and to end late 2023. Operations would continue at T2 and T3 during construction and the tenant(s) within T2 and T3 would manage their flight activity within the T2/T3 area based on the nature and location of construction activities occurring at the time, including managing flight schedules and gate availability to minimize aircraft delays and passenger inconvenience. Temporary gate closures during construction at T2 and T3 would likely be limited to no more than two or three at a time and would be coordinated with overall flight scheduling and gate assignments to minimize disruptions.

Off-Road Equipment

Off-road construction equipment includes dozers, loaders, compactors, and other heavy-duty construction equipment that are not licensed to travel on public roadways. Off-road construction equipment types, models, horsepower, load factor, and estimated maximum daily hours of operation were obtained and derived from the LAX Midfield Satellite Concourse (MSC) North Project (MSC North Project) EIR[43] for each individual project component. Equipment types with corresponding operating hours were matched with specific construction activities for each project component. Although much of the project is expected to be constructed in two shift workdays, a third overnight shift would be used for those work activities that cannot be accomplished on the day and night shifts due to coordination and interference issues. For the annual analysis, a third shift was assumed for 20 percent of workdays, leading to an average of 2.2 shifts per day. Eight hours were assumed to be the maximum hours per shift.

Off-road diesel exhaust emission factors for VOC, NO_X, and PM_{10} were based on the California Air Resources Board's (CARB's) 2011 Inventory Model database for In-Use Off-Road Construction, Industrial, Ground Support and Oil Drilling equipment (OFFROAD 2011).[44] Off-road exhaust emission factors for CO and SO_2 were derived from CARB's OFFROAD2007 model.[45] $PM_{2.5}$ emission factors were developed using the PM_{10} emission factors

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[43] City of Los Angeles, Los Angeles World Airports, Final Environmental Impact Report for Los Angeles International Airport (LAX) Midfield Satellite Concourse (MSC), (SCH 2013021020), June 2014. Available: http://www.lawa.org/MSCNorth/Index.aspx, Accessed January 19, 2017.

[44] California Air Resources Board, 2011 Inventory Model for In-Use Off-Road Equipment, Available: http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles, Accessed July 19, 2016.

[45] California Air Resources Board, 2007 Inventory Model for In-Use Off-Road Equipment, Available: http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles, Accessed July 19, 2016.

and $PM_{2.5}$ size profiles derived from the CARB-approved California Emission Inventory and Reporting System (CEIDARS).[46,47]

Emissions for off-road equipment were calculated by multiplying an emission factor by the horsepower, load factor, usage factor, and operational hours for each type of equipment.

On-Road On-Site Equipment

On-road on-site equipment emissions are generated from on-site pickup trucks, water trucks, haul trucks, dump trucks, cement trucks, and other on-road vehicles that are licensed to travel on public roadways. Exhaust emissions for each construction year from on-road, on-site vehicles were calculated using CARB's EMFAC2014 emission factor model.[48]

On-road on-site equipment types were categorized into vehicle types corresponding to CARB vehicle classes. Emission factors from the EMFAC2014 model are expressed in grams per mile and account for startup, running, and idling operations. In addition, the VOC emission factors include diurnal, hot soak, running, and resting emissions, while the PM_{10} and $PM_{2.5}$ factors include tire and brake wear.

The emission factors were converted to pounds per hour and applied to the hourly activity schedule described previously.

On-Road Off-Site Equipment

On-road off-site vehicle trips include personal vehicles used by construction workers to access the construction site, as well as hauling trips for the transport of various materials and concrete to and from the site. On-road off-site hauling activity, including miles per trip were derived from the MSC North Project EIR and number of trips were based on the MSC North Project EIR and the proposed project schedule for each project component. On-road off-site vehicle emissions were calculated by determining total vehicle miles traveled (VMT) by each type of vehicle. VMT were determined assuming CalEEMod default trip distances of 40-miles roundtrip for all deliveries and worker trips. On-site deliveries were assumed to utilize the most conservative feasible route when determining VMT. The emission factors obtained from EMFAC2014 as described previously (in grams per mile) were applied to the VMT estimates to calculate total emissions.

Fugitive Dust

Fugitive dust is an additional source of PM_{10} and $PM_{2.5}$ emissions associated with construction activities. Fugitive dust includes re-suspended road dust from off-and on-road vehicles, as well as dust from grading, loading, and unloading activities. Additional sources of fugitive dust quantified in the analysis included construction demolition and concrete batching. Fugitive dust emissions were calculated using methodologies, formulas, and values from the U.S. Environmental Protection Agency (USEPA)'s Compilation of Air Pollutant Factors (AP-42),[49] the

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46 South Coast Air Quality Management District, Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, October 2006, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/final_pm2_5methodology.pdf?sfvrsn=2, accessed November 12, 2015.

47 California Air Resources Board, California Emission Inventory and Reporting System (CEIDARS) - Particulate Matter (PM) Speciation Profiles - Summary of Overall Size Fractions and Reference Documentation, June 2, 2016, Available: http://www.arb.ca.gov/ei/speciate/pmsizeprofile2jun16.zip, Accessed August 5, 2016.

48 California Air Resources Board, Research Division, EMFAC2014 On-Road Emissions Inventory Estimation Model, Available: http://www.arb.ca.gov/msei/modeling.htm, Accessed November 12, 2015.

49 U.S. Environmental Protection Agency, AP 42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Section 13.2.1, Paved Roads, January 2011, Section 13.2.2 Unpaved Roads, November 2006, Section 13.2.3 Heavy Construction Operations, January 1995, Available: https://www3.epa.gov/ttn/chief/ap42/ch13/index.html, accessed November 12, 2015.

SCAQMD's CEQA *Air Quality Handbook*[50], and documentation associated with CARB's California Emission Estimator Model (CalEEMod) emissions estimator computer program.[51]

The proposed project is considered to be a large operation per SCAQMD Rule 403 (a large operation is any active operation on property which contains 50 or more acres of disturbed surface area or any earth-moving operation with a daily earth-moving or throughout volume of 3,850 cubic meters [5,000 cubic yards] or more three times during the most recent 365-day period.) Watering three times a day, as required by SCAQMD Rule 403 for large projects, was estimated to reduce on-site fugitive dust emissions by 61 percent.[52]

Fugitive VOCs

A primary source of construction-related fugitive VOC emissions is concrete or asphalt paving. VOC emissions from asphalt paving operations result from evaporation of the petroleum distillate solvent, or diluent, used to liquefy asphalt cement. Based on the CARB default data contained within CalEEMod, an emission factor of 2.62 pounds of VOC (from asphalt curing) per acre of asphalt material was used to determine VOC emissions from asphalt paving. Another source of construction-related fugitive VOC emissions is architectural coatings. VOC emissions from architectural coatings result from evaporation of volatile compounds present in a coating applied to a structure's surface. Based on the CARB data contained within CalEEMod, an emission factor of 0.012 pounds of VOC (from evaporation) per square foot of coated surface was used to determine VOC emissions from architectural coatings.

4.1.1.3.2 Dispersion Modeling for Local Concentrations

Air dispersion modeling was used to estimate the localized effects from the on-site portion of daily emissions from the sources described above. The localized effects were evaluated at nearby sensitive receptor locations (shown on **Figure 4.1.1-1**) that could be affected by the proposed project. The USEPA and SCAQMD-approved dispersion model, AMS/EPA Regulatory Model (AERMOD), was used to model the air quality impacts of CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emissions.[53] AERMOD can estimate the air quality impacts of single or multiple point, area, or volume sources using historical meteorological conditions. Volume sources are three-dimensional sources of emissions that can be used to model releases from a variety of emission sources, including moving vehicles (such as cars and trucks) on roadways. Area sources were used to represent the emissions from heavy-duty construction equipment and fugitive dust. Model inputs were developed following the SCAQMD's Final Localized Significance Threshold (LST) Methodology[54] and its Modeling Guidance for AERMOD.[55] To be conservative, this analysis did not calculate PM_{10} deposition, which would likely reduce the ambient modeled concentration of PM_{10} from the construction sources.

The workday was assumed to occur evenly for each hour of each day during the week (Monday through Friday) for all the proposed project. No work was assumed to occur during the weekend (Saturday through Sunday).

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50 South Coast Air Quality Management District, CEQA Air Quality Handbook, April 1993, as updated by SCAQMD Air Quality Significance Thresholds, March 2015, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2, accessed July 19, 2016.

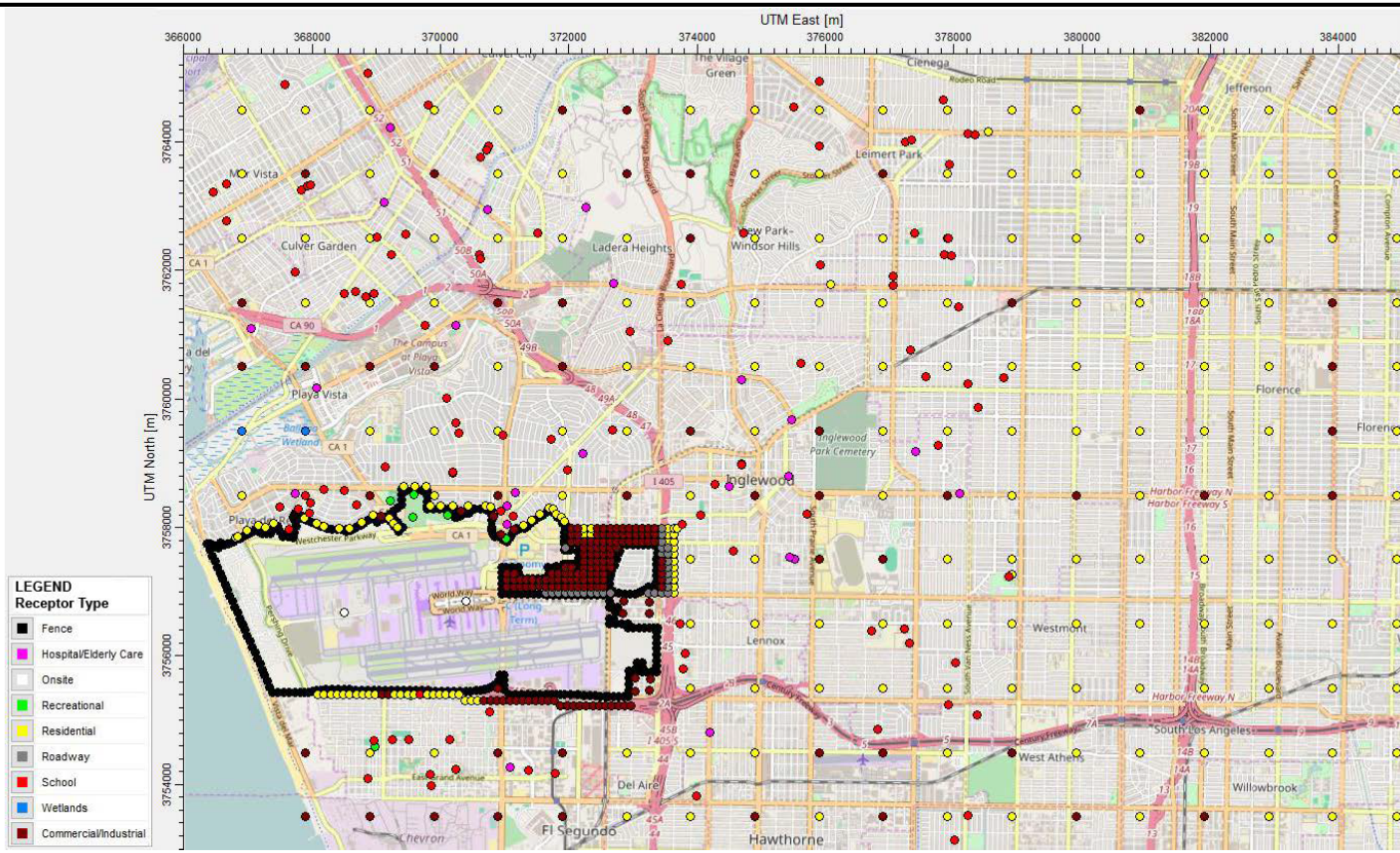
51 California Air Resources Board, California Emissions Estimator Model, Version 2013.2.2, Available: http://www.caleemod.com/, Accessed November 12, 2015.

52 South Coast Air Quality Management District, Rule 403 Fugitive Dust, as amended June 3, 2005, Available: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4, accessed November 12, 2015.

53 The AERMOD modeling system is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. Additional information, documentation, and guidance regarding the AERMOD modeling system is available on the USEPA's website at https://www3.epa.gov/scram001/dispersion_prefrec.htm#aermod, accessed January 3, 2017.

54 South Coast Air Quality Management District, Final Localized Significance Threshold Methodology, revised July 2008. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2, accessed July 7, 2016.

55 South Coast Air Quality Management District, SCAQMD Modeling Guidance for AERMOD, Available: http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance, accessed July 7, 2016.



Source: Los Angeles World Airports, October 2016.
Prepared by: CDM Smith, November 2016.

LAX Terminals 2 and 3 Modernization Project	Receptor Locations	Figure 4.1.1-1

Sources

Construction activities were assumed to be located at the project site and batch plant/staging areas. As shown in **Figure 2-12** and detailed in Section 2.5 of Chapter 2, *Project Description,* there is a proposed primary construction staging area and potential batch plant located north of Imperial Highway, between Aviation and La Cienega Boulevards. In addition, an optional primary construction staging area located within the northern area of the airport, on a portion of an existing LAWA-owned construction staging area along the south side of Westchester Parkway, east of the southern terminus of La Tijera Boulevard, as well as a batch plant staging area (adjacent to Aviation Boulevard), are being proposed. Due to the proximity of the optional primary construction staging area to sensitive receptors (i.e., residential area), which would likely have a higher influence on localized concentrations, the optional primary construction staging area results were used as the most conservative in the analysis. The on-site sources, including the batch plant/staging areas, were modeled as volume sources using the line-volume option in AERMOD. The haul route from the batch plant/staging area to the project site was also modeled as line-volume sources. These construction volume sources were modeled with a 5-meter release height and 1.4-meter initial vertical dimension.

Receptor Locations

Receptor points are the geographic locations where the air dispersion model calculates air pollutant concentrations. These discrete receptors were used to determine air quality impacts in the vicinity of the project site.[56] Receptors were placed at the boundary of LAX (along the fence line) and at various locations outside of the Airport property near project element construction sites, as well as inside the Airport at the Theme Building and near World Way West, as shown on **Figure 4.1.1-1**.

Meteorology

The meteorological data used in the analysis were obtained from the National Climatic Data Center website, and was preprocessed using AERMET.[57,58] AERMET is a meteorological preprocessor for organizing available meteorological data into a format suitable for use in the AERMOD air quality dispersion model. These files were also developed by the SCAQMD using site-specific surface characteristics (i.e., surface albedo, surface roughness, and Bowen ratio)[59] obtained using AERSURFACE.[60] AERSURFACE is a tool that provides realistic reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input into AERMET. The data set used consisted of hourly surface data collected at the LAX National Weather Service station (Station 23174) for calendar year 2015; [61] the data included ambient temperature, wind speed, wind direction, and atmospheric stability parameters, as well as mixing height parameters from the appropriate upper air station (Miramar, California). For the past 20 years, LAWA has used one year of meteorological data (met data) per previous SCAQMD suggestions. A review of wind roses for LAX from 2011 through 2015 (included in Appendix B.1.4) shows very little variation from year to year. A review of this data indicates that the results for 2015 would not change by more than approximately 10 percent if other years of met data were modeled. Therefore, if modeled concentrations are within 10 percent of a concentration threshold, as was the case for the 1-hour NO_2 NAAQS determination, impacts were conservatively estimated to be significant, as described in Section 4.1.1.6.3, **Table 4.1.1-8**.

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[56] Discrete Cartesian receptors are identified by their x (east-west) and y (north-south) coordinates and represent a specific location of interest.

[57] National Centers for Environmental Information, Climate Data Online: Dataset Discovery, Available: https://www.ncdc.noaa.gov/cdo-web/datasets, accessed July 19, 2016.

[58] U.S. Environmental Protection Agency, Support Center for Regulatory Atmospheric Modeling (SCRAM), Meteorological Processors and Accessory Programs, Available: https://www3.epa.gov/scram001/metobsdata_procaccprogs.htm, accessed July 19, 2016.

[59] The surface albedo is the portion of sunlight that is reflected; the Bowen ratio is the measure of moisture available for evaporation.

[60] U.S. Environmental Protection Agency, Support Center for Regulatory Atmospheric Modeling (SCRAM), Related Programs, Available: https://www3.epa.gov/ttn/scram/dispersion_related.htm#aersurface, accessed July 19, 2016.

[61] This represents the most recent year with complete data; the data has passed the USEPA's requirement for 90 percent completeness by quarter for wind direction, wind speed, and temperature.

Terrain

The terrain data used in the analysis were USGS National Elevation Data (NED) geographic tiff files (GEO TIFF) with 10-meter elevation resolution. Two files covered the modeling domain: NED_n34w119_13.tif and NED_n35w119_13.tif. [62] This data was processed with the AERMAP pre-processor for AERMOD to generate base elevations for each source and receptor location.

Ozone Limiting Method for NO_2 Modeling

AERMOD contains various options for modeling the conversion of NO_x to NO_2, including the Ambient Ratio Methods (ARM and ARM2), Ozone Limiting Method (OLM), and Plume Volume Molar Ratio Method (PVMRM). Per the air quality modeling protocol reviewed by SCAQMD, the OLM option was used in this modeling analysis.[63] The SCAQMD provides hourly O_3 data for modeling conversion of NO_X to NO_2 using the OLM option. In addition, the following values were used in the analysis:

- Ambient Equilibrium NO_2/NO_x Ratio: 0.90
- In-stack NO_2/NO_x Ratio: 0.11 for heavy-duty trucks and construction equipment
- Default Ozone Value: Hourly O_3 data file provided by the SCAQMD

4.1.1.4 Existing Conditions

4.1.1.4.1 Climatological Conditions[64]

The Airport is located within the South Coast Air Basin of California, a 6,745 square-mile area encompassing all of Orange County and the urban, non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The meteorological conditions at the Airport are heavily influenced by the proximity of the Airport to the Pacific Ocean to the west and the mountains to the north and east. This location tends to produce a regular daily reversal of wind direction; onshore (from the west) during the day and offshore (from the east) at night. Comparatively warm, moist Pacific air masses drifting over cooler air resulting from coastal upwelling of cooler water often form a bank of fog that is generally swept inland by the prevailing westerly (i.e., from the west) winds. The “marine layer” is generally 1,500 to 2,000 feet deep, extending only a short distance inland and rising during the morning hours producing a deck of low clouds. The air above is usually relatively warm, dry, and cloudless. The prevalent temperature inversion in the Basin tends to prevent vertical mixing of air through more than a shallow layer.

A dominating factor in California weather is the semi-permanent high-pressure area of the North Pacific Ocean. This pressure center moves northward in summer, holding storm tracks well to the north, and minimizing precipitation. Changes in the circulation pattern allow storm centers to approach California from the southwest during the winter months and large amounts of moisture are carried ashore. The Los Angeles region receives on average 10 to 15 inches of precipitation per year, of which 83 percent occurs during the months of November through March. Thunderstorms are light and infrequent, and on very rare occasions, trace amounts of snowfall have been reported at the Airport.

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62 United States Geological Survey, National Map Viewer. Available: https://viewer.nationalmap.gov/basic/, Accessed November 28, 2016.

63 OLM is a widely accepted approach for estimating the conversion of NO_x to NO_2 in source plumes. SCAQMD provided the hourly ozone data that was used in the T2/3 OLM analysis.

64 Ruffner, J.A., Gale Research Company, Climates of the States: National Oceanic and Atmospheric Administration Narrative Summaries, Table, and Maps for Each State with Overview of State Climatologist Programs, Third Edition, Volume 1: Alabama – New Mexico, 1985, pp. 83-93.

The annual minimum mean, maximum mean, and overall mean temperatures at the airport are 56 degrees Fahrenheit (°F), 70°F, and 63°F, respectively. The prevailing wind direction at the airport is from the west-southwest with an average wind speed of roughly 6.4 knots (7.4 miles per hour [mph] or 3.3 meters per second [m/s]). Maximum recorded gusts range from 27 knots (31 mph or 13.9 m/s) in July to 56 knots (64 mph or 28.6 m/s) in March. The monthly average wind speeds range from 5.3 knots (6.1 mph or 2.7 m/s) in November to 7.6 knots (8.7 mph or 3.9 m/s) in April.[65]

4.1.1.4.2 Regulatory Setting

Air quality is regulated by federal, state, and local laws. In addition to rules and standards contained in the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA), air quality in the Los Angeles region is subject to the rules and regulations established by CARB and SCAQMD with oversight provided by the USEPA, Region IX.

Federal

The USEPA is responsible for implementation of the CAA. The CAA was first enacted in 1970 and has been amended numerous times in subsequent years (1977, 1990, and 1997). Under the authority granted by the CAA, USEPA has established National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: O_3, NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. **Table 4.1.1-1** presents the NAAQS that are currently in effect for criteria air pollutants. As discussed previously, O_3 is a secondary pollutant, meaning that it is formed from reactions of "precursor" compounds under certain conditions. The primary precursor compounds that can lead to the formation of O_3 are VOCs and NO_X.

Table 4.1.1-1
National and California Ambient Air Quality Standards (NAAQS and CAAQS)

			NAAQS	
Pollutant	**averaging time**	**CAAQS**	**primary**	**secondary**
Ozone (O_3)	8-hour	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³)	Same as Primary
	1-Hour	0.09 ppm (180 µg/m³)	N/A	N/A
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	N/A
	1-Hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	N/A
Nitrogen Dioxide (NO_2)	Annual	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)	Same as Primary [1/]
	1-Hour	0.18 ppm (339 µg/m³)	0.10 ppm (188 µg/m³)	N/A
Sulfur Dioxide (SO_2) [2/]	Annual	N/A	0.030 ppm (80 µg/m³)	N/A
	24-Hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)	N/A
	3-Hour	N/A	N/A	0.5 ppm (1300 µg/m³)
	1-Hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³)	N/A
Respirable Particulate Matter (PM_{10})	AAM	20 µg/m³	N/A	N/A
	24-Hour	50 µg/m³	150 µg/m³	Same as Primary
Fine Particulate Matter ($PM_{2.5}$)	AAM	12 µg/m³	12.0 µg/m³	15 µg/m³
	24-Hour	N/A	35 µg/m³ [10/]	Same as Primary
Lead (Pb)	Rolling 3-Month Average	N/A	0.15 µg/m³	Same as Primary

65 Western Regional Climate Center, Los Angeles International Airport (KLAX), CA Climatological Summary, Period of Record: Jul 1996 to Dec 2008, Available: http//www.wrcc.dri.edu/summary/lax.ca.html. Last accessed August 1, 2016.

Table 4.1.1-1
National and California Ambient Air Quality Standards (NAAQS and CAAQS)

			NAAQS	
Pollutant	averaging time	CAAQS	primary	secondary
	Monthly	1.5 μg/m³	N/A	N/A
Vis bility Reducing Particles	8-Hour	Extinction of 0.23 per kilometer	N/A	N/A
Sulfates	24-Hour	25 μg/m³	N/A	N/A

Notes:
NAAQS = National Ambient Air Quality Standards
CAAQS = California Ambient Air Quality Standards
ppm = parts per million (by volume)
μg/m³ = micrograms per cubic meter
N/A = Not applicable
mg/m³ = milligrams per cubic meter
AAM = Annual arithme ic mean
1/ On March 20, 2012, the USEPA took final action to retain the current secondary NAAQS for NO_2 (0.053 ppm averaged over a year) and SO_2 (0.5 ppm averaged over three hours, not to be exceeded more than once per year) (77 Federal Register [FR] 20264).
2/ On June 22, 2010, the 1-hour SO_2 NAAQS was updated and the previous 24-hour and annual primary NAAQS were revoked. The previous 1971 SO_2 NAAQS (24-hour: 0.14 ppm; annual: 0.030 ppm) remains in effect until one year after an area is designated for the 2010 NAAQS (75 FR 35520).
Source: California Air Resources Board, Ambient Air Quality Standards Chart, Available: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf, Accessed November 15, 2016.
Prepared by: CDM Smith, January 2017.

The CAA also specifies future dates for achieving compliance with the NAAQS and mandates that states submit and implement a State Implementation Plan (SIP) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met. The 1990 amendments to the CAA identify specific emission reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones.

LAX is located in the South Coast Air Basin, which is designated as a federal nonattainment area for O_3, $PM_{2.5}$, and Pb. Nonattainment designations under the CAA for O_3 are classified into levels of severity based on the level of concentration above the standard, which is also used to set the required attainment date. The South Coast Basin is classified as an extreme nonattainment area for O_3. The Basin was redesignated in 1998 to attainment/maintenance for NO_2 and in 2007 to attainment/maintenance for CO. Attainment/maintenance means that the pollutant is currently in attainment and that measures are included in the SIP to ensure that the NAAQS for that pollutant are not exceeded again (maintained). More recently, the Basin was redesignated to attainment/maintenance for PM_{10} on July 26, 2013.[66] Most recently, the Basin was also found to attain the 1997 $PM_{2.5}$ NAAQS;[67] however the Basin remains a nonattainment area for the 2006 daily and 2012 annual $PM_{2.5}$ NAAQS shown in **Table 4.1.1-2**. The attainment status with regards to the NAAQS is presented in **Table 4.1.1-2** for each criteria pollutant.

State

The CCAA, signed into law in 1988, requires all areas of the State to achieve and maintain the California Ambient Air Quality Standards (CAAQS) by the earliest practicable date. The CAAQS are generally as stringent as, and in several cases more stringent than, the NAAQS; however, in the case of short-term standards for NO_2 and SO_2, the CAAQS are less stringent than the NAAQS. The currently applicable CAAQS are presented with the NAAQS in **Table 4.1.1-1**. The attainment status with regards to the CAAQS is presented in **Table 4.1.1-2** for each criteria pollutant. CARB has been granted jurisdiction over a number of air pollutant emission sources that operate in the

66 U.S. Environmental Protection Agency, Approval and Promulgation of Implementation Plans; Designation of Areas for Air Quality Planning Purposes; California; South Coast Air Basin; Approval of PM_{10} Maintenance Plan and Redesignation to Attainment for the PM_{10} Standard, Federal Register, Vol. 78, No. 123, June 26, 2013, pp. 38223-38226.

67 U.S. Environmental Protection Agency, Clean Data Determination for 1997 $PM_{2.5}$ Standards; California-South Coast; Applicability of Clean Air Act Requirements, Federal Register, Vol. 81, No. 142, July 25, 2016, pp. 48350-48356.

State. Specifically, CARB has the authority to develop emission standards for on-road motor vehicles (with USEPA approval), as well as for stationary sources and some off-road mobile sources. In turn, CARB has granted authority to the regional air pollution control and air quality management districts to develop stationary source emission standards, issue air quality permits, and enforce permit conditions.

Table 4.1.1-2
South Coast Air Basin Attainment Status

Pollutant	Federal Standards (NAAQS) 1/	California Standards (CAAQS) 2/
Ozone (O_3)	Nonattainment – Extreme	Nonattainment
Carbon Monoxide (CO)	Attainment – Maintenance	Attainment
Nitrogen Dioxide (NO_2)	Attainment – Maintenance	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Respirable Particulate Matter (PM_{10})	Attainment - Maintenance	Nonattainment
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment 3/	Nonattainment
Lead (Pb)	Nonattainment	Attainment

Notes:

1/ Status as of June 17, 2016.

2/ Effective December 2015.

3/ Classified as attainment for 1997 NAAQS, moderate nonattainment for 2012 NAAQS, and serious nonattainment for 2006 NAAQS.

Sources: U.S. Environmental Protection Agency. Green Book Nonattainment Areas. Available: http://www3.epa.gov/airquality/greenbk/index.html. accessed May 24, 2016; California Air Resources Board, Area Designations Maps/State and National, Available: https://www.arb.ca.gov/desig/adm/adm htm, Accessed December 2015; U.S. Environmental Protection Agency. Federal Register vol. 81 No. 142 48350. Available: https://www.federalregister.gov/documents/2016/07/25/2016-17410/clean-data-determination-for-1997-pm25, effective November 28, 2015.

Prepared By: CDM Smith, January 2017.

South Coast Air Quality Management District

SCAQMD has jurisdiction over an area of 10,743 square miles consisting of Orange County and the urban, non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, and the Riverside County portions of the Salton Sea Air Basin and Mojave Desert Air Basin. The Basin is a sub-region of SCAQMD's jurisdiction and covers an area of 6,745 square miles. While air quality in this area has improved, the Basin requires continued diligence to meet air quality standards.

The SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the CAAQS and NAAQS. SCAQMD and CARB have adopted the 2012 AQMP which incorporates the latest scientific and technological information and planning assumptions, including the 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), and updated emission inventory methodologies for various source categories.[68] The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012. SCAQMD released the Draft 2016 AQMP for public review on June 30, 2016, and a revised draft incorporating public comments on October 7, 2016. The 2016 Draft AQMP includes baseline emissions assumptions consistent with the 2016 RTP/SCS, approved by the Southern California Association of Governments (SCAG) on April 7, 2016. As the 2016 AQMP has not yet been approved, the 2012 AQMP is the most appropriate plan to use for consistency analysis. The AQMP builds upon other agencies' plans to achieve federal standards for air quality in the Basin. It incorporates a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, and on-road and off-road mobile sources. The 2012 AQMP builds upon improvements in previous plans, and includes new and changing federal requirements, implementation of new technology measures, and the continued development of economically sound, flexible compliance approaches. In addition, it highlights the significant amount of emission reductions needed and the urgent need to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria pollutant standards within the timeframes allowed under the federal CAA.

68 South Coast Air Quality Management District, Vision for Clean Air: A Framework for Air Quality and Climate Planning, June 27, 2012, Available: http://www.aqmd.gov/home/library/clean-air-plans/vision-for-clean-air, accessed November 12, 2015.

The 2012 AQMP's key undertaking is to bring the Basin into attainment with NAAQS for 24-hour $PM_{2.5}$ by 2014. It also intensifies the scope and pace of continued air quality improvement efforts toward meeting the 2023 8-hour O_3 standard deadline with new measures designed to reduce reliance on the CAA Section 182(e)(5) long-term measures for NO_x and VOC reductions. SCAQMD expects exposure reductions to be achieved through implementation of new and advanced control technologies as well as improvement of existing technologies.

The control measures in the 2012 AQMP consist of four components: 1) Basin-wide and Episodic Short-term $PM_{2.5}$ Measures; 2) Contingency Measures; 3) 8-hour O_3 Implementation Measures; and 4) Transportation and Control Measures provided by SCAG. The Plan includes eight short-term $PM_{2.5}$ control measures, 16 stationary source 8-hour O_3 measures, 10 early action measures for mobile sources, seven early action measures proposed to accelerate near-zero and zero emission technologies for goods movement-related sources, and five on-road and five off-road mobile source control measures. In general, the District's control strategy for stationary and mobile sources is based on the following approaches: 1) available cleaner technologies; 2) best management practices; 3) incentive programs; 4) development and implementation of zero-near-zero technologies and vehicles and control methods; and 5) emission reductions from mobile sources.

The SCAQMD also adopts rules to implement portions of the AQMP. Some of these rules are applicable to the construction of the proposed project. Rule 403 requires the implementation of best available fugitive dust control measures during active construction activities capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads. Also, SCAQMD Rule 113 limits the amount of volatile organic compounds from architectural coatings in solvents, which lowers the emissions of odorous compounds.

Southern California Association of Governments

SCAG is the metropolitan planning organization (MPO) for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties and serves as a forum for the discussion of regional issues related to transportation, the economy, community development, and the environment. As the federally-designated MPO for the Southern California region, SCAG is mandated by the federal government to research and develop plans for transportation, hazardous waste management, and air quality. Pursuant to California Health and Safety Code Section 40460(b), SCAG has the responsibility for preparing and approving the portions of the AQMP relating to regional demographic projections and integrated regional land use, housing, employment, and transportation programs, measures, and strategies. SCAG is also responsible under the CAA for determining conformity of transportation projects, plans, and programs with applicable air quality plans. With regards to air quality planning, SCAG has prepared and adopted the 2016-2040 RTP/SCS, which includes a Sustainable Communities Strategy that addresses regional development and growth forecasts. [69]

Other Related Rules and Policies

In the Basin, the City of Los Angeles, CARB, and the SCAQMD have adopted or proposed additional rules and policies governing the use of cleaner fuels in public vehicle fleets. The City of Los Angeles Policy CF#00-0157 requires that City-owned or operated diesel-fueled vehicles be equipped with particulate traps and that they use ultra-low-sulfur diesel fuel. CARB has adopted a Risk Reduction Plan for diesel-fueled engines and vehicles.[70] The SCAQMD has adopted a series of rules that would require the use of clean fuel technologies in on-road transit buses, on-road public fleet vehicles, airport taxicabs and shuttles, trash trucks, and street sweepers.[71]

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69 Southern California Association of Governments, Final 2016–2040 Regional Transportation Plan/Sustainable Communities Strategy: A Plan for Mobility, Accessibility, Sustainability and a High Quality of Life, Adopted April 7, 2016, Available: http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx, Accessed January 19, 2017.

70 California Air Resources Board, Stationary Source Division, Mobile Source Control Division, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, October 2000, Available: http://www.arb.ca.gov/diesel/documents/rrpfinal.pdf, accessed August 22, 2016.

71 South Coast Air Quality Management District, Rule 1186.1 – Less-Polluting Sweepers, amended January 9, 2009; Rule 1191 – Clean On-Road Light- and Medium-Duty Public Fleet Vehicles, adopted June 16, 2000; Rule 1192 – Clean On-Road Transit Buses, adopted June 16, 2000; Rule 1193 – Clean On-Road Residential and Commercial Refuse Collection Vehicles, amended July 9, 2010; Rule 1194

Los Angeles Green Building Code Tier 1 standards, which are applicable to all projects with a Los Angeles Department of Building and Safety permit valuation over $200,000, require the proposed project to implement a number of measures that would reduce criteria pollutant and greenhouse gas emissions. These include measures such as: reduce vehicle and equipment idling times; comply with Tier 4 emission standards for non-road diesel equipment; retrofit existing diesel equipment with particulate filters and oxidation catalysts; replace aging equipment with new low-emission models; and consider the use of alternative fuels for construction equipment.

4.1.1.4.3 Existing Ambient Air Quality

In an effort to monitor the various concentrations of air pollutants throughout the basin, the SCAQMD has divided the region into 38 Source Receptor Areas in which monitoring stations operate. The monitoring station that is most representative of existing air quality conditions in the project area is the Southwest Coastal Los Angeles Monitoring Station located at 7201 W. Westchester Parkway (referred to as the LAX Hastings site), less than 0.5-mile from Runway 6L-24R (northernmost LAX runway). Criteria pollutants monitored at this station include O_3, CO, SO_2, NO_2, and PM_{10}. The nearest representative monitoring station that monitors $PM_{2.5}$ is the South Coastal Los Angeles County 1 Station, which is located 1305 E. Pacific Coast Highway (Long Beach). Existing ambient concentrations were used for dispersion modeling of NO_2, SO_2, and CO, but not for PM_{10} and $PM_{2.5}$ in Section 4.1.1.5.2 per SCAQMD guidelines. The most recent data available from the SCAQMD for these monitoring stations at the time of the Draft EIR preparation encompassed the years 2011 to 2015, as shown in **Table 4.1.1-3**.

Ozone – The maximum 1-hour O_3 concentration recorded during the 2011 to 2015 period was 0.114 parts per million (ppm), recorded in 2014. During the reporting period, the California 1-hour standard was exceeded four times. The maximum 8-hour O_3 concentration was 0.081 ppm recorded in 2013. The California standard was exceeded between 1 and 6 days annually from 2013 to 2015. The 8-hour NAAQS was not exceeded in 2014 or 2015 (not enough data was available in 2013 to determine the Federal 8-hour design value).

Carbon Monoxide – The highest 1-hour CO concentration recorded was 3.1 ppm, recorded in 2013. The maximum 8-hour CO concentration recorded was 2.51 ppm recorded in 2013. As demonstrated by the data, the standards were not exceeded during the five-year period.

Nitrogen Dioxide – The highest 1-hour NO_2 concentration recorded was 0.098 ppm in both 2011 and 2012. The maximum 98th percentile 1-hour concentration was 0.066 ppm, recorded in 2014. The highest recorded NO_2 annual arithmetic mean was 0.013 ppm recorded in 2011. As shown, the standards were not exceeded during the five-year period.

Sulfur Dioxide – The highest 1-hour concentration of SO_2 was 0.015 ppm recorded in 2014 and 2015, while the highest 99th percentile 1-hour concentration recorded was 0.008 ppm in 2011. The maximum 24-hour concentration was 0.003 ppm, recorded in 2014. The highest annual arithmetic mean concentration was 0.001, recorded in 2013. As shown, the standards were not exceeded during the five-year period.

– Commercial Airport Ground Access, amended October 20, 2000; and Rule 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles, amended June 6, 2008, Available: http://www.aqmd.gov/home/regulations/fleet-rules, accessed August 22, 2016.

Table 4.1.1-3
Southwest Coastal Los Angeles and South Coastal Los Angeles County Monitoring Station Ambient Air Quality Data

Pollutant 1/ 2/	2011	2012	2013	2014	2015
Ozone (O_3)					
Maximum Concentration 1-hr period, ppm	0.078	0.106	0.105	0.114	0.096
Days over State Standard (0.09 ppm)	0	1	1	1	1
Federal Design Value 8-hr period, ppm	--- 4/	--- 4/	--- 4/	0.064	0.068
Maximum California Concentration 8-hr period, ppm	0.067	0.075	0.081	0.080	0.078
Days over State Standard (0.07 ppm)	0	1	1	6	3
Carbon Monoxide (CO)					
Maximum Concentration 1-hr period, ppm	2.3	2.8	3.1	2.7	1.7
Days over State Standard (20.0 ppm)	0	0	0	0	0
Maximum Concentration 8-hr period, ppm	1.8	1.7	2.5	1.9	---
Days over State Standard (9.0 ppm)	0	0	0	0	0
Nitrogen Dioxide (NO_2)					
Maximum Concentration 1-hr period, ppm	0.098	0.098	0.078	0.087	0.087
98th Percentile Concentration 1-hr period, ppm	0.065	0.055	0.059	0.066	0.060
Days over State Standard (0.18 ppm)	0	0	0	0	0
Annual Arithmetic Mean (AAM), ppm	0.013	0.010	0.012	0.012	0.011
Exceed State Standard? (0.030 ppm)	No	No	No	No	No
Sulfur Dioxide (SO_2)					
Maximum Concentration 1-hr period, ppm	0.011	0.005	0.010	0.015	0.015
Days over State Standard (75 ppb)	0	0	0	0	0
99th Percentile Concentration 1-hr period, ppm	0.008	N/A	0.006	N/A	N/A
Maximum Concentration 24-hr period, ppm	0.002	0.001	0.001	0.003	0.002
Days over State Standard (140 ppb)	0	0	0	0	0
Annual Arithmetic Mean (AAM), ppm	0.000	0.000	0.001	---	0.000
Respirable Particulate Matter (PM_{10}) 3/					
Maximum Federal Concentration 24-hr period, μg/m³	41	31	38	46	31
Days over Federal Standard (150 μg/m³)	0	0	0	0	0
Maximum California Concentration 24-hr period, μg/m³	41	30	37	45	31
Days over State Standard (50 μg/m³)	0	0	---	0	0
Annual California Concentration, μg/m³	21.4	19.5	---	21.9	---
Exceed State Standard? (20 μg/m³)	***Yes***	No	---	***Yes***	***Yes***
Fine Particulate Matter ($PM_{2.5}$) 3/					
Federal Design Value 24-hr period, μg/m³	28	26	26	--- 4/	--- 4/
Federal Design Value Annual period, μg/m³	11.2	10.6	10.8	--- 4/	--- 4/
Maximum California Concentration 24-hr period, μg/m³	42.0	59.1	42.9	61.9	62.2
Annual Federal Concentration, μg/m³	10.7	10.5	10.9	--- 4/	10.2
Exceed State Standard? (12 μg/m³)	No	No	No	No	No

Notes:

AAM = Annual arithmetic mean
μg/m³ = micrograms per cubic meter
ppb = parts per billion (by volume)
--- = insufficient data to determine the value
ppm = parts per million (by volume)
N/A = not applicable

1/ Monitoring data from the Southwest Coastal Los Angeles Station (Station No. 820) was used for O_3, CO, NO_2, SO_2 and PM_{10} concentrations. Monitoring data from the South Coastal Los Angeles County 1 Monitoring Station (Station No. 072) was used for $PM_{2.5}$ concentrations.

2/ An exceedance is not necessarily a violation. Viola ions are defined in 40 CFR 50 for NAAQS and 17 CCR 70200 for CAAQS

3/ Statistics may include data that are related to an exceptional event.

4/ Insufficient data available to determine the value.

Source: California Air Resources Board, iADAM: Air Quality Data Statistics, Available: http://www.arb.ca.gov/adam/, accessed November 15, 2016; California Air Resources Board, AQMIS2, Available: http://www.arb.ca.gov/aqmis2/aqmis2.php, accessed November 15, 2016.

Prepared by: CDM Smith, January 2017

Respirable Particulate Matter (PM_{10}) – The highest recorded 24-hour PM_{10} concentration recorded was 46 μg/m³ in 2014. During the period 2011 to 2015, the CAAQS for 24-hour PM_{10} was not exceeded and the NAAQS was not violated. The maximum annual arithmetic mean recorded was 21.9 μg/m³ in 2014.

Fine Particulates ($PM_{2.5}$) – The maximum 24-hour $PM_{2.5}$ concentration recorded was 62.2 μg/m3 in 2015. The highest arithmetic mean of 10.9 was recorded in 2013. Between 2011 and 2013 the 24-hour and annual NAAQS were not violated. Not enough data was recorded or available in 2014 or 2015 to determine the NAAQS design values.

4.1.1.5 Thresholds of Significance

4.1.1.5.1 Regional Emissions Thresholds

The SCAQMD has developed CEQA construction-related thresholds of significance for air pollutant emissions from projects proposed in the Basin. Construction emission thresholds are summarized in **Table 4.1.1-4**. In accordance with the SCAQMD *CEQA Air Quality Handbook*, a significant air quality impact would occur if the estimated incremental increase in construction-related emissions attributable to the proposed project would be greater than the daily emission thresholds presented in **Table 4.1.1-4**.

Table 4.1.1-4
SCAQMD CEQA Thresholds of Significance for Air Pollutant Emissions in the South Coast Air Basin

Mass Emission Thresholds lbs/day		
Pollutant	**Construction**	**Operations**
Carbon monoxide, CO	550	550
Volatile organic compounds, VOC [1/]	75	55
Nitrogen oxides, NO_X	100	55
Sulfur dioxide, SO_2	150	150
Respirable particulate matter, PM_{10}	150	150
Fine particulate matter, $PM_{2.5}$	55	55
Lead, Pb [2/]	3	3

Notes:

1/ The emissions of VOCs and reactive organic gases are essentially the same for the combustion emission sources hat are considered in this EIR. This EIR will typically refer to organic emissions as VOCs.

2/ The only source of lead emissions from LAX is from aviation gasoline (AvGas) associated with piston-engine general aviation aircraft; however, due to the low number of piston-engines general aviation aircraft operations at LAX, AvGas quanti ies are low and emissions from these sources would not be materially affected by the project.

Source: South Coast Air Quality Management District, SCAQMD Air Quality Significance Thresholds, March 2015. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-hresholds.pdf?sfvrsn=2, accessed November 15, 2016.

Prepared by: CDM Smith, January 2017

Baseline Used to Determine Significance for the Proposed Project Emissions

For construction-related increments associated with the proposed project, a baseline of zero emissions is used. Therefore, all construction-related emissions attributable to the proposed project are compared to the significance thresholds for construction.

For energy-related operational increments associated with the proposed project, a baseline of the 2016 existing energy-related emissions is used. Therefore, all energy-related operational emissions attributable to the proposed project are compared to the significance thresholds for operations.

4.1.1.5.2 Local Concentration Thresholds

The SCAQMD has also developed construction-related thresholds of significance[72] for air pollutant concentration impacts from projects proposed in the Basin. These thresholds are summarized in **Table 4.1.1-5**. In accordance with the SCAQMD *CEQA Air Quality Handbook*, a significant air quality impact would occur if the estimated incremental ambient concentrations due to construction-related emissions would be greater than the concentration thresholds presented in **Table 4.1.1-5**. The SCAQMD's recommended thresholds for the evaluation of local air quality impacts are based on the difference between the maximum monitored ambient pollutant concentrations in the area and the CAAQS or NAAQS. Therefore, the thresholds depend upon the concentrations of pollutants monitored locally with respect to a project site. For pollutants that already exceed the CAAQS or NAAQS (e.g., PM_{10} and $PM_{2 5}$), the thresholds are based on SCAQMD Rule 403 for construction as described in the *Final Localized Significance Threshold Methodology*.[73]

The methodology requires that the increase in ambient air concentrations, determined using a computer-based air quality dispersion model, be compared to local significance thresholds for $PM_{10,}$ $PM_{2.5}$, NO_2, SO_2 and CO. The thresholds for NO_2, SO_2, and CO represent the allowable increase in concentrations above background levels in the vicinity of the project site that would not cause or contribute to an exceedance of the relevant ambient air quality standards. The significance thresholds for PM_{10} and $PM_{2.5}$ are intended to constrain emissions so as to aid in the progress toward attainment and maintenance of the ambient air quality standards.[74] For the purposes of this analysis, the local construction emissions resulting from development of the proposed project are assessed with respect to the thresholds in **Table 4.1.1-5** using dispersion modeling (i.e., AERMOD). Details regarding the thresholds associated with each pollutant are provided below.

- **NO_2** - The local significance thresholds for 1-hour NO_2 concentrations are the 1-hour NO_2 CAAQS of 339 micrograms per cubic meter (µg/m^3), and the 1-hour NO_2 NAAQS of 188 µg/m^3. The 1-hour NO_2 NAAQS was determined from the 3-year average of the 98th percentile of the daily maximum 1-hour average, and thus requires a different approach to determine background and project-related concentrations than the 1-hour NO_2 CAAQS. The significance threshold for annual NO_2 concentrations is the annual NO_2 CAAQS, which is more stringent than the annual NO_2 NAAQS, therefore, compliance with the CAAQS also indicates compliance with the NAAQS. Because the thresholds are the ambient air quality standards, the project incremental concentrations were added to background concentrations before the comparison to the standard was made.

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72 South Coast Air Quality Management District, CEQA Air Quality Handbook, April 1993; as updated by SCAQMD Air Quality Significance Thresholds, March 2015, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2, Accessed January 19, 2017.

73 South Coast Air Quality Management District, Final Localized Significance Threshold Methodology, revised July 2008. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2, accessed July 7, 2016.

74 South Coast Air Quality Management District, Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds, October 2006, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/particulate-matter-(pm)-2.5-significance-thresholds-and-calculation-methodology/final_pm2_5methodology.pdf?sfvrsn=2, accessed November 12, 2015.

Table 4.1.1-5
SCAQMD CEQA Thresholds of Significance for Air Pollutant Concentrations in the South Coast Air Basin

Project-Related Concentration Thresholds			
Pollutant	**Averaging Period**	**Construction**	**Project Only or Total**
PM_{10}	Annual[1/]	1.0 µg/m^3	Project Only
PM_{10}	24-hour[1/]	10.4 µg/m^3	Project Only
$PM_{2.5}$	24-hour[1/]	10.4 µg/m^3	Project Only
CO	1-hour[2/]	20 ppm (23 mg/m^3)	Total incl. Background
CO	8-hour	9.0 ppm (10 mg/m^3)	Total incl. Background
NO_2	1-hour (State)	0.18 ppm (339 µg/m^3)	Total incl. Background
NO_2	1-hour (Federal)[3/]	0.100 ppm (188 µg/m^3)	Total incl. Background
NO_2	Annual (State)[2/]	0.03 ppm (57 µg/m^3)	Total incl. Background
SO_2	1-hour (State)	0.25 ppm (655 µg/m^3)	Total incl. Background
SO_2	1-hour (Federal)[4/]	0.075 ppm (655 µg/m^3)	Total incl. Background
SO_2	24-hour	0.04 ppm (655 µg/m^3)	Total incl. Background

Notes:
1/ The concentration thresholds for PM_{10} and $PM_{2.5}$ have been developed by SCAQMD for construction impacts associated with the proposed project.
2/ The concentration threshold for 1-hour CO and annual NO_2 is the CAAQS, which is more stringent than the NAAQS for these pollutants and averaging periods.
3/ To evaluate impacts of the proposed project to ambient 1-hour NO_2 levels, the analysis includes both the current SCAQMD 1-hour State NO_2 threshold and the more stringent revised 1-hour federal ambient air quality standard of 188 µg/m^3. To attain the federal standard, the 3-year average of 98th percentile of the daily maximum 1-hour average at a receptor must not exceed 0.100 ppm.
4/ To attain the SO_2 federal 1-hour standard, the 3-year average of the 99th percentile of the daily maximum 1-hour averages at a receptor must not exceed 0.075 ppm.
Source: SCAQMD, 1993, 2011; USEPA, 2010a (Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Final Rule, Federal Register Vol. 75, No. 6474, February 9, 2010) and 2010b (Primary National Ambient Air Quality Standard for Sulfur Dioxide, Final Rule, Federal Register Vol. 75, No. 35520, June 22, 2010).
Prepared By: CDM Smith, January 2017

- **SO_2** - The significance thresholds for 1-hour SO_2 concentrations are the 1-hour SO_2 CAAQS of 655 µg/m^3, and the 1-hour SO_2 NAAQS of 196 µg/m^3. The 1-hour SO_2 NAAQS is determined from the 3-year average of the 99th percentile of the daily maximum 1-hour average, and thus requires a different approach to determine background and project-related concentrations than the 1-hour SO_2 CAAQS. The significance threshold for daily SO_2 concentrations is the 24-hour SO_2 CAAQS, which is more stringent than the 24-hour SO_2 NAAQS; therefore, compliance with the CAAQS indicates compliance with the NAAQS. Results are also presented for the 3-hour and annual SO_2 NAAQS. Because the thresholds are the ambient air quality standards, the project incremental concentrations were added to background concentrations before the comparison to the standard was made.
- **CO** – The significance thresholds for CO are the 1-hour and 8-hour CAAQS of 23 milligrams per cubic meter (mg/m^3) and 10 mg/m^3, respectively. With respect to CO, the CAAQS are at least as stringent as the NAAQS; therefore, compliance with the CAAQS indicates compliance with the NAAQS. Because the thresholds are the ambient air quality standards, the project incremental concentrations were added to background concentrations before the comparison to the standard was made.
- **PM_{10} and $PM_{2.5}$** – The significance thresholds for PM_{10} and $PM_{2.5}$ concentrations are the CEQA thresholds developed by SCAQMD. SCAQMD developed a daily construction threshold for of 10.4 µg/m^3. SCAQMD also developed an annual construction threshold of 1.0 µg/m^3. These PM_{10} and $PM_{2.5}$ construction thresholds solely consider the project's incremental increases in PM_{10} and $PM_{2.5}$ concentrations; they do not require that project PM_{10} and $PM_{2.5}$ emissions be added to ambient background concentrations to determine impact significance.

4.1.1.5.3 Determination of Background Concentrations

The background concentrations for criteria pollutants were determined using historical pollutant concentrations available from CARB.[75] For the purposes of determining the background concentrations for comparison to the CAAQS (NO_2, CO, and SO_2), peak values were selected from the most recent three years of ambient air concentrations, shown in **Table 4.1.1-3** of Section 4.1.1.4.3, Existing Ambient Air Quality. For 1-hour SO_2 NAAQS, the background concentration was determined from the maximum consecutive three-year average of the 99th percentile (SO_2) peak daily 1-hour values from the most recent five years of data. As noted above, the concentration thresholds for PM_{10} and $PM_{2.5}$ developed by SCAQMD are for project increments only; therefore, no background concentrations were estimated for these two pollutants.

Finally, when modeling construction source emissions for comparison to the 1-hour NO_2 NAAQS, a seasonal hour-of-day NO_2 background file was developed following guidance developed by the California Air Pollution Control Officers Association (CAPCOA).[76] The most recent three years of monitored 1-hour NO_2 data available (2013-2015) from the LAX Hastings site was obtained from the USEPA.[77] This approach was used for construction to address the hourly construction impacts that occur in the late evening and early morning hours.

4.1.1.6 Impacts Analysis

4.1.1.6.1 Regional Construction Emissions

Peak daily construction-related emissions were calculated from a peak-month average day for each month of each year of construction associated with the proposed project. The peak daily emissions are presented in **Table 4.1.1-6** for all criteria and precursor pollutants studied (CO, VOC, NO_X, SO_2, PM_{10}, and $PM_{2.5}$). These calculations include appropriate reductions achieved with implementation of mandated dust control, as required by SCAQMD Rule 403 (Fugitive Dust).

Table 4.1.1-6
Project Maximum Construction Emissions (lbs/day)

Pollutant	Peak Daily Emissions	Threshold	Significant?
Carbon monoxide, CO	161	550	No
Volatile organic compounds, VOC	61	75	No
Nitrogen oxides, NO_X	261	100	Yes
Sulfur dioxide, SO_2	1	150	No
Respirable particulate matter, PM_{10}	86	150	No
Fine particulate matter, $PM_{2.5}$	46	55	No
Source: Appendix B.1.1 of this EIR. Prepared By: CDM Smi h, January 2017			

As seen in **Table 4.1.1-6**, the unmitigated regional construction emissions would be less than the SCAQMD CEQA construction emission thresholds for CO, VOC, SO_2, PM_{10}, and $PM_{2.5}$ but would exceed the threshold for NO_X. Therefore, the proposed project's construction emissions of NO_X would be a significant impact.

75 California Air Resources Board, iADAM: Air Quality Data Statistics – Top 4 Summary, Available http://www.arb.ca.gov/adam/topfour/topfour1.php, accessed August 22, 2016.

76 California Air Pollution Control Officers Association, Modeling Compliance of the Federal 1-Hour NO_2 NAAQS, October 27, 2011, p. 14. Available: https://www.valleyair.org/busind/pto/Tox_Resources/CAPCOANO2GuidanceDocument10-27-11.pdf, accessed August 22, 2016.

77 U.S. Environmental Protection Agency, Air Quality System (AQS) – AirData – Download Data Files, Available: http://aqsdr1.epa.gov/aqsweb/aqstmp/airdata/download_files.html#Raw, accessed August 23, 2016. Downloaded hourly_42602_2015.zip, hourly_42602_2014.zip, hourly_42602_2013.zip, and hourly_42602_2012.zip.

4.1.1.6.2 Regional Operational Emissions

Peak daily energy-related operational emissions were calculated using a CalEEMod default analysis for the proposed project. The peak daily emissions are presented in **Table 4.1.1-7** for all criteria and precursor pollutants studied (CO, VOC, NO_X, SO_2, PM_{10} and $PM_{2.5}$). These calculations include appropriate reductions achieved with implementation of mandated dust control, as required by SCAQMD Rule 403 (Fugitive Dust).

Table 4.1.1-7
Project Maximum Energy-Related Operational Emissions (lbs/day)

Pollutant	Peak Daily Emissions	Threshold	Significant?
Carbon monoxide, CO	2	550	No
Volatile organic compounds, VOC	18	55	No
Nitrogen oxides, NO_X	2	55	No
Sulfur dioxide, SO_2	<1	150	No
Respirable particulate matter, PM_{10}	<1	150	No
Fine particulate matter, $PM_{2.5}$	<1	55	No
Source: Appendix B.2.1 of this EIR. Prepared By: CDM Smi h, January 2017			

As seen in **Table 4.1.1-7**, the unmitigated regional energy-related operational emissions would be less than the SCAQMD CEQA construction emission thresholds for all criteria pollutants. Therefore, the proposed project's energy-related operational emissions would be less than significant.

4.1.1.6.3 Local Construction Impacts

As discussed in Section 4.1.1.3, Methodology, the local effects from the on-site portion of construction emissions were evaluated at nearby sensitive receptor locations that could be affected by the proposed project consistent with the methodologies in the SCAQMD's Final Localized Significance Threshold Methodology,[78] and its Modeling Guidance for AERMOD.[79] The results of air dispersion modeling of the project construction sources are summarized in **Table 4.1.1-8**.

78 South Coast Air Quality Management District, Final Localized Significance Threshold Methodology, revised July 2008. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2, accessed July 7, 2016.

79 South Coast Air Quality Management District, SCAQMD Modeling Guidance for AERMOD, Available: http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance, accessed July 7, 2016.

Table 4.1.1-8
Project Peak Construction Concentrations (µg/m³)

Pollutant	Averaging Period[1/]	Construction (ug/m³)	Background (ug/m³)	Total (ug/m³)	Threshold (ug/m³)[1/]	Significant?
CO	1-hr CAAQS	30	3,565	3,595	23,000	No
	8-hr CAAQS	14	2,778	2,792	10,000	No
NO_2	1-hr CAAQS	103	164	267	339	No
	1-hr NAAQS	180	--[2/]	180	188	Within 10% of Threshold[3/]
	1-hr NAAQS[3/]	191	--[2/]	191	188	Yes
NO_2	Annual CAAQS	2	23	24	57	No
SO_2	1-hr CAAQS	<1	39	39	655	No
	1-hr NAAQS	<1	16	16	196	No
	3-hr NAAQS	<1	39	39	1,300	No
	24-hr CAAQS	<1	8	8	105	No
	Annual NAAQS	<1	3	3	80	No
PM_{10}	24-hr	5.3	--[4/]	5.3	10.4	No
	Annual	0.4	--[4/]	0.4	1.0	No
$PM_{2.5}$	24-hr	3.0	--[4/]	3.0	10.4	No

Notes:

CAAQS = California Ambient Air Quality Standard.

NAAQS = National Ambient Air Quality Standard.

1/ NAAQS and CAAQS often have the same averaging period, but usually have different standard values and may have different methods of determining compliance with each standard.

2/ The background 1-hour NO_2 values for the NAAQS analysis included 98th percen ile concentrations for each hour-of-day by season (Winter, Spring, Summer, and Fall), 96 hourly values total, and these background NO_2 concentrations were included in the AERMOD runs so that the modeled concentration already included addition of background NO_2.

3/ As noted in Section 4.1.1.3.2, under Meteorology, LAWA has conducted an additional evaluation of the 1-hour NO_2 NAAQS analysis since the initial result (180 µg/m3) using one year of met data was within 10 percent of the threshold (188 µg/m3). The additional evaluation used the peak (highest 1st-high) project increment value instead of the 98 h percentile (highest 8th-high) value, as suggested by SCAQMD (SCAQMD 2017). The peak value was added to the seasonal hour of day NO_2 background file used for the ini ial NAAQS comparison. The result of the additional evaluation indicated that the project impact on the 1-hour NO_2 NAAQS threshold would be significant.

4/ PM_{10} and $PM_{2.5}$ thresholds are project only values, therefore, are not added to background concentrations.

Source: Appendix B.1 2 of this EIR.

Prepared By: CDM Smi h, January 2017.

As shown in **Table 4.1.1-8**, the unmitigated local construction concentrations would be less than the SCAQMD CEQA ambient air quality standards for all criteria pollutants except for NO_2 1-hr NAAQS. Therefore, the localized construction impacts of the proposed project relative to NO_2 concentrations would be significant.

4.1.1.7 Cumulative Impacts

A list of past, present, and reasonably foreseeable probable future projects whose construction could overlap with construction of the proposed project is provided in **Table 4.1.1-9** along with estimated mass emissions. Emissions for several of these cumulative development projects were estimated or obtained from publicly available and readily accessible environmental documents. Construction emissions for other projects were estimated based on the ratio of the project costs as compared to the proposed project, the ratio of construction trip intensity, and the ratio of the emissions using the proposed project as a reference baseline. Calculation details for the proposed project are provided in Appendix B.1. Due to the uncertainty of the multiple project schedules, the SCAQMD construction thresholds in tons per quarter were used per SCAQMD's 1993 CEQA Air Quality Handbook.[80]

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80 South Coast Air Quality Management District, CEQA Air Quality Handbook, 1993.

The SCAQMD has provided guidance on an acceptable approach to addressing cumulative impacts for air quality.[81] This guidance states as follows: "As Lead Agency, the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in the Environmental Assessment or EIR … Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. … Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively considerable."

Table 4.1.1-9
Cumulative Construction Projects Peak Quarter Emissions Estimates (tons/quarter)

Related LAWA Project During Construction	CO	VOC	NO_x	SO_x	PM_{10}	$PM_{2.5}$
LAX T2/T3 Modernization Project [1/]	4.3	1.8	3.9	<1	1.9	1.0
South Terminal Improvements	0.59	0.25	0.76	0.01	0.10	0.05
LAX Bradley West Project	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Terminal 1 Improvements	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
West Aircraft Maintenance Area Project	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Runway 6R-24L Runway Safety Area Improvements-NorthAirfield	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Runway 7L-25R Runway Safety Area Improvements-South Airfield	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Airport Metro Connector (AMC) 96th Street Transit Station	4.9	1.0	8.8	<1	1.0	0.6
LAX Midfield Satellite Concourse (MSC) North Project	35.0	3.6	12.5	<1	9.5	2.2
Hyperion Treatment Plant Connector	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Miscellaneous Projects and Improvements	23.9	6.4	32.3	<1	4.2	1.7
Terminal 2 Improvements	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Runway 7R-25L Rehabilitation	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
MSC North Extension [3/]	3.5	0.4	1.3	<1	1	0.2
Northside Development	8.1	4.1	1.6	<1	1.0	0.4
Terminal 3 Improvements	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
City Los Angeles Bureau of Sanitation Stormwater Infiltration and Treatment Facility	11.3	1.0	6.0	0.0	1.5	0.7
Terminal 1.5	1.0	1.5	1.2	<1	0.3	0.2
Terminal 3 (T3) Connector	0.5	0.2	0.6	<1	0.1	0.0
Canine Facility/Airport Police Department Range	–[6]	–[6]	–[6]	–[6]	–[6]	–[6]
Secured Area Access Post (SAAP) Project	1.3	0.2	1.8	<1	0.2	0.2
Airport Police Station Relocation	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]	–[2/]
Concourse 0 [5/]	2.3	0.5	5.6	<1	2.6	0.4
MSC South Project	3.5	0.4	1.3	<1	1	0.2
North Airfield Safety Improvements [4/]	6.8	1.4	16.3	<1	10.9	1.5
Landside Access Modernization Program	7.5	2.1	18.4	<1	1.8	0.9
Total from Other Construction Projects Emissions	94.8	21.4	100.4	<1	32.6	8.3
Total Cumulative Construction Project Emissions	**114.5**	**24.8**	**112.3**	**<1**	**36.1**	**10.0**
SCAQMD Construction Emission Significance Thresholds	24.75	2.5	2.5	6.75	6.75	2.5
Emissions Exceed SCAQMD Project-Level Threshold?	Yes	Yes	Yes	No	Yes	Yes

Notes:

1/ Project construction is estimated to occur from 2017 to 2023.

2/ Based on the projected construction schedule, this project would not result in overlapping construction emissions with the proposed project during the estimated combined peak day.

3/ MSC Nor h Extension peak day emissions estimated to be 10 percent of MSC North Project emissions.

4/ North Airfield Safety Improvements emissions were based on emissions estimated for LAX Specific Plan Amendment Study – Alternative 2 for construction elements: Center Taxiway for 24L, Runway 24L & South Parallel Taxiways, North CTA Aprons & Taxiways, and associated Support.

5/ Concourse 0 emissions were based on emissions estimated for LAX Specific Plan Amendment Study – Staff Recommended Alternative for construction elements: North CTA Concourses, North CTA Aprons & Taxiways, and associated Support.

81 South Coast Air Quality Management District, White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution, Appendix A: Background, August 2003, D-3.

Table 4.1.1-9
Cumulative Construction Projects Peak Quarter Emissions Estimates (tons/quarter)

Related LAWA Project During Construction	CO	VOC	NO_x	SO_x	PM_{10}	$PM_{2.5}$
6/ Canine Facility/Airport Police Department Range is accounted for in Northside Development.						
Sources: City of Los Angeles, Los Angeles World Airports, Final Environmental Impact Report for Los Angeles International Airport (LAX) Midfield Satellite Concourse, (SCH No. 2013021020), June 2014; City of Los Angeles, Los Angeles World Airports, Final Environmental Impact Report for Los Angeles International Airport (LAX) Northside Plan Update, (SCH 2012041003), December 2014; City of Los Angeles, Los Angeles World Airports, Draft Environmental Impact Report for Los Angeles International Airport (LAX) Landside Access Modernization Program, (SCH 2015021014), Section 4.2, Air Quality and Human Health Risk, and Appendix F, Air Quality, Greenhouse Gas Emissions, and Human Health Risk Assessment, September 2016, Available: http://www.connectinglax.com/informed.html, Accessed January 19, 2017.City of Los Angeles, Los Angeles World Airports, Los Angeles International Airport (LAX) Terminal 1.5 Project Final Initial Study-Mitigated Negative Declaration, November 2016; City of Los Angeles, Los Angeles World Airports, Final Environmental Impact Report for Los Angeles International Airport (LAX) Specific Plan Amendment Study, (SCH 1997061047), January 2013.						
Prepared by: CDM Smith, January 2017						

As shown in **Table 4.1.1-9**, cumulative construction emissions of CO, VOC, NO_X, PM_{10}, and $PM_{2.5}$ would exceed the significance thresholds. Therefore, cumulative construction emissions of these five pollutants would be cumulatively significant.

Construction of the proposed project would exceed the project-specific significance construction emission thresholds for NO_X, as shown in **Table 4.1.1-6**. As a result, the contribution of the proposed project to cumulative construction-related impacts would be cumulatively considerable for NO_x. The project's contribution to cumulative CO, VOC, PM_{10}, and $PM_{2.5}$ impacts would not be cumulatively considerable.

The emissions estimates presented in **Table 4.1.1-9** are based upon project construction information known or reasonably assumed for the development projects listed in **Table 3-1**, as presented in Section 3.4, Development Setting of Chapter 3, *Overview of Project Setting*. The emissions estimates in **Table 4.1.1-9** do not include construction-related emissions from the 200+ other probable development projects listed in **Table 3-2** of Section 3.4 because quantification of construction-related emissions from those other projects, especially as related to overlapping the construction-related emissions of the proposed project, would be speculative in light of not having more information related to construction timing, duration, and approach. It is reasonable to conclude, however, that construction of those other development projects would add to the air quality impacts identified above as being cumulatively significant, but would not change the related conclusion that only the proposed project's contribution to cumulative NO_x impacts would be cumulatively considerable.

4.1.1.8 Mitigation Measures

LAWA has implemented a wide range of actions designed to reduce temporary, construction-related air pollutant emissions from its ongoing construction program and has established aggressive construction emissions reduction measures, particularly with regard to requiring construction equipment and heavy duty trucks to be newer models that have low-emission engines or be equipped with emissions control devices.[82] To achieve this commitment, LAWA has developed standard control measures which would be applied to the proposed project as mitigation measures.

The following project control measure would address construction-related emissions associated with the proposed project. The individual measures were selected from a list of standard control measures developed by LAWA for projects at LAX. Only those measures that are applicable to the proposed project are identified below. Measure numbers follow those on the standard list, therefore, the numbers listed in the table are not consecutive. This Standard Control Measure is proposed as a mitigation measure to reduce impacts to air quality. Although only NOx impacts were significant, the following measures reduce emissions from other criteria pollutants as well.

[82] City of Los Angeles, Los Angeles World Airports, Los Angeles World Airports Sustainability Report 2015, Available: http://www.laxsustainability.org/documents/Sustainability_Report_2015.pdf, accessed August 25, 2016.

♦ **LAX-AQ-1. Construction-Related Air Quality Control Measures.**

This measure describes numerous specific actions to reduce fugitive dust emissions and exhaust emissions from on-road and off-road mobile and stationary sources used in construction. Specific measures are identified in **Table 4.1.1-10**. Measures 1e, 1o, and 1p listed in the table were incorporated into the post-mitigation modeling (see Section 4.1.1.9 for modeling assumptions associated with these measures). However, the extent to which the remaining measures would reduce air quality impacts is not easily quantifiable; therefore, the analysis conservatively does not quantify the air quality benefit (i.e., emission reductions) of these measures (if feasible) is made in this analysis.

Table 4.1.1-10
Construction-Related Air Quality Control Measures

Measure Number	Measure	Type of Measure
1a	Post a publicly vis ble sign(s) with the telephone number and person to contact regarding dust complaints; this person shall respond and take corrective action within 24 hours.	Fugitive Dust
1b	During construction, the contractor shall demonstrate that all ground surfaces are covered or treated sufficiently to minimize fugitive dust emissions.	Fugitive Dust
1c	All areas to be paved should be completed as soon as practical; in addition, building pads should be laid as soon as practical after grading.	Fugitive Dust
1d	Prohibit idling or queuing of diesel-fueled vehicles and equipment in excess of five minutes. This requirement will be included in specifications for any LAX projects requiring on-site construction. Exemptions may be granted for safety-related and operational reasons, as defined by CARB or as approved by LAWA.	On-Road and Off-Road Mobile
1e	All diesel-fueled equipment used for construction will be outfitted with the best available emission control devices, where technologically feasible, primarily to reduce emissions of diesel particulate matter (PM), including fine PM ($PM_{2.5}$), and secondarily, to reduce emissions of NOx. This requirement shall apply to diesel-fueled off-road equipment (such as construction machinery), diesel-fueled on-road vehicles (such as trucks), and stationary diesel-fueled engines (such as electric generators). (It is unlikely that this measure will apply to equipment with Tier 4 engines, as these engines typically already incorporate the best available emission control devises.) The emission control devices utilized in construction equipment shall be verified or certified by California Air Resources Board or US Environmental Protection Agency for use in on-road or off-road vehicles or engines. For multi-year construction projects, a reassessment of equipment availability, equipment fleet mixtures, and best available emissions control devices shall be conducted annually for equipment newly brought to the project site each year.	Mobile and Stationary
1g	To the extent feasible, have construction employees commute during off-peak hours.	On-Road Mobile
1h	Make access available for on-site lunch trucks during construction, as feasible and consistent with requirements pertaining to airport security, to minimize off-site worker vehicle trips. (for the proposed project, lunch trucks would not access the CTA)	On-Road Mobile
1i	Utilize on-site rock crushing facility during construction, when feasible, to reuse rock/concrete and minimize off-site truck haul trips.	Stationary Point Source Controls
1j	Every effort shall be made to utilize grid-based electric power at any construction site, where feasible. Grid-based power can be from a direct hookup or a tie in to electricity from power poles. If diesel- or gasoline-fueled generators are necessary, generators using "clean burning diesel" fuel and exhaust emission controls shall be utilized.	Stationary Point Source Controls
1m	The contractor or builder shall designate a person or persons to ensure the implementation of all components of the construction-related measure through direct inspections, record reviews, and investigations of complaints.	Administrative
1n	Locate rock-crushing operations and construction material stockpiles for all LAX-related construction in areas away from LAX-adjacent residents, to the extent possible, to reduce impacts from emissions of fugitive dust.	Stationary Point Source Controls
1o	On-road medium-duty and larger diesel-powered trucks used on LAX construction projects with a gross vehicle weight rating of at least 14,001 pounds shall, at a minimum, comply with USEPA 2010 on-road emissions standards for PM_{10} and NOx. Contractor requirements to utilize such on-road haul trucks or the next cleanest vehicle available will be subject to the	On-Road Mobile

Table 4.1.1-10
Construction-Related Air Quality Control Measures

Measure Number	Measure	Type of Measure
	provisions of LAWA Air Quality Control Measure 1q below.	
1p	All off-road diesel-powered construction equipment greater than 50 horsepower shall meet, at a minimum, USEPA Tier 4 (final) off-road emissions standards. Contractor requirements to utilize Tier 4 (final) equipment or next cleanest equipment available will be subject to the provisions of LAWA Air Quality Control Measure 1q below.	Off-Road Mobile
1q	The on-road haul truck and off-road construction equipment requirements set forth in Air Quality Standard Control Measures 1o and 1p above shall apply unless any of the following circumstances exist and the Contractor provides a written finding consistent with project contract requirements that: • The Contractor does not have the required types of on-road haul trucks or off-road construction equipment within its current available inventory and intends to meet the requirements of the Measures 1o and 1p as to a particular vehicle or piece of equipment by leasing or short-term rental, and the Contractor has attempted in good faith and due diligence to lease the vehicle or equipment that would comply with these measures, but that vehicle or equipment is not available for lease or short-term rental within 120 miles of the project site, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 1q) apply. • The Contractor has been awarded funding by SCAQMD or another agency that would provide some or all of the cost to retrofit, repower, or purchase a piece of equipment or vehicle, but the funding has not yet been provided due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent the equipment or vehicle that would comply with Measures 1o and 1p, but that equipment or vehicle is not available for lease or short-term rental within 120 miles of the project site, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 1q) apply. • Contractor has ordered a piece of equipment or vehicle to be used on the construction project in compliance with Measures 1o and 1p at least 60 days before that equipment or vehicle is needed at the project site, but that equipment or vehicle has not yet arrived due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent a piece of equipment or vehicle to meet the requirements of Measures 1o and 1p, but that equipment or vehicle is not available for lease or short-term rental within 120 miles of the project, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 1q) apply. • Construction-related diesel equipment or vehicle will be used on the project site for fewer than 20 calendar days per calendar year. The Contractor shall not consecutively use different equipment or vehicles that perform the same or a substantially similar function in an attempt to use this exception (Measure 1q) to circumvent the intent of Measures 1o and 1p. • Documentation of good faith efforts and due diligence regarding the above exceptions shall include written record(s) of inquiries (i.e., phone log[s]) to at least three (3) leasing/rental companies that provide construction-related on-road trucks of the type specified in Measure 1o above (i.e., medium-duty and larger diesel-powered trucks with a gross vehicle weight rating of at least 14,001 pounds) or diesel-powered off-road construction equipment such as the types to be used by the Contractor, documenting the availability/unavailability of the required types of trucks/equipment. LAWA will, from time-to-time, conduct independent research and verification of the availability of such vehicles and equipment for lease/rent within a 120-mile radius of LAX, which may be used in reviewing the acceptability of the Contractor's good faith efforts and due diligence. In any of the situations described above, the Contractor/ Subcontractor shall provide the next cleanest piece of equipment or vehicle as provided by the step down schedules in Table A for Off-Road Equipment and Table B for On-Road Equipment. Nothing in the above shall require an emissions control device (i.e., VDECS) that does not meet OSHA standards.	On-Road and Off-Road Mobile

Table 4.1.1-10
Construction-Related Air Quality Control Measures

Measure Number	Measure	Type of Measure

Table A
Off-Road Compliance Step Down Schedule*

Compliance Alternative	Engine Standard	CARB-verified DECS (VDECS)
1	Tier 4 interim	N/A**
2	Tier 3	Level 3
3	Tier 2	Level 3
4	Tier 1	Level 3
5	Tier 2	Level 2
6	Tier 2	Level 1
7	Tier 3	Uncontrolled
8	Tier 2	Uncontrolled
9	Tier 1	Level 2
** Tier 4 (interim or final) or 2007 model year equipment not already supplied with a factory-equipped diesel particulate filter shall be outfitted with Level 3 VDECS.		
Equipment less than Tier 1, Level 2 shall not be permitted.		

Table B
On-Road Compliance Step Down Schedule*

Compliance Alternative	Engine Model Year	CARB-verified DECS (VDECS)
1	2007	N/A**
2	2004	Level 3
3	1998	Level 3
4	2004	Uncontrolled
5	1998	Uncontrolled
** 2007 Model Year equipment not already supplied with a factory-equipped diesel particulate filter shall be outfitted with Level 3 VDECS.		
Equipment with a model year earlier than Model Year 1998 shall not be permitted.		

* How to use Table A and Table B: For example, if Compliance Alternative #1 is required by this policy but Contractor cannot obtain an off-road vehicle that meets the Tier 4 interim standard (Compliance Alternative #1 in Table A) and meets one of the above exceptions, then Contractor shall use a vehicle that meets the next compliance alternative (Compliance Alternative #2) which is a Tier 3 engine standard equipped with a Level 3 VDECS. Should Contractor not be able to supply a vehicle with a Tier 3 engine equipped with a Level 3 VDECS in accordance with Compliance Alternative #2 and has satisfied the requirements of one of the above exceptions as to Contractor's ability to obtain a vehicle meeting Compliance Alternative #2, Contractor shall then supply a vehicle meeting the next compliance alternative (Compliance Alternative #3), and so on. If Contractor is proposing an exemption for on-road equipment, the step down schedule in Table B should be used. Contractor must demonstrate that it has satisfied one of the exceptions listed above before it can use a subsequent Compliance Alternative. The goal of this requirement is to ensure that Contractor has exercised due diligence in supplying the cleanest fleet available.

Nothing in the above shall require an emissions control device (i.e., VDECS) that does not meet OSHA standards.

Source: LAWA, 2016.
Prepared By: CDM Smith, January 2017

LAWA will include in bid documents for the proposed project language specifying that contractors shall use equipment on the proposed project that meets the most stringent emission requirements as specified in LAWA's standard control measures.

In addition to Standard Control Measure (Mitigation Measure) LAX-AQ-1, the following mitigation measure is also proposed to reduce significant construction-related air quality impacts associated with off-road equipment and on-site, on-road trucks emissions of all criteria pollutants.

- **MM-AQ (T2/T3)-1. Preferential Use of Renewable Diesel Fuel.**

  LAWA will require the use of renewable diesel fuel in proposed project construction off-road equipment and on-site, on-road trucks, for at least 90 percent of diesel fuel demand. Renewable diesel fuel is available locally for fleetwide use and has been shown to reduce criteria pollutant and greenhouse gas emissions from diesel engines.[83,84]

4.1.1.9 Impacts After Mitigation

As detailed in Section 4.1.1.8, Standard Control Measure (Mitigation Measure) LAX-AQ-1 would require the use of newer models of construction equipment and heavy duty trucks that have low-emission engines or be equipped with emissions control devices. In addition, Mitigation Measure MM-AQ (T2/T3)-1 would require the use of renewable diesel fuel in construction equipment and trucks for at least 90 percent of diesel fuel demand. Implementation of the recommended mitigation measures would result in substantial emission reductions compared to fleet-wide average emissions for heavy-duty construction equipment and trucks in the southern California region. In order to provide a conservative (worst-case) estimate of mitigated emission reductions, and in order to account for a lack of availability of equipment at times, implementation of Standard Control Measure (Mitigation Measure) LAX-AQ-1 assumed that an additional 25 percent of the on-road trucks (relative to the EMFAC2014 default assumptions) would meet the USEPA 2010 on-road emissions standards for VOC, NO_2, PM_{10}, and $PM_{2.5}$. Similarly, the mitigated off-road construction equipment fleet was assumed to be 30 percent USEPA Tier 3 compliant, 35 percent Tier 4 Interim compliant, and 35 percent Tier 4 Final compliant. Fifty percent of the USEPA Tier 3 compliant equipment was assumed to be fitted with Level 3 VDECS diesel particulate filters. Compliance with the USEPA Tier 3 and Tier 4 off-road emissions standards would also result in substantial reduction in emissions of VOC, NO_x, PM_{10}, and $PM_{2.5}$ compared to fleet-wide average emissions for heavy-duty construction equipment. In addition, the use of renewable diesel fuel in the construction fleet also provides reductions in emissions of NO_x, CO, PM_{10}, and $PM_{2.5}$. The estimated effects of these control measures are shown in the tables below.

4.1.1.9.1 Mitigated Regional Construction Emissions

Mitigated daily construction emissions are presented in **Table 4.1.1-11** for all criteria and precursor pollutants studied (CO, VOC, NO_x, SO_2, PM_{10}, and $PM_{2.5}$).

Table 4.1.1-11
Project - Maximum Construction Emissions (lbs/day), with Mitigation

Pollutant	Peak Daily Emissions	Threshold	Significant?
Carbon monoxide, CO	135	550	No
Volatile organic compounds, VOC	55	75	No
Nitrogen oxides, NO_X	129	100	***Yes***
Sulfur dioxide, SO_2	1	150	No
Respirable particulate matter, PM_{10}	77	150	No
Fine particulate matter, $PM_{2.5}$	39	55	No

Source: Appendix B.1.1 of this EIR.
Prepared By: CDM Smith, November 2016.

83 Neste Oil Corporation NEXBTL Renewable Diesel, 2014, Available: https://www.neste.com/sites/default/files/attachments/nexbtl_03032014.pdf, accessed August 23, 2016.

84 Propel Fuels, 2016, Available: https://propelfuels.com/fleet_and_commercial, accessed August 23, 2016.

As shown in **Table 4.1.1-11**, with the inclusion of mitigation measures, regional emissions of NO_X would remain significant.

4.1.1.9.2 Mitigated Local Construction Impacts

The results of NO_2 air dispersion modeling of the project construction sources, incorporating mitigation, are summarized in **Table 4.1.1-12**.

Table 4.1.1-12
Project - Construction Peak Concentrations (µg/m³), with Mitigation

Pollutant	Averaging Period	Construction (µg/m³)	Background (µg/m³)	Total (µg/m³)	Threshold (µg/m³)	Significant?
NO_2	1-hr CAAQS	37	164	201	339	No
	1-hr NAAQS	131[2/]	--[1/]	131[2/]	188	No
	Annual CAAQS	0.8	23	24	57	No

Notes:

1/ The background 1-hour NO_2 values for the NAAQS analysis included 98th percen ile concentrations for each hour-of-day by season (Winter, Spring, Summer, and Fall), 96 hourly values total, and these background NO_2 concentrations were included in the AERMOD runs so that the modeled concentration already included addition of background NO_2.

2/ As noted in Section 4.1.1.3.2, under Meteorology, and reported in Section 4.1.1.6, LAWA conducted an additional evaluation of the unmitigated 1-hour NO_2 NAAQS analysis since the initial unmitigated result (180 µg/m³) using one year of met data was within 10 percent of he threshold (188 µg/m³). The additional evaluation used the peak (highest 1st-high) project increment value instead of the 98th percen ile (highest 8th-high) value, as suggested by SCAQMD (SCAQMD 2017). The peak value was added to the seasonal hour of day NO_2 background file used for the initial NAAQS comparison. Therefore, he peak 1-hour NO_2 value (instead of the 98th percentile) from he mitigated analysis is shown in this table to provide basis for comparison to the unmitigated result as well as a conservative comparison to the NAAQS.

Source: Appendix B.1 2 of this EIR.

Prepared By: CDM Smi h, January 2017

As shown in **Table 4.1.1-12**, the local construction concentrations after the incorporation of mitigation would be reduced to a level less than the SCAQMD CEQA ambient air quality standards for NO_2. Therefore, the mitigated localized construction effects of the proposed project relative to criteria pollutant emissions would be less than significant.

4.1.1.10 <u>Level of Significance After Mitigation</u>

4.1.1.10.1 Regional Construction Significance

With implementation of Standard Control Measure (Mitigation Measure) LAX-AQ-1 and Mitigation Measure MM-AQ (T2/T3)-1, construction-related significant NO_x impacts associated with regional emissions would be reduced, but not to a level that would be less than significant or less than cumulatively considerable. No other feasible mitigation measures have been identified that would reduce NO_x impacts further. Therefore, impacts to regional air quality from project-related construction NO_x emissions would be significant and unavoidable.

4.1.1.10.2 Regional Operational Significance

Unmitigated energy-related operational impacts associated with regional emissions would be less than significant, and therefore less than cumulatively considerable.

4.1.1.10.3 Local Construction Significance

Unmitigated construction-related impacts associated with local NO_2 concentrations would be significant, and therefore also cumulatively considerable. With implementation of Standard Control Measure (Mitigation Measure) LAX-AQ-1 and Mitigation Measure MM-AQ (T2/T3)-1, construction-related impacts associated with local NO_2 concentrations would be reduced to less than significant, and therefore also less than cumulatively considerable.

4.1.2 Human Health Risk Assessment

4.1.2.1 Introduction

As discussed in Chapter 2, *Project Description*, the proposed project would modernize Terminals 2 and 3. Such changes would result in the release of toxic air contaminants (TAC) from construction activities which could have an impact on people living in the vicinity of the Airport. The objective of this Human Health Risk Assessment (HHRA) and health impact analysis is to assess incremental changes to health impacts for people exposed to TAC resulting from construction associated with the proposed project. The HHRA and health impact analysis disclose whether construction of the proposed project would create significant health risks for people living, working, recreating, or attending school near LAX.

The approach and methods used in this HHRA have been consistently applied over several years as part of EIR development to support LAWA projects. An overview of approach and methods, provided below, is a general roadmap to the analyses.

Construction of the proposed project would take approximately six years and four months, starting in approximately the fourth quarter of 2017 and completing by 2023.

Assessing possible impacts of TAC releases during construction is complex and requires consideration of TAC emissions from a variety of Airport operations and from non-LAX-related mobile and stationary sources, as well as from construction activities. Additionally, emissions from all sources will change with time and by location. Regional sources are subject to efforts to improve air quality in the South Coast Air Basin by reducing emissions from both mobile and stationary sources, emissions from Airport operations will change as aircraft and other equipment are replaced, and construction emissions will vary in time and space as different parts of the projects are begun and completed. Because of these complexities, TAC impact analyses require an approach that examines incremental impacts to air quality.

Incremental risks are assessed as follows for this assessment:

- Construction emissions were estimated using construction schedules prepared for staging the project. Only the proposed project's incremental additional construction emissions were considered.

No investigation or modeling of non-airport sources near LAX was conducted. The South Coast Air Quality Management District (SCAQMD) has published a series of studies on air quality that provide data on regional air quality in the South Coast Air Basin, and these data were used to evaluate cumulative impacts of emissions on health risks. The most recent study of air quality (Multiple Air Toxics Exposure Study [MATES] IV) accounts, as much as possible, for impacts of regulatory efforts to improve air quality. [85]

The analysis described allows for comparisons of air quality impacts to assess possible health impacts:

- The air quality impacts to human health risks from the proposed project construction emissions provides a measure of project impacts during the period of construction.
- Comparison of regional air quality as measured in the MATES IV study with construction impacts of the proposed project provide an indication of the relative impact of the project on regional air quality.

The remaining subsections describe the development and results of the HHRA in detail. Appendix B.1.3 provides the detailed data supporting for this analysis.

As with all activities at facilities that accommodate vehicles and equipment that consume fuel, activities at LAX release TAC to the air. These TAC may come from motor vehicles; combustion of fossil fuels to produce hot water, steam, and power; and other sources. Impacts to human health associated with releases of TAC may include

[85] South Coast Air Quality Management District, Final Report – Multiple Air Toxics Exposure Study in the South Coast Air Basin – MATES-IV, May 2015, Available: http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-iv/mates-iv-final-draft-report-4-1-15.pdf?sfvrsn=7. Accessed January 19, 2017.

increased cancer risks, increased chronic (long-term) non-cancer health hazards, and increased acute (short-term) non-cancer health hazards from inhalation of TAC.

4.1.2.1.1 Scope of Analysis

The HHRA conducted for the proposed project addresses construction-related emissions. Cancer risks as well as chronic and acute non-cancer health hazard assessments all rely on estimating TAC concentrations in the air. Proposed project emissions are modeled using dispersion modeling to determine localized concentrations, which in turn are used to estimate the amount of TAC that people living, working, recreating, or going to school near LAX might inhale over both short (acute) and long (chronic) time frames.

Estimated emission rates, along with meteorological and geographic information, were used as inputs to an air dispersion model. The dispersion model predicted possible concentrations of TAC released during proposed project construction within the study area around the Airport. Modeled concentrations were used to estimate human health risks and hazards, which serve as the basis of the significance determinations for the proposed project. A detailed description of the estimation of emissions of TACs is provided in Section 4.1.1.2 for air quality. A summary is provided below.

TAC concentrations were estimated in two steps: first, dispersion modeling was used to estimate total volatile organic compound (VOC) and particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}) concentrations, and then individual organic or particulate TAC concentrations were calculated using component profiles to speciate total VOC and PM_{10} concentration estimates into individual elements and compounds (species). For example, if total VOC at a given location was 0.1 microgram per cubic meter ($\mu g/m^3$) and a given volatile TAC makes up 1 percent of total VOC, the concentration of that TAC at that location would be 0.001 $\mu g/m^3$.

Project-related concentrations for TAC from construction sources were estimated using an air dispersion model (AERMOD Version 15181) with model options for 1-hour maximum, 8-hour maximum, and annual average concentrations selected[86]. Data used as input to the model were taken from construction-based sources:

- Construction-related carcinogenic TAC emissions were modeled for each year of construction using the schedule for proposed project construction activities and projected emissions during these activities. Year-by-year emissions estimates were used to account for changes in both location and types of activities needed as the project progresses. Incremental annual average TAC concentrations were used to estimate cancer risk over the entire construction period.
- Construction-related acute and non-cancer chronic TAC emissions were modeled for the peak month and peak year of construction emissions, respectively. Incremental short-term 1-hour and 8-hour concentrations were then used to estimate acute non-cancer health hazard impacts, and incremental annual average concentrations were used to estimate chronic non-cancer health hazards using methods described in Appendix B.1.3.

4.1.2.1.2 Exposure Concentrations

TAC concentrations were estimated at hundreds of locations surrounding the Airport. This modeling grid was used to find locations where Airport emissions would have the greatest impact. Modeled concentrations at these locations were used to estimate incremental human health risks and hazards. These estimates assist in making determinations of significance of health impacts for the proposed project.

[86] The AERMOD modeling system is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. Additional information, documentation, and guidance regarding the AERMOD modeling system, including the model code and documentation for AERMOD Version 15181, is available on the USEPA's website at https://www3.epa.gov/scram001/dispersion_prefrec.htm#aermod, accessed January 3, 2017.

In February 2015, the California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment (OEHHA) released the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.[87] The guidance recommends the use of a software program, Hot Spots Analysis and Reporting Program Version 2 (HARP2) developed by the Air Resources Board, for calculating and presenting HRA results for the Hot Spots Program. For this HHRA, HARP2 equations and calculations were utilized to address project-specific impacts.

4.1.2.1.3 Overview of Risk Assessment

This HHRA is based on estimates for construction TAC emissions associated with the proposed project. Baseline construction emissions are assumed to be zero. Cumulative impacts, including possible impacts of Airport and non-airport related construction, are discussed in Section 4.1.2.5.

Emissions sources during construction were analyzed for each construction year from 2017 through 2023.

The HHRA followed State and, as necessary, federal guidance[88] for performance of risk assessments and was conducted as described above and defined in SCAQMD, CalEPA, and United States Environmental Protection Agency (USEPA) guidance[89,90,91] consisting of selection of TAC of concern, exposure assessment, toxicity assessment, and risk characterization. These steps are summarized below.

Selection of TAC of Concern

In general, TAC of concern for the HHRA are based on TAC identified under Assembly Bill AB 2588 and for which the CalEPA OEHHA has developed cancer slope factors, chronic reference exposure levels, and/or acute reference exposure levels.[92] Cancer slope factors define the relationship between inhalation of TAC and risk of developing cancer. Reference exposure levels define the relationship between inhalation of TAC and subsequent non-cancer health impacts. Reference exposure levels are separately identified for both long- and short-term exposure durations.

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87 California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015, Available: http://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0, Accessed January 19, 2017.

88 FAA does not conduct HHRA analyses in the NEPA context; federal USEPA guidance is used only to assist with risk assessment in cases where State guidance is silent or outdated.

89 South Coast Air Quality Management District, Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics Hot Spots Information and Assessment Act (AB 2588), June 5, 2015.

90 California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines, Part I: The Determination of Acute Reference Exposure Levels for Airborne Toxicants, March 1999, Available: http://oehha.ca.gov/air/crnr/adoption-air-toxics-hot-spots-risk-assessment-guidelines-part-i-technical-support-document, Accessed January 19, 2017; California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis, August 2012, Available: http://oehha.ca.gov/air/crnr/notice-adoption-technical-support-document-exposure-assessment-and-stochastic-analysis-aug, Accessed January 19, 2017; California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines, Part III: Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, June 2008, Available: http://oehha.ca.gov/air/crnr/air-toxics-hot-spots-program-risk-assessment-guidelines-part-iii-1999, Accessed January 19, 2017; California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II: Technical Support Document for Describing Available Cancer Potency Factors, updated May 2009, Available: http://oehha.ca.gov/air/crnr/technical-support-document-cancer-potency-factors-2009, Accessed January 19, 2017; California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015, Available: http://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0, Accessed January 19, 2017.

91 U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Risk Assessment Guidance for Superfund, Vol. I, Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002, December 1989.

92 California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Toxicity Criteria Online Database, Available: http://oehha.ca.gov/chemicals, Accessed January 19, 2017.

The list of TAC of concern used in this HHRA was developed using regulatory lists, emissions estimates, human toxicity information, results of the LAX Master Plan HHRA, and a review of health risk assessments for construction activities included in similar EIRs. [93] This list of TAC was further refined to include only TAC with chronic Reference Exposure Levels (RELs), acute RELs, and inhalation cancer slope factors identified by the CalEPA OEHHA. The resulting list of TAC of concern evaluated in this HHRA is provided in **Table 4.1.2-1**.

Exposure Assessment

For analysis of the proposed project, the following sensitive receptors were selected for quantitative evaluation: on-airport workers, off-airport workers, off-airport adult residents, and off-airport child residents. Each receptor represents a unique population and set of exposure conditions. As a whole, they cover a range of exposure scenarios for people who may be affected by proposed project emissions, and include receptors that would be subject to the highest exposures for receptors located downwind and within the area of possible impact. Thus, risks and hazards for Maximally Exposed Individuals (MEI) and for receptors at various distances north, east and south of the Airport are provided to assist in evaluation of significance determinations.

Table 4.1.2-1
Toxic Air Contaminants (TAC) of Concern for the Proposed Project

Toxic Air Contaminant	Type
Acetaldehyde	VOC
Acrolein	VOC
Benzene	VOC
1,3-Butadiene	VOC
Ethylbenzene	VOC
Formaldehyde	VOC
n-Hexane	VOC
Methyl alcohol	VOC
Methyl ethyl ketone	VOC
Propylene	VOC
Styrene	VOC
Toluene	VOC
Xylene (total)	VOC
Naphthalene	PAH
Arsenic	PM-Metal
Cadmium	PM-Metal
Chromium VI	PM-Metal
Copper	PM-Metal
Lead	PM-Metal
Manganese	PM-Metal
Mercury	PM-Metal
Nickel	PM-Metal
Selenium	PM-Metal
Vanadium	PM-Metal
Diesel PM	Diesel Exhaust
Chlorine	PM-Inorganics
Silicon	PM-Inorganics
Sulfates	PM-Inorganics

Notes:
PAH = Polycyclic aromatic hydrocarbons
PM = Particulate matter
VOC = Vola ile organic compounds
Prepared By: CDM Smith., January 2017

93 City of Los Angeles, Los Angeles World Airports, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), Section 4.24.1, Human Health Risk Assessment, Technical Report 14a, Health Risk Assessment, and Technical Report S-9s, Supplemental Health Risk Assessment, April 2004. Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017.

The EIR's approach to assessing health risks considers all receptors. The range of risks and hazards for areas surrounding LAX thus provides information about community impacts at locations where individuals live, work, recreate, or go to school, as they compare to regulatory thresholds and to impacts associated with typical air quality in the South Coast Air Basin.

Different receptors (e.g., off-site workers, child residents) could be exposed to TAC in several ways, deemed exposure pathways. An exposure scenario that considers various pathways by which they might be exposed to TAC was developed for each receptor. As discussed below, exposure scenarios for the proposed project include a single exposure pathway – inhalation of Airport–related TAC.

An exposure pathway consists of four parts:

- A TAC source (e.g., construction equipment fuel combustion)
- A release mechanism (e.g., construction equipment engine exhaust)
- A means of transport from point of release to point of exposure (e.g., local winds)
- A route of exposure (e.g., inhalation)

If any of these elements of an exposure pathway is absent, no exposure can take place, and, the pathway is considered incomplete. Incomplete pathways were not evaluated in this HHRA. In addition, some exposure pathways may be complete, but may result in little or negligible exposure (see next paragraph).

An example previously addressed in LAWA environmental documents is deposition of particulate emissions onto ground and hard surfaces, with subsequent exposure for people that contact this material on their skin and/or via hand to mouth activity. Although some deposition of particulate matter does occur, the amount of material deposited is too small to result in accumulation that may be of concern for health impacts. Other exposure pathways -- including uptake from soil into homegrown vegetables; transport of TAC in soil to indoor dust and/or surface water; and other indirect pathways -- were addressed quantitatively in the programmatic HHRA developed for the LAX Master Plan EIR[94] (see LAX Master Plan Final EIR Technical Report 14a and Technical Report S-9a).[95] No pathway other than inhalation was found to be an important contributor to exposure and thus to human health risk. Based on this previous analysis, pathways other than inhalation were not assessed.

For this HHRA, the inhalation pathway is the single substantive exposure pathway and is responsible for essentially all risk and hazard associated with the proposed project. Inhalation of TAC is therefore the only pathway that was quantitatively evaluated.

Toxicity Assessment

Risks from exposure to TAC were calculated by combining estimates of exposure via inhalation with appropriate toxicity criteria, as described in more detail below. A toxicity assessment for TAC of concern was conducted for the LAX Master Plan Final EIR, as described in Technical Report 14a of that EIR. Since completion of these reports, some changes have been made by both the CalEPA OEHHA and USEPA to toxicity criteria for a few TAC identified in **Table 4.1.2-1**. To maintain consistency with regulatory guidance, toxicity information from previous HHRA efforts was updated to be consistent with the most current state and federal regulatory databases for the analyses included in this report. Such criteria remained unchanged for DPM, Cr VI, benzene, formaldehyde, nickel, all TAC associated with the greatest estimated health impacts in previous programmatic and project-specific LAWA risk assessments.

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94 City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017.

95 City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017

Acute RELs developed by the State of California were used in the characterization of acute non-cancer health hazards associated with the proposed project. [96] Other sources of acute toxicity criteria (e.g., ATSDR) were also evaluated as a source of acute criteria as part of this re-assessment of toxicity information.

Cancer slope factors, and chronic RELs developed by the State of California[97] were used to characterize cancer risks and chronic non-cancer health hazards associated with longer-term inhalation of emissions from construction or operational activities. Both types of toxicity criteria are based on studies of chronic exposure in animals or, in some cases, to people. Tables of the toxicity values used in the HHRA calculations are provided in Appendix B.1.3.

Acute RELs were used to characterize hazards associated with short-term exposure (usually from exposures on the order of 1-hour). RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. Since margins of safety[98] are incorporated to address data gaps and uncertainties, exceeding an REL does not automatically indicate an adverse health impact. Acute RELs are applicable to all receptors, children and adults, and hazards are the ratio of estimated or measured concentrations and the REL.

Risk Characterization

Assessment of chronic human health impacts due to release of TAC associated with operation of the proposed project assumes that receptors are exposed to concentrations of TACs over 9- and 30- year periods for off-site residential receptors; and a 25-year period for off-site workers.

For construction, location and magnitude of emissions were assumed to change as different portions of the project are begun and completed throughout the construction period. To incorporate this variability into the model, construction emissions were modeled separately for each year of construction from 2017 to 2023. Risks for receptors were calculated by grid point for each year of construction and then added together to determine total risk by grid point for the construction period. For the portion of the receptors' exposure period that was longer than the construction period, construction emissions were assumed to be zero.

TAC concentrations for operations were not modeled as the proposed project would not result in changes in operational TAC emissions. See Section 4.1.1 for an explanation of why the proposed project would not change operational air pollutant emissions.

Grid points were identified where construction impacts were likely to be maximal. Concentrations of TAC in air at these locations then formed the basis for the risk estimate. Such risk estimates are overly-conservative for most people living, working, recreating, or attending school near LAX.

For the proposed project, grid points were analyzed along the Airport fence-line and at intervals within the study area. In addition, several on-Airport grid points that are not located within the proposed project boundaries were also modeled (for on-Airport/off-site workers) and in the center of LAX (for on-Airport/on-site construction workers). These locations represent maximally exposed individuals (MEI), based on dispersion modeling (see Section 4.1.1, under air quality, above). Concentrations of each TAC at these nodes were used in calculating cancer risk, and chronic and acute non-cancer health hazard estimates. These calculations were used to identify locations with maximum cancer risks and maximum non-cancer health hazards and serve as to assist determinations of significance.

MEI estimates were partially land use specific. On-Airport locations were used to identify commercial and on-airport worker TAC concentrations. For off-airport locations, land uses were designated as either residential, commercial,

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[96] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Toxicity Criteria Online Database, Available: http://oehha.ca.gov/chemicals, Accessed January 19, 2017.

[97] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Toxicity Criteria Online Database, Available: http://oehha.ca.gov/chemicals, Accessed January 19, 2017.

[98] Margin of safety is a ratio of the no-observed-effect level to the estimated exposure dose. Margins of safety are incorporated in the development of toxicity values to account for differences in dose-response among individuals. For example, the same dose of alcohol may have a greater effect on a woman than a man, not only because a woman is smaller in body size but also because men and women metabolize alcohol at different rates.

or residential/commercial based on review of aerial photos and then evaluated for the receptors appropriate for the land use designations (workers at commercial locations; adult and child residents at residential locations; etc.). Locations of schools, hospitals, nursing homes, daycare facilities, etc. were identified as sensitive receptor locations and designated as residential/commercial so that these grid points would be evaluated for both worker and residential receptors. The modeled receptor locations are shown on **Figure 4.1.1-1**.

Concentrations of TAC as modeled at the fence-line (LAX boundary) represent the highest or near-highest concentrations that could be considered "off-airport." Fence-line receptors were used for the criteria pollutant impact analysis in Section 4.1.1, under air quality (above). Since no homes are located on the fence-line and grid points were identified for special receptors outside of the fence-line to represent the nearest off-airport worker locations as well as nearest residential locations, fence-line grid points were not evaluated as receptors in the human health risk analysis. Concentrations in areas where people actually work or live would be lower than that at the fence-line.

Evaluating Cancer Risks

Cancer risks were estimated by multiplying exposure estimates for carcinogenic chemicals by corresponding cancer slope factors. Results were risk estimates expressed as the probability of developing cancer. Cancer risks were based on an exposure duration of 30 years for adult residents, 9 years for child residents, and 25 years for workers. Years of exposure after construction assume a risk increment of 0 from operations. Impacts of exposure to multiple TAC were accounted for by adding cancer risk estimates for exposure to all carcinogenic chemicals.

Chronic Non-Cancer Health Hazards

Chronic non-cancer health hazard estimates were calculated by dividing exposure estimates by RELs. RELs are estimates of highest exposure levels that would not cause adverse health effects even if exposures continue over a lifetime. The ratio of exposure concentration to reference concentration is termed the hazard quotient (HQ). A HQ greater than one indicates an exposure concentration greater than an exposure that is considered safe. A ratio that is less than one indicates that project-related (incremental) exposure was less than the highest exposure level that would not cause an adverse health effect and, hence, no impact to human health is likely. Risks of adverse effects cannot be estimated using reference doses. However, because reference concentrations are developed in a conservative fashion, HQs only slightly higher than one are generally accepted as being associated with low risks (or even no risk) of adverse effects, and that potential for adverse effects increases as the HQ gets larger.

Impacts of exposure to multiple chemicals were accounted for by adding estimated HQs for non-carcinogenic chemicals that affect the same target organ or tissue in the body. Addition of HQs for TAC that produce effects in similar organs and tissues results in a Hazard Index (HI) that reflects possible total hazards. Several TAC have effects on the respiratory system including acetaldehyde, acrolein, formaldehyde, xylenes, and diesel particulates. Non-cancer health hazards for the proposed project were calculated for the respiratory system which accounted for essentially all non-cancer health hazards.

Acute Non-Cancer Health Hazards

Acute non-cancer risk estimates were calculated by dividing estimated maximum 1-hour TAC concentrations in air by acute RELs. An acute REL is a concentration in air below which adverse effects are unlikely for people, including sensitive subgroups, exposed for a short time on an intermittent basis. In most cases, RELs are estimated on the basis of an 1-hour exposure duration. USEPA defines intermittent exposure as an exposure lasting less than 24 hours and occurring no more than monthly. RELs do not distinguish between adults and children, but are established at levels that are considered protective of sensitive populations. Since margins of safety are incorporated to address data gaps and uncertainties, exceeding the REL does not automatically indicate an adverse health impact. OEHHA has developed acute RELs for several of the TAC of concern.

Short-term concentrations for TAC associated with construction of the proposed project were estimated using the same AERMOD used to estimate annual average concentrations, but with the model option for 1-hour maximum concentrations selected. These concentrations represent the highest predicted concentrations of TAC. Acute non-cancer health hazards were then estimated at each grid point by dividing estimated maximum 1-hour TAC concentrations in air by acute RELs. A HI equal to or greater than 1, the threshold of significance for acute non-cancer health impacts, indicates some potential for adverse acute non-cancer health impacts. A HI less than 1 suggests that adverse acute non-cancer health impacts are unlikely.

Occupational Health Hazards

Impacts to on-site workers were evaluated by comparing estimated 8-hour air concentrations of TAC at on-site locations under the proposed project for construction to the California Occupational Safety and Health Administration (CalOSHA) 8-hour Time-Weighted Average Permissible Exposure Levels (PEL-TWAs).[99]

Population-based Risks

When MEI risks exceed threshold levels, CalEPA guidance indicates that population-based risks should be calculated. This type of assessment estimates the "cancer burden" that might be experienced within an exposed population. Cancer burden is the sum of individual risks for people living in the study area. For example, if 100,000 people live in an area that experiences an increased cancer risk of 10 in 1 million due to the proposed project, the chance of a single case of cancer in this population caused by the proposed project would be 1 in 100 (100,000 times 10×10^{-6}).

Population-based risk conservatively assumes that a population (not necessarily the same individuals) will live within the study area over a 70-year lifetime period. In this sense, cancer burden calculations are more conservative than individual cancer risks calculated on an exposure duration of 30 years.

Cancer burden was calculated by multiplying incremental cancer risk calculated for a 70-year resident at a grid point by the number of people who live in the census block associated with that grid point, and adding up the estimated number of potential cancer cases across each zone of impact (10^{-6}, 10^{-5}, etc.) in the study area. In some cases, a single census block may contain more than one modeled grid point. When this situation occurred, the average of the calculated risks for the grid points within the census block was used for the calculation. Cancer burden is a single number for each zone of impact that is intended to estimate the theoretical number of cancer cases within the population that is exposed to the project-related emissions for a lifetime (70 years). As discussed previously, cancer risk for years after construction has completed are considered to be zero.

The estimate is conservative for several reasons. It assumes that the population is stable over the time of the evaluation, that individuals in the population are equally sensitive to the toxic effects of TAC, that sensitivity is near the maximum possible based on current data, that all people in the population live long enough for cancer effects to be observed, that people in a given zone spend essentially all of their time in that zone, and that the basic approach to assessing cancer risk, which itself involves use of conservative methods, is reasonably accurate. Thus, estimates of cancer burden are likely to be substantially exaggerated.

A similar approach was used for the assessment of population-based hazard impacts. However, instead of multiplying the hazard indices, zones of impact were identified as where hazard indices exceeded 0.5, 1.0, and in increments of 1.0. Population counts for each zone of impact were summed to provide a single number for each zone of impact. As with the cancer burden, when a single census block contained more than one modeled grid point, the average of the calculated hazard indices for the grid points within the census block was used to determine which zone of impact the census block was representative. Population estimates for acute, 8-hour, and chronic health impacts are presented separately. These calculations are subject to much of the same conservatism as discussed above for cancer risks.

Uncertainties

Uncertainties are present in all facets of HHRA. For this analysis, uncertainties identified included uncertainties associated with emission estimates and dispersion modeling, evaluation of sensitive receptor populations, exposure

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99 California Occupational Safety and Health Administration, Table AC-1, Permissible Exposure Limits for Chemical Contaminants, Available: https://www.dir.ca.gov/title8/5155table_ac1.html, Accessed January 19, 2017.

parameter assumptions, toxicity assessment, use of 2015 OEHHA Air Toxics Methodology[100] instead of Risk Assessment Guidance for Superfund (RAGS)[101] methodology, and interactions among acrolein and criteria pollutants. Detailed discussions of these uncertainties associated with the HHRA are presented in Appendix B.1.3. The approach used in this EIR health impact analysis uses conservative assumptions and methods to account for multiple uncertainties. This approach is appropriate for assessing the health risks associated with the proposed project.

4.1.2.2 Existing Conditions

4.1.2.2.1 Regulatory Setting

Federal

The USEPA provides guidance on performing HHRAs for certain purposes through its Office of Emergency and Remedial Response publication, *Risk Assessment Guidance for Superfund, Vol I, Human Health Evaluation Manual* (Part A), Interim Final, EPA/540/1-89/002, published December, 1989. The FAA does not prepare or use HHRAs in the airport context.

State

The California Air Resources Board's (CARB) statewide comprehensive air toxics program was established in the early 1980's. The Toxic Air Contaminant Identification and Control Act (AB 1807) created California's program to reduce exposure to air toxics.

In September 1987, the California Legislature established the AB 2588 air toxics "Hot Spots" program. It requires facilities to report their air toxics emissions, ascertain health risks, and to notify nearby residents of significant risks. In September 1992, the "Hot Spots" Act was amended by Senate Bill 1731 which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan. Beginning in 2000, the CARB has adopted diesel risk reduction plans and measures to reduce diesel particulate matter (DPM) emissions and the associated health risk. These are discussed in more detail in the following section.

California Air Resources Board Air Toxics Control Measure (ATCM)

In 2004, CARB adopted a control measure to limit commercial heavy duty diesel motor vehicle idling in order to reduce public exposure to DPM and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. In general, it prohibits idling for more than 5 minutes at any location.

In addition to limiting exhaust from idling trucks, CARB promulgated emission standards for off-road diesel construction equipment such as bulldozers, loaders, backhoes, and forklifts, as well as many other self-propelled off-road diesel vehicles. A CARB regulation that became effective on June 15, 2008, aims to reduce emissions by installation of diesel soot filters and encouraging the replacement of older, dirtier engines with newer emission controlled models. The regulation requires that fleets limit their unnecessary idling to 5 minutes; there are exceptions for vehicles that need to idle to perform work (such as a crane providing hydraulic power to the boom), vehicles being serviced, or in a queue waiting for work. A prohibition against acquiring certain vehicles (e.g., Tier

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[100] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program, Risk Assessment Guidelines, Guidance Manual for Preparation of Health Risk Assessments, February 2015, Available: http://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0, Accessed January 19, 2017.

[101] RAGS (Risk Assessment Guidance for Superfund) establishes methods used for estimating human health risks associated with chemical exposure. RAGS Part A established general methods for such assessment for exposure via inhalation of chemicals in air, but these methods were superseded by new methods published in RAGS Part F. This change in guidance occurred during the life of the LAX Master Plan environmental analysis, such that older risk assessments used RAGS Part A methods, but later assessments used updated RAGS Part F methods.

0 and Tier 1) began on March 1, 2009. Implementation of the fleet averaging emission standards is staggered based on fleet size, with the largest operators to begin compliance in 2015.[102] By 2020, CARB estimates that DPM will be reduced by 74 percent and smog forming NO_X (an ozone precursor emitted from diesel engines) by 32 percent, compared to what emissions would be without the regulation.[103]

The CalEPA provides guidance on performing an HHRA through its OEHHA publications:

- Air Toxics Hot Spots Program Risk Assessment Guidelines, Part I: The Determination of Acute Reference Exposure Levels for Airborne Toxicants, March 1999;
- Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II: Technical Support Document for Describing Available Cancer Potency Factors, updated May 2009;
- Air Toxics Hot Spots Program Risk Assessment Guidelines, Part III: Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, June 2008;
- Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis, August 2012; and
- Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, February 2015.

Regional/Local

SCAQMD has jurisdiction over the air quality of the Basin. The SCAQMD has determined that the significance criterion for cancer health risks is a ten in one million increase in the chance of developing cancer. The SCAQMD has also adopted a significance criterion for cancer burden. The cancer burden is the estimated increase in the occurrence of cancer cases in a population as a result of exposures to TAC emissions. The SCAQMD has determined that the significance criterion for cancer burden is greater than 0.5 excess cancer cases in areas with an incremental increase in cancer risk greater than or equal to 1 in 1 million. The significance of non-cancer (acute and chronic) risks is evaluated in terms of HIs for different endpoints. The SCAQMD threshold for non–cancer risk for both acute and chronic HI is 1.0.

4.1.2.2.2 Existing Health Risk in the Project Area

In June 1987, the SCAQMD published the first *Multiple Air Toxics Exposure Study (MATES),* which was the most comprehensive air toxics study ever conducted in an urban environment. This original study has been updated several times; the most recent study, MATES-IV,[104] was published in May 2015. The study estimates the cancer risk from TAC emissions throughout the Basin by conducting a comprehensive monitoring program, an updated emissions inventory of TACs, and a modeling effort to fully characterize health risks for those living in the Basin. The study includes a series of maps showing regional trends in estimated outdoor inhalation cancer risk from toxic emissions. These risk maps depict inhalation cancer risk due to modeled outdoor TAC pollutant levels, and do not account for cancer risk due to other types of exposure. The study found that the largest contributors to inhalation cancer risk are diesel engines. According to MATES-IV, cancer risks in the South Coast Air Basin range from 320 in one million to 480 in one million, with an average of 418 in one million. These cancer risk estimates are relatively high (although substantially lower than those found in MATES-III) and indicate that current impacts associated with ongoing releases of TAC (e.g., from vehicle exhaust) and from sources of TAC from past and present projects in the region are substantial.

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[102] California Air Resources Board, In-Use Off-Road Diesel Vehicle Regulation, Overview, Revised February 2014, Available: http://www.arb.ca.gov/msprog/ordiesel/faq/overview_fact_sheet_dec_2010-final.pdf, Accessed November 2016.

[103] California Air Resources Board, Facts about Emissions and Health Benefits of Regulation for In-Use Off-Road Diesel Vehicles, revised September 20, 2007, Available: http://www.arb.ca.gov/msprog/ordiesel/documents/OFRDDIESELhealthFS.pdf, Accessed November 2013.

[104] South Coast Air Quality Management District, Final Report – Multiple Air Toxics Exposure Study in the South Coast Air Basin – MATES-IV, May 2015, Available: http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-iv/mates-iv-final-draft-report-4-1-15.pdf?sfvrsn=7. Accessed January 19, 2017.

As part of the MATES III Study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps' estimates represent the number of potential cancers per million people associated with a lifetime of breathing air toxics (24 hours per day outdoors for 70 years) in parts of the area. The estimated lifetime cancer risk from exposure to TACs for those residing within the vicinity of the proposed project is estimated at 884 cancers per million, while the vast majority of the area surrounding LAX ranges between 500 to 1,200 cancers per million. [105] However, the visual resolution available in the map is 1 kilometer by 1 kilometer and, thus, impacts for individual neighborhoods are not discernible on this map. In general, the risk of the project site is comparable with other areas in the Los Angeles area; the risk from air toxics is lower near the coastline, and increases inland, with higher risks concentrated near large diesel sources (e.g., freeways, airports, and ports).

The SCAQMD also provides guidance on performing an HHRA through its publication, *Supplemental Guidelines for Preparing Risk Assessment for the Air Toxics Hot Spots Information and Assessment Act* (AB 2588), June 2015. This document incorporates the updated risk methodologies established by OEHHA's 2015 Guidance Manual that take into account for early childhood exposure. According to MATES-IV, although in general there has been an overall Basin-wide reduction in air toxics concentrations since MATES-III, application of the updated risk estimation methods recently adopted by OEHHA result in an estimated population weighted risk across the South Coast Air Basin range of 897 per million, an increase in cancer risks.

The CARB also prepares a series of maps that show regional trends in estimated outdoor inhalable cancer risk from air toxic emissions. The Year 2010 Los Angeles County Central map, which is the most recently available map to represent existing conditions, shows cancer risk ranging from 500 to 1,500 cancers per million in the project area, which is generally consistent with the SCAQMD's risk maps.[106]

The data from the SCAQMD and CARB provide a slightly different range of risk. This difference is primarily related to the fact that the SCAQMD risk is based on monitored pollutant concentrations and the CARB risk is based on dispersion modeling and emission inventories. Regardless, the SCAQMD and CARB data show that an inherent health risk associated with living in urbanized areas of the Basin, where mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors to the overall risk.

Sources of Toxic Air Contaminants of Concern

Baseline sources of TACs at LAX include both stationary and mobile sources. Stationary sources consist of aircraft maintenance facilities, the existing fuel farm, and the LAX Central Utilities Plant (CUP). Mobile sources of TACs include aircraft, ground service equipment, and on- and off-airport vehicles. These sources generate a number of TACs of concern, including volatile organics, polycyclic aromatic hydrocarbons, metals, and other constituents.

Exposed Populations

Screening-level air dispersion modeling conducted for the LAX Master Plan Final EIS/EIR indicated that the greatest area of human health impact from Airport activities is confined to the Airport property (see Section 4.1.1, under air quality, above). However, health risks from LAX may accrue to populations in the nearby area. The exposed population within this area of impact includes workers, residents, and sensitive receptors such as schools, hospitals, and nursing. The Airport is bound to the north and south by residential areas which are likely to contain populations that are particularly sensitive to air pollution. These population groups include children, elderly, and acutely and chronically ill persons (especially those with cardio-respiratory diseases). Sensitive land uses in close proximity to the project site include the following:

- The El Segundo residential neighborhood located approximately 1,300 feet to the south of Runway 7R-25L.
- The Westchester residential neighborhood located approximately 1,300 feet to the north of Runway 6L-24R.

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[105] South Coast Air Quality Management District, Multiple Air Toxics Exposure Study III Model Estimated Carcinogenic Risk, Available: http://www3.aqmd.gov/webappl/matesiii/, accessed August 11, 2016.

[106] California Air Resources Board, Cancer Inhalation Risk: Local Trend Maps, Available: http://www.arb.ca.gov/ch/communities/hlthrisk/cncrinhl/rskmapvwtrend.htm.400, Accessed January 19, 2017.

4.1.2.3 Thresholds of Significance

Significance determinations for health impacts are assessed as incremental increases or decreases in cancer risks and non-cancer health hazards. A significant[107] incremental impact to human health would occur if changes related to construction of the proposed project would result in one or more of the following conditions:

- An increased incremental cancer risk[108] greater than, or equal to, 10 in one million (10×10^{-6}) for potentially exposed off-site workers or residents.
- A cancer burden greater than, or equal to 0.5 excess cancer cases in areas within the greater than 1 in 1 million zone of impact.
- A total incremental chronic hazard index[109] greater than, or equal to, one for any target organ system at any receptor location.
- A total incremental acute HI greater than, or equal to, one for any target organ system at any receptor location.
- Exceedance of Permissible Exposure Limits - Time Weighted Average or Threshold Limit Values for workers.

The thresholds listed above are based on SCAQMD guidance.[110] Thresholds for workers are based on standards developed by CalOSHA.

4.1.2.4 Impacts Analysis

The following analysis pertains to the construction-related impacts of the proposed project. Air concentrations for TAC were developed using emissions estimates and dispersion modeling. Using these emission estimates, exposure parameters for receptors and current toxicity values, cancer risks and chronic non-cancer health hazards were calculated for adult residents, resident children ages 0 to 9 years, and off-airport workers at locations where air concentrations for TAC were predicted. Appendix B.1.3 provides detailed health risk modeling data supporting the impact analyses.

For this analysis, 970 grid points (which include both commercial, non-sensitive, and sensitive receptor locations) were analyzed within the study area in the vicinity of the Airport for each construction year from 2017 to 2023. These locations are shown on **Figure 4.1.1-1**.

The concentrations at these locations represent maximum concentrations of TAC predicted by the air dispersion modeling, and can be used to evaluate exposure to MEI. By definition, MEI documents a ceiling for risks and hazards for off-airport residential and commercial receptors. These calculations assumed that people live and work within this study area for the entire exposure duration. This assumption is conservative. Many people that live in the study area will work, shop, travel, recreate and participate in other activities outside of the study area.

4.1.2.4.1 Cancer Risks

Peak construction-related cancer risks for MEI are presented in **Table 4.1.2-2** and summarized in the following sections; calculations are presented in Appendix B.1.3. As shown, unmitigated construction-related cancer risks would be less than significant for adult workers as well as adult and child residents.

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[107] The term "significant" is used as defined in CEQA and does not imply an independent judgment of the acceptability of risk or hazard.

[108] Incremental cancer risk is defined as the difference in cancer risks between the proposed Project and the Without Project condition.

[109] For purposes of this analysis, a health hazard is any non-cancer adverse impact on health. (Cancer-related risks are addressed separately in this analysis.) A chronic health hazard is a hazard caused by repeated exposure to small amounts of a TAC. An acute health hazard is a hazard caused by a single or a few exposures to relatively large amounts of a chemical. A hazard index is the sum of ratios of estimated exposures to TAC and recognized safe exposures developed by regulatory agencies.

[110] South Coast Air Quality Management District, SCAQMD Air Quality Significance Thresholds, March 2015, Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2, accessed August 23, 2016.

Table 4.1.2-2
Incremental Peak Construction-Related Cancer Risks for Maximally Exposed Individuals

Receptor Type	Cancer Risks (per million people)	Threshold (per million people)	Exceeds Threshold?
Adult Resident, 30 years	3.4	10	No
Child Resident, 9 years	3.5	10	No
Adult Worker, 25 years	1.0	10	No
Source: CDM Smith, December 2016. Prepared By: CDM Smith, January 2017			

Residents (Adult and Child)

For construction-related cancer risks, adult and child residents were evaluated at residential and residential/commercial grid nodes[111]. Because construction of the proposed project is estimated to be approximately six years and four months, incremental cancer risk for adult residents was estimated assuming seven years of construction; following completion of construction, it was assumed that adult residents were exposed to no other project-related TAC impacts for the remaining 23 years of the 30-year exposure period.

Since the exposure period for a child resident is nine years, which is greater than the seven-year construction scenario, the cancer risk for child residents was estimated assuming seven years of construction; following completion of construction, it was assumed that the child residents were exposed to no other project-related TAC impacts for the remaining two years of the nine-year exposure period.

Incremental cancer risk for an adult resident at the peak location during construction is estimated to be 3.4 in one million, below the threshold of significance of 10 in one million. DPM would contribute to the majority of the cancer risk for adult resident (approximately 89 percent) followed by hexavalent chromium, contributing approximately nine percent. DPM is primarily an emission from diesel construction equipment, haul trucks, and concrete trucks. The peak cancer risk location for adult residents is shown on **Figure 4.1.2-1**.

Adult Worker

For the construction scenario, adult workers were evaluated at on and off-airport grid nodes.[112] Because the exposure period of the adult worker is 25 years and construction of the project is estimated to be six years and four months, incremental cancer risk for the worker was estimated assuming seven years of construction; following completion of construction, it was assumed that adult workers were exposed to no increased operational impacts for the remaining 18 years of the 25-year exposure period.

Construction-related cancer risks for adult workers at the peak off-airport location are estimated to be one in one million, below the threshold of significance of 10 in one million. Similarly, to adult residents, DPM would contribute to the majority of the cancer risk for adult workers (approximately 94 percent) followed by hexavalent chromium, contributing approximately five percent. The peak cancer risk location for adult workers is shown on **Figure 4.1.2-1**.

4.1.2.4.2 Chronic Non-Cancer Health Hazards

Project-related chronic non-cancer hazard indices for construction impacts associated with the proposed project are provided in **Table 4.1.2-3**. Hazard indices are shown for each year of construction. As shown, chronic non-cancer human health hazards would be less than significant for both residents and workers.

111 Residents were evaluated at residential and residential/commercial grid nodes. They were not evaluated at the fence-line and commercial grid nodes.

112 Workers were evaluated at commercial and residential/commercial grid nodes. They were not evaluated at the fence-line and residential grid nodes.

Resident (Adult and Child)

The maximum HI for a resident living at the peak hazard location for a single year of construction of the proposed project is 0.009, projected to occur in 2021. The peak residential hazard location is shown on **Figure 4.1.2-1**. Non-cancer hazard indices for adult residents and child residents are the same because the OEHHA methodology does not normalize hazard indices to body weight. As shown in **Table 4.1.2-3**, all incremental chronic non-cancer health hazards for residential adults and for young children are would be below the significance threshold of one.

Adult Worker

The maximum HI for an adult worker at the peak hazard location for a single year of construction of the proposed project is 0.037, projected to occur in 2021. The peak commercial hazard location is shown on **Figure 4.1.2-1**. All incremental chronic non-cancer health hazards for adult workers would be below the significance threshold of one.

Table 4.1.2-3
Incremental Chronic Non-Cancer Human Health Hazards for Maximally Exposed Individuals from Project Construction

Year	Resident[1/]	Adult Worker[1/]	Significance Threshold	Exceeds Threshold?
2021	0.009	0.037	1	No

Note:

1/ Hazard indices are unitless.

Source: Appendix B.1.3 of this EIR.

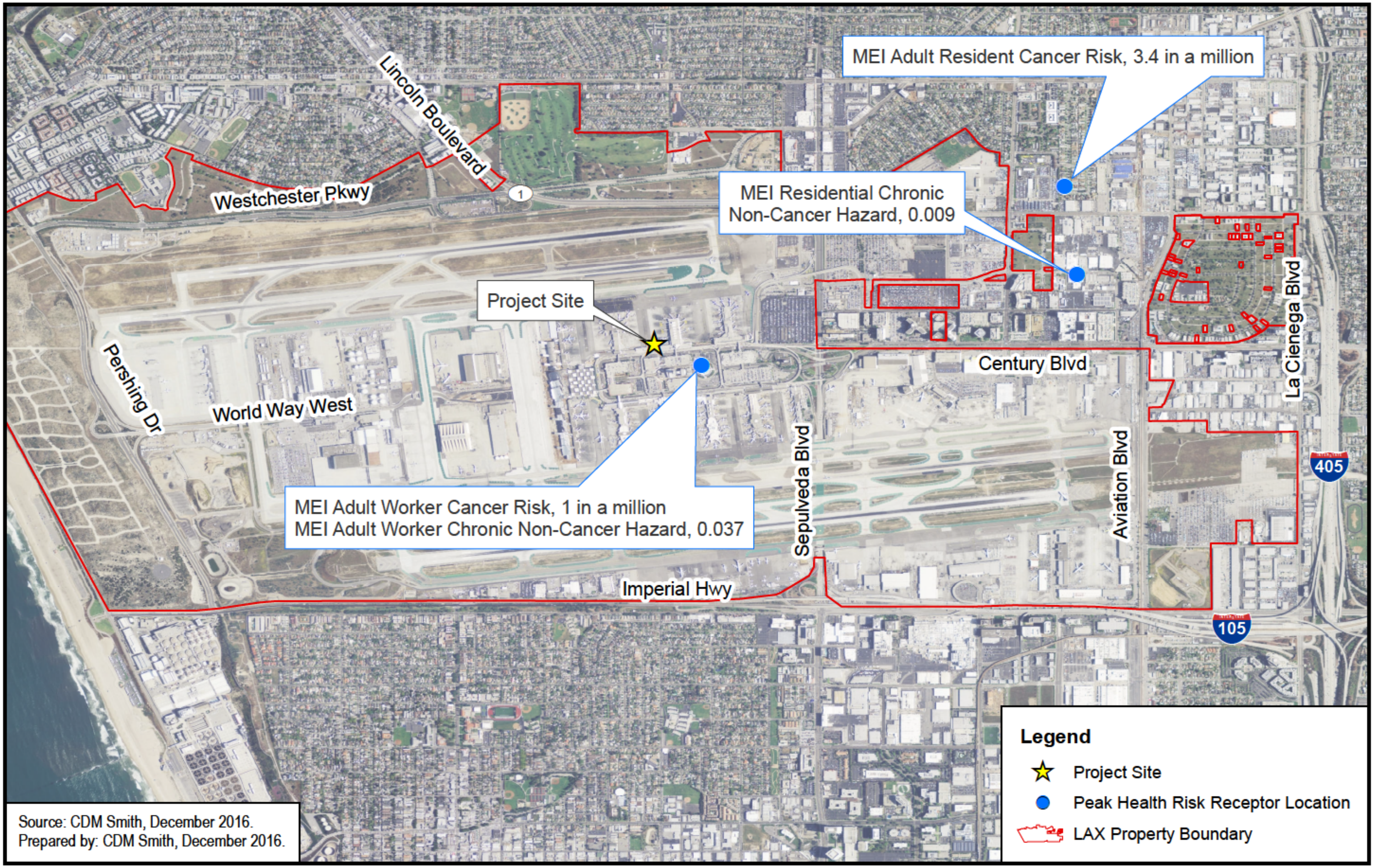
Prepared By: CDM Smi h, January 2017

4.1.2.4.3 Acute Non-Cancer Health Hazards

Acute non-cancer health hazards were evaluated for the peak emission year of construction – 2021. The year 2021 is estimated to have the peak diesel exhaust emissions as well as the peak overall emissions for particulate matter. One-hour exposure durations were used to represent non-worker receptors who would be exposed while moving through or near LAX. Eight-hour exposure durations were used to represent workers who would be exposed and on-site for longer periods of time. Both residents and workers were modeled for both exposure scenarios to fully capture any potential risk to residents or workers due to construction of the proposed project.

A HI equal to or greater than one would indicate possible acute adverse health effects. For all receptors, the hazard quotient for acute exposure to all TACs are less than one. Hence, no adverse health impacts are projected. Also, note that TACs affect different organs in the body so the effects of acute exposure would not necessarily be additive between all TACs.

At their peak 1-hour concentrations, Arsenic and Nickel are responsible for 13 percent and 42 percent, respectively, of all predicted construction-related acute non-cancer health hazards. Benzene is responsible for 13 percent of all predicted acute non-cancer health hazards associated with construction of the proposed project. Formaldehyde have a contribution of 23 percent to the total acute non-cancer. Acrolein, which is associated with aircraft operations, results are mentioned here for informational purposes because it has historically been a TAC of concern for acute non-cancer health hazards for other LAX projects. Acrolein as a contribution to non-cancer health hazards associated with construction of the proposed project only contributes 0.55 percent to the overall 1-hour acute non-cancer health risk. Maximum acute non-cancer health hazards associated with a 1-hour exposure to these chemicals from the proposed project construction are summarized in **Table 4.1.2-4**.



LAX Terminals 2 and 3 Modernization Project

Peak Unmitigated Construction Health Risks

Figure
4.1.2-1

Table 4.1.2-4
Construction-Related Acute (1-Hour) Non-Cancer Health Hazards

	Arsenic[1/]	Nickel[1/]	Benzene[1/]	Formaldehyde[1/]	Total Risk	Significance Threshold	Exceeds Threshold?
On-Site Worker	0.007	0.023	0.007	0.013	0.055	1	No
Off-Site Worker	0.003	0.009	0.003	0.004	0.022	1	No
Residential	0.003	0.008	0.003	0.008	0.024	1	No

Note:
1/ Hazard indices are unitless.
Sourнce: Appendix B.1.3 of this EIR.
Prepared By: CDM Smith, January 2017

At their peak 8-hour concentrations, Arsenic, Manganese, and Nickel are responsible for 14 percent, 58 percent, and 11 percent, respectively, of all predicted construction-related acute non-cancer health hazards. Benzene is responsible for 14 percent of all predicted acute non-cancer health hazards associated with construction of the proposed project. Acrolein, which is associated with aircraft operations, results are mentioned here for informational purposes because it has historically been a TAC of concern for acute non-cancer health hazards for other LAX projects. Acrolein as a contribution to non-cancer health hazards associated with construction of the proposed project only contributes 0.30 percent to the overall 8-hour acute non-cancer health risk. Maximum acute non-cancer health hazards associated with an 8-hour exposure to these chemicals from the proposed project construction are summarized in **Table 4.1.2-5**.

Table 4.1.2-5
Construction-Related Acute (8-Hour) Non-Cancer Health Hazards

	Arsenic[1/]	Manganese[1/]	Nickel[1/]	Benzene[1/]	Total Risk	Significance Threshold	Exceeds Threshold?
On-Site Worker	0.033	0.137	0.026	0.033	0.238	1	No
Off-Site Worker	0.018	0.076	0.014	0.012	0.125	1	No
Residential	0.013	0.055	0.010	0.006	0.088	1	No

NOTE:
1/ Hazard indices are uni less.
Source: Appendix B.1.3 of this EIR.
Prepared By: CDM Smith, January 2017

4.1.2.4.4 Occupation Effects

Impacts to on-site workers during construction were evaluated above by comparing estimated 8-hour air concentrations of TAC at the on-site location under the proposed project for construction to RELs to determine HIs. As in the LAX Master Plan and Specific Plan Amendment Study EIRs,[113] it was determined that the CalOSHA 8-hour PEL-TWAs were inappropriate for addressing worker risk from a dispersion analysis. All TAC concentrations were less than significant by multiple orders of magnitude because CalOSHA 8-hour PEL-TWAs were developed for on-site real-time monitoring rather than dispersion analyses. The 1-hour and 8-hour REL comparisons

113 City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017; City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Specific Plan Amendment Study, (SCH 1997061047), January 2013, Available: http://www.lawa.org/LAXSPAS/Reports.aspx, Accessed January 19, 2017.

presented above compare the same TACs as in the CalOSHA PEL-TWA thresholds to more conservative thresholds and therefore, have more appropriately already addressed the issue of occupational exposure. Based on that analysis, occupational risks would be less than significant.

4.1.2.4.5 Population-based Risks

The population-based cancer burden presented in this EIR was conducted in a conservative manner using the peak year of construction risk as a surrogate for each year of construction. Even with this conservative assumption, population-based cancer burden risk peaked at 0.11 excess cancer cases, which is less than the cancer burden threshold listed in Section 4.1.2.3 above (a cancer burden greater than, or equal to 0.5 excess cancer cases in areas within the greater than 1 in 1 million zone of impact); therefore, the cancer burden from the proposed project would also be less than the threshold of significance. The detailed cancer burden analysis is presented in Appendix B.1.3 of this EIR.

4.1.2.4.6 Summary of Unmitigated Impacts

The HHRA addressed incremental health impacts associated with implementation of the proposed project. The evaluation assessed cancer risks, chronic non-cancer health hazards, and acute non-cancer health hazards. The text below summarizes impact conclusions based on modeling estimates.

- Incremental cancer risks associated with unmitigated construction of the proposed project would be below the threshold of significance of 10 in one million for child resident, adult resident, and adult worker. Incremental cancer risk impacts from construction would be less than significant.
- The cancer burden would be less than significant.
- Occupational risks would be less than significant.
- Incremental chronic non-cancer hazard indices associated with construction of the proposed project would be below the threshold of significance for all receptor types (i.e., child resident, adult resident, and adult worker). Incremental chronic non-cancer impacts from construction would be less than significant.
- Incremental acute non-cancer hazard indices would be equal to or below the threshold of significance of 1 at all locations of modeled peak TAC concentrations for construction of the proposed project. Incremental acute non-cancer impacts would be less than significant for both workers and residents.

4.1.2.5 Cumulative Impacts

Unlike air quality, for which standards have been established that determine acceptable levels of pollutant concentrations, no standards exist that establish acceptable levels of human health risks or that identify a threshold of significance for cumulative health risk impacts. Therefore, the discussion below addresses cumulative health risk impacts, and project-related contributions to those impacts; however, no determination is made regarding the significance of cumulative impacts. Since these results are not used for significance determination, a general discussion of the cumulative impacts for the proposed project is provided. Based on information available from the SCAQMD and USEPA with respect to regional cancer risk estimates and TAC predictions, the geographic areas considered in the cumulative health risk impacts analysis include the South Coast Air Basin for cancer risk and the LAX area for non-cancer health hazards, as further described below.

4.1.2.5.1 Summary of Cumulative Impacts

Although no defined thresholds for cumulative health risk impacts are available, it is the policy of the SCAQMD to use the same significance thresholds for cumulative impacts as for the project-specific impacts analyzed in the EIR.[114] If cumulative health risks are evaluated following this SCAQMD policy, the project's contribution to the

[114] South Coast Air Quality Management District, White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution, Appendix D, August 2003.

cumulative cancer risk would not be cumulatively considerable under the unmitigated construction scenario since the incremental cancer risk impacts of the proposed project for all receptors under this scenario would be below the individual cancer risk significance thresholds of 10 in one million.

In contrast to cancer risk, the SCAQMD policy does have different significance thresholds for project-specific and cumulative impacts for hazard indices for TAC emissions. A project-specific significance threshold is 1.0 while the cumulative threshold is 3.0. Based on this SCAQMD policy, chronic non-cancer hazard indices associated with airport emissions under the proposed project would not be cumulatively considerable. A detailed discussion of cumulative cancer risks and cumulative non-cancer hazards is provided below.

4.1.2.5.2 Cancer Risks

The SCAQMD has conducted a series of urban air toxics monitoring and evaluation studies for the South Coast Air Basin called MATES in the South Coast Air Basin.[115] The original study published in June 1987 has been updated several times; the most recent study, MATES-IV, was published in May 2015.[116] According to MATES-IV, although in general there has been an overall Basin-wide reduction in air toxics concentrations since MATES-III, application of the updated risk estimation methods recently adopted by OEHHA result in an estimated population weighted risk across the South Coast Air Basin of 897 per million, an increase in cancer risks. In fact, MATES-IV estimated that the estimated lifetime risks near the Ports of Los Angeles and Long Beach of over 2,500 per million from air toxics. These cancer risk estimates are high and indicate that current impacts associated with ongoing releases of TAC (e.g., from vehicle exhaust) and from sources of TAC from past and present projects in the region are substantial. The MATES-IV study is an appropriate estimate of present cumulative impacts of TAC emissions in the South Coast Air Basin. It does not, however, have sufficient resolution to determine the fractional contribution of current LAX operations to TAC in the airshed. Only possible incremental contributions to cumulative impacts can be assessed.

Meaningful quantification of future cumulative health risk exposure in the entire South Coast Air Basin is not possible. Moreover, the threshold of significance used to determine cancer risk impacts associated with the proposed project is based on the cancer risks associated with individual projects; this threshold is not appropriately applied to conclusions regarding cumulative cancer risk in the South Coast Air Basin.

However, based on the relatively high cancer risk level associated with TAC in air in the South Coast Air Basin (i.e., an additional 897 cancer cases per million according to MATES-IV), the proposed project (with a maximum estimated incremental cancer risk of 3.5 cancer cases per million) would not add substantially (less than 1 percent) to the already high cumulative cancer risk in the South Coast Air Basin. This small increase estimated for the proposed project would not be measurable in collected cancer statistics against urban background conditions in the South Coast Air Basin.

The above comparisons do not account for possible positive changes in air quality in the South Coast Air Basin in the future. SCAQMD and other agencies are consistently working to reduce air pollution. In particular, reductions in emissions of diesel particulates are being considered and implemented. Since DPM is the major contributor to estimated cancer risks, substantial reductions in diesel emissions would result in substantial reductions in cumulative cancer risks. These, and other such regulations intended to reduce TAC emissions within the South Coast Air Basin, would reduce cumulative impacts overall. While continued, if not increased, regulation by the SCAQMD of point sources as well as more stringent emission controls on mobile sources would reduce TAC emissions, whether such measures would alter incremental contributions of TAC releases to cumulative impacts under the proposed project cannot be ascertained.

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[115] General information on the original Multiple Air Toxics Exposure Study and subsequent updates conducted by South Coast Air Quality Management District, Available: http://www.aqmd.gov/home/library/air-quality-data-studies/health-studies

[116] South Coast Air Quality Management District, Final Report – Multiple Air Toxics Exposure Study in the South Coast Air Basin – MATES-IV, May 2015, Available: http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-iv/mates-iv-final-draft-report-4-1-15.pdf?sfvrsn=7. Accessed January 19, 2017.

4.1.2.5.3 Chronic Non-Cancer Hazards

Acrolein is the TAC of concern that is responsible for the majority of all predicted chronic non-cancer health hazards associated with LAX operations. However, for the proposed project construction, chronic non-cancer health hazards are primarily attributable to DPM, chlorine, and manganese, and to a lesser extent arsenic, cadmium, nickel, benzene, and formaldehyde. In 2015, USEPA published an independent study of possible annual average air concentrations within the South Coast Air Basin associated with a variety of TAC, including acrolein, chlorine, and DPM (silicon and barium were not included).[117] These estimates provide a means for assessing cumulative chronic non-cancer health hazard impacts of airport operations in much the same manner as cumulative cancer risks were assessed using the MATES-IV results.

Within Los Angeles County, USEPA predictions[118] for annual average concentrations yield acrolein hazard indices by census tract ranging from 2 to 11, with an average of 3; DPM hazard indices ranging from 0.09 to 0.4, with an average of 0.2; and chlorine hazard indices ranging from 0.07 to 0.2, with an average of 0.09. Incremental hazard indices for the proposed project (**Table 4.1.2-3**) were estimated to range from 0.010 to 0.029, below the threshold of significance of one. Given the relatively small hazard indices associated with proposed project emissions, the proposed project would not add significantly to cumulative chronic non-cancer health hazards.

Because of the substantial uncertainties associated with the USEPA estimates[119], the cumulative analysis for chronic non-cancer health hazard impacts is semi-quantitative and based on a range of possible contributions. This cumulative analysis does not address the issue of interactions among acrolein and criteria pollutants. Such interactions cannot, at this time, be addressed in a quantitative fashion. A qualitative discussion of the issue is presented in the LAX Master Plan Final EIR[120] Technical Report S-9a, Section 7.

As discussed in the LAX Master Plan Final EIR (Section 4.24.1.2), limited data are available for describing acrolein emissions. Therefore, estimates of chronic non-cancer health hazards are very uncertain. Chronic non-cancer health hazards associated with the proposed project should only be used to provide a relative comparison to basin-wide conditions. These hazards should not be viewed as absolute estimates of potential health impacts. Moreover, USEPA's estimates are based on data from 2015 and are therefore several years old. Emissions from some important sources may have been reduced as a result of continuing efforts by SCAQMD and other agencies to improve air quality in the South Coast Air Basin. Finally, the estimates do not consider degradation of TAC in the atmosphere.

4.1.2.5.4 Acute Non-Cancer Hazards

Formaldehyde, and manganese are the primary TAC of concern in proposed project emissions that might be present at concentrations approaching the threshold for acute non-cancer health hazards. Predicted concentrations of TAC released from construction activities for the proposed project estimate that acute non-cancer health hazards would be below the significance threshold of one. The assessment of cumulative acute non-cancer health hazards follows the methods used to evaluate cumulative acute non-cancer health hazards presented in the LAX Master Plan Final EIR[121] (Section 4.24.1.7 and Technical Report S-9a, Section 6.3), incorporating updated National-Scale Air Toxics Assessment (NATA) tables from 2015. USEPA-modeled emission estimates by census tract were used to estimate annual average ambient air concentrations. These census tract emission estimates are subject to high

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117 U.S. Environmental Protection Agency, 2011 National-Scale Air Toxics Assessment, 2015, Available: https://www.epa.gov/national-air-toxics-assessment/2011-national-air-toxics-assessment, Accessed January 19, 2017.

118 U.S. Environmental Protection Agency, 2011 National-Scale Air Toxics Assessment, 2015, Available: https://www.epa.gov/national-air-toxics-assessment/2011-national-air-toxics-assessment, Accessed January 19, 2017.

119 U.S. Environmental Protection Agency, 2011 National-Scale Air Toxics Assessment, 2015, Available: https://www.epa.gov/national-air-toxics-assessment/2011-national-air-toxics-assessment, Accessed January 19, 2017.

120 City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017.

121 City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017.

uncertainty, and USEPA warns against using them to predict local concentrations. Thus, for the analysis of cumulative acute non-cancer health hazards, estimates for each census tract within Los Angeles County were identified, and the range of concentrations was used as an estimate of the possible range of annual average concentrations in the general vicinity of the Airport. This range of concentrations was used to estimate a range of acute non-cancer hazard indices using the same methods as described in the LAX Master Plan Final EIR[122] (Section 4.24.1.7 and Technical Report S-9a, Section 6.1). The methodology entails converting the USEPA annual average estimates to maximum 1-hour average concentrations by dividing annual average estimates by 0.08. Maximum 1-hour average concentrations were then divided by the acute REL to calculate acute non-cancer hazard indices. The range of hazard indices was then used as a basis for comparison with estimated maximum acute non-cancer health hazards for the proposed project. The relative magnitude of acute non-cancer health hazards calculated on the basis of the USEPA estimates and maximum hazards estimated for the proposed project were taken as a general measure of relative cumulative impacts. Emphasis must be placed on the relative nature of these estimates. Uncertainties in the analysis preclude estimation of absolute impacts.

When USEPA annual average estimates are converted to possible maximum 1-hour average concentrations, acrolein acute non-cancer hazard indices are estimated to range from 0.2 to 1.3, with an average of 0.4; formaldehyde acute non-cancer hazard indices are estimated to range from 0.3 to 0.7, with an average of 0.5; and manganese acute non-cancer hazard indices are estimated to range from 0.03 to 0.1, with an average of 0.06 for locations within the HHRA study area. Predicted overall maximum incremental acute non-cancer health hazards for the proposed project associated with acrolein peaked at 0.0004; associated with formaldehyde peaked at 0.013; and associated with manganese peaked at 0.137. Results suggest that the acute non-cancer health hazards for the proposed project would not add significantly to total acute non-cancer health hazards for the proposed project. Therefore, acute non-cancer health hazards associated with the proposed project would not be cumulatively considerable.

4.1.2.6 Mitigation Measures

As described in Section 4.1.2.4, health risk impacts from construction of the proposed project would be less than significant and project-related contributions to significant cumulative impacts would not be cumulatively considerable. Therefore, no mitigation measures are required.

4.1.2.7 Level of Significance After Mitigation

Health risk impacts from construction of the proposed project would be less than significant.

4.1.2.8 Other Measures

As indicated in Section 4.1.2.4, health risk impacts from construction of the proposed project would be less than significant; therefore, no mitigation measures are required to reduce impacts. However, as discussed in Section 4.1.1.8, Standard Control Measure (Mitigation Measure) LAX-AQ-1, Construction-Related Air Quality Control Measures, and Mitigation Measure MM-AQ (T2/T3)-1, Preferential Use of Renewable Diesel Fuel, would be applied to the proposed project to reduce construction-related air pollutant emissions. Although developed to address air quality impacts, these mitigation measures would also reduce health risks associated with exposure to TAC.

[122] City of Los Angeles, Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements, (SCH 1997061047), April 2004, Available: http://www.lawa.org/ourLAX/PastProjects.aspx?id=8844, Accessed January 19, 2017.

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