4.1 Air Quality and Human Health Risk

4.1.1 Air Quality

4.1.1.1 Introduction

This air quality analysis addresses criteria pollutant emissions from operational activities (on-site stationary sources, on-site mobile sources, and off-site regional traffic) that would occur at buildout of the proposed project in the horizon year of 2020. The analysis also addresses emissions from construction activities (e.g., on-site and off-site construction equipment, fugitive dust, and worker vehicle trips) that would occur during the temporary construction period, which is anticipated to occur between late 2018 and late 2020. Impacts related to human health risks from inhalation of toxic air contaminant (TAC) emissions are addressed in Section 4.1.2, *Human Health Risk Assessment*. Greenhouse gas emissions are discussed separately in Section 4.3, *Greenhouse Gas Emissions*. Appendix B provides details on methods, assumptions and backup data for both air quality and the human health risk assessment (HHRA).

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. Based on the analysis in the Initial Study, the potential for the proposed project to create objectionable odors affecting a substantial number of people was determined to be less than significant and this topic does not require any additional analysis in this EIR.

As discussed 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. However, consolidation of aircraft maintenance and GSE facilities on the east side of the airport would increase the level of activity at a location that is in close proximity to the LAX fence-line.[38] Because impacts to air quality are measured at the fence-line, emissions associated with the increased aircraft and GSE movements, and with increased maintenance activities at the East Maintenance Facility resulting from the consolidation, were analyzed in this EIR for potential impacts.

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 regional emissions modeling. The analysis also includes an assessment of localized effects of air pollutants associated with the proposed project based on the South Coast Air Quality Management District's (SCAQMD) localized significance thresholds (LSTs). The criteria pollutant emissions inventories and localized effects 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 SCAQMD for the South Coast Air Basin.[39] This section is based in part on the detailed information contained in Appendix B of this EIR.

---

[38] As discussed in Chapter 2, Project Description, as with the existing facilities, the proposed project would include electric GSE (eGSE) charging stations within the GSE maintenance facility. The number of eGSE charging stations would be the same as the current number of stations. In addition, the hangar and aircraft apron would be designed as a "Pad-of-the-Future," with dual 400 hertz (Hz) electric power for all aircraft parking positions, which would support stationary or portable ground power units (GPUs), stationary or portable pre-conditioned air (PCA) units, and/or electrification of GSE maintenance activities. The portable GPUs and PCA units to be used at the facility would include existing diesel, gasoline, and electric-powered units. Any future changes to UAL's GSE fleet, including the addition of new eGSE equipment, would occur independently of the proposed project.

[39] 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.

4.1.1.1.1 Pollutants of Interest

Six criteria pollutants were evaluated for the proposed project's construction and operational activities: ozone (O_3), using as surrogates volatile organic compounds (VOCs) 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, ($PM_{2.5}$).[40]

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 South Coast Air Basin. The only source of Pb emissions from LAX is from aviation gasoline (AvGas) associated with piston-engine general aviation aircraft; however, UAL does not operate any piston-engine aircraft, so Pb emissions would not change with implementation of the proposed project.[41]

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 because the relative abundance of sulfates from fuel combustion is much lower than that of SO_2, and because very little sulfur is emitted from project sources.[42]

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 under standard professional practice 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.

Ozone (O_3)[43]

O_3, the main component of smog, is formed from precursor pollutants 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. O_3 levels are typically highest in warm-weather months and in urban areas. 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

---

40 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.

41 Section VIII.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 federal Occupational Safety and Health Administration (OSHA) and California OSHA 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.

42 Seinfeld and Pandis, *Atmospheric Chemistry and Physics – From Air Pollution to Climate Change*, 1998, p. 59.

43 U.S. Environmental Protection Agency, *Ozone Pollution – Ozone Basics*. Available: https://www.epa.gov/ozone-pollution/ozone-basics, accessed November 6, 2017.

people with impaired respiratory systems (e.g., asthmatics), but also healthy 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)[44]

NO_2 is a reddish-brown to dark brown gas with an irritating odor. NO_2 forms when nitric oxide reacts with atmospheric oxygen. The primary source of NO_2 is the combustion of fuel. 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)[45]

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 sources which burn fossil fuels. Breathing air with high concentrations of 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 ($PM_{2.5}$)[46]

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.[47] 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.

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, or other man-made disturbances, on unpaved areas. Secondary formation of particulate matter may occur in some cases where gases like sulfur oxides (SO_X) and NO_X interact with other compounds in the air to form particulate matter.[48] In the

44 U.S. Environmental Protection Agency, *Nitrogen Dioxide (NO_2) Pollution – Basic Information about NO_2*. Available: https://www.epa.gov/no2-pollution/basic-information-about-no2, accessed November 6, 2017.

45 U.S. Environmental Protection Agency, *Carbon Monoxide (CO) Pollution in Outdoor Air – Basic Information about Carbon Monoxide (CO) Outdoor Air Pollution.* Available: https://www.epa.gov/co-pollution/basic-information-about-carbon-monoxide-co-outdoor-air-pollution, accessed November 6, 2017.

46 U.S. Environmental Protection Agency, *Particulate Matter (PM) Pollution – Particulate Matter (PM) Basics.* Available: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics, accessed November 6, 2017.

47 U.S. Environmental Protection Agency, *Particle Pollution and Your Health*, September 2003. Available: https://www3.epa.gov/airnow/particle/pm-color.pdf.

48 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.

South Coast Air Basin, both VOCs and ammonia are also 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). SO_X is a major precursor to particulate matter formation. 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)[49]

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.

4.1.1.1.2 Scope of Analysis

The air quality analysis conducted for the proposed project addresses construction-related impacts for the peak day of proposed construction activities and operations-related impacts following completion of construction. The basic steps involved in the scope of analysis are listed below.

Construction

Construction emissions were quantified for each year of construction, which is anticipated to occur between 2018 and 2020. The proposed project would take approximately 22 months (1 year, 10 months) to construct.

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

- Identify construction-related emissions sources;
- Develop peak daily and annual construction emissions inventories for the identified sources;
- Compare project regional construction emissions inventories for each year of construction with appropriate CEQA significance thresholds for construction;
- Compare peak daily on-site construction emissions with appropriate SCAQMD LSTs for construction;
- Determine level of significance of project impacts; and
- Identify construction-related mitigation measures, if required.

---

49 U.S. Environmental Protection Agency, *Sulfur Dioxide (SO_2) Pollution – Sulfur Dioxide Basics.* Available: https://www.epa.gov/so2-pollution/sulfur-dioxide-basics, accessed November 6, 2017.

Operations

Operational emissions were quantified for existing conditions and for the first year of operation of the project, expected to occur in 2021. The scope of the evaluation of operational emissions included the following components:

- Identify operational-related emissions sources;
- Develop peak daily and annual operational emissions inventories for the identified sources;
- Compare emissions inventories for existing conditions and for the first year of operations with appropriate CEQA significance thresholds for operations;
- Conduct dispersion modeling of operational impacts;
- Determine level of significance of project impacts; and
- Identify operations-related mitigation measures, if required.

4.1.1.2 Methodology

4.1.1.2.1 Emissions Source Types - Construction

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-road 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, painting, and paving.

The basis for the construction emissions analysis is the construction schedule, provided in Appendix B.1, that includes 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. Construction activity is estimated at a monthly level of refinement; thus, the peak day of construction was identified as a day occurring during the month with the highest daily emissions. 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.

As further described in Chapter 2, *Project Description*, construction of the proposed project would occur over approximately 22 months, projected to begin in approximately the fourth quarter 2018 and to end in late 2020. Maintenance operations would continue at United Airlines' (UAL) existing West Maintenance Facility and East Maintenance Facility during construction, although some activities that currently occur at the East Maintenance Facility, including administration and GSE maintenance, would be conducted at the West Maintenance Facility. Maintenance activities would be managed to minimize operational disruption such that baseline operational activity is expected to remain unchanged during the construction period.

Off-Road Equipment

For purposes of this EIR, off-road construction equipment includes bulldozers, 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 anticipated to be used during construction of the proposed project were derived from similar activities associated with the LAX Landside Access Modernization Program for each individual project component.[50] Equipment types with corresponding operating hours were matched with specific construction activities for each project component. The proposed project is expected to be constructed in two-shift workdays during the peak month of construction, with shift durations of eight hours.

In addition to off-road construction equipment use, off-road operational equipment, specifically use of portable diesel aircraft ground power units (GPUs), would increase during construction. Some of the existing electrified aircraft parking spaces at the East Maintenance Facility would be unavailable during construction. Aircraft that previously would have used these electrified aircraft parking spaces would use diesel GPUs instead. As a result, off-road GPU activity is expected to temporarily increase by approximately 15 percent during construction. To quantify the increase in diesel GPU use, the number of GPU units reported by UAL for the 2017 LAX GSE Emissions Reduction Program was used as a baseline. Annual and peak daily GPU operational activity was based on the default GSE activities in 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).[51]

Off-road diesel exhaust emission factors for VOC, NO_X, and PM_{10} were based on CARB's OFFROAD2011. Off-road exhaust emission factors for CO and SO_2 were derived from CARB's OFFROAD2007 model.[52] $PM_{2.5}$ emission factors were developed using the PM_{10} emission factors and $PM_{2.5}$ size profiles derived from the CARB-approved California Emission Inventory and Reporting System (CEIDARS).[53,54]

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

For purposes of this EIR, 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.[55]

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.

50 City of Los Angeles, Los Angeles World Airports, *Final 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, as revised in the Final EIR, February 2017.

51 California Air Resources Board, *2011 Inventory Model for In-Use Off-Road Equipment.* Available: https://www.arb.ca.gov/msei/ordiesel.htm.

52 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.

53 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.

54 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.

55 California Air Resources Board, Research Division, *EMFAC2014 On-Road Emissions Inventory Estimation Model*. Available: http://www.arb.ca.gov/msei/modeling.htm.

The emission factors were converted to pounds per hour and applied to the hourly activity schedule described in Appendix B.1.

On-Road Off-Site Equipment

On-road off-site vehicle trips include personal vehicles used by construction workers to access the construction site, personal vehicles used by operational workers whose work location would change during construction, and hauling trips for the transport of various materials and concrete to and from the site. On-road off-site hauling activity for the proposed project, including number of trips, was based on similar activity associated with the LAX Landside Access Modernization Program; the proposed project schedule for each project component and miles per trip were based on California Emissions Estimator Model (CalEEMod) default haul and delivery distances.[56] On-road off-site vehicle emissions were calculated by determining total vehicle miles traveled (VMT) by each type of vehicle. The emission factors obtained from EMFAC2014 as described previously (in grams per mile) were applied to the VMT estimates to calculate total emissions.

During construction, some of the activities that currently occur at the East Maintenance Facility, including administration and GSE maintenance, would be conducted at the West Maintenance Facility. Employees whose work would be conducted at the West Maintenance Facility during construction would park in existing UAL parking lots at the West Maintenance Facility. The majority of employees at LAX live in areas that are located east of the airport.[57] Therefore, the relocation of maintenance activities to the west side of the airport would increase VMT by maintenance employees from their places of residence to the worksite during construction. Emissions associated with the additional VMT from these employee trips were included in the analysis and were estimated using CARB's EMFAC2014 emission factor model.

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, unloading activities, and construction demolition. 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), the SCAQMD's *CEQA Air Quality Handbook*, and documentation associated with CARB's CalEEMod emissions estimator computer program.[58,59,60]

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 throughput 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

---

56 California Air Resources Board, *California Emissions Estimator Model, Version 2013.2.2 User Guide, Appendix D.* Available: http://www.aqmd.gov/docs/default-source/caleemod/05_appendix-d2016-3-2.pdf.

57 Los Angeles World Airports Security Badge Office, 2015.

58 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://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors.

59 South Coast Air Quality Management District, *CEQA Air Quality Handbook, April 1993;* 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.

60 California Air Resources Board, *California Emissions Estimator Model, Version 2013.3.2.* Available: http://www.caleemod.com/.

day, as required by SCAQMD Rule 403 for large projects, was estimated to reduce on-site fugitive dust emissions by 61 percent.[61]

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.

4.1.1.2.2 Emissions Source Types - Operations

Operations-related criteria pollutant emissions were quantified for CO, VOC, NO_X, SO_2, $PM_{10,}$ and $PM_{2.5}$ for both the existing conditions and proposed project's first year of operation. The first year of operations was selected because SCAQMD- and USEPA-approved emission models are designed to account for the gradual reduction in emissions over time. Because no increase in maintenance is expected to occur over time as a result of the proposed project after the first year of operations and emission factors are expected to decrease over time, the first year of operations would be the highest year of operational emissions associated with the implementation of the proposed project.

Sources of operational emissions evaluated in the analysis include aircraft tugs, aircraft taxiing, and aircraft engine run-ups.[62] With implementation of the proposed project, the number of aircraft movements between the passenger gates and the East Maintenance Facility was assumed to be the same as under baseline conditions. However, all aircraft that currently travel to the West Maintenance Facility would instead travel to the East Maintenance Facility. Because the East Maintenance Facility is closer to UAL's passenger gates, which are located in Terminals 7 and 8, the average daily travel distance for both taxiing and towing of aircraft would be reduced with implementation of the proposed project. In addition to the decreased travel distance, because of the proximity to the gates, more aircraft would be towed between the gates and the maintenance facility than under baseline conditions. Those aircraft not being towed would taxi using the main aircraft engines to move to and from the maintenance facility. As compared to taxiing, towing results in fewer emissions. Based on information from UAL regarding baseline operations and the proposed project location and design, it was estimated that, under the proposed project, the number of aircraft being towed would increase from 11 or 12 daily to 16 daily, with a corresponding decrease in taxiing aircraft.

As part of the proposed project, UAL would consolidate its stationary source equipment at the East Maintenance Facility, and would upgrade its current equipment with new, cleaner technologies. The existing equipment to be replaced (at both the east and west facilities) would be dismantled and/or decommissioned. Stationary equipment to be installed would include natural gas boilers and water heaters, a diesel-operated emergency generator, and a maintenance-related spray booth (which would replace the existing spray booths at both the east and west facilities). These sources would replace existing

---

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

62 Airlines routinely inspect and maintain their aircraft to ensure the safety of the traveling public, and each aircraft is on a stringent maintenance schedule based on its number of hours in operation. As part of this regularly scheduled maintenance, the FAA requires that aircraft engines be tested at various power levels to ensure their proper operation. These tests are called engine run-ups and occur when aircraft are stationary.

equipment and would service similar capacities to existing sources. UAL operates a Title V facility at LAX; therefore, the replaced equipment would be subject to review and approval by SCAQMD under new source review and other regulations. Where required, the project equipment would meet Best Available Control Technology (BACT). In particular, it is expected that the Permit to Operate for the new spray booth at the proposed project site would be structured to reduce allowable paint and solvent usage below current permitted levels. Therefore, emissions from new stationary operational sources would be the same as, or lower than, emissions under baseline conditions.[63]

The basis for the operational emissions analysis includes aircraft movement, engine testing, and maintenance data, which were provided by UAL and are available in Appendix B.2. Average daily activity estimates were developed for each operational source. As described in Chapter 2, *Project Description*, with implementation of the proposed project, the volume and basic nature of UAL's existing maintenance operations at LAX would not change or increase. Therefore, the number of aircraft movements between the gates and maintenance facilities, as well as the number of engine run-ups, was assumed to be the same under baseline conditions and future-with-project conditions. However, all of the aircraft movements would be to the East Maintenance Facility under the project conditions, which is closer to the airport property boundary (i.e., fence-line) than the West Maintenance Facility. Therefore, dispersion modeling of the operational emissions was conducted to determine if project-related air pollutant concentrations at the property line and beyond would exceed any ambient air quality standards.

During project operations, all employees would be located at the East Maintenance Facility. This would involve relocation of employees who currently work at the West Maintenance Facility. As mentioned previously, the majority of employees at LAX live in areas that are located east of the airport. Therefore, the consolidation of maintenance activities on the east side of the airport would reduce operational VMT by maintenance employees from their places of residence to the worksite. In addition, consolidation of UAL's maintenance activities into a single facility would eliminate vehicle trips between the two maintenance facilities that occur under baseline conditions. These reductions in VMT would be a beneficial impact of the proposed project.[64]

Aircraft

Air pollutant emissions from aircraft movements between the terminal gates utilized by UAL and either the West Maintenance Facility or East Maintenance Facility locations, as well as emissions from engine run-ups, were modeled. Engine models and associated engine emission indices for representative aircraft engines were obtained from the FAA's Aviation Environmental Design Tool (AEDT), Version 2d.[65,66] The distances between the terminal gates and UAL maintenance facilities were determined using Google Earth

---

63 The expected reduction in emissions associated with operational stationary sources was not quantified in the analysis; no credit is taken for this reduction.

64 The reduction in emissions associated with the reduced VMT associated with operational worker trips and trips between the two existing maintenance facilities was not quantified in the analysis; no credit is taken for this reduction.

65 U.S. Department of Transportation, Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT) Version 2d*. Available: https://aedt.faa.gov/.

66 AEDT Version 2d does not calculate emissions or dispersion for operations that do not include a landing or a takeoff. The activity associated with the proposed project only affects ground operations, (i.e., moving aircraft between the passenger gates and the maintenance hangars.) Therefore, emission factor and fuel flow data from the AEDT 2d databases were incorporated into a spreadsheet used to estimate taxiing and run-up test emissions from aircraft engines typically operated by UAL at LAX (included in Appendix B). The information obtained from the AEDT 2d databases included engine fuel flow, engine reference emission indices, and modal-specific adjustment factors on fuel flow for idle mode (applied to taxiing aircraft) and climb-out mode (applied to engine run-up testing). The procedures outlined in the U.S. Department of Transportation, Federal Aviation Administration, *Aviation Environmental Design Tool (AEDT) Technical Manual Version 2d, Service Pack 3*, June 2016, Section 5.1, were followed to estimate these emissions. Available: https://aedt.faa.gov/Documents/AEDT2b_TechManual.pdf.

Pro©, and travel time in the taxi operating mode assumed a travel speed of 25 miles per hour (mph).[67] A portion of the aircraft were assumed to taxi under main engine power to and from the maintenance facilities, and the remaining aircraft were assumed to be moved by aircraft tugs, discussed below.

Engine run-ups were assumed to occur at the West Maintenance Facility area under existing conditions, and at the East Maintenance Facility under the proposed project. Emissions associated with engine run-ups were included in the analysis.

Ground Support Equipment (Aircraft Tugs)

Air pollutant emissions from aircraft tugs used to move aircraft between the terminal gates and the maintenance facilities were developed from emission factors based on the CARB OFFROAD2011 and OFFROAD2007 models; these models are discussed in the Off-Road Equipment section above. Two aircraft tug sizes were included in the analysis: wide-body aircraft tugs (size assumed to be greater than 200 horsepower [HP]), and narrow-body aircraft tugs (size assumed to be less than 200 HP). The same distances used for aircraft taxiing were used for the tugging distance, but tug speed was limited to 5 mph.

4.1.1.2.3 Dispersion Modeling

Air dispersion modeling was used to estimate the localized effects from the on-site portion of daily emissions from the operational sources described above. The localized effects were evaluated at nearby receptor points (shown on **Figure 4.1.1-1**) that could be affected by the proposed project. The USEPA- and SCAQMD-approved dispersion model, American Meteorological Society/USEPA Regulatory Model (AERMOD), was used to model the air quality impacts of CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emissions.[68] AERMOD can estimate the air quality impacts of single point, multiple point, area, or volume sources using historical meteorological conditions. A series of area sources strung together can be used to model releases from a variety of emission sources, including the taxiing and towing of aircraft on taxiways.

Volume sources were used to represent the emissions from the aircraft engine run-ups. Model inputs were developed following the SCAQMD's Modeling Guidance for AERMOD.[69] To be conservative, this analysis did not calculate PM_{10} deposition, which would potentially reduce the ambient modeled concentration of PM_{10}.

Dispersion modeling was not performed for construction, as SCAQMD's emission lookup tables in the Final Localized Significance Threshold Methodology[70] were used to conservatively estimate localized construction impacts.

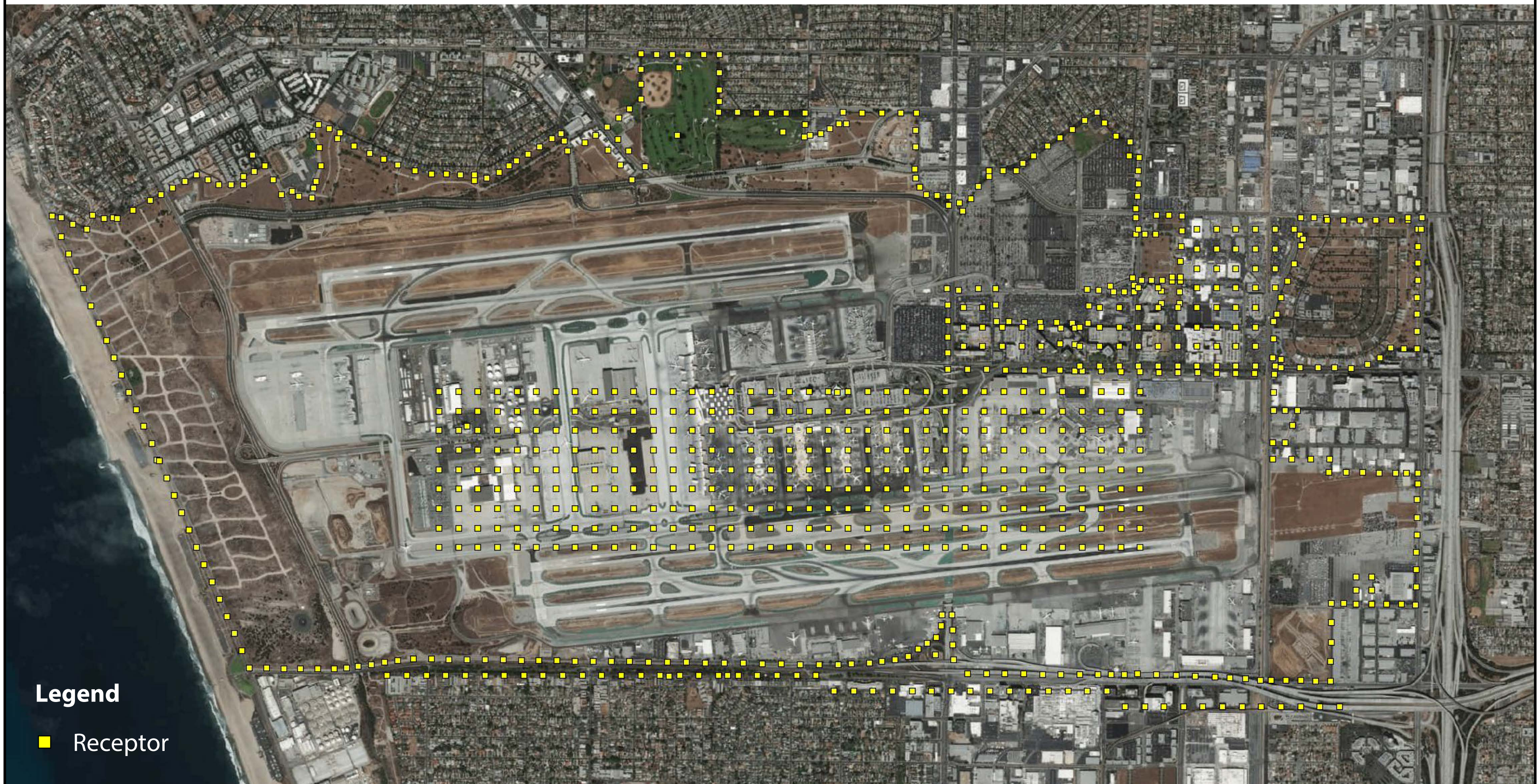
---

[67] It is likely that aircraft that travel from the gates at Terminals 7 and 8 to the existing West Maintenance Facility travel at speeds lower than 25 mph due to congestion on terminal-area taxiways west of these gates, resulting in longer taxi times. As a result, it is likely that emissions from aircraft taxiing under baseline conditions are higher than assumed in this analysis and that, consequently, incremental emissions resulting from the proposed project would be lower than assumed in this analysis. The assumptions in this Draft EIR result in a conservative analysis of project-related operational impacts from aircraft taxiing.

[68] 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://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models.

[69] South Coast Air Quality Management District, SCAQMD Modeling Guidance for AERMOD. Available: http://www.aqmd.gov/home/air-quality/air-quality-data-studies/meteorological-data/modeling-guidance, accessed March 13, 2018.

[70] 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.



Source: CDM Smith.
Prepared by: CDM Smith, March 2018.

LAX UAL East Aircraft Maintenance and GSE Project	Receptor Locations	Figure 4.1.1-1

Sources

Operational activities were assumed to be located at specified locations at the project site and along the taxiways. On-site sources were modeled as area sources using the polygon-area option in AERMOD. Aircraft taxi and towing routes were modeled as line-area sources. These sources were modeled with a 12-meter release height and 2.8-meter initial vertical dimension.

Receptor Locations

Receptor points are the geographic locations where the air dispersion model calculates ambient air pollutant concentrations. These discrete receptors were used to determine the concentrations of criteria pollutants in the vicinity of the project site.[71] Receptors were placed at the nearest off-site receptor locations, 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.[72,73] 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) obtained using AERSURFACE.[74,75] 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 years 2012 through 2016; 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).

Terrain

The terrain data used in the analysis were U.S. Geological Survey 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.[76] These data were 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 methods for modeling the conversion of NO_X to NO_2, including the Ozone Limiting Method (OLM) and the Plume Volume Molar Ratio Method (PVMRM). The OLM option was used in this modeling analysis because it is the most applicable to the non-stack, mobile sources included in

---

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

72 National Climatic Data Center Portal. Available: ftp://ftp.ncdc.noaa.gov/pub/data/noaa/; and ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/, accessed November, 2017.

73 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 November 4, 2017.

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

75 U.S. Environmental Protection Agency, *Support Center for Regulatory Atmospheric Modeling (SCRAM), Air Quality Dispersion Modeling – Related Model Support Programs.* Available: https://www.epa.gov/scram/air-quality-dispersion-modeling-related-model-support-programs, accessed November 4, 2017.

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

this project.[77] 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; and
- Default Ozone Value: Hourly O_3 data file provided by the SCAQMD.

4.1.1.3 Existing Conditions

4.1.1.3.1 Climatological Conditions[78]

LAX 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 South Coast Air 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.

The annual minimum mean, maximum mean, and overall mean temperatures at the airport are 56 degrees Fahrenheit (°F), 70°F, and 63°F, respectively.[79] The prevailing wind direction at the airport is from the west-southwest with an average wind speed of roughly 6.4 knots (7.4 mph or 3.3 meters per second [m/s]).[80,81] 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.[82]

---

77 OLM is a USEPA-approved methodology for determining NO_X to NO_2 conversion. OLM provides a more accurate determination of NO_X to NO_2 conversion than other approved methods by using actual monitored ozone data.

78 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.

79 Western Regional Climate Center, *Los Angeles Intl AP, California (045114)*. Available: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5114, accessed November 7, 2017.

80 Western Regional Climate Center, *Prevailing Wind Direction.* Available: https://wrcc.dri.edu/Climate/comp_table_show.php?stype=wind_dir_avg, accessed November 7, 2017.

81 Western Regional Climate Center, *Average Wind Speeds - MPH.* Available: https://wrcc.dri.edu/Climate/comp_table_show.php?stype=wind_speed_avg, accessed November 7, 2017.

82 Western Regional Climate Center, *2008 LCD for Los Angeles International, California.* Available: https://wrcc.dri.edu/Climate/west_lcd_show.php?iyear=2008&sstate=CA&stag=losangelesintl&sloc=Los+Angeles+International, accessed November 7, 2017.

4.1.1.3.2 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/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
	1-Hour	0.09 ppm (180 µg/m^3)	N/A	N/A
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	N/A
	1-Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	N/A
Nitrogen Dioxide (NO_2)	Annual	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary[1]
	1-Hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	N/A
Sulfur Dioxide (SO_2)[2]	Annual	N/A	0.030 ppm (80 µg/m^3)	N/A
	24-Hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	N/A
	3-Hour	N/A	N/A	0.5 ppm (1300 µg/m^3)
	1-Hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3)	N/A
Respirable Particulate Matter (PM_{10})	AAM	20 µg/m^3	N/A	N/A
	24-Hour	50 µg/m^3	150 µg/m^3	Same as Primary
Fine Particulate Matter ($PM_{2.5}$)	AAM	12 µg/m^3	12.0 µg/m^3	15 µg/m^3
	24-Hour	N/A	35 µg/m^3 [10/]	Same as Primary
Lead (Pb)	Rolling 3-Month Average	N/A	0.15 µg/m^3	Same as Primary
	Monthly	1.5 µg/m^3	N/A	N/A
Visibility Reducing Particles	8-Hour	Extinction of 0.23 per kilometer	N/A	N/A
Sulfates	24-Hour	25 µg/m^3	N/A	N/A

Source: California Air Resources Board, Ambient Air Quality Standards Chart, May 4, 2016. Available: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

Table 4.1.1-1 National and California Ambient Air Quality Standards (NAAQS and CAAQS)	
Notes:	
NAAQS = National Ambient Air Quality Standards	N/A = Not applicable
CAAQS = California Ambient Air Quality Standards	mg/m^3 = milligrams per cubic meter
ppm = parts per million (by volume)	AAM = Annual arithmetic mean
$\mu g/m^3$ = micrograms per cubic meter	
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 1 year after an area is designated for the 2010 NAAQS (75 FR 35520).	
Prepared by: CDM Smith, January 2018.	

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 South Coast Air Basin was redesignated in 1998 to attainment/maintenance for NO_2 and in 2007 to attainment/maintenance for CO. A designation of attainment/maintenance means that the pollutant is currently in attainment (i.e., meets standards) and that measures are included in the SIP to ensure that the NAAQS for that pollutant are not exceeded again (maintained). More recently, the South Coast Air Basin was redesignated to attainment/maintenance for PM_{10} on July 26, 2013.[83] Most recently, the South Coast Air Basin was also found to attain the 1997 $PM_{2.5}$ NAAQS;[84] however, the South Coast Air 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 regard to the NAAQS is presented in Table 4.1.1-2 for each criteria pollutant.

83 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.

84 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.

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

Sources: U.S. Environmental Protection Agency, *Green Book Nonattainment Areas*. Available: https://www.epa.gov/green-book, accessed March 2018; California Air Resources Board, *Area Designations Maps/State and National.* Available: https://www.arb.ca.gov/desig/adm/adm.htm, accessed November 2017; 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, p. 48350. Available: https://www.federalregister.gov/documents/2016/07/25/2016-17410/clean-data-determination-for-1997-pm25, effective August 24, 2016.

Notes:

1. Status as of November 3, 2017.
2. Status as of November 3, 2017.
3. Classified as attainment for 1997 NAAQS, moderate nonattainment for 2012 NAAQS, and serious nonattainment for 2006 NAAQS.

Prepared By: CDM Smith, January 2018.

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.[85] The currently applicable CAAQS are presented with the NAAQS in Table 4.1.1-1. The attainment status with regard to the CAAQS is presented in Table 4.1.1-2 for each criteria pollutant. CARB has jurisdiction over a number of air pollutant emission sources that operate in the 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.

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 South Coast Air Basin is a sub-region of SCAQMD's jurisdiction and covers an area of 6,745 square miles. Although air quality in this area has improved, the South Coast Air Basin requires continued diligence to meet air quality standards.

85 The numerical value of the NO_2 and SO_2 1-hour CAAQS is less stringent than the NAAQS value; however, the form of the CAAQS is different than the form of the NAAQS. The CAAQS is attained for both pollutants when measured concentrations never exceed the CAAQS value. The 1-hour NO_2 NAAQS is attained when the 98th percentile of measured concentrations is less than the NAAQS. The 1-hour SO_2 NAAQS is attained when the 99th percentile of measured concentrations is less than the NAAQS. Therefore, the CAAQS and NAAQS are not directly comparable.

The SCAQMD adopted a series of Air Quality Management Plans (AQMPs) to meet the CAAQS and NAAQS. The most recent AQMP adopted by SCAQMD and CARB is the 2016 AQMP. However, the most recent plan that has been approved by USEPA as an update to the State Implementation Plan (SIP) is the 2012 AQMP. Both the 2016 AQMP and 2012 AQMP are briefly discussed below.

SCAQMD adopted the 2016 AQMP on March 3, 2017.[86] It incorporates the latest scientific and technology information and planning assumptions, including those consistent with the 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[87] measures adopted by the Southern California Association of Governments (SCAG) on April 7, 2016, and updated emission inventory methodologies for various source categories. The 2016 AQMP incorporates a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, and on-road and off-road mobile sources. The 2016 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.

The 2016 AQMP's key undertaking is to bring the South Coast Air Basin into attainment with the following standards:

- 8-hour 80 parts per billion (ppb) Ozone NAAQS by 2023 (adopted in 1997);
- 8-hour 75 ppb Ozone NAAQS by 2031 (adopted in 2008);
- 1-hour 120 ppb Ozone NAAQS by 2022 (adopted in 1979);
- 24-hour 35 micrograms per cubic meter (µg/m3) PM2.5 NAAQS by 2019 (adopted in 2006); and
- Annual 12 µg/m3 PM2.5 NAAQS by 2025 (adopted in 2012).

The overall control strategy is an integrated approach relying on fair-share emission reductions from federal, state, and locally regulated sources. The 2016 AQMP is composed of stationary and mobile source emission reductions from (1) traditional regulatory control measures, (2) incentive-based programs, (3) co-benefits from climate programs, (4) mobile source strategies and (5) reductions from federally-controlled sources, which include aircraft, locomotives and ocean-going vessels. These strategies are to be implemented in partnership with CARB and USEPA. In addition, the SCAG-approved 2016 RTP/SCS transportation programs, measures, and strategies, which are generally designed to reduce VMT, are included within baseline emissions.

LAWA provided baseline and forecasted airport emission inventories to SCAQMD for LAX, Van Nuys Airport, and Ontario International Airport (which was then under LAWA's jurisdiction), and the aircraft emissions from these inputs were included in the 2016 AQMP. The 2016 AQMP includes several future air pollution control measures to be developed and implemented by CARB. These measures include state regulations potentially requiring zero-emission GSE and zero-emission airport shuttle buses in the future.

---

86 South Coast Air Quality Management District, *Final 2016 Air Quality Management Plan (AQMP)*, March 3, 2017. Available: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp.

87 Southern California Association of Governments, *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/Documents/2016/final/f2016RTPSCS.pdf.

Previously, SCAQMD and CARB adopted the 2012 AQMP,[88] which included the 2012-2035 RTP/SCS[89] measures. The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012. The 2012 AQMP's key undertaking was to bring the South Coast Air Basin into attainment with NAAQS for 24-hour $PM_{2.5}$ by 2014. It also intensified 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 consisted of four components: (1) South Coast Air 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 included eight short-term $PM_{2.5}$ control measures, sixteen stationary source 8-hour O_3 measures, ten 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. Several previously adopted rules are applicable to the construction of the proposed project as well as to stationary sources being relocated or replaced as part of the proposed project. SCAQMD Rule 403[90] 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. SCAQMD Rule 113[91] limits the amount of VOCs from architectural coatings in solvents, which lowers the emissions of odorous compounds. As explained previously, UAL operates a Title V facility at LAX. Therefore, Regulation II – Permits[92] would apply to relocated or replaced stationary equipment associated with the maintenance operations and facilities (such as spray booths, comfort heating/cooling, and emergency generators); replacement stationary equipment could also be subject to requirements and/or exemptions under Regulation XIII – New Source Review.[93]

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

---

88 South Coast Air Quality Management District, *Final 2012 Air Quality Management Plan*, December 7, 2012. Available: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2012-aqmp-carb-epa-sip-submittal.

89 Southern California Association of Governments, *2012-2035 Regional Transportation Plan/Sustainable Communities Strategy*: Towards a Sustainable Future, April 2012. Available: http://rtpscs.scag.ca.gov/Documents/2012/final/f2012RTPSCS.pdf.

90 South Coast Air Quality Management District, *Rule 403 – Fugitive Dust*, amended June 3, 2005. Available: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.

91 South Coast Air Quality Management District, *Rule 1113 – Architectural Coatings*, amended February 5, 2016. Available: http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf?sfvrsn=17.

92 South Coast Air Quality Management District, *Regulation II - Permits*. Available: http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/regulation-ii.

93 South Coast Air Quality Management District, *Regulation XIII – New Source Review.* Available: http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/regulation-xiii.

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 surface transportation projects, plans, and programs with applicable air quality plans. With regard to air quality planning, SCAG prepared and adopted the 2016-2040 RTP/SCS, which includes a Sustainable Communities Strategy that addresses regional development and growth forecasts.[94]

Other Related Rules and Policies

In the South Coast Air 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 adopted a Risk Reduction Plan for diesel-fueled engines and vehicles.[95] The SCAQMD 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.[96]

LAWA's Sustainable Design and Construction Policy, adopted in September 2017, requires that new buildings and major building renovation projects at LAX be designed to achieve the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED®) Silver certification, at a minimum, unless an exemption is provided.[97] Silver certification mandates that energy efficiency features be incorporated into new construction, which would reduce criteria pollutant and greenhouse gas emissions.

In 2015, LAWA adopted the LAX GSE Emissions Reduction Policy.[98] It is the first GSE emissions reduction policy of its kind in the nation. The Policy requires annual reporting of GSE operating at LAX and associated emissions, and requires that GSE operators reduce emissions from their GSE fleets operating at LAX to specific emission factor goals (in grams per brake horsepower-hour) by 2019 and 2021.

4.1.1.3.3 Existing Ambient Air Quality

In an effort to monitor the various concentrations of air pollutants throughout the South Coast Air Basin, the SCAQMD 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

94 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.

95 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.

96 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 – 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.

97 City of Los Angeles, Los Angeles World Airports, *LAWA Sustainable Design and Construction Policy*, September 7, 2017.

98 Los Angeles World Airports, *Ground Support Equipment Emissions Policy*, April 16, 205. Available: https://www.lawa.org/-/media/lawa-web/environment/files/lax_gse_emission_reduction_policy_boac.ashx?la=en&hash=A46EAB51C1192B3B8DF6FCD0BF55E478EA76DAE5.

(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). The most recent data available from the SCAQMD for these monitoring stations at the time of the Draft EIR preparation encompassed the years 2012 to 2016, as shown in **Table 4.1.1-3**.

Table 4.1.1-3
Ambient Air Quality Data

Pollutant[1,2]	2012	2013	2014	2015	2016
Ozone (O_3)					
Maximum Concentration 1-hr period, ppm	0.106	0.105	0.114	0.096	0.087
Days over State Standard (0.09 ppm)	1	1	1	1	0
Federal Design Value 8-hr period, ppm	---[4]	---[4]	0.064	0.068	0.070
Maximum California Concentration 8-hr period, ppm	0.075	0.082	0.080	0.078	0.080
Days over State Standard (0.07 ppm)	1	1	6	3	3
Carbon Monoxide (CO)					
Maximum Concentration 1-hr period, ppm	4.8	5.6	5.4	4.3	4.3
Days over State Standard (20.0 ppm)	0	0	0	0	0
Maximum Concentration 8-hr period, ppm	3.9	3.4	3.8	3.0	3.6
Days over State Standard (9.0 ppm)	0	0	0	0	0
Nitrogen Dioxide (NO_2)					
Maximum Concentration 1-hr period, ppm	0.077	0.078	0.087	0.087	0.082
98th Percentile Concentration 1-hr period, ppm	0.055	0.059	0.066	0.060	0.055
Days over State Standard (0.18 ppm)	0	0	0	0	0
Annual Arithmetic Mean (AAM), ppm	---[4]	---[4]	0.012	0.011	0.010
Exceed State Standard? (0.030 ppm)	---[4]	---[4]	No	No	No
Sulfur Dioxide (SO_2)					
Maximum Concentration 1-hr period, ppm	---[5]	---[5]	---[5]	---[5]	---[5]
Days over State Standard (75 ppb)	0	0	0	0	0
99th Percentile Concentration 1-hr period, ppm	0.021	0.012	0.010	0.012	0.012
Maximum Concentration 24-hr period, ppm	0.003	0.004	0.003	0.003	0.004
Days over State Standard (140 ppb)	0	0	0	0	0
Annual Arithmetic Mean (AAM), ppm	0.001	0.001	0.001	0.001	0.001
Respirable Particulate Matter (PM_{10})[3]					
Maximum Federal Concentration 24-hr period, µg/m^3	31	38	46	42	43
Days over Federal Standard (150 µg/m^3)	0	0	0	0	0
Maximum California Concentration 24-hr period, µg/m^3	30	37	45	42	---[4]
Days over State Standard (50 µg/m^3)	0	---[4]	0	---[4]	---[4]
Annual California Concentration, µg/m^3	19.6	---[4]	21.9	---[4]	---[4]
Exceed State Standard? (20 µg/m^3)	No	---[4]	Yes	Yes	Yes
Fine Particulate Matter ($PM_{2.5}$)[3]					
Federal Design Value 24-hr period, µg/m^3	26	26	---[4]	---[4]	---[4]
Federal Design Value Annual period, µg/m^3	10.6	10.8	---[4]	---[4]	---[4]
Maximum California Concentration 24-hr period, µg/m^3	59.1	42.9	61.9	62.2	35.2
Annual Federal Concentration, µg/m^3	10.5	10.9	---[4]	10.2	9.5

Table 4.1.1-3
Ambient Air Quality Data

Pollutant[1,2]	2012	2013	2014	2015	2016
Exceed State Standard? (12 µg/m^3)	No	No	No	No	No

Sources: California Air Resources Board, *iADAM: Air Quality Data Statistics*. Available: http://www.arb.ca.gov/adam/, accessed November 6, 2017. U.S. Environmental Protection Agency, *Air Quality Statistics Report*. Available: https://www.epa.gov/outdoor-air-quality-data/air-quality-statistics-report, accessed November 7, 2017.

Notes:
AAM = Annual arithmetic mean
ppb = parts per billion (by volume)
ppm = parts per million (by volume)
µg/m^3 = micrograms per cubic meter
--- = insufficient data to determine the value
N/A = not applicable

1. Monitoring data from the Southwest Coastal Los Angeles Station (Station No. 820) was used for O_3, NO_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. USEPA regional summaries were used for CO and SO_2 concentrations.
2. An exceedance is not necessarily a violation. Violations 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.
5. CARB does not provide summarized CO and SO_2 concentration data for the South Coast Air Basin.

Prepared by: CDM Smith, January 2018.

The data show the following pollutant trends (refer to Table 4.1.1-1 for NAAQS and CAAQS):

- **Ozone** – The maximum 1-hour O_3 concentration recorded during the 2012 to 2016 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 0.082 ppm recorded in 2013. The California standard was exceeded between 1 and 6 days annually from 2012 to 2016. The 8-hour NAAQS was not exceeded in 2014, 2015 or 2016, however there was not enough data was available in 2012 or 2013 to determine the Federal 8-hour design value.
- **Carbon Monoxide** – The highest 1-hour CO concentration recorded was 5.6 ppm, recorded in 2013. The maximum 8-hour CO concentration recorded was 3.9 ppm recorded in 2012. 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 0.087 ppm in both 2014 and 2015. The maximum 98th percentile 1-hour concentration was 0.066 ppm, recorded in 2014. The highest recorded NO_2 annual arithmetic mean was 0.012 ppm recorded in 2014. As shown, the standards were not exceeded during the five-year period.
- **Sulfur Dioxide** – The highest 99th percentile 1-hour concentration recorded was 0.021 ppm in 2012. The maximum 24-hour concentration was 0.004 ppm, recorded in both 2013 and 2016. The highest annual arithmetic mean concentration was 0.001, recorded in each year between 2012 and 2016. As shown, the standards were not exceeded during the five-year period.
- **Respirable Particulate Matter (PM_{10})** – The highest recorded 24-hour PM_{10} concentration recorded was 46 µg/m^3 in 2014. During the period 2012 to 2016, the CAAQS for 24-hour PM_{10} was not exceeded and the NAAQS was not violated. The maximum annual California concentration recorded was 21.9 µg/m^3 in 2014.
- **Fine Particulates ($PM_{2.5}$)** – The maximum 24-hour $PM_{2.5}$ concentration recorded was 62.2 µg/m^3 in 2015. The highest annual federal design value of 10.8 was recorded in 2013. Between 2012 and 2013 the 24-hour and annual NAAQS were not violated. Not enough data was recorded or available in 2014, 2015 or 2016 to determine the NAAQS design values.

4.1.1.4 Thresholds of Significance

4.1.1.4.1 Emissions Thresholds

The SCAQMD has established CEQA operational and construction-related thresholds of significance for air pollutant emissions from projects proposed in the South Coast Air Basin.[99] These thresholds serve to address a project's consistency with applicable SCAQMD plans, impacts to ambient air quality standards, and contributions to cumulative impacts, including cumulatively considerable net increases to any criteria pollutant for which the air basin is in nonattainment, as specified in Appendix G of the State CEQA Guidelines. Construction and operational 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 or operations-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

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-thresholds.pdf?sfvrsn=2.

Notes:

1. The emissions of VOCs and ROGs are essentially the same for the combustion emission sources that 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 quantities are low and emissions from these sources would not be materially affected by the project.

Prepared by: CDM Smith, January 2018.

Baseline Used to Determine Significance for the Proposed Project Emissions

For construction-related incremental emissions 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 operations-related incremental emissions associated with the proposed project, a baseline of 2017 emissions is used, accounting for operations at both the East and West Maintenance Facilities. Incremental operational emissions attributable to the proposed project are compared to the significance thresholds for operations.

99 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.

4.1.1.4.2 Localized Significance Thresholds

The SCAQMD has developed emission thresholds for local air quality impacts from construction activities, referred to as localized significance thresholds (LSTs).[100] LSTs are only applicable to the following criteria pollutants: NO_X, CO, PM_{10}, and $PM_{2.5}$. As per SCAQMD's *CEQA Air Quality Handbook*, "LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area."[101] LSTs are analogous to NAAQS and CAAQS; pollutant levels below LSTs would not be expected to violate the NAAQS or CAAQS. The LST methodology was developed as a tool to assist in the evaluation of projects for which project-specific air quality modeling may not be warranted. The methodology provides mass rate look-up tables that allow a user to readily determine if the daily emissions for proposed construction or operational activities could result in significant localized air quality impacts. LSTs are applicable at the project-specific level and are generally not applicable to regional projects. The proposed project's emissions from on-site construction activity, as determined following the methodology discussed in Section 4.1.1.2, were compared to the LST values. If the proposed project's on-site construction emissions would exceed the LSTs, then the impacts to local air quality were considered significant.

SCAQMD's LST methodology determines localized emission thresholds based on a combination of the project area that would be disturbed during any given day of construction, the ambient air quality in the source receptor area, and the distance to the nearest receptor point. To determine the area that would be disturbed, the methodology offers a selection of 1 acre, 2 acres, or 5 or more acres disturbed, each relating to a different matrix of emission thresholds. For the proposed project, it is anticipated that 5 or more acres would be disturbed at any given time during project construction. The closest receptor from the project site boundary (i.e., LAX Crowne Plaza Hotel on Century Boulevard) is located at a distance of approximately 135 meters (approximately 450 feet); therefore, the LSTs for 100 meters were used. **Table 4.1.1-5** summarizes allowable on-site emissions for a project located in the Southwest Coastal Los Angeles County Source-Receptor Area with a 100 meter receptor distance and a 5 or more acre area of disturbance. LSTs consider ambient concentrations of pollutants for each source receptor area and distances to the nearest receptor. In accordance with the SCAQMD *CEQA Air Quality Handbook*, a significant air quality impact would occur if the estimated incremental emissions would be greater than the emissions thresholds presented in Table 4.1.1-5.

The thresholds for NO_2, CO, PM_{10}, and $PM_{2.5}$ represent the allowable peak day emissions that would not cause or contribute to a significant impact to local air quality.

---

100 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.

101 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.

Table 4.1.1-5 SCAQMD Localized Significance Thresholds for Localized Air Pollutant Impacts in the South Coast Air Basin		
Project-Related Construction and Operational Thresholds[1]		
Pollutant	Construction Threshold (lbs/day)	Operations Threshold (lbs/day)
ROG	---	---
NO_X	202	202
CO	2,608	2,608
PM_{10}	60	15
$PM_{2.5}$	19	5
SO_2	---	---

Sources: South Coast Air Quality Management District, *Localized Significance Thresholds – Appendix C – Mass Rate Look Up.* Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf, accessed November 7, 2017.

Notes:

1. The LSTs that apply to the proposed project are based on a minimum 5-acre site disturbance area and a distance to the nearest receptor distance of 100 meters.

Prepared By: CDM Smith, January 2018.

4.1.1.5 Impacts Analysis

4.1.1.5.1 Construction Impacts

Regional Construction Impacts

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 construction 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).

Significant regional emissions of NO_X would result from heavy-duty on-site construction equipment and trucks. Daily NO_X emissions would potentially exceed the SCAQMD threshold of significance for approximately 7 months of the 22-month construction period. The peak daily NO_X emissions would potentially occur for only one month.

Table 4.1.1-6 Project Maximum Construction Emissions (lbs/day)			
Pollutant	Peak Daily Emissions	Construction Threshold	Significant?
CO	178	550	No
VOC	41	75	No
NO_X	259	100	**Yes**
SO_2	1	150	No
PM_{10}	85	150	No
$PM_{2.5}$	30	55	No

Source: Appendix B.1 of this EIR.

Prepared By: CDM Smith, January 2018.

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.

Localized Construction Impacts

As discussed in Section 4.1.1.2, *Methodology*, the local effects from the on-site portion of construction emissions were evaluated at the nearest receptor location that could be affected by the proposed project consistent with the methodologies in the SCAQMD's Final Localized Significance Threshold Methodology. The comparison of the peak daily on-site construction emissions compared with the SCAQMD's LSTs are presented in **Table 4.1.1-7**.

As shown in Table 4.1.1-7, the unmitigated on-site construction emissions would exceed the SCAQMD LSTs for NO_X, PM_{10}, and $PM_{2.5}$. Therefore, the localized construction impacts of the proposed project relative to NO_X, PM_{10}, and $PM_{2.5}$ emissions would be significant.

Table 4.1.1-7
Project Maximum On-Site Construction Emissions (lbs/day)

Pollutant	Peak Daily On-Site Emissions	Construction Threshold (LST)	Significant?
NO_X	249	202	**Yes**
CO	139	2,608	No
PM_{10}	82	60	**Yes**
$PM_{2.5}$	29	19	**Yes**
SO_2	N/A	N/A[1]	N/A

Source: Appendix B.1 of this EIR.

Notes:

1. SCAQMD has not developed LSTs for SO_2.

Prepared By: CDM Smith, January 2018.

As with significant regional emissions, significant local emissions of NO_X would primarily result from heavy-duty on-site construction equipment and trucks; these emissions would exceed the SCAQMD threshold of significance for approximately one month of the 22-month construction period. Significant local emissions of PM_{10} and $PM_{2.5}$ would primarily result from apron demolition and installation activities; these emissions would exceed the SCAQMD thresholds of significance for approximately 4 months of the 22-month construction period.

4.1.1.5.2 Operational Impacts

Regional Operational Impacts

Peak daily operational emissions were calculated based on peak daily operational data provided by UAL, included in Appendix B.2. The peak daily operational emissions are presented in **Table 4.1.1-8** for all criteria and precursor pollutants studied (CO, VOC, NO_X, SO_2, PM_{10} and $PM_{2.5}$).

As shown in Table 4.1.1-8, operational emissions with implementation of the proposed project would be lower than baseline emissions (i.e., operation of the proposed project would have a beneficial result with respect to criteria pollutant emissions). This reduction is due to the relocation of maintenance activities from the West Maintenance Facility to the East Maintenance Facility, which is located in closer proximity to UAL's passenger gates in Terminals 7 and 8. By placing all maintenance activity in closer proximity to the passenger gates, the average daily travel distance for both taxiing and towing of aircraft would be reduced. In addition to the decreased travel distance, with implementation of the proposed project, more aircraft would be towed between the gates and the maintenance facility than under baseline conditions, although the total number of daily aircraft movements would be the same. This would result in a reduction in taxi-related emissions compared to baseline conditions. As shown in Table 4.1.1-8, the unmitigated regional operational emissions would be less than the SCAQMD CEQA operational emission thresholds for all criteria pollutants. Therefore, the proposed project's regional operational emissions would be less than significant.

Table 4.1.1-8
Maximum Peak Daily Operational Emissions (lbs/day)

Pollutant	Baseline Peak Daily Emissions	Proposed Project Peak Daily Emissions	Increment in Peak Daily Emissions	Threshold	Significant?
CO	75.37	44.59	-30.79	550	No
VOC	6.72	3.98	-2.74	55	No
NO_X	23.38	15.83	-7.55	55	No
SO_2	4.70	2.71	-1.99	150	No
PM_{10}	0.45	0.34	-0.11	150	No
$PM_{2.5}$	0.45	0.34	-0.11	55	No

Source: Appendix B.2 of this EIR.

Prepared By: CDM Smith, February 2018.

Localized Operational Impacts

As discussed in Section 4.1.1.2, *Methodology*, the local effects from the on-site operational emissions were evaluated at all receptor locations that could be affected by the proposed project, consistent with the methodologies in the SCAQMD's Final Localized Significance Threshold Methodology and its Modeling Guidance for AERMOD.[102] The results of air dispersion modeling of the project operational sources are presented in **Table 4.1.1-9**

As shown in Table 4.1.1-9, the unmitigated on-site operational emissions would not exceed the thresholds. Therefore, the localized operational impacts of the proposed project would be less than significant.

4.1.1.6 Cumulative Impacts

4.1.1.6.1 Cumulative Construction Impacts

A list of other development projects at and immediately adjacent to LAX whose construction could overlap with construction of the proposed project is provided in **Table 4.1.1-10** 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 obtained from the Final EIR for the Terminals 2 and 3 (T2/T3) Modernization Project.[103] Calculation details for the proposed project are provided in Appendix B.1. Due to the uncertainty of the

102 South Coast Air Quality Management District, SCAQMD Modeling Guidance for AERMOD. Available: http://www.aqmd.gov/home/air-quality/air-quality-data-studies/meteorological-data/modeling-guidance, accessed March 13, 2018.

103 City of Los Angeles, Los Angeles World Airports, *Final Environmental Impact Report for Los Angeles International Airport (LAX) Terminals 2 and 3 Modernization Project*, June 2017.

multiple project schedules, the SCAQMD construction thresholds in tons per quarter were used per SCAQMD's 1993 CEQA Air Quality Handbook.[104]

Table 4.1.1-9
Operational Concentrations at Peak Increment Receptors ($\mu g/m^3$)

Pollutant	Averaging Period[1]	Baseline Concentrations ($\mu g/m^3$)	1st Year of Operations Concentrations ($\mu g/m^3$)	Increment ($\mu g/m^3$)[4]	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Threshold ($\mu g/m^3$)[1]	Significant?
CO	1-hr CAAQS	63	69	6	6,400	6,406	23,000	No
	8-hr CAAQS	19	17	-2	4,457	4,557	10,000	No
NO_2	1-hr CAAQS	34	206[2]	172[2]	---[2]	172	339	No
	1-hr NAAQS	33	188[2]	155[2]	---[2]	155	188	No
	Annual CAAQS	1	6	5	23	28	57	No
SO_2	1-hr CAAQS	4	41	37	55	92	655	No
	1-hr NAAQS	4	35	31	55	86	196	No
	3-hr NAAQS	4	23	19	55	74	1,300	No
	24-hr CAAQS	<1	1	1	10	11	105	No
	Annual NAAQS	<1	<1	<1	3	3	80	No
PM_{10}	24-hr	<0.1	0.1	0.1	---[3]	0.1	10.4	No
	Annual	<0.1	<0.1	<0.1	---[3]	<0.1	1.0	No
$PM_{2.5}$	24-hr	<0.1	0.1	0.1	---[3]	0.1	10.4	No

Source: Appendix B.3 of this EIR.

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. For the CAAQS and NAAQS analysis, the 1-hour NO_2 background concentrations were calculated as the 98th percentile concentrations for each hour-of-day, by season (Winter, Spring, Summer, and Fall). Due to the hourly nature of these background concentrations, which vary substantially by hour-of-day, these background concentrations were included in the AERMOD dispersion model for the first year of operations. Therefore, the project increment includes the background concentrations.
3. PM_{10} and $PM_{2.5}$ thresholds are project only values, therefore, are not added to background concentrations.
4. Numbers may not add exactly due to rounding.

Prepared By: CDM Smith, January 2018.

104 South Coast Air Quality Management District, *CEQA Air Quality Handbook*, 1993.

Table 4.1.1-10
Cumulative Construction Projects Peak Quarter Emissions Estimates (tons/quarter)[1]

Concurrent Construction Project	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
UAL East Aircraft Maintenance and GSE Project (proposed project)[2]	5.3	1.2	7.0	<0.1	3.1	1.1
LAX Bradley West Project	0.6	2.1	0.7	<0.1	0.1	<0.1
Metro Crenshaw/LAX Transit Corridor Project	4.9	1.0	8.8	<0.1	1.0	0.6
Argo Drain Sub-Basin Stormwater Infiltration and Treatment Facility[3]	2.4	0.4	3.4	<0.1	0.4	0.4
Secured Area Access Post (SAAP) Project	1.3	0.2	1.8	<0.1	0.2	0.2
Terminals 2 and 3 Modernization Project	4.3	1.8	3.9	<0.1	1.9	1.0
Midfield Satellite Concourse North	22.0	2.5	9.1	<0.1	4.7	1.0
Terminal 1.5	1.0	1.5	1.2	<0.1	0.3	0.2
Miscellaneous Projects/Improvements	23.9	6.4	32.3	<0.1	2.0	1.7
Landside Access Modernization Program	7.5	2.1	18.4	<0.1	1.8	0.9
Receiving Station X[3]	0.8	<0.1	0.7	<0.1	0.3	0.1
Airport Police Facility[3]	0.3	0.4	0.3	<0.1	0.5	0.4
Total from Other Construction Projects Emissions	69.0	18.4	80.6	<0.1	13.2	6.5
Total Cumulative Construction Project Emissions	**74.3**	**19.6**	**87.6**	**<0.1**	**16.3**	**7.6**
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

Source: Appendix B.1 of this EIR.

Notes:

1. This table includes cumulative projects whose construction would occur during the estimated combined (i.e., cumulative) peak day.
2. Proposed project construction is estimated to occur between 2018 and 2020.
3. This project is part of the LAX Northside Development.

Prepared By: CDM Smith, May 2018.

The emissions estimates presented in Table 4.1.1-10 are based upon project construction information known or reasonably assumed for the development projects listed in Table 3-1, as presented in Chapter 3, *Overview of Project Setting*, Section 3.4.

The SCAQMD guidance on an acceptable approach to addressing cumulative impacts for air quality 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."[105]

As shown in Table 4.1.1-10, 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 emissions associated with 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 regional construction-related impacts would be cumulatively considerable for NO_X. The project's contribution to cumulative regional CO, VOC, PM_{10}, and $PM_{2.5}$ impacts would not be cumulatively considerable.

As stated in Section 4.1.1.4.2, LSTs were developed by SCAQMD to evaluate impacts to local air quality at the project-specific level using on-site emission thresholds. As noted above, per SCAQMD guidance, projects that exceed SCAQMD's significance thresholds are generally considered to result in a cumulatively considerable contribution to cumulative air quality impacts. As shown in Table 4.1.1-7, project-related on-site construction emissions would exceed the SCAQMD LSTs for NO_X, PM_{10}, and $PM_{2.5}$. Thus, the project's contribution to cumulative localized construction impacts relative to NO_X, PM_{10} and $PM_{2.5}$ would be cumulatively considerable.

As with the impacts associated with the proposed project, cumulatively significant regional and localized construction emissions of NO_X would occur from equipment and trucks used for installation of cumulative projects. The primary activities associated with the cumulatively significant regional and localized construction emissions of PM_{10} and $PM_{2.5}$ would be demolition and installation of cumulative projects. Cumulatively significant regional construction emissions of VOC and CO would occur from painting/coating of buildings and structures and from roadway paving and striping (the proposed project's contribution to cumulatively significant VOC and CO impacts would not be cumulatively considerable).

4.1.1.6.2 Cumulative Operational Impacts

As noted above, per SCAQMD guidance, projects that do not exceed SCAQMD's significance thresholds are generally not considered to result in a cumulatively considerable contribution to cumulative air quality impacts. As shown in Tables 4.1.1-8 and 4.1.1-9, operation of the proposed project would not exceed the SCAQMD significance thresholds. Therefore, the contribution of the proposed project operations to cumulative air quality impacts would not be cumulatively considerable.

4.1.1.7 Mitigation Measures

As described in Section 4.1.1.5.1, construction of the proposed project would have a significant impact relative to NO_X, PM_{10}, and $PM_{2.5}$. The following mitigation measure is proposed to reduce these impacts to air quality.

- **MM-AQ (UAL)-1. Construction-Related Air Quality Mitigation Measures.**

  This measure includes specific actions to reduce exhaust emissions from on-road and off-road mobile and stationary sources used in construction. Measures a and b listed in **Table 4.1.1-11** were incorporated into the post-mitigation modeling (see Section 4.1.1.8 for modeling assumptions associated with these measures).

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

Table 4.1.1-11
Construction-Related Air Quality Mitigation Measures

Measure	Measure	Type of Measure
a	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 NO_X. Contractor requirements to utilize such on-road haul trucks or the next cleanest vehicle available will be subject to the provisions of LAWA Air Quality Mitigation Measure c below.	On-Road Mobile
b	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 Mitigation Measure c below.	Off-Road Mobile
c	The requirements in a and b shall apply unless the Contractor provides a written finding that: ▪ The Contractor does not have the required types of trucks or equipment detailed in Measures a and b within its current available inventory and has made a good faith effort to lease or rent such trucks or equipment but they are not available. ▪ The Contractor has been awarded funding that would provide some or all of the cost to retrofit, repower, or purchase trucks or equipment that comply with Measures a and b but the funding has not yet been provided and the Contractor has attempted in good faith to lease or rent such trucks or equipment but they are not available. ▪ Contractor has ordered equipment or trucks in compliance with Measures a and b at least 60 days before that equipment or vehicle is needed at the project site, but that equipment or vehicle has not yet arrived, and the Contractor has attempted in good faith to lease or rent such trucks or equipment but they are not available. ▪ Construction-related diesel equipment or trucks will be used on the project site for fewer than 20 calendar days per calendar year. In any of the situations described above, the Contractor/Subcontractor shall provide the next cleanest piece of equipment or truck 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 Occupational Safety and Health Administration (OSHA) standards.	On-Road and Off-Road Mobile

Table A
Off-Road Equipment 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 4.1.1-11
Construction-Related Air Quality Mitigation Measures

Table B **On-Road Equipment 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.		

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

Prepared By: CDM Smith, June 2018.

4.1.1.8 Level of Significance After Mitigation

Table 4.1.1-12 and the text below summarizes the significance determinations for air quality impacts after incorporation of mitigation, all of which are based on comparisons to the baseline (2017) conditions.

Table 4.1.1-12
Summary of Air Quality Impacts After Mitigation

Pollutant	Regional Construction Emissions	Localized Construction Emissions
NO_X	SU	LS
CO	LS	LS
PM_{10}	LS	SU
$PM_{2.5}$	LS	SU
SO_2	LS	LS

Source: Appendix B.1 of this EIR.

Notes:

LS = Less than Significant Impact

SU = Significant and Unavoidable Impact

Prepared By: CDM Smith, January 2018.

4.1.1.8.1 Construction Impacts

Summary of Construction-Related Mitigation Measures

As detailed in Section 4.1.1.7, Mitigation Measure MM-AQ (UAL)-1 would require the use of newer models of construction equipment and heavy duty trucks that have low-emission engines or are equipped with emissions control devices. 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. To provide a conservative (worst-case) estimate of mitigated emission reductions, and to account for a lack of availability of equipment at times, implementation of Mitigation Measure MM-AQ (UAL)-1 assumed that the on-road trucks would be as good as or better than 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 20 percent USEPA Tier 3 compliant, 40 percent Tier 4 Interim compliant, and 40 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. The estimated effects of these measures are shown in the tables below.

Regional Construction Impacts

Impacts After Mitigation

Mitigated daily construction emissions are presented in **Table 4.1.1-13** for all criteria and precursor pollutants studied (CO, VOC, NO_X, SO_2, PM_{10}, and $PM_{2.5}$).

Table 4.1.1-13
Project Maximum Construction Emissions with Mitigation (lbs/day)

Pollutant	Peak Daily Emissions	Threshold	Significant?
Carbon monoxide, CO	178	550	No
Volatile organic compounds, VOC	27	75	No
Nitrogen oxides, NO_X	127	100	Yes
Sulfur dioxide, SO_2	1	150	No
Respirable particulate matter, PM_{10}	85	150	No
Fine particulate matter, $PM_{2.5}$	30	55	No

Source: Appendix B.1 of this EIR.

Prepared By: CDM Smith, January 2018.

As shown in Table 4.1.1-13, while the use of newer models of construction equipment and lower-emission heavy trucks would substantially reduce emissions associated with the proposed project (peak daily emissions of NO_X would be reduced from 260.4 lbs/day to 129 lbs/day), even with the inclusion of mitigation measures, regional emissions of NO_X would remain significant.

The significant regional emissions of NO_X following implementation of mitigation measures would continue to result from general heavy-duty on-site construction equipment and trucks. With mitigation, daily NO_X emissions would exceed the SCAQMD threshold of significance for approximately 3 months of the 22-month construction period, down from 7 months in the unmitigated scenario.

Summary of Level of Significance After Mitigation

With implementation of Mitigation Measure MM-AQ (UAL)-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 further reduce NO_X impacts. Therefore, impacts to regional air quality from project-related construction NO_X emissions would remain significant and unavoidable.

Localized Construction Impacts

Impacts After Mitigation

The results of localized emissions impacts of the project construction sources, incorporating mitigation, are summarized in **Table 4.1.1-14**.

Table 4.1.1-14
Project Maximum On-Site Construction Emissions with Mitigation (lbs/day)

Pollutant	Peak Daily On-Site Emissions	Construction Threshold	Significant?
NO_X	118	202	No
CO	139	2,608	No
PM_{10}	82	60	**Yes**
$PM_{2.5}$	29	19	**Yes**
SO_2	N/A	N/A[1]	N/A

Source: Appendix B.1 of this EIR.

Notes:

1. SCAQMD has not developed LSTs for SO_2.

Prepared By: CDM Smith, January 2018.

As shown in Table 4.1.1-14, the on-site construction emissions after the incorporation of mitigation would be reduced to a level less than the SCAQMD CEQA ambient air quality standards for NO_X but would remain significant for PM_{10} and $PM_{2.5}$. Therefore, the mitigated localized construction impacts of the proposed project relative to PM_{10} and $PM_{2.5}$ emissions would remain significant and unavoidable.

As stated previously, significant local emissions of PM_{10} and $PM_{2.5}$ would result from apron demolition and installation activities. These emissions would exceed the SCAQMD thresholds of significance for approximately 4 months of the 22-month construction period even with the implementation of mitigation.

Summary of Level of Significance After Mitigation

With implementation of Mitigation Measure MM-AQ (UAL)-1, localized construction emissions of PM_{10} and $PM_{2.5}$ 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 further reduce PM_{10} and $PM_{2.5}$ impacts. Therefore, impacts to localized air quality from project-related construction PM_{10} and $PM_{2.5}$ emissions would remain significant and unavoidable.

4.1.1.8.2 Operational Impacts

Unmitigated regional and localized impacts associated with operational emissions would be less than significant. Operation of the proposed project would have a beneficial result with respect to criteria pollutant emissions.

4.1.2 Human Health Risk Assessment

4.1.2.1 Introduction

As discussed in Chapter 2, *Project Description*, the proposed project would consolidate and modernize existing UAL aircraft maintenance and GSE facilities at LAX at UAL's existing East Maintenance Facility site. Such changes would result in the release of TAC from construction activities and a shift in location of TAC released from operational activities, which could have an impact on people working and living in the vicinity of the airport. The objective of this HHRA and health impact analysis is to assess incremental changes to health impacts for people exposed to TAC resulting from construction and operational changes associated with the proposed project. The HHRA and health impact analysis disclose whether implementation 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 1 year and 10 months, starting in approximately the fourth quarter of 2018 and completing in the fourth quarter of 2020.

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 phases 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 a construction schedule, provided in Appendix B.1, that included approximate durations and activities for each project component that together constitute the proposed project. Only the proposed project's on-site incremental construction emissions were considered in the HHRA.
- Operational emissions were estimated using current and future estimates of UAL's aircraft and GSE movements, and the location of current and future engine testing at LAX. Only the proposed project's incremental additional operational emissions were considered.

No investigation or modeling of non-airport sources near LAX was conducted. The 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.[106]

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

- The air quality impacts to human health risks from proposed project construction emissions provide a measure of project impacts during the period of construction.
- The air quality impacts to human health risks from proposed project operational emissions provide a measure of project impacts during the first year of operations. The first year of operations was selected as the most conservative representation of future project emissions as discussed in Section 4.1.1.2.2.
- Comparison of regional air quality as measured in the MATES IV study with construction and operational impacts of the proposed project provides an indication of the relative impact of the project on regional air quality and related human health risk.

The remaining sections describe the development and results of the HHRA in detail. Appendix B.4 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

[106] 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.

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

4.1.2.2 Methodology

The HHRA conducted for the proposed project addresses construction and operations-related emissions. Cancer risks and 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.

4.1.2.2.1 Dispersion Modeling for Local Concentrations

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 and the first year of operations 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 above. A summary is provided below.

TAC concentrations were estimated using dispersion modeling to estimate total PM_{10} concentrations and VOC concentrations; 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).

Project-related concentrations for TAC from construction and operations-related sources were estimated using an air dispersion model (AERMOD Version 16216r) with the model option for 1-hour, 8-hour, and annual average concentrations selected.[107] Data used as input to the model were taken from construction and operations-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 construction progresses. Incremental annual average TAC concentrations were used to estimate cancer risk over the entire construction period.
- Operations-related carcinogenic TAC emissions were modeled for each year of operation once construction was completed, based on the first year of operations using current and projected future aircraft and GSE movements, and the location of current and future engine testing activities. Incremental annual average TAC concentrations were used to estimate cancer risk for each year of a receptor's exposure period beyond the construction period.

4.1.2.2.2 Exposure Concentrations

TAC concentrations were estimated at the nearest receptor locations surrounding the airport (shown in Figure 4.1.1-1). 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

[107] 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 16216r, is available on the USEPA's website at https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models.

human health risks and hazards. These estimates assist in making determinations of the significance of health impacts for the proposed project.

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.[108] The guidance recommends the use of a software program, Hot Spots Analysis and Reporting Program Version 2 (HARP2), developed by CARB, 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.

4.1.2.2.3 Overview of Risk Assessment

This HHRA is based on estimates for TAC emissions modeled for the construction and the first year of operation of the proposed project. Baseline construction emissions are assumed to be zero. Baseline operational emissions are represented by the baseline UAL maintenance-related aircraft movements, engine testing, and GSE maintenance at the airport. Cumulative impacts, including possible impacts of airport and non-airport related activity, are discussed in Section 4.1.2.6.

Emissions sources during construction were analyzed for each construction year from 2018 through 2020.

The HHRA followed state and, as necessary, federal guidance for performance of risk assessments and was conducted as described above and defined in SCAQMD and CalEPA guidance[109,110] 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 (RELs), and/or acute RELs.[111] Cancer slope factors define the relationship between inhalation of TAC and risk of

---

108 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: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

109 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.

110 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: https://oehha.ca.gov/air/crnr/adoption-air-toxics-hot-spots-risk-assessment-guidelines-part-i-technical-support-document; 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: https://oehha.ca.gov/air/crnr/notice-adoption-technical-support-document-exposure-assessment-and-stochastic-analysis-aug; 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: https://oehha.ca.gov/air/crnr/air-toxics-hot-spots-program-risk-assessment-guidelines-part-iii-1999; 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: https://oehha.ca.gov/air/crnr/technical-support-document-cancer-potency-factors-2009; 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: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

111 California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, *Toxicity Criteria Online Database.* Available: https://oehha.ca.gov/chemicals, accessed January 19, 2017.

developing cancer. RELs define the relationship between inhalation of TAC and subsequent non-cancer health impacts. RELs are separately identified for both long- and short-term exposure durations.

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.[112] This list of TAC was further refined to include only TAC with chronic 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**.

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

112 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-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir.

Table 4.1.2-1 Toxic Air Contaminants (TAC) of Concern for the Proposed Project
PM = Particulate matter
VOC = Volatile organic compounds
Prepared By: CDM Smith, January 2018.

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 type 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.

The 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); and
- 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. 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.[113] No pathway other

113 City of Los Angeles, Los Angeles World Airports, *Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements,* (SCH 1997061047), Technical Report 14a, Health Risk Assessment, and Technical Report S-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir.

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 the CalEPA OEHHA 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 diesel particulate matter (DPM), hexavalent chromium, benzene, formaldehyde, and nickel, all of which are associated with the greatest estimated health impacts in previous programmatic and project-specific LAWA risk assessments.

Acute RELs developed by the State of California were used in the characterization of acute non-cancer health hazards associated with the proposed project.[114] Other sources of acute toxicity criteria (e.g., Agency for Toxic Substance and Disease Registry [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 were used to characterize cancer risks and chronic non-cancer health hazards associated with longer-term inhalation of emissions from construction or operational activities.[115] Both types of toxicity criteria are based on studies of chronic exposure in animals or, in some cases, in people. Tables of the toxicity values used in the HHRA calculations are provided in Appendix B.4.

Acute RELs were used to characterize hazards associated with short-term exposure (usually from exposures on the order of 1-hour or 8-hours). RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. Because margins of safety are incorporated to address data gaps and uncertainties, exceeding an REL does not automatically indicate an adverse health impact.[116] 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 child and adult residential receptors, respectively, and a 25-year period for off-site workers.

---

[114] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, *Toxicity Criteria Online Database.* Available: https://oehha.ca.gov/chemicals, accessed January 19, 2017.

[115] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, *Toxicity Criteria Online Database*. Available: https://oehha.ca.gov/chemicals, accessed January 19, 2017.

[116] 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.

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 2018 to 2020. 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 modeled for the first year of operations. Although the proposed project would result in an overall decrease in operational TAC emissions, it was projected that the centralization of TAC emissions could lead to potential impacts on human health due to the closer proximity of these emissions to people living, working, recreating, or attending school near LAX.

Grid points were identified where construction and operational 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 for several on-airport locations that are not located within the proposed project boundaries (for on-airport/off-site workers) and for several off-airport locations (for off-airport workers/residents). These locations represent MEI, based on dispersion modeling. 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 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. Off-airport locations were used to identify residential, commercial, and other sensitive land uses, such as schools, hospitals, nursing homes, daycare facilities, etc. For identified sensitive land uses without a corresponding discrete receptor, the nearest receptor that is closer to the project site was used as representative. The modeled receptor locations are shown on Figure 4.1.1-1.

Receptors placed at the fence-line (LAX boundary) represent the highest or near-highest concentrations that could be considered "off-airport." However, because no homes are located on the fence-line, concentrations in areas where people actually work or live would be lower than that at the fence-line.

Methodology for 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. Consistent with recent OEHHA guidance,[117] cancer risks were based on an exposure duration of 30 years for adult residents (age 16 through 45), 9 years for child residents (age 0 through 9), 30 years for a resident from the third trimester through age 30, and 25 years for workers (age 16 through age 40). The methodology is conservative, as it assumes individuals would be exposed to TAC for almost every hour of each day of the receptor's respective exposure duration. Years of exposure after construction assume a risk increment equal to the future operational risk minus the baseline operational risk, calculated at each

[117] 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: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

receptor point. Impacts of exposure to multiple TAC were accounted for by adding cancer risk estimates for exposure to all carcinogenic chemicals.

Methodology for Evaluating 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). An HQ greater than 1 indicates an exposure concentration greater than an exposure that is considered safe. A ratio that is less than 1 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 1 are generally accepted as being associated with low risks (or even no risk) of adverse effects, and it is generally accepted 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.

Methodology for Evaluating 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. Intermittent exposure is defined 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. Because 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. An 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. An HI less than 1 suggests that adverse acute non-cancer health impacts are unlikely.

Methodology for Evaluating 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 Division of Occupational Safety and Health (CalOSHA) 8-hour Time-Weighted Average Permissible Exposure Limits (PEL-TWAs).[118]

---

118 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.

Population-Based Risks

When MEI risks exceed threshold levels, CalEPA guidance indicates that population-based risks should be calculated.[119] 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 x 10^{-6}). As shown in Section 4.1.2.5, *Impact Analysis*, below, no MEI thresholds would be exceeded by the proposed project. Therefore, a population-based cancer burden analysis was not performed for this EIR.

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 parameter assumptions, toxicity assessment, the assumptions inherent to the 2015 OEHHA Air Toxics Methodology, and interactions among acrolein and criteria pollutants.[120] 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.

4.1.2.3 Existing Conditions

4.1.2.3.1 Regulatory Setting

State

CARB's statewide comprehensive air toxics program was established in the early 1980s. 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, CARB has adopted diesel risk reduction plans and measures to reduce DPM emissions and the associated health risk. These are discussed in more detail in the following section.

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.

---

119 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: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

120 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: https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.

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 a boom), vehicles being serviced, or in a queue waiting for work. A prohibition against acquiring certain vehicles (e.g., Tier 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 2014.[121] 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.[122]

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 South Coast Air Basin. The SCAQMD determined that the significance criterion for cancer health risks is a 10 in 1 million increase in the chance of developing cancer. The SCAQMD 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 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.[123]

4.1.2.3.2 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, was published in May 2015.[124] The study

[121] California Air Resources Board, *In-Use Off-Road Diesel Vehicle Regulation, Overview*, Revised October 2016. Available: https://www.arb.ca.gov/msprog/ordiesel/faq/overview_fact_sheet_dec_2010-final.pdf.

[122] 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.

[123] South Coast Air Quality Management District, *SCAQMD Air Quality Significance Thresholds*, revised March 2015. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf.

[124] 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.

estimates the cancer risk from TAC emissions throughout the South Coast Air 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 South Coast Air 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 1 million to 480 in 1 million, with an average of 418 in 1 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.

As part of the MATES III Study, the SCAQMD 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.[125] 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 early childhood exposure. According to MATES-IV, although in general there has been an overall South Coast Air 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.

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.[126]

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 South Coast Air Basin, where mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors to the overall risk.

---

125 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.

126 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.

Sources of Toxic Air Contaminants of Concern

Baseline sources of TACs associated with UAL's maintenance activities include both stationary and mobile sources. Stationary sources consist of aircraft maintenance facilities. Mobile sources of TACs include aircraft, GSE, 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 EIR indicated that the greatest area of human health impact from airport activities is confined to the airport property (see Section 4.1.1.2, 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 facilities. 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 LAX Crowne Plaza Hotel located at 5985 W. Century Boulevard, approximately 450 feet north of the project site.
- The Lennox residential neighborhood located approximately 5,875 feet to the east of the project site.
- The El Segundo residential neighborhood located approximately 5,650 feet to the southeast of the project site.
- The El Segundo residential neighborhood located approximately 5,000 feet to the southwest of the project site.
- Westchester neighborhoods located approximately 3,800 feet to the north of the project site.

4.1.2.4 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 incremental impact to human health would occur if changes related to construction or operation of the proposed project would result in one or more of the following conditions:[127]

- An increased incremental cancer risk greater than, or equal to, 10 in 1 million (10×10^{-6}) for potentially exposed off-site workers or residents.[128]
- 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 greater than, or equal to, 1 for any target organ system at any receptor location.[129]

---

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

128 Incremental cancer risk is defined as the difference in cancer risks between the proposed project and the "without project" condition.

129 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.

- A total incremental acute HI greater than, or equal to, 1 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.[130]

4.1.2.5 Impacts Analysis

The following analysis pertains to the construction and operations-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.4 provides detailed health risk modeling data supporting the impact analyses.

Locations representative of the nearest sensitive receptors were analyzed within the study area in the vicinity of the airport for each construction year from 2018 to 2020. 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.

4.1.2.5.1 Cancer Risks

Peak construction and operations-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.4. As shown, construction and operations-related cancer risks would be less than significant for adult workers, as well as adult and child residents.

Residents (Adult, Child, and 30-Year)

For construction and operations-related cancer risks, adult, child, and 30-year residents were evaluated at identified residential receptors. Because construction of the proposed project is estimated to be approximately 1 year and 10 months, incremental cancer risk for residents was estimated assuming 2 years of construction; following completion of construction, it was assumed that residents would be exposed to operational project-related TAC impacts for the remaining years of their respective exposure periods.

---

130 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.

Table 4.1.2-2 Incremental Peak Cancer Risks for Maximally Exposed Individuals			
Receptor Type	Cancer Risks[1] (per million people)	Threshold (per million people)	Exceeds Threshold?
30-Year Resident, 30 years	1.2	10	No
Adult Resident, 30 years	0.1	10	No
Child Resident, 9 years	0.9	10	No
Adult Worker, 25 years	4.3	10	No

Source: Appendix B.4 of this EIR.

1. Cancer risk includes 2 years of construction and all remaining time of the exposure period as operational risk.

Prepared By: CDM Smith, January 2018.

Incremental cancer risks for adult, child and a 30-year residents at the peak residential receptor are estimated to be 0.1 in 1 million, 0.9 in 1 million and 1.2 in 1 million, respectively, all of which are below the threshold of significance of 10 in 1 million. For the peak construction portion of the cancer risk, DPM would contribute approximately 39 percent of the risk for residents. Hexavalent chromium would contribute approximately 48 percent. For the operations portion of the cancer risk, DPM would contribute approximately 72 percent while hexavalent chromium would contribute approximately 28 percent. The peak cancer risk location for residents is shown on **Figure 4.1.2-1**.

Adult Worker

Adult workers were evaluated at on and off-airport grid nodes. Because the exposure period of the adult worker is 25 years and construction of the project is estimated to be 1 year and 10 months, incremental cancer risk for the worker was estimated assuming 2 years of construction; following completion of construction, it was assumed that adult workers were exposed to operational impacts associated with the proposed project for the remaining 23 years of the 25-year exposure period.

Construction-related cancer risks for adult workers at the peak off-site location are estimated to be 4.3 in 1 million, below the threshold of significance of 10 in 1 million. Similarly to residents, for the construction portion of the cancer risk, DPM and hexavalent chromium would contribute the majority of the cancer risk for adult workers, approximately 36 percent and 47 percent, respectively. For the operational contribution to the cancer risk, DPM and hexavalent chromium would contribute 97 percent and 3 percent, respectively. The peak cancer risk location for adult workers is shown on Figure 4.1.2-1.

4.1.2.5.2 Chronic Non-Cancer Health Hazards

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

LAX UAL East Aircraft Maintenance and GSE Project	Peak Unmitigated Construction Health Risks	Figure **4.1.2-1**

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

Year	Resident[1]	Adult Worker[1]	Significance Threshold	Exceeds Threshold?
Peak Construction Year, 2019	0.010	0.168	1	No
First Year of Operations, 2021	<0.001	0.001	1	No

Source: Appendix B.4 of this EIR.

Note:

1. Hazard indices are unitless.

Prepared By: CDM Smith, January 2018.

Resident

The maximum HI for a resident living at the peak hazard location for a single year of construction of the proposed project is 0.010, projected to occur in 2019. The maximum HI for a resident living at the peak hazard location for a single year of operations of the proposed project is <0.001. The peak residential hazard locations for construction and for operations are shown on Figure 4.1.2-1. Non-cancer hazard indices for adult residents, child residents, and the 30-year resident 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 1.

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 0.168, projected to occur in 2019. The maximum HI for an adult worker at the peak hazard location for a single year of operations of the proposed project is 0.001. The peak commercial hazard location is shown on Figure 4.1.2-1 for construction and operations. All incremental chronic non-cancer health hazards for adult workers would be below the significance threshold of 1.

4.1.2.5.3 Acute Non-Cancer Health Hazards

Acute non-cancer health hazards were evaluated for the modeled peak day of construction and operations. One-hour exposure durations were used to represent exposure to individuals moving through or near LAX. Eight-hour exposure durations were used to represent exposure to individuals who would be on-site for longer periods of time. Both residential receptor locations and worker receptor locations were modeled for each exposure scenario to fully capture any potential risk associated with construction or operation of the proposed project.

An HI equal to or greater than 1 would indicate possible acute adverse health effects. As shown in **Table 4.1.2-4** and **Table 4.1.2-5**, for both 1-hour and 8-hour exposure periods for all receptor locations, the HQs for acute exposure to all TACs would be less than 1. Hence, no adverse health impacts are projected.

When examining construction-related acute non-cancer health hazards by target organ system, at peak 1-hour concentrations, the highest hazard target organ system is the immune system, with nickel and benzene responsible for 67.9 percent and 32.1 percent of the total risk at the peak worker location, respectively. At the peak residential location, nickel and benzene are responsible for 84.3 percent and 15.7 percent of the total risk, respectively. Exposure to other common TAC associated with construction activities, such as arsenic and formaldehyde, result in non-zero hazard indices, but do not contribute to risk affecting the highest risk organ system. Acrolein, which is associated with aircraft operations, does not contribute substantially to construction-related acute hazards. 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.

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

Location	Acrolein[1]	Arsenic[1]	Benzene[1]	Formaldehyde[1]	Nickel[1]	Total Risk[2]	Significance Threshold	Exceeds Threshold?
Worker (Construction)	0.007	0.015	0.025	0.045	0.053	0.078	1	No
Worker (Operations)	0.027	<0.001	0.002	0.006	<0.001	0.033	1	No
Resident (Construction)	<0.001	0.003	0.002	0.002	0.009	0.011	1	No
Resident (Operations)	0.006	<0.001	<0.001	0.001	<0.001	0.007	1	No

Source: Appendix B.4 of this EIR.

Note:

1. Hazard indices are unitless.
2. TACs affect different organs in the body so the combined risk of acute exposure would not necessarily be additive between all TACs.

Prepared By: CDM Smith, January 2018.

When examining operations-related acute non-cancer health hazards by target organ system, at peak 1-hour concentrations, the highest hazard target organ system is the eyes, with acrolein and formaldehyde responsible for 80.8 percent and 18.5 percent of the total risk at the peak worker location, respectively. At the peak residential location, acrolein and formaldehyde for 80.8 percent and 18.5 percent of the total risk, respectively. Exposure to another common TAC associated with operational activities, benzene, has a non-zero hazard index, but does not contribute to risk affecting the highest risk organ system. Maximum acute non-cancer health hazards associated with a 1-hour exposure to these chemicals from the proposed project operation are summarized in Table 4.1.2-4.

When examining construction-related acute non-cancer health hazards by target organ system, at peak 8-hour concentrations, the highest hazard target organ system is the reproductive/development system, with manganese, benzene, and arsenic responsible for 64.0 percent, 17.0 percent, and 15.0 percent of the total risk at the peak worker location, respectively. At the peak residential location, manganese, benzene, and arsenic are responsible for 71.9 percent, 16.8 percent, and 7.3 percent of the total risk, respectively. Exposure to other common TAC associated with construction activities, such as formaldehyde and nickel, result in non-zero hazard indices, but do not contribute to risk affecting the highest risk organ system. Acrolein, which is associated with aircraft operations, does not contribute substantially to construction-related acute hazards. Maximum acute non-cancer health hazards associated with a 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 and Operations-Related Acute (8-Hour) Non-Cancer Health Hazards

Location	Acrolein[1]	Arsenic[1]	Benzene[1]	Formaldehyde[1]	Manganese[1]	Nickel[1]	Total Risk[2]	Significance Threshold	Exceeds Threshold?
Worker (Construction)	0.011	0.085	0.097	0.011	0.363	0.074	0.567	1	No
Worker (Operations)	0.014	<0.001	0.002	0.005	<0.001	<0.001	0.022	1	No
Resident (Construction)	<0.001	0.011	0.005	0.004	0.048	0.010	0.066	1	No
Resident (Operations)	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	1	No

Source: Appendix B.4 of this EIR.

Note:

1. Hazard indices are unitless.
2. TACs affect different organs in the body so the combined risk of acute exposure would not necessarily be additive between all TACs.

Prepared By: CDM Smith, January 2018.

When examining operations-related acute non-cancer health hazards by target organ system, at peak 8-hour concentrations, the highest hazard target organ system is the eyes, with acrolein, formaldehyde, and manganese responsible for 69.9 percent, 27.3 percent, and 2.4 percent of the total risk at the peak worker location, respectively. At the peak residential location, acrolein, formaldehyde, and manganese are responsible for 67.6 percent, 26.4 percent, and 5.7 percent of the total risk, respectively. Exposure to another common TAC associated with operational activities, benzene, has a non-zero hazard index, but does not contribute to risk affecting the highest risk organ system. Maximum acute non-cancer health hazards associated with a 8-hour exposure to these chemicals from the proposed project operation are summarized in Table 4.1.2-5.

4.1.2.5.4 Occupational 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, it was determined that the CalOSHA 8-hour PEL-TWAs were inappropriate for addressing worker risk from a dispersion analysis.[131] 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 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.

4.1.2.5.5 Population-Based Risks

A population-based cancer burden analysis was not performed for this EIR because no MEI threshold was exceeded.

4.1.2.5.6 Summary of 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 implementation of the proposed project would be below the threshold of significance of 10 in 1 million for child resident, adult resident, and adult worker. Incremental cancer risk impacts 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 and operation 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 and operations would be less than significant.

---

131 City of Los Angeles, Los Angeles World Airports, *Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements,* (SCH 1997061047), Technical Report 14a, Health Risk Assessment, and Technical Report S-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir; City of Los Angeles, *Final Environmental Impact Report for Los Angeles International Airport (LAX) Specific Plan Amendment Study*, (SCH 1997061047), Appendix G1, Human Health Risk Assessment, January 2013. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/specific-plan-amendment-study/documents.

- 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 and operation of the proposed project. Incremental acute non-cancer impacts would be less than significant for both workers and residents.

4.1.2.6 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, but no determination is made regarding the significance of cumulative impacts. However, the project's incremental contribution to cumulative impacts is identified, following SCAQMD policy.[132] Based on information available from the SCAQMD 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.

4.1.2.6.1 Cancer Risk

The SCAQMD has conducted a series of urban air toxics monitoring and evaluation studies (MATES) for the South Coast Air Basin.[133] The original study was published in June 1987 and has been updated several times. The most recent study, MATES-IV, was published in May 2015.[134] According to MATES-IV, although in general there has been an overall South Coast Air Basin-wide reduction in air toxics concentrations since MATES-III, application of the updated risk estimation methods recently adopted by OEHHA results in an estimated population weighted risk across the South Coast Air Basin of 897 case per million people, an increase in the previously-reported cancer risk. As noted above, no standards exist that establish acceptable levels of human health risks or that identify a threshold of significance for cumulative health risk impacts. Therefore, there is no basis upon which to make a determination regarding the significance of these cumulative health risks. Moreover, while the MATES-IV study is an appropriate estimate of present cumulative impacts of TAC emissions in the South Coast Air Basin, it does not 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 4.3 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.

---

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

[133] 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/air-quality/air-quality-studies/health-studies.

[134] 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.

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 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, and whether such measures would alter incremental proposed project contributions of TAC releases to cumulative impacts would be speculative to predict.

4.1.2.6.2 Chronic Non-Cancer Health 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, chronic non-cancer health hazards are primarily attributable to chlorine and manganese and, to a lesser extent, arsenic, cadmium, DPM, 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.[135] 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 for annual average concentrations yield acrolein hazard indices by census tract ranging from 0.13 to 11, with an average of 2; DPM hazard indices ranging from 0.01 to 0.50, with an average of 0.15; and chlorine hazard indices ranging from 0.01 to 0.16, with an average of 0.06.[136] Incremental hazard indices for the proposed project (Table 4.1.2-3) were estimated to range from <0.001 to 0.17, below the threshold of significance of 1. 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,[137] 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 Technical Report S-9a, Section 7.[138]

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 South Coast Air 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

---

135 U.S. Environmental Protection Agency, *2011 National-Scale Air Toxics Assessment*, Released 2015. Available: https://www.epa.gov/national-air-toxics-assessment/2011-national-air-toxics-assessment, accessed January 18, 2018.

136 U.S. Environmental Protection Agency, *2011 National-Scale Air Toxics Assessment*, Released 2015. Available: https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment-results, accessed January 18, 2018.

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

138 City of Los Angeles, Los Angeles World Airports, *Final Environmental Impact Report for Los Angeles International Airport (LAX) Proposed Master Plan Improvements,* (SCH 1997061047), Technical Report S-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir.

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. Degradation may be very important for relatively reactive chemicals, such as acrolein.

4.1.2.6.3 Acute Non-Cancer Health Hazards

Acrolein, formaldehyde, and manganese are the primary TAC of concern in proposed project emissions as these pollutants are associated with jet aircraft engines and/or construction emissions. Predicted concentrations of TAC released from construction and operational activities for the proposed project estimate that acute non-cancer health hazards would be below the significance threshold of 1.

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 (Section 4.24.1.7 and Technical Report S-9a, Section 6.3),[139] 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 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 (Section 4.24.1.7 and Technical Report S-9a, Section 6.1).[140] 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 for each census tract in Los Angeles County 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 0.027 (Table 4.1.2-4); hazards associated with formaldehyde peaked at 0.045 (Table 4.1.2-4); and hazards associated with manganese peaked at 0.363 (Table 4.1.2-5).

---

[139] 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, and Technical Report S-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir.

[140] 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, and Technical Report S-9a, Supplemental Health Risk Assessment, April 2004. Available: https://www.lawa.org/en/lawa-our-lax/environmental-documents/documents-certified/2004-lax-master-plan-program/final-environmental-impact-report-feir.

Comparing the results for the proposed project to the estimated existing risks for Los Angeles County suggests that the acute non-cancer health hazards for the proposed project would not substantially contribute to total acute non-cancer health hazards of acrolein and formaldehyde. While acute non-cancer health hazards associated with manganese and several other TACs would increase during construction, as shown in Table 4.1.2-5, the total acute hazard indices would not exceed the significance threshold during construction and would drop considerably during operations. Therefore, acute non-cancer health hazards associated with the proposed project would not be cumulatively considerable.

4.1.2.6.4 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.[141] If cumulative health risks are evaluated following this SCAQMD policy, the project's contribution to the cumulative cancer risk would not be cumulatively considerable under the proposed project scenario since the incremental cancer risk impacts associated with the combined construction and operation of the proposed project for all receptors would be below the individual cancer risk significance thresholds of 10 in 1 million.

With regard to hazard indices for TAC emissions, SCAQMD's policy has different significance thresholds for project-specific versus cumulative impacts. The project-specific significance threshold is 1.0 and the cumulative threshold is 3.0. Based on this SCAQMD policy, chronic non-cancer hazards and acute non-cancer health hazards associated with project-related emissions would not be cumulatively considerable.

4.1.2.7 Mitigation Measures

As described in Sections 4.1.2.5 and 4.1.2.6, health risk impacts from construction and operation of the proposed project would be less than significant and project-related contributions to cumulative impacts would not be cumulatively considerable. Therefore, no mitigation measures are required. However, as discussed in Section 4.1.1.7, Mitigation Measure MM-AQ (UAL)-1 (Construction-Related Air Quality Mitigation Measures) would reduce construction-related air pollutant emissions associated with the proposed project. Although developed to address construction-related air quality impacts from criteria pollutant emissions, this mitigation measure would also reduce health risks associated with exposure to TAC.

4.1.2.8 Level of Significance After Mitigation

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

---

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