4.4 Human Health Risk Assessment

4.4.1 Introduction

This Human Health Risk Assessment (HHRA) addresses potential impacts to people exposed to toxic air contaminants (TACs) anticipated to be released as a result of the proposed Project. Potential impacts to human health associated with releases of TACs may include increased cancer risks and increased chronic (long-term) and acute (short-term) non-cancer health hazards from inhalation of TACs by people working, living, recreating, or attending school on or near the Project site. The objective of this HHRA is to estimate increased incremental health risk associated with construction activities of the proposed Project. Given that the proposed Project would not increase operational capacity at LAX nor would it substantially affect airport operations, this HHRA only assesses the health impacts to people exposed to TACs during the construction phase of the proposed Project.

The HHRA was conducted in four steps as defined in South Coast Air Quality Management District[1] (SCAQMD), California Environmental Protection Agency[2] (CalEPA) and U.S. Environmental Protection Agency[3] (EPA) guidance, consisting of:

- Identification of TACs that may be released in sufficient quantities to present a public health risk (Hazard Identification);
- Analysis of ways in which people might be exposed to TACs (Exposure Assessment);
- Evaluation of the toxicity of TACs that may present public health risks (Toxicity Assessment); and
- Characterization of the magnitude and location of potential health risks for the exposed community (Risk Characterization).

Specifically, this HHRA addresses the following issues:

[1] South Coast Air Quality Management District, Supplemental Guidelines for preparing Risk Assessment for the Air Toxics Hot Spots Information and Assessment Act (AB2588). July 2005.

[2] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines, Part I: Technical Support Document for the Determination of Acute Reference Exposure Levels for Airborne Toxicants, March 1999; Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis, September 2000; Air Toxics Hot Spots Program Risk Assessment Guidelines, Part III: The Determination of Chronic Reference Exposure Levels for Airborne Toxicants, February 23, 2000; Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II: Technical Support Document for Describing Available Cancer Potency Factors, updated August 2003; Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.

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

- Quantitative assessment of potential cancer risks and chronic non-cancer health hazards due to the release of TACs associated with the proposed Project construction activities.
- Quantitative evaluation of possible acute non-cancer health hazards due to the release of TACs associated with the proposed Project construction activities.

Risk assessment is an evolving and uncertain process, which includes important uncertainties emanating from the estimation of emissions of TACs, the dispersion of such TACs in the air, actual human exposure to such TACs, and health effects associated with such exposure. There are also uncertainties associated with evaluation of the combined effects of exposure to multiple chemicals, as well as interactions among pollutants. These uncertainties were discussed in detail in the LAX Master Plan Final EIR Technical Report 14a and Technical Report S-9a.[4] This HHRA relied upon the best data and methodologies available; however, the nature and types of uncertainties described in the LAX Master Plan Final EIR Technical Reports also apply to this HHRA.

To help address uncertainties, conservative methods were used to estimate cancer risks and chronic non-cancer hazards. That is, methods were used that are much more likely to overestimate possible health risks. For example, risks were calculated for individuals at locations where TAC concentrations are predicted to be highest (maximally exposed individual or MEI). Further, these individuals were assumed to be exposed to TACs for almost all days of the year and for many years to maximize estimates of possible exposure.

Resulting incremental risk estimates represent upper-bound predictions of exposure and, therefore, health risk, which may be associated with living near, and breathing TACs released during the construction phase of the proposed Project. By protecting hypothetical individuals that receive the highest exposures, the risk assessment is also protective for actual members of the population near LAX that would not be as highly exposed.

The HHRA for the proposed Project also evaluates potential short-term (1-hour) exposures and associated acute, health impacts. These estimates are also intentionally conservative; for example, maximum concentrations were used to assess possible hazards for receptors that live, work, go to school, or recreate off-airport. Actual exposure concentrations in off-airport areas are, again, overestimated by this approach.

4.4.2 Methodology

Cancer risk and chronic and acute non-cancer health hazard assessments for this HHRA consisted of two steps: (1) estimation of emissions of TACs associated with project construction, and subsequent air dispersion modeling of those emissions; and (2) estimation of incremental health risks associated with those emissions. The estimated emission rates were used, along with meteorological and geographic information, as inputs to the USEPA AERMOD air dispersion model to predict ambient concentrations of TACs released during construction of the

[4] City of Los Angeles, Los Angeles World Airports (LAWA), and FAA, Final Environmental Impact Statement/Final Environmental Impact Report, Los Angeles International Airport Proposed Master Plan Improvements, April 2004.

proposed Project. The predicted concentrations were in turn used to calculate human health risks and hazards.

The results of the analysis were then interpreted by comparing cancer risks and chronic non-cancer health hazards to regulatory thresholds. For purposes of assessing the significance of any health impacts, these comparisons were made for MEI at locations where maximum concentrations of TAC were predicted by the air dispersion modeling. An impact was considered significant if cancer risks and/or chronic non-cancer health hazards for MEI exceeded regulatory thresholds. Acute non-cancer health hazards were estimated by comparing modeled maximum 1-hour concentrations with acute Reference Exposure Levels (RELs).

Details of the methodologies, as well as health risk calculations, are provided in **Appendix E** of this EIR.

4.4.2.1 Exposure Assessment

The exposure assessment includes identification of exposed populations, selection of exposure pathways, and calculation of exposure concentrations and total dose. For the HHRA analysis of the proposed Project, receptors selected for quantitative evaluation were: off-airport workers, off-airport adult residents, off-airport child residents, off-airport school children, and on-airport workers. Each receptor represents a unique population and set of exposure conditions. As a whole, they cover a range of exposure scenarios for people who may be affected by the construction emissions of the proposed Project. Receptors for which exposure scenarios were prepared were selected to provide protective risks and hazards estimated for MEI and to demonstrate the range of risks and hazards in the vicinity of the airport. As previously noted, by providing estimates for the most exposed individuals for determination of significance, the general population is protected.

Different receptors could be exposed to TAC in several ways, called exposure pathways. An exposure pathway consists of four basic parts: a TAC source (e.g., diesel engines); a release mechanism (e.g., diesel engine exhaust); a means of transport from the release point to the receptor (e.g., local winds); and a route of exposure (e.g., inhalation). Numerous possibly complete exposure pathways exist for receptors at or near LAX, but most are anticipated to make minimal to negligible contribution to total risks and hazards. For this HHRA, the inhalation pathway is the most important complete exposure pathway, contributing the majority of risk associated with the proposed Project, and was therefore quantitatively evaluated for all receptors. Other exposure pathways, including deposition of TACs onto soils and subsequent exposure via incidental ingestion of this soil, uptake from soil into plants, and other indirect pathways, were addressed quantitatively in the programmatic HHRA developed for the LAX Master Plan EIR (see LAX Master Plan Final EIR Technical Report 14a and Technical Report S-9a).

Modeled concentrations were used for estimating human health risks and hazards, which serve as the basis for significance determinations for the proposed Project. To estimate cancer risks and the potential for adverse acute and chronic non-cancer health hazards, TAC intake via inhalation for each receptor were estimated. Average long-term daily intakes were used to estimate risk and hazards. Cancer risk was evaluated as the lifetime average daily dose (LADD) according to CalEPA and EPA guidance. Non-cancer health hazards were evaluated as average daily dose (ADD) over the period of exposure, again, following CalEPA and USEPA guidance.

The assessment of chronic non-cancer health hazard impacts due to the release of TACs associated with the construction of the proposed Project assumes that exposure concentrations of TACs are constant over a 70-year period for residential receptors. Exposure parameters used to calculate LADD and ADD for all receptors for the inhalation pathway are summarized in **Table 4.4-1**.

Table 4.4-1

Parameters Used to Estimate Exposures to TACs of Concern

	Off-Airport Receptors				
	Off-Site Resident				
Exposure Pathway Inhalation of Particulates and Gases	**Adult (70 years)**	**Adult (30 years)**	**Child**	**Off-Site School Child**	**Off-Site Worker**
Daily Breathing Rate (m^3/day)	20[2]	20[2]	15[2]	6[2]	10[2]
Exposure Frequency (days/yr)	350[1,3]	350[1,3]	350[1,3]	200[4]	245[1]
Exposure Duration (years)	70[1,5]	30[1,5]	6[2]	6[4]	40[1]
Body Weight (kg)	70[1,6]	70[1,6]	15[2]	40	70[1,6]
Averaging Time - Non-cancer (days)	25,550[1,6]	10,929	2,190[6]	2,190[6]	14,600[6]
Averaging Time - Cancer (days)	25,550[1,6]	25,550	25,550[1,6]	25,550[1,6]	25,550[1,6]

Notes:
1 Cal/EPA, Air Toxic Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.
2 USEPA, Exposure Factors Handbook, USEPA/600/P-95/002Fa, 1997.
3 USEPA, Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors, Office of Solid Waste and Emergency Response, Washington D.C., August, 1991.
4 Site-specific. See Appendix E, Attachment E.1 and E.3.
5 70 year exposure duration will be used as basis for determining significance.
6 USEPA, Risk Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual, Part A, USEPA/540/1-89/002, Office of Emergency and Remedial Response, Washington D.C., 1989.

Source: Ricondo & Associates, Inc., April 2014.

4.4.2.2 Toxicity Assessment

Toxicity cancer risk factor and chronic REL of TACs developed by the State of California were used to characterize cancer risks and chronic non-cancer health associated with longer term exposure to construction emissions. Acute REL for each analyzed TAC developed by the State of California were used in the characterization of potential acute non-cancer health hazards associated with the construction of the proposed Project.

4.4.2.3 Risk Characterization

Concentrations of TAC of concern in air, locations of potentially exposed populations, including locations for MEI exposure scenarios (worker, resident, student), and toxicity criteria were used to calculate incremental human health risks associated with the proposed Project.

For the proposed Project, grid points were analyzed along the airport fence-line and within the study area, as shown in **Figure 4.4-1**. These locations are anticipated to represent MEI, based on previous dispersion modeling for LAX. Concentrations of each TAC at these nodes were used in calculating cancer risk, and chronic and acute non-cancer health hazard estimates. These calculations were used to identify locations with maximum cancer risks and maximum non-cancer health hazards and serve as the basis for significance determinations.

MEI estimates were partially land use specific. On-airport locations were used to identify on-airport worker locations. For off-airport locations, all land uses and associated receptors (commercial, residential, etc.) were evaluated for all fence-line grid points under the assumption that such land use could be present now or in the future. Risk and hazard calculations were based on receptors appropriate for land use designations. For example, at each grid node, exposure parameters appropriate for adult commercial workers, for both adult and child residential receptors and for school children were used to estimate exposures, cancer risks, and non-cancer health hazards at that grid point location.

Fence-line concentrations of TAC represent the highest or near-highest concentrations that could be considered "off-airport." Concentrations in areas where people actually work, live, or attend school are predicted to be lower. Thus, impacts for residents, workers, and school children are likely to provide protective estimates for risks and hazards that may occur as a result of implementing the proposed Project.

Nineteen (19) of the 326 grid node locations that are located closest to the schools nearest the LAX fence-line (e.g., St. Bernard High School, and Visitation Elementary School located north of LAX) were selected to assess acute non-cancer health hazards for sensitive receptors attending or working at schools near the fence-line. The analysis for these 19 grid nodes provides direct information on potential impacts on students, faculty, and staff at these schools. To ensure a conservative analysis for school children, grid nodes were placed between the schools and construction and operational sources and somewhat closer to these TAC sources. Finally, one location on the airport was evaluated to represent where on-airport workers might receive the greatest exposure to TACs. Risk and hazard estimates for this location were not used for significance determination; health and safety of on-airport workers is regulated under the California Occupational Safety and Health Administration (CalOSHA) and no risk or hazards are estimated for these workers. Instead, these estimates are used to provide additional perspective on possible impacts of construction emissions by comparison to the CalOSHA 8-hour Time-Weighted Average Permissible Exposure Levels (PEL-TWAs).

Evaluation of Cancer Risks and Chronic Non-Cancer Health Hazard

Cancer risks of TACs were estimated by multiplying exposure estimates for TACs by the pollutant-specific cancer risk factor. The result is a risk estimate expressed as the odds of developing cancer. Cancer risks were based on an exposure duration of 70 years.

Chronic non-cancer health hazard estimates of TACs were calculated by dividing exposure estimates of each TAC by the chronic REL. RELs are estimates of the highest exposure levels that would not cause adverse health effects even if exposures continue over a lifetime. A ratio that is less than one indicates that the proposed Project exposure was less than the highest exposure level that would cause adverse health effects and, hence, no impact to human health would be expected.

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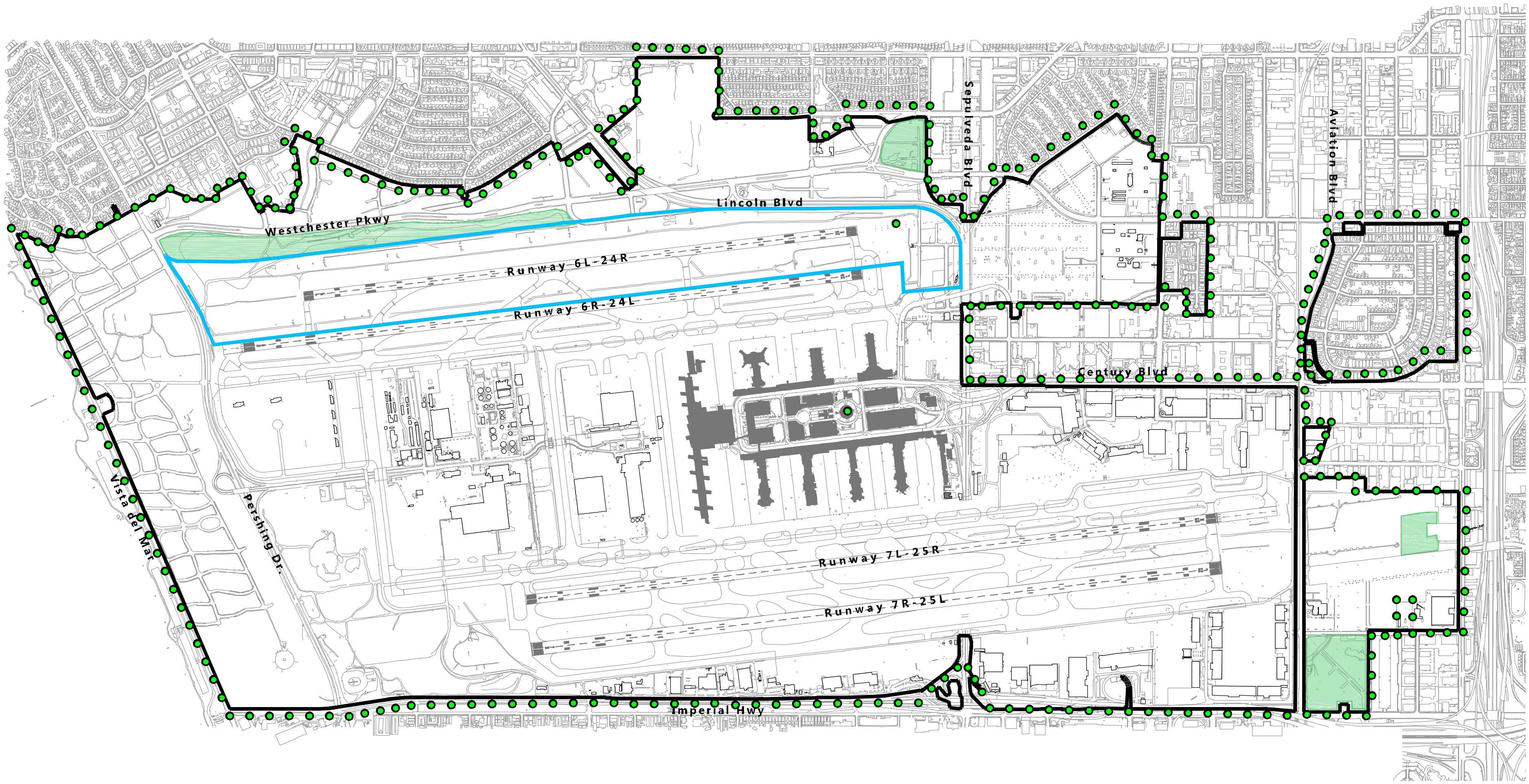

Source: Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Ricondo & Associates, Inc., October 2013.

Prepared by: Ricondo & Associates, Inc., May 2014.

LAX Runway 6L-24R and Runway 6R-24L Runway Safety Area and Associated Improvements Draft EIR

Human Health Risk Assessment Receptor Locations

Figure **4.4-1**

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Evaluation of Acute Non-Cancer Health Hazard Impacts

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. RELs do not distinguish between adults and children, but are established at levels that are considered protective of sensitive populations. Since margins of safety are incorporated to address data gaps and uncertainties, exceeding the REL does not automatically indicate an adverse health impact.

Short-term concentrations for TAC associated with Project construction were estimated using the same air dispersion model (AERMOD) used to estimate annual average concentrations, but with the model option for 1-hour maximum concentrations selected. These concentrations represent the highest predicted concentrations of TAC. Acute non-cancer health hazards were then estimated at each grid point by dividing estimated maximum 1-hour TAC concentrations in air by acute RELs. A hazard index equal to or greater than 1, the threshold of significance for acute non-cancer health impacts, indicates some potential for adverse acute non-cancer health impacts. A hazard index less than 1 suggests that adverse acute non-cancer health impacts are not expected.

Evaluation of Health Effects for On-Airport Construction Workers

Impacts to construction workers were evaluated by comparing estimated acute 8-hour concentrations at one on-airport construction area receptor, to the CalOSHA 8-hour time-weighted average permissible exposure level (PEL-TWA) standards.

4.4.2.4 Overview of Risk Assessment

The HHRA was conducted on TAC emissions associated with the proposed Project construction activities. The HHRA followed state and federal guidance for performance of risk assessments and was conducted in four steps described above, as defined in SCAQMD, CalEPA, and EPA guidance, consisting of selection of TAC of concern, exposure assessment, toxicity assessment, and risk characterization. These steps are summarized below.

Selection of Toxic Air Contaminants of Concern

TACs of concern evaluated in this HHRA are shown in **Table 4.4-2**. They were selected based on emissions estimates and human toxicity information, results of the LAX Master Plan HHRA, and a review of health risk assessments included in the Crossfield Taxiway Project (CFTP) Final EIR, LAX Bradley West Project Final EIR, LAX Specific Plan Amendment Study (SPAS) Final EIR, LAX Runway 7L-25R Runway Safety Area (RSA) and Associated Improvements Final EIR, LAX West Aircraft Maintenance Area (WAMA) Project Final EIR, and the Midfield Satellite Concourse (MSC) Draft EIR. The primary TACs that contribute to health risk from diesel exhaust are from diesel particulate matter (DPM) and formaldehyde. However, all the TACs listed in Table 4.4-2 were included within this HHRA.

Table 4.4-2

Toxic Air Contaminants (TAC) of Concern for the Proposed Project

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

Notes:
PAH = Polycyclic aromatic hydrocarbons
PM = Particulate matter
VOC = Volatile organic compounds

Source: Ricondo & Associates, Inc., December 2013.

These TACs represent those pollutants that are most conducive to cancer risk, as well as adverse chronic and acute health exposure.

Emissions of Toxic Air Contaminants

Both organic and particulate-bound TACs were analyzed in this HHRA. TACs exist in air as either reactive organic gases or particulate matter. For purposes of this EIR, organic emissions are represented by volatile organic compounds (VOC). Emission rates of organic TACs were developed from VOC emission inventories for the same construction sources analyzed in Section 4.1 of this EIR. TACs associated with small particles, or those particles less than 10 microns in diameter (PM_{10}), are the focus for particulate emissions, because this size fraction can deposit in the lung and is therefore primarily responsible for inhalation exposure. Emission rates of particulate-bound TACs were developed from the PM_{10} emission inventories also included in Section 4.1. Speciation profiles[5] for VOC and PM_{10} emissions from individual source types, primarily developed by the California Air Resources Board (CARB), were used to calculate TAC emissions.[6] These emissions form the basis for modeling concentrations of TACs in air on and around LAX.

Construction Activities Emissions

Construction of the proposed Project would result in temporary emissions of various air pollutants from construction equipment, vehicles used by workers commuting to the job site, trucks used for haul/delivery trips, and demolition (material crushing and grading). Methods for estimating source emissions are detailed in Section 4.1, *Air Quality*. For emissions estimating, the period of construction for the proposed Project was anticipated to be entirely within 2015.

Emissions of DPM (assumed to be equal to the engine exhaust component of particulates less than 10 microns in diameter) are expected to contribute the majority to total incremental cancer risks for construction sources. Based on previous evaluations of construction impacts at LAX, other TACs have minimal contributions. DPM is classified as a carcinogenic TAC by the California Office of Environmental Health Hazard Assessment (OEHHA). However, the evaluation of cancer risks and chronic health hazards evaluated the release of DPM as well as other associated TACs from construction equipment.

TAC inventories for construction equipment VOC emissions were developed from Organic Profile No. 818 for diesel-fueled equipment, and Organic Profile No. 2110 for gasoline vehicles. TAC emission inventories for construction equipment PM emissions were developed from Profile No. 425 for diesel-fueled equipment, and Profile No. 420 for construction dust.

Aircraft Operations during Construction Emissions

During the construction of the proposed Project, Runway 6L-24R would be closed for a period of 122 days (approximately 4 months) to allow for runway rehabilitation; operations from this runway must be accommodated through the use of other runways at LAX during this time. In

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5 Speciation profiles provide estimates of the chemical composition of emissions and are used in the emission inventory and air quality models. CARB maintains and updates estimates of the chemical composition and size fractions of PM_{10} and the chemical composition and reactive fractions of VOC for a variety of emission source categories. Speciation profiles are used to provide estimates of TAC emissions.

6 California Air Resources Board, Available at: http://www.arb.ca.gov/ei/speciate/dnldoptvv10001.php, Accessed: December 2, 2013.

addition, to allow for completion of construction work on the Argo Ditch, Runway 6L-24R must operate at a reduced length of 7,000 feet for a period of 60 days (2 months). As discussed in Section 4.1 of this EIR, taxi times during these periods would increase above baseline conditions. The incremental differences in taxi/idle times were used for the analysis of aircraft TAC emissions associated with the shift in aircraft operations during the runway closure period and the shortened runway period, as compared to the normal operations scenario. This difference was used to determine the incremental impact: evaluation of potential impacts to human health associated with the proposed Project-specific operational sources during construction (e.g., the shift in aircraft operations) was assessed in this HHRA.

TAC inventories for aircraft VOC emissions were developed from EPA Profile No. 5565 for aircraft engine exhaust.

Exposure Concentrations

Air dispersion modeling was used to estimate TACs concentrations from construction sources of the proposed Project. Concentrations of TACs were estimated using the air dispersion model (AERMOD, Version 12345) with model options for 1-hour maximum and annual average concentrations selected. Incremental short-term 1-hour concentrations were then used to estimate acute non-cancer health hazard impacts and incremental annual average concentrations were used to estimate cancer risk and chronic non-cancer health hazards.

Concentrations were estimated at 326 grid nodes at or near the LAX property line (fence-line), at one grid node at the LAX Theme Building, and at one grid node near the construction area. Receptor type (i.e., recreational, residential, commercial, or school) for each grid node was dictated by land use at or near the grid node location. Modeled concentrations at the fence-line are higher than concentrations modeled farther out from the airport where people currently reside, work, recreate, and go to school due to pollutant dispersion over distance. Concentrations at these fence-line locations reasonably represent concentrations of TACs for use in evaluating MEI.

Nineteen (19) of the 326 fence-line grid nodes are located close to school sites nearest to the LAX fence-line (i.e., Saint Bernard High School at 9100 Falmouth Avenue in Playa Del Rey, and the Visitation Catholic Elementary School north of LAX at 8740 Emerson Avenue in Westchester). These grid nodes were selected to assess risks and hazards for sensitive receptors attending or working at schools near the fence-line.

One grid node was modeled at the Project construction site to represent where on-airport workers might receive the greatest exposure to TACs. The TAC concentrations were compared to the California Occupational Safety and Health Administration (CalOSHA) 8-hour PEL-TWAs.

4.4.3 Existing Conditions

4.4.3.1 Regulatory Setting

Federal

The EPA provides guidance on performing an HHRA through its Office of Emergency and Remedial Response publication, *Risk Assessment Guidance for Superfund, Vol I, Human*

Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002, published December, 1989.

State

The CARB's statewide comprehensive air toxics program was established in the early 1980's. The Toxic Air Contaminant Identification and Control Act (AB 1807) created California's program to reduce exposure to air toxics. The South Coast Air Quality Management District (SCAQMD) has jurisdiction over the air quality of the Basin and has released a draft final Basin-wide air toxics study (*MATES III, Multiple Air Toxics Exposure Study*, May 2008). As part of the MATES III study, a series of maps showing regional trends in estimated outdoor inhalation cancer risk from toxic emissions was prepared and indicates that the City of Los Angeles is exposed to an inhalation cancer risk of 500-3,692 persons per million. 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 largest contributors to inhalation cancer risk are diesel engines.

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. The SCAQMD has determined that the significance criterion for cancer health risks is a ten in one million increase in the chance of developing cancer. The SCAQMD has also adopted a significance criterion for cancer burden. The cancer burden is the estimated increase in the occurrence of cancer cases in a population as a result of exposures to TAC emissions. The SCAQMD has determined that the significance criterion for cancer burden is greater than 0.5 excess cancer cases in areas with an incremental increase in cancer risk greater than or equal to 1 in 1 million. The significance of non-cancer (acute and chronic) risks is evaluated in terms of hazard indices (HI) for different endpoints. The SCAQMD threshold for non–cancer risk for both acute and chronic HI is 1.0. In September 1992, the "Hot Spots" Act was amended by Senate Bill 1731 which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan. Beginning In 2000, the CARB has adopted diesel risk reduction plans and measures to reduce DPM emissions and the associated health risk. These are discussed in more detail in the following section.

California Air Resources Board Air Toxics Control Measure (ATCM)

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

In addition to limiting exhaust from idling trucks, CARB promulgated emission standards for off-road diesel construction equipment such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. A CARB regulation that became effective on June 15, 2008, aims to reduce emissions by installation of diesel soot filters and encouraging the replacement of older, dirtier engines with newer emission controlled models. The regulation requires that fleets limit their unnecessary idling to 5 minutes; there are exceptions for vehicles that need to idle to perform work (such as a crane providing hydraulic power to the boom), vehicles being serviced, or in a queue waiting for work. A prohibition against acquiring certain vehicles (e.g., Tier 0 and Tier 1) began on March 1, 2009; however, CARB is not enforcing this part of the regulation until "it receives authorization from U.S. EPA."[7] Implementation of the fleet averaging emission standards is staggered based on fleet size, with the largest operators to begin compliance in 2014.[8] 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.[9]

The CalEPA provides guidance on performing an HHRA through its Office of Environmental Health Hazard Assessment publications:

- *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part I: Technical Support Document for 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 August 2003;
- *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part III: The Determination of Chronic Reference Exposure Levels for Airborne Toxicants*, February 23, 2000;
- *Air Toxic Hot Spots Program Risk Assessment Guidelines, Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis*, September 2000; and
- *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, August 2003.

Regional/Local

The SCAQMD 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* (AB2588), July 2005.

4.4.3.2 Existing Health Risk in the Project Area

The SCAQMD has released a draft final Basin-wide air toxics study (*MATES III, Multiple Air Toxics Exposure Study*, May 2008). The MATES III Study represents one of the most comprehensive air toxics studies ever conducted in an urban environment. The Study was aimed at estimating the cancer risk from TAC emissions throughout the Basin by conducting a comprehensive monitoring program, an updated emissions inventory of TACs, and a modeling effort to fully characterize health risks for those living in the Basin. The Study concluded that the average carcinogenic risk from air pollution in the Basin is approximately 1,200 in one

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7 Office of Administrative Law, "California Regulatory Notice Register, February 26, 2010," Available at: http://www.oal.ca.gov/res/docs/pdf/notice/9z-2010.pdf, Accessed November 2013.

8 California Air Resources Board, In-Use Off-Road Diesel Vehicle Regulation, Overview, Revised May 2012, Available at: http://www.arb.ca.gov/msprog/ordiesel/faq/overview_fact_sheet_dec_2010-final.pdf, Accessed November 2013.

9 California Air Resources Board, "Emissions and Health Benefits of Regulation for In-Use Off-Road Diesel Vehicles," Available at: http://www.arb.ca.gov/msprog/ordiesel/documents/OFRDDIESELhealthFS.pdf, Accessed November 2013.

million. Mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors. Approximately 85 percent of the risk is attributed to DPM emissions, approximately 10 percent to other toxics associated with mobile sources (including benzene, butadiene, and formaldehyde), and approximately 5 percent of all carcinogenic risk is attributed to stationary sources (which include industries and other certain businesses, such as dry cleaners and chrome plating operations).

As part of the MATES III study, the SCAQMD has prepared a series of maps that show regional trends in estimated outdoor inhalation cancer risk from toxic emissions, as part of an ongoing effort to provide insight into relative risks. The maps' estimates represent the number of potential cancers per million people associated with a lifetime of breathing air toxics (24 hours per day outdoors for 70 years) in parts of the area. The estimated lifetime cancer risk from exposure to TACs for those residing within the vicinity of the proposed Project is estimated at 884 cancers per million, while the vast majority of the area surrounding LAX ranges between 500 to 1,200 cancers per million.[10] 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 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.[11]

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 shows that there is an inherent health risk associated with living in urbanized areas of the Basin, where mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributors to the overall risk.

Sources of Toxic Air Contaminants of Concern

As indicated in the LAX Master Plan Final EIR, baseline sources of TACs at LAX include both stationary and mobile sources. Stationary sources consist of aircraft maintenance facilities, the existing fuel farm, and the Central Utility Plant. Mobile sources of TACs include aircraft, ground service equipment, and on- and off-airport vehicles. These sources generate a number of TACs of concern, including volatile organics, polycyclic aromatic hydrocarbons, metals, and other constituents.

[10] South Coast Air Quality Management District, Multiple Air Toxics Exposure Study III Model Estimated Carcinogenic Risk, Available at: http://www3.aqmd.gov/webappl/matesiii/, Accessed January 9, 2013.

[11] California Air Resources Board, Cancer Inhalation Risk: Local Trend Maps, Available at: http://www.arb.ca.gov/ch/communities/hlthrisk/cncrinhl/rskmapvwtrend.htm.400. Accessed January 9, 2014.

Exposed Populations

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

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

4.4.4 CEQA Thresholds of Significance

There are no significance thresholds related to a HHRA within Appendix G of the CEQA Guidelines. Significance determinations for health impacts were assessed as incremental increases in cancer risks and non-cancer health hazards associated with the construction of the proposed Project, based on guidance from SCAQMD, CalEPA, and EPA. A significant impact to human health would occur if construction activities of the proposed Project would result in one or more of the following conditions:

- An incremental TAC cancer risk greater than, or equal to, 10 in one million (10×10^{-6}) people for potentially exposed off-site workers, residents, or school children.
- An incremental TAC chronic hazard index greater than, or equal to, one (1) at any receptor location.
- An incremental acute hazard index greater than, or equal to, one (1) at any receptor location.
- Exceedance of PEL-TWA for on-airport workers.

The above thresholds utilized for this HHRA are based on SCAQMD guidance. The SCAQMD is in the process of developing an "Air Quality Analysis Guidance Handbook" (Handbook) to replace the 1993 SCAQMD CEQA Air Quality Handbook. Although not yet published, SCAQMD has made certain sections of the Handbook available, including their air quality significance thresholds, which provide thresholds for TACs.[12] The threshold for workers is based on standards developed by CalOSHA.[13]

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[12] South Coast Air Quality Management District, CEQA Air Quality Handbook, 1993, as updated by "SCAQMD Air Quality Significance Thresholds," March 2011, Available: http://www.aqmd.gov/ceqa/handbook/signthres.pdf.

[13] California Occupational Safety and Health Administration, Permissible Exposure Limits for Chemical Contaminants, Table AC 1, Available: http://www.dir.ca.gov/Title8/5155table_ac1.html, accessed August 2013.

4.4.5 Applicable LAX Master Plan Commitments and Mitigation Measures

As part of the LAX Master Plan, LAWA adopted commitments and control measures pertaining to air quality (denoted with "AQ") in the Alternative D MMRP. Of the three commitments and four control measures that were designed to address air quality impacts related to implementation of the LAX Master Plan, none of the commitments are applicable to the proposed Project, but two of the control measures were considered in the air quality analysis herein (denoted below as LAX-AQ-1 and LAX-AQ-2). The portions of the air quality control measures that would be applicable to the proposed Project are summarized below.

LAX-AQ-1 – General Air Quality Control Measures.

- This measure describes a variety of specific actions to reduce air quality impacts associated with projects at LAX, and applies to all projects. Some components of LAX-AQ-1 are not readily quantifiable, but would be implemented as part of LAX Master Plan projects. Specific measures are identified in **Table 4.4-3**.

LAX-AQ-2 - Construction-Related Control Measures.

- This measure describes numerous specific actions to reduce fugitive dust emissions and exhaust emissions from on-road and off-road mobile and stationary sources used in construction. Some components of LAX-AQ-2 are not readily quantifiable, but would be implemented as part of LAX projects. These control strategies are expected to reduce construction-related emissions. Specific measures are identified in **Table 4.4-4**.

Table 4.4-3

General Air Quality Control Measures[1]

Measure Number	Measure	Type of Measure	Quantified Emissions Reductions
1a	Watering (per SCAQMD Rule 403 and CalEEMod default) – twice daily.	Fugitive Dust	55% PM_{10} and $PM_{2.5}$
1b	Ultra-low sulfur diesel (ULSD) fuel will be used in construction equipment.	On- and Off-Road Mobile	Assumed in modeling
1c	Post a publicly visible sign with the telephone number and person to contact regarding dust complaints; this person shall respond and take corrective action within 24 hours.	Fugitive Dust	NQ
1d	Prior to final occupancy, the applicant demonstrates that all ground surfaces are covered or treated sufficiently to minimize fugitive dust emissions.	Fugitive Dust	NQ
1e	All roadways, driveways, sidewalks, etc., being installed as part of the project should be completed as soon as possible; in addition, building pads should be laid as soon as possible after grading.	Fugitive Dust	NQ

Table 4.4-3

General Air Quality Control Measures[1]

Measure Number	Measure	Type of Measure	Quantified Emissions Reductions
1f	Prohibit idling or queuing of diesel-fueled vehicles and equipment in excess of five minutes. This requirement will be included in specifications for any LAX projects requiring on-site construction.[2]	On- and Off-Road Mobile	NQ
1g	Require that all construction equipment working on-site is properly maintained (including engine tuning) at all times in accordance with manufacturers' specifications and schedules.	Mobile and Stationary	NQ

Notes:

NQ = Not Quantified

1 These measures are from LAX Master Plan Mitigation Measure MM-AQ-1, unless otherwise noted.

2 From LAX Master Plan Mitigation Measure MM-AQ-2 and Community Benefits Agreement Measure X.M and LAWA's Design and Construction Handbook, Section 1.31.9.

Sources: City of Los Angeles, Los Angeles World Airports (LAWA), and FAA, Final Environmental Impact Statement/Final Environmental Impact Report, Los Angeles International Airport Proposed Master Plan Improvements, April 2004; Los Angeles World Airports and LAX Coalition for Economic, Environmental, and Educational Justice, Cooperation Agreement, Los Angeles International Airport Master Plan Program, December 2004; Los Angeles World Airports, Design and Construction Handbook, November 2012.

Table 4.4-4

Construction-Related Control Measures[1]

Measure Number	Measure	Type of Measure	Quantified Emissions Reductions
2a	All diesel-fueled equipment used for construction will be outfitted with the best available emission control devices, where technologically feasible, primarily to reduce emissions of diesel particulate matter (DPM), including fine PM ($PM_{2.5}$), and secondarily, to reduce emissions of NO_X. This requirement shall apply to diesel-fueled off-road equipment (such as construction machinery), diesel-fueled on-road vehicles (such as trucks), and stationary diesel-fueled engines (such as electric generators). (It is unlikely that this measure will apply to equipment with Tier 4 engines.) The emission control devices utilized in construction equipment shall be verified or certified by CARB or USEPA for use in on- road or off-road vehicles or engines. For multi-year construction projects, a reassessment shall be conducted annually to determine what constitutes a best available emissions control device.[2]	Off-Road Mobile	85% PM_{10} and $PM_{2.5}$, adjusted for compatibility

Table 4.4-4

Construction-Related Control Measures[1]

Measure Number	Measure	Type of Measure	Quantified Emissions Reductions
2b	Watering (per SCAQMD Rule 403 and CalEEMod default) – three times daily.	Fugitive Dust	61% PM_{10} and $PM_{2.5}$
2c	Pave all construction access roads at least 100 feet onto the site from the main road.	Fugitive Dust	NQ
2d	To the extent feasible, have construction employees' work/commute during off-peak hours.	On-Road Mobile	NQ
2e	Make available on-site lunch trucks during construction to minimize off-site worker vehicle trips.	On-Road Mobile	NQ
2f	Utilize on-site rock crushing facility, when feasible, during construction to reuse rock/concrete and minimize off-site truck haul trips.	On-Road Mobile	NQ
2g	Specify combination of electricity from power poles and portable diesel- or gasoline-fueled generators using "clean burning diesel" fuel and exhaust emission controls.[3]	Stationary Point Source Controls	NQ
2h	Suspend use of all construction equipment during a second-stage smog alert in the immediate vicinity of LAX.	Mobile and Stationary	NQ
2i	Utilize construction equipment having the minimum practical engine size (i.e., lowest appropriate horsepower rating for intended job).	Mobile and Stationary	NQ
2j	Prohibit tampering with construction equipment to increase horsepower or to defeat emission control devices.	Mobile and Stationary	NQ
2k	The contractor or builder shall designate a person or persons to ensure the implementation of all components of the construction-related measure through direct inspections, record reviews, and investigations of complaints.	Administrative	NQ
2l	LAWA will locate rock-crushing operations and construction material stockpiles for all LAX-related construction in areas away from LAX-adjacent residents, to the extent possible, to reduce impacts from emissions of fugitive dust.[4]	Stationary	Can be quantified in modeling assumptions

Table 4.4-4

Construction-Related Control Measures[1]

Measure Number	Measure	Type of Measure	Quantified Emissions Reductions
2m	LAWA will ensure that there is available and sufficient infrastructure on-site, where not operationally or technically infeasible, to provide fuel to alternative-fueled vehicles to meet all requests for alternative fuels from contractors and other users of LAX. This will apply to construction equipment and to operations-related vehicles on-site. This provision will apply in conjunction with construction or modification of passenger gates related to implementation of the LAX Master Plan relative to the provision of appropriate infrastructure for electric GSE.[5]	Mobile	NQ
2n	On-road trucks used on LAX construction projects with a gross vehicle weight rating of at least 19,500 pounds shall, at a minimum, comply with USEPA 2007 on-road emissions standards for PM_{10} and NO_X.[6]	On-Road Mobile	Assumed in modeling
2o	Prior to January 1, 2015, all off-road diesel-powered construction equipment greater than 50 horsepower shall meet USEPA Tier 3 off-road emission standards. After December 31, 2014, all off-road diesel-power construction equipment greater than 50 horsepower shall meet USEPA Tier 4 off-road emissions standards. Tier 4 equipment shall be considered based on availability at the time the construction bid is issued. LAWA will encourage construction contractors to apply for SCAQMD "SOON" funds to accelerate clean-up of off-road diesel engine emissions.[7]	Off-Road Mobile	Assumed in modeling

Notes:
NQ = Not Quantified
1 These measures are from LAX Master Plan Mitigation Measure MM-AQ-2, unless otherwise noted.
2 From LAX Master Plan Mitigation Measure MM-AQ-2 and Community Benefits Agreement Measure X.F.
3 From LAX Master Plan Mitigation Measure MM-AQ-2 and LAWA's Design and Construction Handbook, Section 1.31.9.
4 From Community Benefits Agreement Measure X.L.
5 From Community Benefits Agreement Measure X.N.
6 From LAX Specific Plan Amendment Study Measure MM-AQ (SPAS)-1.
7 From LAX Specific Plan Amendment Study Measure MM-AQ (SPAS)-1.

Sources: City of Los Angeles, Los Angeles World Airports (LAWA), and FAA, Final Environmental Impact Statement/Final Environmental Impact Report, Los Angeles International Airport Proposed Master Plan Improvements, April 2004; Los Angeles World Airports and LAX Coalition for Economic, Environmental, and Educational Justice, Cooperation Agreement, Los Angeles International Airport Master Plan Program, December 2004; Los Angeles World Airports, Specific Plan Amendment Study, Final Environmental Impact Report, January 2013.

4.4.6 Impact Analysis

Cancer risk estimates from exposure to construction sources are presented below for on-airport workers (occupational exposure), and off-airport workers, residents, and school children. Acute and chronic non-cancer health hazards are also presented.

4.4.6.1 Health Risks to On-Airport Workers

Effects on on-airport workers were evaluated by comparing estimated maximum 8-hour average TAC concentration to the CalOSHA 8-hour Time-Weighted Average Permissible Exposure Levels (PEL-TWA). The estimated maximum 8-hour average TAC concentrations for on-airport locations for construction of the proposed Project are several orders of magnitude below the PEL-TWA and, thus would not exceed those considered acceptable by CalOSHA standards, as shown in **Table 4.4-5**. Therefore, impacts related to health risks to on-airport workers would be less than significant for the proposed Project.

Table 4.4-5

Comparison of CalOSHA Permissible Exposure Limits to Maximum Estimated 8-Hour On-Site Air Concentrations

Toxic Air Contaminant [1]	Project Construction Concentrations (mg/m^3) [2]	CalOSHA PEL TWA (mg/m^3) [3]
Acetaldehyde	0.002258	45
Acrolein	0.001091	0.25
Benzene	0.000844	0.32 [4]
1,3-Butadiene	0.000757	2.2
Ethylbenzene	0.000092	435
Formaldehyde	0.006183	0.37 [4]
Hexane, n-	0.000008	180
Methanol	0.000801	260
Methyl ethyl ketone	0.000073	590
Naphthalene	0.000244	50
Propylene	0.002137	N/A [5]
Styrene	0.000140	215
Toluene	0.000358	37
Xylene (total)	0.000250	435
Diesel PM	0.000530	N/A [5]
Arsenic	0.000001	0.01
Cadmium	0.000002	0.005
Chlorine	0.000240	1.5
Chromium (VI)	0.000001	0.005
Copper	0.000008	1
Lead	0.000040	0.05
Manganese	0.000065	0.2
Mercury	0.000001	0.025
Nickel	0.000004	0.5
Selenium	0.000000	0.2
Silicon	0.013792	6
Sulfates	0.000342	N/A [5]
Vanadium	0.000019	0.05

Table 4.4-5

Comparison of CalOSHA Permissible Exposure Limits to Maximum Estimated 8-Hour On-Site Air Concentrations

Toxic Air Contaminant [1]	Project Construction Concentrations (mg/m^3) [2]	CalOSHA PEL TWA (mg/m^3) [3]

Notes:
1 All TACs for which PEL-TWAs are available are listed. PEL-TWAs are not available for diesel exhaust, propylene, and sulfates.
2 Maximum 1-hour concentrations at on-airport location converted to 8-hour averages by multiplying by a factor of 0.7.
3 California Occupational Safety and Health Administration. Permissible Exposure Limits for Chemical Contaminants, Table AC-1, 2008, http://www.dir.ca.gov/title8/5155table_ac1.html.
4 CalOSHA does not have a value; value is from American Conference of Governmental Industrial Hygienists (ACGIH), Documentation of the Threshold Limit Values and Biological Exposure Indices, 8th ed., Cincinnati, Ohio, 1998.
5 N/A = Not Available

Source: Ricondo & Associates, Inc., April 2014.

4.4.6.2 Cancer Risks and Chronic Non-Cancer Hazards

For cancer risks and chronic non-cancer hazards for the proposed Project, 326 grid points were analyzed along the airport fence-line. The concentrations at the 326 fence-line locations represent maximum concentrations of TAC predicted by the air dispersion modeling, can be used to evaluate exposure to a MEI, and thus provide a ceiling for risks and hazards for off-airport residential, commercial, and student receptors. In essence, these calculations assumed that people live, work, and go to school at the LAX fence-line. Although this assumption is incorrect, it is conservative.

Air concentrations for TAC from construction sources were developed using emissions estimates and dispersion modeling as described above. Using these emission estimates, exposure parameters for potential receptors and current toxicity values, cancer risks and chronic non-cancer health hazards were calculated for adult residents, resident children ages 0 to 6 years, and for elementary-aged school children at fence-line locations. Offsite worker risks and hazards were estimated at the fence-line. Peak cancer risks and chronic non-cancer health hazards for MEI for construction and operations of the proposed Project are summarized in **Table 4.4-6**.

Table 4.4-6

Incremental Cancer Risks and Chronic Non-Cancer Human Health Hazards for Maximally Exposed Individuals from the Proposed Project

Receptor Type	Project Construction	Significance Threshold	Significant?
Incremental Cancer Risks [1] (per million people)			
Child Resident	0.05	10	No
School Child	0.01	10	No
Adult Resident	0.63	10	No
Adult Worker	0.30	10	No
Incremental Non-Cancer Chronic Hazards [2]			
Child Resident	0.13	1	No
School Child	0.02	1	No
Adult Resident	0.13	1	No
Adult Worker	0.04	1	No

Notes:
1 Values provided are changes in the number of cancer cases per million people exposed as compared to baseline conditions. All estimates are rounded to one significant figure.
2 Hazard indices are totals for all TACs that may affect the respiratory system. This incremental hazard index is essentially equal to the total for all TACs.

Source: Ricondo & Associates, Inc., April 2014.

The estimated peak incremental cancer risks for adult residents and child residents for construction of the proposed Project range from 0.05 in one million to 0.6 in one million. Incremental cancer risk for school children at the peak location was estimated to be 0.01 in one million. The peak adult (non-Project) worker cancer risk would be 0.3 in one million. These estimates indicate that Project-related cancer risks for adults and for young children would be below the threshold of significance of 10 in one million for proposed Project construction. These risks are greatly overestimated because (1) they assume that exposure occurs at locations of maximum concentrations even though no people reside at these locations and (2) they assume that exposure to TACs released during Project construction would occur continuously over an entire lifetime. Concentrations of TAC associated with construction of the proposed Project would be much less at current residential locations since construction would occur over a period of approximately 6 months. The spatial distribution of risks is further discussed below. Cancer risk estimates based on actual construction duration are provided in Section 5, Uncertainties, of Appendix E.

Project-related chronic non-cancer hazard indices for construction impacts associated with the proposed Project for adult residents and child residents living at the peak TAC concentration location were estimated to be 0.13. Project-related chronic non-cancer hazard index for chemicals affecting the same target (i.e., the respiratory system) for MEI school children is 0.02. The peak adult (non-Project) worker chronic hazard index was estimated to be 0.04. These estimates indicate that construction-related chronic non-cancer hazards would be less than the hazard index threshold of 1.

4.4.6.3 Acute Non-Cancer Hazards Risk

As with cancer risks and chronic non-cancer health hazards, acute health hazards were analyzed at 328 grid points within the study area (326 fence-line receptors plus two on-airport receptors). Short-term concentrations of TAC for the proposed Project sources were estimated using AERMOD with the model option for 1-hour maximum concentrations selected. Acute health hazards were estimated at each grid point by comparison of the modeled TAC concentration at each grid point with the acute REL. All TAC identified in Project construction emissions, and for which CalEPA has developed acute RELs, were evaluated for potential acute health hazards. All acute health hazard estimates are specific for airport emissions and are independent of county-wide estimates developed by USEPA.

Land use distinctions and different exposure scenarios are not relevant for assessment of acute health hazards. For example, someone visiting a commercial establishment would potentially be subject to the same acute health hazards as someone working at the establishment. Fence-line concentrations of TAC are likely to represent the highest concentrations and therefore the greatest impacts for residents, school children, or off-airport workers. One on-airport grid point was assumed to be a commercial receptor (workers).

Acrolein, formaldehyde, and manganese are the only TAC of concern in construction emissions from the proposed Project that might be present at concentrations approaching the thresholds for acute health hazards. Acute health hazards for other TAC are orders of magnitude below their respective acute RELs and thus would not contribute substantially to health hazards. The primary source of acrolein is aircraft emissions; the primary source of formaldehyde is from diesel-powered construction equipment; the primary source of manganese is fugitive dust. Maximum acute health hazards associated with exposure to these three chemicals from the proposed Project construction are summarized in **Table 4.4-7**.

Table 4.4-7

Maximum Incremental Acute Non-Cancer Hazard Indices from Construction

Pollutant	Acrolein	Formaldehyde	Manganese
Residential			
Maximum HI [1]	**1.43** [2]	0.33	0.10
Minimum HI	-1.64	-0.37	0.01
Average HI	-0.06	-0.01	0.04
School			
Maximum HI	0.70	0.09	0.08
Minimum HI	-1.03	-0.23	0.01
Average HI	-0.20	-0.04	0.05
Offsite Worker			
Maximum HI	**2.05**	0.47	0.19

Table 4.4-7

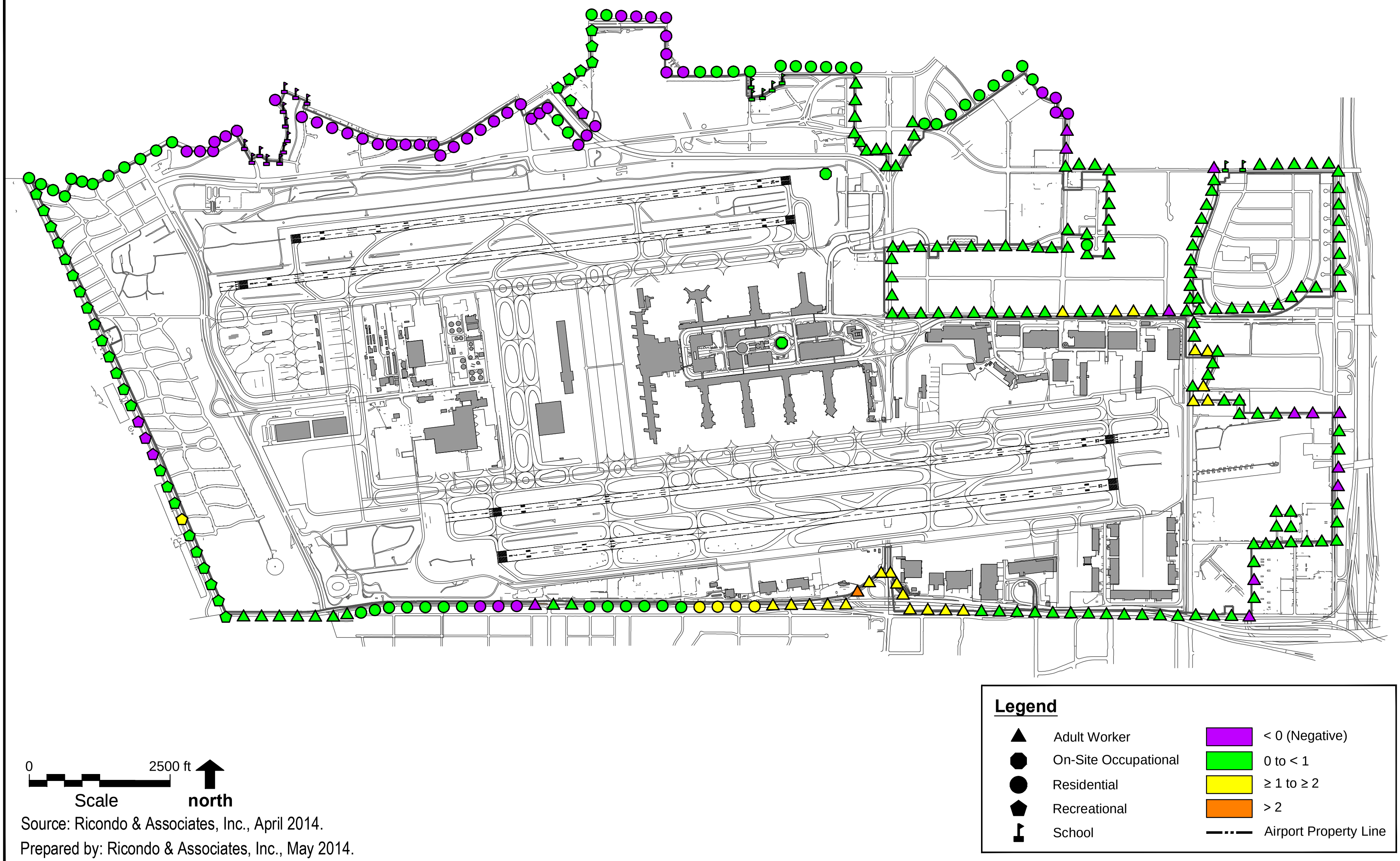
Maximum Incremental Acute Non-Cancer Hazard Indices from Construction

Minimum HI	-0.54	-0.12	0.01
Average HI	0.48	0.11	0.03
Recreational			
Maximum HI	**1.14**	0.26	0.06
Minimum HI	-0.64	-0.14	0.01
Average HI	0.28	0.06	0.02
Overall Off-Airport			
Maximum HI	**2.05**	0.47	0.19
On-Site Occupational			
Maximum HI	0.62	0.16	0.55

Notes:
1 HI = Hazard Index
2 **Bold** HIs are greater than the significance threshold of 1.

Source: Ricondo & Associates, Inc., April 2014.

As shown above, construction-related incremental maximum acute hazard quotients for acrolein for construction of the proposed Project are estimated to be 1.4 for residents living at the peak hazard location, 0.7 for school children, 1.1 for recreational users, and 2.1 for off-site adult workers. However, 300 of 328 grid nodes have incremental acute hazard quotients for acrolein of less than 1; 73 of these receptors show a negative hazard quotient, meaning the short-term impacts actually improve during construction of the proposed Project. Of the twenty-eight grid nodes with incremental acute hazard quotients for acrolein greater than 1, only one of the grid nodes is greater than 2. Additional receptors located at 50 meter increments to the south of the airport show acrolein concentrations falling below the threshold of significance between 50 and 200 meters south of the fence-line. To the west, acrolein concentrations fall below the threshold of significance at approximately 100 meters west of the fence-line. To the east, acrolein concentrations fall below the threshold of significance at between 150 and 200 meters east of the fence-line. General acute hazard quotients for acrolein at all receptor nodes are shown in



Source: Ricondo & Associates, Inc., April 2014.

Prepared by: Ricondo & Associates, Inc., May 2014.

LAX Runway 6L-24R and Runway 6R-24L Runway Safety Area and Associated Improvements Draft EIR

Incremental Acute Non-Cancer Hazards from Acrolein by Receptor Type

Figure **4.4-2**

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The acute REL for acrolein has an uncertainty factor of 60.[14] This factor indicates a moderate uncertainty in the REL based on specific sources of variability not addressed in the toxicological studies, such as individual variation and interspecies differences. Although the maximum acute hazard quotients for acrolein during operations of the proposed Project is greater than 1, it should be noted that the acute REL is set at or below a level at which no adverse health impacts are expected for the majority of the population. Hence, it represents the tail-end of a distribution and not a specific "bright line" beyond which adverse effects are certain; instead any adverse acute non-cancer health effects (mucous membrane irritation) would be part of a complex probabilistic process. Although the maximum acute hazard quotient estimated as 2.1 is above the threshold of significance of 1, the value is still close to the threshold for acute effects, given the uncertainty in the toxicity factor, and may represent minimal actual acute non-cancer health hazards. Thus, an acute hazard quotient of 2.1 does not mean that adverse effects would definitely occur in the receptor population; rather, it indicates that such effects cannot be ruled out on the basis of current knowledge.

Construction-related maximum acute hazard quotients for formaldehyde are estimated to be 0.3 for residents living at the peak hazard location, 0.1 for school children, 0.3 for recreational users, and 0.5 for off-site adult workers.

Construction-related maximum acute hazard quotients for manganese are estimated to be 0.1 for residents living at the peak hazard location, 0.1 for school children, 0.1 for recreational users, and 0.2 for off-site adult workers.

Because the acute hazard quotients for acrolein for receptors representing residents and off-site adult workers are above the threshold of significance of 1, acute non-cancer health hazard impacts during operations of the proposed Project would be significant.

4.4.7 Cumulative Impacts

Acrolein, formaldehyde, and manganese are the primary TAC of concern for the construction of the proposed Project that might be present at concentrations approaching the threshold for acute health hazards. Predicted concentrations of TAC released during the construction of the proposed Project estimate that acute non-cancer health hazards would be above the significance threshold of one for acrolein. 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), incorporating updated National-Scale Air Toxics Assessment tables from 2005. 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

[14] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Technical Support Document for the Derivation of Noncancer Reference Exposure Levels, December 2008.

using the same methods described in the LAX Master Plan Final EIR (Section 4.24.1.7 and Technical Report S-9a, Section 6.1). The methodology entails converting the USEPA annual average estimates to maximum 1-hour average concentrations by dividing the annual average estimates by 0.08. Then the 1-hour average concentrations were divided by the acute REL to calculate acute hazard indices. The range of hazard indices was then used as a basis for comparison with estimated maximum acute non-cancer health hazards for the proposed Project. The relative magnitude of acute non-cancer health hazards calculated on the basis of the USEPA estimates and maximum hazards estimated for the proposed Project were taken as a general measure of relative cumulative impacts. Emphasis must be placed on the relative nature of these estimates. Uncertainties in the analysis preclude estimation of absolute impacts.

When USEPA annual average estimates are converted to possible maximum 1-hour average concentrations, acrolein acute hazard indices are estimated to range from 0.03 to 1.5, with an average of 0.4; formaldehyde acute hazard indices are estimated to range from 0.1 to 2.2, with an average of 1; and manganese acute hazard indices are estimated to range from 0.03 to 0.5, with an average of 0.13 for locations within the HHRA study area. Predicted overall maximum incremental acute non-cancer health hazards for the proposed Project associated with acrolein ranged from 1.1 to 2.1; those associated with formaldehyde ranged from 0.3 to 0.5; and those associated with manganese ranged from 0.2 to 0.6. Results suggest that the proposed Project would add to total 1-hour maximum acrolein concentrations at some locations in the HHRA study area and, therefore, to cumulative acute non-cancer health hazards associated with exposure to acrolein.

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. If cumulative health risks are evaluated following this SCAQMD policy, the project's contribution to the cumulative cancer risk would not be cumulatively considerable since the incremental cancer risk impacts of the proposed Project are all below the individual cancer risk significance thresholds of 10 in one million.

In contrast to cancer risk, the SCAQMD policy does have different significance thresholds for project-specific and cumulative impacts for hazard indices for TAC emissions. A project-specific significance threshold is one (1.0) while the cumulative threshold is 3.0. Based on this SCAQMD policy, the relatively small chronic non-cancer hazard indices associated with emissions under the proposed Project would not be cumulatively considerable. However, acute non-cancer hazard indices would be greater than the cumulative threshold of 3.0, and therefore, would be cumulatively considerable.

4.4.8 Mitigation Measures

LAWA is committed to mitigating temporary construction-related emissions to the extent practicable and has established some of the most aggressive construction emissions reduction measures in southern California, particularly with regard to requiring construction equipment to be equipped with emissions control devices. The specific means for implementing the mitigation measures described in Section 4.4.5 were first approved and implemented as part of the SAIP and would also be applied to the proposed Project.[15] Mitigation measures described in Section 4.4.5 also include those required by the Community Benefits Agreement. These mitigation measures establish a commitment and process for incorporating all technically feasible air quality mitigation measures into each component of the LAX Master Plan, as well as LAX projects that are independent of the LAX Master Plan. In addition, the Los Angeles Green Building Code Tier 1 standards, which are applicable to all projects with a Los Angeles Department of Building and Safety permit-valuation over $200,000, require the proposed Project to implement a number of measures that would reduce criteria pollutant and greenhouse gas emissions. These include measures such as: further reduce vehicle and equipment idling times; comply with Tier 4 emission standards for non-road diesel equipment; retrofit existing diesel equipment with particulate filters and oxidation catalysts; replace aging equipment with new low-emission models; and consider the use of alternative fuels for construction equipment.

The SCAQMD has previously noted that Tier 4-final construction equipment was assumed for the majority of vehicles used on LAWA construction projects; however some vehicles were assumed to only use tier 4-interim engines. The SCAQMD requested that LAWA investigate if additional tier 4-final equipment is available. In addition, the SCAQMD noted that haul trucks were assumed to meet 2007 emission standards, but that 2010 truck emission standards would provide additional NO_x emission reductions. SCAQMD has requested that LAWA consider only using trucks meeting 2010 emissions standards.

LAWA will include in bid documents for the proposed Project language specifying that contractors should use equipment on the Project that meets the most stringent emission requirements. In the event that the contractor can demonstrate that equipment is not available within 120 miles of LAX that meets the most stringent emission requirements, they will be able to utilize equipment that meets the next lowest requirements (e.g., if Tier 4 final equipment is not available, they would be permitted to use Tier 4 interim equipment). Because it is difficult for LAWA to determine whether equipment is available that meet the most stringent emission requirements, for purposes of this analysis, LAWA has kept the equipment mix specified in the Draft EIR, but will require contractors to use equipment that meets stricter standards if available.

Specifically, LAWA will modify the following construction-related air quality control measures (LAX-AQ-2):

- Measure 2n: On-road trucks used on LAX construction projects with a gross vehicle weight rating of at least 19,500 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 Control Measure 2p below.
- Measure 2o: Prior to January 1, 2015, all off-road diesel-powered construction equipment greater than 50 horsepower shall meet, at a minimum, USEPA Tier 3 off-road emission standards. After December 31, 2014, all off-road diesel-power construction equipment greater than 50 horsepower shall meet USEPA Tier 4(final) off-road emissions standards. Tier 4(final) equipment shall be considered based on availability at the time the construction bid is issued. Contractor requirements to utilize Tier 4(final) equipment or next cleanest equipment available will be subject to the provisions of LAWA Air Quality Control Measure 2p below. LAWA will encourage construction

15 The SAIP was the first LAX Master Plan project to be constructed.

contractors to apply for SCAQMD “SOON” funds to accelerate clean-up of off-road diesel engine emissions.

- Measure 2p: The on-road haul truck and off-road construction equipment requirements set forth in Air Quality Control Measures 2n and 2o above shall apply unless any of the following circumstances exist and the Contractor provides a written finding consistent with project contract requirements that:
  - The Contractor does not have the required types of on-road haul trucks or off-road construction equipment within its current available inventory and intends to meet the requirements of the Measures 2n and 2o as to a particular vehicle or piece of equipment by leasing or short-term rental, and the Contractor has attempted in good faith and due diligence to lease the vehicle or equipment that would comply with these measures, but that vehicle or equipment is not available for lease or short-term rental within 120 miles of the project site, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 2p) apply.
  - The Contractor has been awarded funding by SCAQMD or another agency that would provide some or all of the cost to retrofit, repower, or purchase a piece of equipment or vehicle, but the funding has not yet been provided due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent the equipment or vehicle that would comply with Measures 2n and 2o, but that equipment or vehicle is not available for lease or short-term rental within 120 miles of the project site, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 2p) apply.
  - Contractor has ordered a piece of equipment or vehicle to be used on the construction project in compliance with Measures 2n and 2o at least 60 days before that equipment or vehicle is needed at the project site, but that equipment or vehicle has not yet arrived due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent a piece of equipment or vehicle to meet the requirements of Measures 2n and 2o, but that equipment or vehicle is not available for lease or short-term rental within 120 miles of the project, and the Contractor has submitted documentation to LAWA showing that the requirements of this exception provision (Measure 2p) apply.
  - Construction-related diesel equipment or vehicle will be used on the project site for fewer than 20 calendar days per calendar year. The Contractor shall not consecutively use different equipment or vehicles that perform the same or a substantially similar function in an attempt to use this exception (Measure 2p) to circumvent the intent of Measures 2n and 2o.

In any of the situations described above, the Contractor shall provide the next cleanest piece of equipment or vehicle as provided by the step down schedules in **Table 4.4-8** for Off-Road Equipment and **Table 4.4-9** for On-Road Equipment.

Table 4.4-8

Off-Road Vehicle 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 2	Uncontrolled
8	Tier 1	Level 2

Notes:
Equipment less than Tier 1, Level 2 shall not be permitted.
* 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.

Source: CDM Smith, January 2014.

As stated above, LAWA is committed to mitigating temporary construction-related emissions to the extent practicable and will implement the mitigation measures specified in Section 4.4.5 and those discussed above. Although these measures would not mitigate impacts to a level that is less than significant, they would reduce impacts associated with the proposed Project to the extent feasible.

Table 4.4-9

On-Road Vehicle 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

Notes:
Equipment with a model year earlier than model year 1998 shall not be permitted.
* 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.
Nothing in the above measures shall require an emissions control device (i.e., VDECS) that does not meet OSHA standards.

Source: CDM Smith, January 2014.

4.4.9 Level of Significance after Mitigation

Even with incorporation of applicable LAX Master Plan Mitigation Measures and Project-specific mitigation measures as described above, acute non-cancer health hazards impacts for acrolein resulting from the proposed Project would be significant during the proposed 4-month runway closure required during Project construction. LAWA has not identified any additional feasible mitigation measures that could be adopted at this time.

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