3.2 Air Quality

This section discusses the regulatory framework for air quality management and the existing air quality conditions in the area, and analyzes the potential for the Proposed Project to affect existing air quality conditions, both regionally and locally, from activities that emit criteria air pollutants. It also analyzes the types and quantities of emissions that would be generated on a temporary basis due to proposed construction and over the long term due to proposed operation. Emissions of greenhouse gases resulting from the Proposed Project and their potential impacts to climate change and the goals of Assembly Bill 32 are presented and discussed in Section 3.6, *Climate Change and Greenhouse Gases* of this EIR.

The analysis in this section is based on a review of existing air quality conditions in the study area and air quality regulations and plans administered by the United States Environmental Protection Agency (USEPA), California Air Resources Board (CARB), and the Yolo-Solano Air Quality Management District (YSAQMD). This analysis includes the methodologies identified in the YSAQMD's *Handbook for Assessing and Mitigating Air Quality Impacts* (dated July 11, 2007). Other sources of information used in this section include the Solano County General Plan.

This section presents estimates of existing and future year emissions of various air pollutants that were developed using industry-accepted air quality modeling tools and techniques. This section also presents the results of a health risk assessment undertaken to evaluate potential effects to humans from exposure to emissions of toxic air contaminants (TACs) associated with construction and operation of the Proposed Project including various land development projects, aviation projects, as well as aircraft, auxiliary power units (APU), ground support equipment (GSE), and fuel storage tanks. TAC emissions include diesel particulate matter, gaseous pollutants such as formaldehyde, benzene, and acrolein, and metals such as lead.

3.2.1 Environmental Setting

Regional Setting

Climate and Meteorology

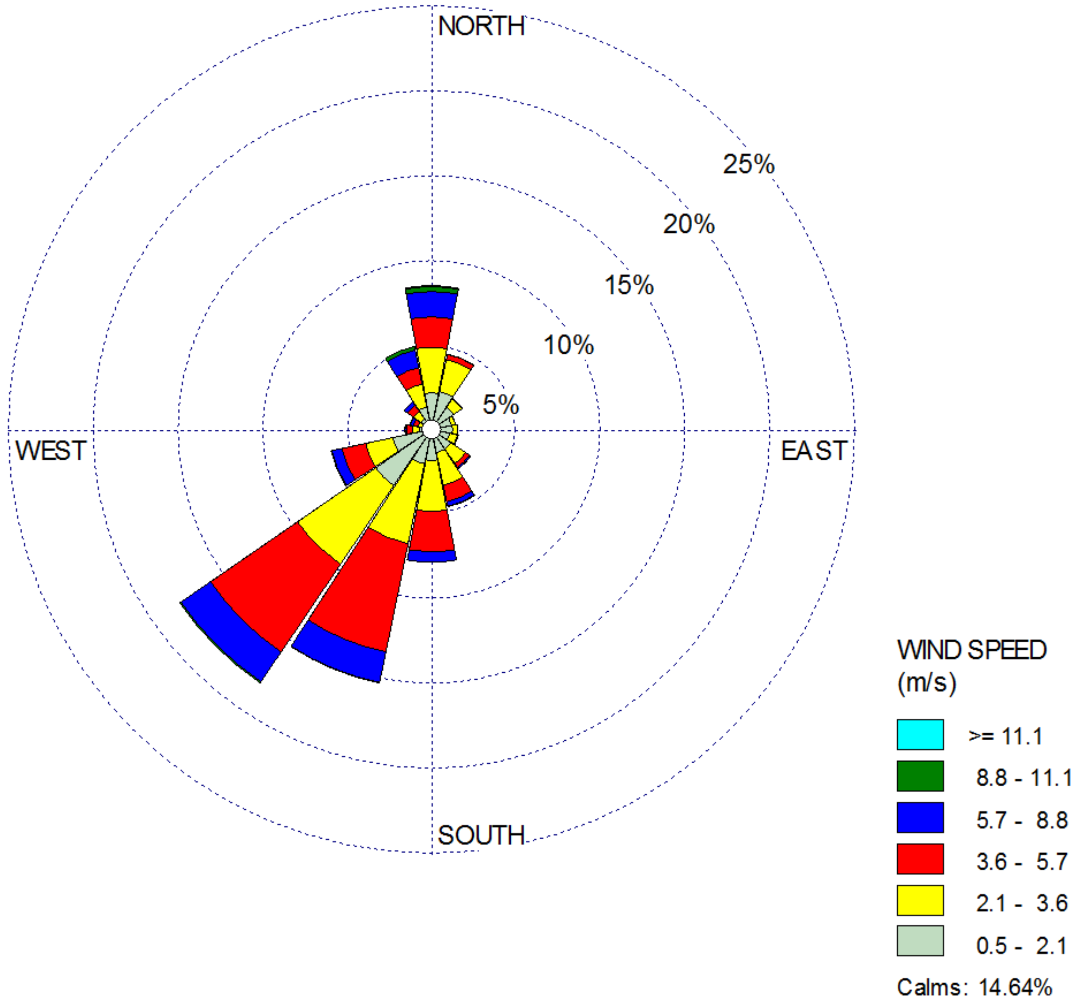
Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The existing facility and project site is located within northern Solano County and the boundaries of the Sacramento Valley Air Basin (SVAB). The SVAB is bounded by is bounded by the North Coast Ranges on the west and Northern Sierra Nevada Mountains on the east. The intervening terrain is relatively flat. Hot dry summers and mild rainy winters characterize the Mediterranean climate of the SVAB. During the year the temperature may range from 20 to 115 degrees Fahrenheit with summer highs usually in the 90s and winter lows occasionally below freezing. Average annual rainfall is about 20 inches, and the rainy season generally occurs from November through March. The prevailing winds are moderate in strength and vary from moist breezes from the south to dry land flows from the north.

The mountains surrounding the SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells collect over the Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions that trap pollutants near the ground.

The summer ozone season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds with the delta sea breeze arriving in the afternoon out of the southwest. Usually the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. During about half of the days from July to September, however, a phenomenon called the “Schultz Eddy” prevents this from occurring. Instead of allowing for the prevailing wind patterns to move north carrying the pollutants out, the Schultz Eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south toward the Yolo-Solano District. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating federal or state standards. The eddy normally dissipates around noon when the delta sea breeze arrives.

The project site lies approximately 60 miles east of the Pacific Ocean in northern Solano County. Wind measurements collected at the Nut Tree Airport indicate that the predominant wind flow is from of the southwest. Winds from the southwest to the south-southwest occur approximately 33 percent of the time.[1] Average wind speeds vary from season to season with the strongest average winds occurring during late spring and early summer and the lightest average winds during fall and winter months. Average wind speeds are 7.0 miles per hour (mph) during the summer and 4.9 mph during the winter.[2] **Figure 3.2-1** presents the wind rose for Nut Tree Airport. **Table 3.2-1** presents average precipitation and temperature data for Nut Tree Airport.

1 California Air Resources Board, *California Surface Wind Climatology*, June 1992.
2 *Ibid*.



SOURCE: KB Environmental, Inc., 2012.

Nut Tree Airport Master Plan EIR. 120526

Figure 3.2-1
Wind Rose for Nut Tree Airport

TABLE 3.2-1
AVERAGE HIGH TEMPERATURE AND PRECIPITATION AT NUT TREE AIRPORT

Month	Average High Temperature	Average Precipitation (inches)
January	56	3.74
February	61	5.05
March	67	2.61
April	71	1.33
May	80	0.92
June	89	0.08
July	94	0.01
August	93	0.04
September	88	0.09
October	78	0.91
November	65	2.60
December	57	5.81

SOURCE: Temperature data is from the National Data Climatic Data Center for 2008; precipitation data is from Western Regional Climate Center web site: wrcc.dri.edu/cgi-bin/cliRECtM.pl?ca5326, for a 10-year period.

Local Setting

The Proposed Project site is located in the northwest portion of Solano County within the City of Vacaville. The land uses associated with the immediate areas surrounding the Airport are generally industrial, business park, commercial and public park/recreational. The project site, which is operated by the County, is designated by the Solano County General Plan as public/institutional. Land uses to the north and east of the Proposed Project site are designated for business/industrial park uses. Land uses to the southeast of the Proposed Project site are designated for commercial uses. Land uses to the west of the project are designated for community facilities and open space predominately light industrial. Beyond the commercial areas, residential areas are located to the west, southwest, and southeast of the Proposed Project.

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to certain types of population groups or activities. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardio-respiratory diseases. Land uses such as schools, children’s day care centers, parks and playgrounds, hospitals, and nursing and convalescent homes are considered to be more sensitive to poor air quality than other land uses because the population groups associated with these land uses have increased susceptibility to respiratory distress. Residential areas are also considered to be sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present.

Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, as the majority of the workers tend to stay indoors most of the time.

Browns Valley Parkway, with a mix of commercial and residential properties, lies to the south of the Airport. The closest residential property southwest of the Airport is located approximately 2,500 feet from the Airport property boundary off the approach end to Runway 02. Also to the southwest of the Airport are recreational fields (City of Vacaville Park and Recreation) that lie between the approach end of Runway 02 and the residential properties to the southwest at a distance of approximately 1,000 feet from the runway. To the west of the Airport lies the continuation of the Browns Valley Parkway as it routes toward the north-northwest as well as a large residential community and a place of worship. The residences to the west are the closest sensitive receptors to the Airport property boundary located at approximately 1,900 feet west of the property line at their closest point. The New Hope Christian Fellowship Church is located approximately 2,200 feet west of the airport. Edwin Markham Elementary School is located approximately 3,000 feet southwest of the Airport property boundary.

Existing Pollutant Levels at Nearby Monitoring Stations

As discussed previously, the project site is located within the SVAB which is under the jurisdiction of the YSAQMD. The YSAQMD maintains a monitoring station within the City of Vacaville to monitor air quality and compliance with applicable ambient standards. The station is located at 2012 Ulatis Drive, approximately 1.3 miles south of the Project site. This station analyzes ozone (O_3) only. The nearest monitoring station that collects data for particulate matter of 10 microns or less in diameter (PM_{10}) is located at 650 Merchant Street in Vacaville, approximately two miles southwest from the project site. The nearest monitoring station that collects data for particulate matter of 2.5 microns or less in diameter ($PM_{2.5}$) and oxides of nitrogen (NOx) is located in Davis, approximately 16 miles northeast of the project site. The nearest monitoring station that collects data for carbon monoxide (CO) and sulfur dioxide (SO2) is located in Vallejo, approximately 23 miles southwest of the project site. **Table 3.2-2** includes the ambient pollutant levels monitored at these stations for the years 2007 through 2011.[3]

[3] California Air Resources Board, *2006 State Area Designations*, http://www.arb.ca.gov/desig/adm/adm.htm, accessed July 27, 2008.

TABLE 3.2-2
PROJECT AREA AIR POLLUTANT SUMMARY, 2007-2011[A]

Pollutant	Standard[b]	2007	2008	2009	2010	2011
Ozone (O_3)						
Highest 1-hr average, ppm[c]	0.09	0.103	0.112	0.106	0.105	0.088
Number of days above state standard [d]		1	4	3	2	0
Highest 8-hr average, ppm	0.07[e]	0.078	0.093	0.109	0.078	0.073
Number of days above state standard		2	4	2	1	0
Carbon Monoxide (CO)						
Highest 8-hr average, ppm[c]	9.0	2.7	2.3	2.2	1.9	2.4
Number of days above state standard		0	0	0	0	0
Nitrogen Dioxide (NO_2)						
Highest 1-hr average, ppm[c]	0.18	0.07	0.09	0.08	0.07	0.06
Number of days above state standard [d]		0	0	0	0	0
Sulfur Dioxide (SO_2)						
Highest 1-hr average, ppm[c]	0.25	0.004	0.003	0.003	0.002	0.002
Number of days above state standard [d]		0	0	0	0	0
Particulate Matter-10 Micron (PM_{10})						
Highest 24-hr average, $\mu g/m^3$ [c]	50	42	61	27	35	38
Number of days above state standard [d,f]		0	1	0	0	0
Annual Arithmetic Mean, $\mu g/m^3$ [c]	20	14.6	16.5	13.6	ND	14.4
Violation		No	No	No	ND	No
Particulate Matter-2.5 Micron ($PM_{2.5}$)						
Highest 24-hr average, $\mu g/m^3$ [c]	35[g]	62	78	36	39	43
Number of days above federal standard [d,f h]		ND	ND	ND	ND	ND
Annual Arithmetic Mean, $\mu g/m^3$ [c]	12	9	9	9	9	13
Violation		No	No	No	No	Yes

Underlined values indicate an excess of applicable standard.

a. Data for CO and SO_2 are from the BAAQMD Vallejo monitoring station. Data for SO_2 and $PM_{2.5}$ concentrations are from the YSAQMD U.C. Davis monitoring station. Ozone data is from the YSAQMD Vacaville (Ulatis Drive) station. Data for PM10 is from the YSAQMD Vacaville (Merchant Street) Station.
b. State standard, not to be exceeded.
c. ppm - parts per million; $\mu g/m^3$ - micrograms per cubic meter.
d. Refers to the number of days in a year during which at least one exceedance was recorded.
e. The federal standard for 8-hour ozone of 0.08 ppm was in effect during this period.
f. Measured every six days.
g. The 24-hour standard for $PM_{2.5}$ is a federal standard. California does not have a 24-hour standard for $PM_{2.5}$.
h. ND = no determination. Sampling methods were not sufficient to determine a value with respect to the federal 24-hout standard. However, data indicate that violations were likely to have occurred.

SOURCE: CARB, 2012.

Ozone. Ozone (O_3) is a secondary pollutant produced through a series of photochemical reactions involving reactive organic gases (ROGs) and nitrogen oxides (NO_x). O_3 creation requires ROGs and NO_x to be available for approximately three hours in a stable atmosphere with strong sunlight. O_3 is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources generating ROG and NO_x emissions. The effects of O_3 include eye and respiratory irritation, reduction of resistance to lung infection and possible aggravation of pulmonary conditions in persons with lung disease. O_3 is also damaging to vegetation and untreated rubber.

As shown in **Table 3.2-2**, the California state one-hour and eight-hour O_3 standards were exceeded up to four days per year in Vacaville.

Carbon Monoxide (CO). The SCAB is designated attainment/maintenance for the federal CO standard and attainment for the state CO standard.[4] CO is a non-reactive pollutant that is a product of incomplete combustion. At high concentrations, CO reduces the oxygen-carrying capacity of the blood and can cause headaches, dizziness, unconsciousness and even death. Ambient CO concentrations usually follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion and/or stagnant wind conditions, high mobile CO concentrations may exist at sensitive receptors located near roadways. The one-hour or eight-hour CO standards were not exceeded in Solano or Yolo Counties during the five–year period from 2007 to 2011.

Nitrogen Dioxide. The two oxides of nitrogen of most concern to the YSAQMD: nitric oxide (NO) and NO_2, are both emitted from motor vehicle engines, power plants, refineries, industrial boilers, aircraft, and railroads. NO_2 acts mainly as an irritant affecting the eyes, nose, throat, and respiratory tract. Extremely high-dose exposure to NO_2 may result in pulmonary edema and diffuse lung injury. Continued exposure to high NO_2 levels can contribute to the development of acute or chronic bronchitis. Low level NO_2 exposure may cause increased bronchial reactivity in some asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease and increased risk of respiratory infections, especially in young children. NO_2 is usually formed when NO reacts with atmospheric oxygen. NO_2 gives the air the "whiskey brown" color associated with smog. Since NO_x emissions contribute to O_3 generation, NO_x emissions are regulated through the O_3 Attainment Plans. However, as shown in **Table 3.2-2**, the one-hour NO_2 standard was not exceeded at the in Solano or Yolo counties in the five–year period from 2007 to 2011.

Sulfur Oxides (SO_x). Various oxides of sulfur are calculated and measured as SO_2. SO_2 is primarily produced by the burning of high sulfur coal in industrial operations and power plants, although within the SVAB it is primarily from fossil fuel combustion. In some parts of the state, elevated levels can also be due to natural causes, such as wind-blown dust and sea salt spray. Suspended sulfates contribute to overall particulate concentrations in ambient air which, if high enough, are suspected to be a cause of premature death in individuals with pre-existing respiratory disease. Major health concerns associated with exposure to high concentrations of SO_2 include effects on breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. The one-hour SO_2 standard was not exceeded at the nearest station in Vallejo during the five–year period from 2007 to 2011.

Particulate Matter. Particulate matter can be inhaled deep into the lungs and cause adverse health effects. The effects of inhaling particulate matter have been widely studied in humans and animals and include asthma, lung cancer, cardiovascular issues, and premature death. The size of the particle is a main determinant of where in the respiratory tract the particle will come to rest when inhaled. Depending on its size, particulate matter can penetrate into the deepest part of the lungs. Larger particles are generally filtered in the nose and throat and do not cause problems, but

4 *Ibid.*

PM_{10} can settle in the bronchi and lungs, and cause health problems. The ten micrometer size does not represent a strict boundary between respirable and non-respirable particles, but has been agreed upon for monitoring of airborne particulate matter by most regulatory agencies. Similarly, $PM_{2.5}$ tends to penetrate into the gas-exchange regions of the lung, and very small particles (less than 100 nanometers) may pass through the lungs to affect other organs. In particular, a study published in the *Journal of the American Medical Association* indicates that $PM_{2.5}$ leads to high plaque deposits in arteries, causing vascular inflammation and atherosclerosis — a hardening of the arteries that reduces elasticity, which can lead to heart attacks and other cardiovascular problems.[5] Researchers suggest that even short-term exposure at elevated concentrations could significantly contribute to heart disease.

Particulate matter occurs in the atmosphere from many kinds of dust- and fume-producing industrial and agricultural operations, fuel combustion, and atmospheric photochemical reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others such as vehicular traffic have a more regional effect.

Particulate matter contributes to pollution through fugitive dust and exhaust emissions. Fugitive dust is produced from activities that disturb soil such as grading, digging, or just driving on an unpaved road. Particulate matter from exhaust gasses is produced from incomplete combustion, resulting in soot formation. Both forms of particulate matter are accounted for in calculations performed in this analysis. As shown in **Table 3.2-2**, the 24-hour PM_{10} standards have been exceeded once at the Vacaville Monitoring Station in the five-year period from 2007 to 2011. In addition, the annual arithmetic mean standard was not exceeded in the five year period. Data indicate that The federal 24-hour $PM_{2.5}$ standard, which was initially promulgated by USEPA in 1997 and revised in 2006, was likely to have been exceeded in each of the past five years at the Davis station, although officially the YSAQMD does not make a determination with respect to the federal 24-hour PM2.5 standard from this data.. The state annual arithmetic mean standard for $PM_{2.5}$ was exceeded in one of the last five years measured in Davis.

Reactive Organic Gases (ROG). There is currently no ambient air quality standard for ROG. ROG are any reactive compounds of carbon, excluding methane, CO, carbon dioxide (CO_2), carbonic acid, metallic carbides or carbonates, ammonium carbonate, and other exempt compounds. ROG are a precursor of ozone and as such are regulated under the YSAQMD ozone attainment plan.[6] However, since there is no ambient air quality standard for ROG, exceedances of such a standard are not possible. Additionally, because ROG can include a variety of compounds, there are no specific health effects that can be attributed to it aside from its role as an ozone precursor. Individual components of ROG may have health effects related to their potential presence as a TAC. Health effects related to TACs include cancer, birth defects, neurological damage and death. The terms ROG and volatile organic compound (VOC) are often used interchangeably and the terminology will vary from air district to air district.

5 Pope, C Arden, et al., *Cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution*, 2002.
6 Yolo-Solano Air Quality Management District, *Triennial Assessment and Plan Update*, May, 2010.

Lead. Health effects related to lead exposure include anemia, rise in blood pressure, kidney damage, miscarriages, and brain damage. Lead concentrations historically exceeded the state and federal air quality standards by a wide margin, but have not exceeded the standards at any regular monitoring station since 1982. Though special monitoring sites immediately downwind of lead sources recorded localized violations of the state standard in 1994, no violations were recorded at these stations in 1996. As a result of the phase-out of leaded motor vehicle gasoline, metal processing is currently the primary source of lead emissions in the SVAB. The highest concentrations of lead in air are generally found near lead smelters. Other stationary sources that generate lead emissions include waste incinerators, utilities, and lead-acid battery manufacturers.

Solano County is not a major source of lead emissions and there are no lead monitoring stations in close proximity to the proposed project site. Annual emissions of lead in Solano County are well below the USEPA's lead monitoring threshold of 0.5 tons per year.

Sulfates. Sulfates are monitored at a handful of stations in SVAB and the last recorded exceedance was in 2001. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. As SO_2 is a precursor to sulfates, YSAQMD recommends analyzing SO_2 as an indicator of sulfates. As such, sulfate emissions are not quantified in this analysis. Health effects of sulfates would be similar to those described for SO_2.

Toxic Air Contaminants. TACs are pollutants known or suspected to cause cancer or other serious health effects such as birth defects. TACs may also have significant adverse environmental and ecological effects. Examples of TACs include formaldehyde, acrolein, benzene; diesel particulate matter (DPM); hydrogen sulfide; toluene; and metals such as cadmium, mercury, chromium, and lead. Health effects from TACs vary depending on the specific toxic pollutant but may include cancer and immune system damage, as well as neurological, reproductive, developmental, and respiratory problems. There are no ambient standards for specific TACs, or associated attainment designations. YSAQMD staff uses the risk assessment health values prepared by the California Office of Environmental Health Hazard Assessment (OEHHA) for regulatory purposes such as risk analysis, rulemaking, permitting, public notice, and risk reduction. The health values used by various special-purpose agencies may vary due to particular mandates, guidelines, models, assumptions, and safety considerations.

Existing Health Risk in the Surrounding Area

There are several sources and activities located on or nearby the project site which emit TACs. Emitting equipment generally consists of boilers, paint booths and emergency generators as well as aircraft and airport support equipment.

The other major source of TAC emissions in the project area is vehicle traffic on the I-80 freeway, which has an average daily traffic volume of 149,000 vehicles and a relatively high truck percentage of 6.4 percent,[7] 60 percent of which is attributable to vehicles with four or more axles that are likely to be diesel powered and therefore a source of DPM.

7 California Department of Transportation, *Annual Average Daily Truck Traffic on the California State Highway System*, 2010.

3.2.2 Regulatory Setting

Federal

Federal Clean Air Act

The 1977 federal Clean Air Act (CAA) required the USEPA to identify National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. National standards have been established for the six "criteria air pollutants," so-called because the USEPA publishes criteria documents to justify the choice of standards. The six "criteria air pollutants" for which federal and state ambient standards have been established are: O_3, CO, NO_2, SO_2, particulate matter (PM_{10} and $PM_{2.5}$), and lead. Documented health effects from air pollution include acute respiratory infections, chronic bronchitis, pulmonary emphysema, and bronchial asthma. Criteria pollutant standards are listed in **Table 3.2-3**.

TABLE 3.2-3
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b]
O_3	1 hour	0.09 ppm	NS
	8 hour	0.070 ppm	0.075 ppm
CO	1 hour	20 ppm	35 ppm
	8 hour	9.0 ppm	9 ppm
NO_2	1 hour	0.18 ppm	NS
	Annual	0.030	0.053 ppm
SO_2	1 hour	0.25 ppm	NS
	24 hour	0.04 ppm	0.14 ppm
	Annual	NS	0.03 ppm
PM_{10}	24 hour	50 µg/m^3	150 µg/m^3
	Annual[c]	20 µg/m^3	NS
$PM_{2.5}$	24 hour	NS	35 µg/m^3
	Annual	12 µg/m^3 [d]	15 µg/m^3
Sulfates	24 hour	25 µg/m^3	NS
Lead	30 day[d]	1.5 µg/m^3	0.15 µg/m^3
	Quarter	NS	1.5 µg/m^3
Hydrogen Sulfide	1 hour	0.03 ppm	NS
Visibility-Reducing Particles	8 hour	see note e	NS

NS = no standard; ppm = parts per million; µg/m^3 = micrograms per cubic meter.

a CAAQS = state ambient air quality standards (California). CAAQS for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 hour and 24 hour), nitrogen dioxide, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.

b NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The one-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the three-year average of the fourth-highest daily concentration is 0.08 ppm or less. The 24-hour PM_{10} standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour $PM_{2.5}$ standard is attained when the three-year average of the 98th percentile is less than the standard.

c State standard = annual geometric mean; national standard = annual arithmetic mean.

d 30-day federal standard was promulgated in October of 2008. USEPA changed the calculation method for the averaging time to use to 'rolling' three month period with a maximum (not-to-be-exceeded) form, evaluated over a three-year period. This replaces the current approach of using calendar quarters. A rolling three month average considers each of the 12 three-month periods associated with a given year, not just the four calendar quarters within that year.

e Statewide visibility-reducing particle standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a ten-mile nominal visual range.

SOURCE: CARB, 2012.

Pursuant to the 1990 federal CAA Amendments, the USEPA has classified air basins (or portions thereof) as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether the national standards had been achieved. In some parts of the country, areas are designated as Attainment/Maintenance (or simply Maintenance) indicating that these areas are in a transition period from formerly being a nonattainment area to an attainment area. For ozone, carbon monoxide, and particulate matter (PM_{10} and $PM_{2.5}$), the nonattainment designations are further classified by the severity, or degree, of the violation of the NAAQS. For example, in the case of ozone, these classifications range from moderate to extreme.

Attainment Status

Pursuant to the 1990 federal CAA Amendments, USEPA classified air basins (or portions thereof) as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether the national standards had been achieved. The USEPA has designated the SVAB as nonattainment with respect to the federal eight-hour ozone standard and the federal 24-hour standard $PM_{2.5}$. SVAB is classified as an attainment area for the federal NO_2, SO_2 and lead standards, unclassified for the 24-hour PM_{10} standard and unclassified/attainment for the CO standards.[8]

The YSAQMD is currently in the process of finalizing its SIP with respect to the federal 8-hour ozone standard (2008 standard) and PM2.5 standard (2006 standard). The state SIP has been submitted to USEPA which commented and requested revisions to the Draft SIP. As of April 2012, the USEPA proposed approval of the revisions but have not yet acted[9]. Previous SIP's were developed for NAAQS that are no longer in affect (the 1-hour ozone standard).

State

California Clean Air Act

CARB manages air quality, regulates mobile emissions sources, and oversees the activities of county air pollution control districts and regional air quality management districts. CARB regulates local air quality indirectly by establishing state ambient air quality standards and vehicle emissions standards, and by conducting research, planning, and coordinating activities.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. These standards, commonly referred to as CAAQS, are shown in **Table 3.2-3**.

Attainment Status

Under the California CAA, signed into law in 1988, areas have been designated as attainment or nonattainment with respect to the state standards. The SVAB is currently designated as a

8 U.S. Environmental protection Agency, *The Greenbook Non-attainment Areas for Criteria Pollutants*, http://www.epa.gov/air/oaqps/greenbk/index.html, accessed on January 27, 2008.

9 federalregister.gov/articles/2012/04/18/2012-8948/revisions-to-the-california-state-implementation-plan-yolo-solano-air-quality-management-district

nonattainment area for ozone and respirable particulate matter with respect to state standards.[10] The SVAB is designated attainment for the state standards for CO, NO_2, SO_2, sulfates, and lead.

Air Quality Attainment Plan

The California CAA requires areas with unhealthy levels of O_3, CO, NO_2, SO_2, and inhalable particulate matter to develop plans describing how CAAQS will be achieved. The Board of the YSAQMD adopted the Air Quality Attainment Plan (AQAP) in February of 1992 which was subsequently approved by CARB in May of 1992.

Every three years, the YSAQMD prepares a Triennial Assessment and Plan Update of its AQAP detailing how the SVAB will expeditiously achieve the CAAQS. Each updated version of the AQAP updates the previous plan. The latest update was published in May of 2010.The Final 2010 Triennial Report and Update for YSAQMD builds upon improvements accomplished from the previous plans, and aims to incorporate all feasible control measures while balancing costs and socioeconomic impacts.

Toxic Air Contaminants

Regulation of TACs under California State law, and regulation of hazardous air pollutants (HAPs) under federal regulations, is achieved through federal and state controls on individual sources. The 1977 CAA Amendments required to identify National Emission Standards for HAPs to protect public health and welfare. These substances include certain VOCs, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. There is uncertainty as to the precise degree of hazard.

The 1990 CAA Amendments offer a technology-based and performance-based approach to reducing air toxics from major sources of air pollution, followed by a risk-based approach to address any remaining, or residual risks. Under the 1990 CAA Amendments, designated HAPs are regulated under a two-phase strategy. Under the technology-based approach, the USEPA develops standards for controlling routine emissions of HAP emissions from each major type of facility within an industry group (or source category). These standards require facilities to install controls, known as Maximum Achievable Control Technology (MACT), based on emissions levels that are already being achieved by better-controlled and lower-emitting sources in an industry. MACT includes measures, methods and techniques, such as material substitutions, work practices, and operational improvements, aimed at reducing HAP emissions. USEPA has issued MACT standards covering over 100 categories of major industrial sources, such as chemical plants, oil refineries, and steel mills, as well as categories of smaller sources, such as dry cleaners, commercial sterilizers, and chromium electroplating facilities.

California law has developed its own list of TACs separate from but inclusive of many of the federal HAPs. California law defines TACs as air pollutants having carcinogenic or non-carcinogenic health effects. The State Air Toxics Program was established in 1983 under AB 1807. A total of 243 substances have been designated TACs under California law; they include the 189 (federal) HAPs

[10] *Ibid.*

adopted in accordance with AB 2728, including benzene and DPM. The Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; AB 2588 does not regulate air toxics emissions. TAC emissions from individual facilities are quantified and prioritized. “High priority” facilities are required to perform a health risk assessment and, if specific thresholds are exceeded, are required to communicate the results to the public in the form of notices and public meetings. Depending on the risk levels, emitting facilities are required to implement varying levels of risk reduction measures. SCAQMD implements AB 2588, and is responsible for prioritizing facilities that emit air toxics, reviewing health risk assessments, and implementing risk reduction procedure.

An air toxics control measure (ATCM) for stationary diesel engines was adopted by CARB in February, 2004, and became effective December 8, 2004. Among other provisions, ATCM established emission standards and fuel use requirements for new and in-use stationary engines used in prime and emergency back-up applications (non-agricultural) and for new stationary engines used in agricultural applications.

Local

Association of Bay Area Governments

The Association of Bay Area Governments (ABAG) is the regional planning agency for the nine counties in the San Francisco Bay Area. The project site is located in northern Solano County. Although the northern portion of Solano County lies within the jurisdiction of the YSAQMD, from a regional planning perspective, this jurisdiction is split between the Sacramento Area Council of Governments (SACOG) within Yolo county and the ABAG within Solano County.

As the designated Metropolitan Planning Organization (MPO), ABAG is mandated by the federal government to research and draw up plans for transportation, growth management, and air quality. With regard to air quality, ABAG is engaged in development of demographic projections plus the integrated land use, housing, employment, transportation programs, measures, and strategies portions of the air quality management plan (AQMP). ABAG also has responsibility under the federal CAA for determining conformity of projects, plans and programs to the air plan.

The transportation committee of ABAG is engaged in problems, programs and other matters which pertain to the regional issues of mobility, air quality, transportation control measures and communications, and make recommendations on such matters to the Regional Council. Major programs that are under the purview of the transportation committee are the Regional Transportation Plan (RTP), the Regional Transportation Improvement Plan (RTIP), aviation, highway, transportation finance, and transportation conformity.

The RTIP identifies specific funding sources and funding amounts for each transportation project. Projects include highway improvements, transit, rail and bus facilities, high occupancy vehicle lanes, signal synchronization, intersection improvements, and freeway ramps. The RTIP must include all transportation projects that require federal funding, as well as all regionally significant transportation projects for which federal approval is required, regardless of funding source.

Yolo-Solano Air Quality Management District

YSAQMD is the air pollution control agency for all of Yolo County and the northern portion of Solano County including the project site. YSAQMD has two basic roles under CEQA. First, if acting as a lead agency, the District can be responsible for preparing environmental analysis in the EIR. Secondly, and most commonly, YSAQMD will review and comment on air quality analysis prepared by other public agencies.

In 2007, the YSAQMD published the *Handbook for Assessing and Mitigating Air Quality Impacts*. The *Air Quality Handbook* is the current guidance document for preparing air quality analyses and is intended to assist the lead agency with conducting an air quality analysis for CEQA documents. The *Air Quality Handbook* provides baseline information, recommendations for significance thresholds for both local and regional impacts, direction on how to calculate emissions from the operational phases of a project, direction on how to assess the impact from TAC, and suggestions on to how to best mitigate adverse air quality impacts of the project.

As discussed previously in regards to the SIP, YSAQMD has also developed an AQMP which builds upon improvements accomplished from the previous SIPs, aimed at achieving the $PM_{2.5}$ standard through implementation of short-term and mid-term control measures, and achieving the eight-hour O_3 standard based on implementation of additional long-term measures.

Additional Rules and Regulations

Locally, YSAQMD is responsible for controlling emissions primarily from stationary sources of air pollution. YSAQMD develops and updates an AQMP, which serves as the blueprint to bring this area into compliance with federal and state clean air standards. Rules are adopted to reduce emissions from various sources, including specific types of equipment, industrial processes, paints and solvents, and even consumer products. Permits are issued to businesses and industries to ensure compliance with air quality rules. YSAQMD staff conducts periodic inspections to ensure compliance with these requirements. Fuel storage tanks, generators or other stationary sources are not proposed by the Master Plan.

Solano County General Plan

Solano County has adopted the General Plan to guide development within its jurisdiction. The General Plan contains Public Health and Safety and Air Quality Elements that addresses, among other topics, local issues and programs to improve air quality and includes the following five policies and four applicable implementation programs:.

> **Policy HS.P-43.** Support land use, transportation management, infrastructure and environmental planning programs that reduce vehicle emissions and improve air quality.
>
> **Policy HS.P-44.** Minimize health impacts from sources of toxic air contaminants, both stationary (e.g., refineries, manufacturing plants) as well as mobile sources (e.g., freeways, rail yards, commercial trucking operations).
>
> **Policy HS.P-45.** Promote consistency and cooperation in air quality planning efforts.

Policy HS.P-46. Coordinate with and provide incentives to agricultural producers to minimize the impacts of operations on air quality.

Policy HS.P-47. Support recycling programs which reduce emissions associated with manufacturing and waste disposal.

Implementation Program HS.I-54. Require that when development proposals introduce new significant sources of toxic air pollutants, they prepare a health risk assessment as required under the Air Toxics "Hot Spots" Act (AB 2588, 1987) and, based on the results of the assessment, establish appropriate land use buffer zones around those areas posing substantial health risks.

Implementation Program HS.I-59. Require the implementation of best management practices to reduce air pollutant emissions associated with the construction of all development and infrastructure projects.

Implementation Program HS.I-63. Use the guidelines presented in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, or the applicable Air Quality Management District guidelines and recommendations available at the time, when establishing buffers around sources of toxic air contaminants or odorous emissions

Implementation Program HS.I-64. Assess air quality impacts using the latest version of the California Environmental Quality Act Guidelines and guidelines prepared by the applicable Air Quality Management District.

3.2.3 Analysis, Impacts, and Mitigation

Significance Criteria

Appendix G of the *CEQA Guidelines* provides guidance for the assessment of the significance of potential environmental impacts. Relative to air quality, a project would normally have a significant effect on the environment if it would:

a. Conflict with or obstruct implementation of the applicable air quality plan;
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
d. Expose sensitive receptors to substantial pollutant concentrations; or
e. Create objectionable odors affecting a substantial number of people.

The YSAQMD has developed CEQA significance thresholds for project construction and operation for guidance to lead agencies responsible for determining significant air quality impacts for their projects. YSAQMD's significance thresholds are 80 pounds per day of PM_{10} and 10 tons per year of ROG or NOx.

Regarding local CO emissions from roadway traffic, the Proposed Project would result in a significant air quality impact if it would cause or contribute to a localized CO concentrations in excess of the California one-hour CO standard of 20 parts per million (ppm), or the eight-hour CO standard of 9 ppm, at an intersection or roadway near a sensitive receptor. Per YSAQMD guidance, it can be assumed that significant localized CO concentration impacts would not occur if Level of Service (LOS) for impacted roadway intersections would remain at LOS E or better.

The operation of any project with the potential to expose sensitive receptors to substantial levels of TACs would have a potentially significant impact. More specifically, proposed development projects that have the potential to increase, above baseline, the public exposure to TACs in excess of the following thresholds would be considered to have a significant air quality impact:

- Cancer risk for the Maximally Exposed Individual increases by at least ten in one million;[11]
- Ground-level concentrations of non-carcinogenic TACs would result in a Hazard Index greater than 1 for the Maximally Exposed Individual.[12]

Methodology and Assumptions

Air quality impacts due to the Proposed Project within YSAQMD are assessed using methodologies identified in *Handbook for Assessing and Mitigating Air Quality Impacts*. Conformity with the air quality plan was assessed relative to goals and policies contained within the YSAQMD's AQAP.

Impacts are assessed relative to regional emissions by calculating construction-related emissions using the California Emissions Estimator Model (CalEEMod Version 2011.1.1) and comparing these emissions to thresholds established by YSAQMD. Likewise, operational air emissions are assessed by calculating pollutant emissions from both stationary and mobile sources and by comparing these emissions to the significance criteria. Emissions calculations for operations were also performed using the CalEEMod model for area, stationary, and motor vehicles sources associated with the Proposed Project. Aircraft, APU, GSE, and fuel tank emissions were calculated using the FAA's Emissions and Dispersion Modeling System (EDMS) (Version 5.1.3).[13] Project-specific data was used in calculations to the extent such data was available; otherwise conservative assumptions were used. Supporting information, assumptions, detailed methodologies concerning the air quality and health risk assessment are contained in **Appendix B**.

[11] Maximally Exposed Individual represents the worst-case risk estimate, based on a theoretical person continuously exposed for 70 years at the point of highest compound concentration in air.

[12] The hazard index is the ratio of a hazardous air pollutant concentration to its reference concentration, or safe exposure level. If this "hazard index" exceeds one, people are exposed to levels of hazardous air pollutants that may pose non-cancer health risks.

[13] EDMS is the recommended emissions and dispersion model for airport emissions approved by the FAA.

Impacts and Mitigation Measures

Air pollutant emissions would be generated by the Proposed Project from construction activities (which include worker and haul trips, construction equipment, and fugitive dust), as well as from operational sources such as increased motor vehicle trips and aircraft operations generated by the project and stationary sources (fuel tanks). The impacts of these emissions are considered on both a regional and local level. While the potential exists for both vehicle trips and aircraft operations to occur elsewhere if the Proposed Project is not constructed, and therefore represent redirected vehicle trips and aircraft operations, as a conservative analysis all vehicle trips and aircraft operations generated by the Proposed Project are considered to be new emission sources within the air basin.

Impact 3.2-1: Could implementation of the Proposed Project conflict with or obstruct implementation of an applicable air quality plan? (*Less Than Significant*)

An EIR must discuss the consistency between the Proposed Project and applicable Air Quality Management Plan for the jurisdiction in which it is located[14]. The 2010 Triennial Assessment and Plan Update for YSAQMD is the most current revision to the 1992 AQAP and relies on a comprehensive and integrated control approach aimed at reducing ozone precursor emissions through implementation of all feasible control measures under the District's purview.

Additionally, Solano County has developed its General Plan to guide development within its jurisdiction. The Solano County General Plan contains a Public Health and Safety Element that addresses, among other topics, local issues and programs to improve air quality.

Table 3.2-4 addresses the consistency of the Proposed Project with the relevant Air Quality goals and policies. As identified in **Table 3.2-4** the Proposed Master Plan would be considered generally consistent with the relevant goals and policies related to air quality.

[14] California Office of Planning and Research, CEQA Guidelines, 2012 Appendix G p.243

TABLE 3.2-4
CONSISTENCY OF THE PROPOSED PROJECT WITH AQMP AND AIR QUALITY GOALS AND POLICIES

Goal or Policy	Consistency Analysis
YSAQMD Air Quality Management Plan	
Overall AQMP goal of achieving reduction in ozone precursors	Impacts 3.2-2 and 3.2.3 address whether the Proposed Project would result in a cumulatively considerable contribution of ozone precursors (ROG and NOx). These impact analyses indicate that the Proposed Project's emissions of ozone precursors would be cumulatively considerable.
Population growth and vehicle miles travelled (vmt) assumptions used to predict future emissions and demonstrate achievement of state ozone standards.	Figures 9 and 10 of the AQMP predict a growth of 23 percent and 30 percent between a baseline year of 2005 and 2020 for population and vehicle miles, respectively. Impact 3.13-1 of the Population and Housing section identified that the Proposed Project would generate a limited number of permanent jobs and would have no impact on population growth. The Proposed Project would generate 1,047 daily vehicle trips (by full build-out). This represents an increase of less than 0.003 percent of the 30 percent increase in vmt projected in the AQMP. Consequently, the Proposed Project would not contribute appreciably to predicted regional increases in vmt.
Solano County General Plan	
Policy HS.P-43. Support land use, transportation management, infrastructure and environmental planning programs that reduce vehicle emissions and improve air quality.	Provision of infrastructure for more GA aircraft operations will reduce vehicle miles travelled from travelers that might otherwise use an automobile. GA aircraft emissions would predominantly occur above the ozone mixing height and replace regional automobile trips.
Policy HS.P-44. Minimize health impacts from sources of toxic air contaminants, both stationary (e.g., refineries, manufacturing plants) as well as mobile sources (e.g., freeways, rail yards, commercial trucking operations).	The Proposed Master Plan does not propose new fuel tanks or any other source of TAC's.
Policy HS.P-45. Promote consistency and cooperation in air quality planning efforts.	This policy pertains to planning efforts of the County and is not applicable to land use development projects.
Policy HS.P-46. Coordinate with and provide incentives to agricultural producers to minimize the impacts of operations on air quality.	This policy pertains to agricultural land uses County and is not applicable to land use development projects.
Policy HS.P-47. Support recycling programs which reduce emissions associated with manufacturing and waste disposal.	This policy pertains to manufacturing and waste disposal land uses and is not applicable to airport development or land use development projects.

Mitigation Measures: None required.

Impact 3.2-2: Could the Proposed Project violate any air quality standard or contribute substantially to an existing or projected air quality violation? (*Less than Significant*)

Phase I Projects

The following provides a project-level review of potential impacts associated with Phase I projects.

Construction

Construction emissions from the Proposed Project were estimated using the CalEEMod emissions model, which calculates construction emissions for several stages including demolition, site preparation, grading, structural building, paving, and architectural coating. Construction of the Proposed Project would generate air emissions through the use of heavy-duty construction equipment (excavators, bulldozers, wheeled loaders, and cranes, etc), from vehicle trips hauling materials, and from construction workers traveling to and from the project site. In addition, fugitive dust emissions would result from demolition and grading activities. ROG emissions would occur during the paving operations and the application of architectural coatings (i.e., paints).

The assessment of construction air quality impacts considers each of these sources. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and for dust, the prevailing weather conditions. Construction-related emissions for the Proposed Project are presented in **Table 3.2-5**. During Phase I (from 2013 through 2017), the construction projects range from aviation-related activities such as construction of hangars and the runway shift, while non-aviation commercial projects include light industrial, office development, and mixed use retail.

TABLE 3.2-5
UNMITIGATED CONSTRUCTION EMISSIONS FOR THE PROPOSED PROJECT

	Annual (tons)					Daily (pounds)
Project	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**
2013						
Aviation Projects	0.56	1.01	0.72	0.08	0.07	1.93
2014						
Aviation Projects	4.36	3.41	2.58	0.43	0.28	21.9
Commercial Projects	2.37	3.68	2.67	0.42	0.30	21.9
Total	**6.73**	**7.09**	**5.25**	**0.85**	**0.58**	**43.8**
2015						
Aviation Projects	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0
Commercial Projects	0.74	2.61	1.97	0.25	0.20	6.82
Total	**0.74**	**2.61**	**1.97**	**0.25**	**0.20**	**6.82**
2016						
Aviation Projects	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0
Commercial Projects	0.64	1.80	1.42	0.19	0.15	6.70
Total	**0.64**	**1.80**	**1.42**	**0.19**	**0.15**	**6.70**
2017						
Aviation Projects	2.99	2.91	2.57	0.39	0.24	21.0
Worst-case Year (2014)						
Total	**6.73**	**7.09**	**5.25**	**0.85**	**0.58**	**43.8**
YSAQMD Significance Threshold	10	10	-	-	-	80
Significant Impact?	No	No	-	-	-	No

SOURCE: KB Environmental Sciences, Inc, 2013.

As shown in **Table 3.2-5**, the worst case construction emissions (associated with year 2014 construction activities) for Phase I would not exceed any of the YSAQMD significance thresholds for ROG and NOx nor the significance thresholds for PM_{10}. Therefore, construction emission impacts would be *less than significant*. Supporting information, assumptions, detailed methodologies concerning the air emission calculations (including the CalEEMod output files) are contained in **Appendix B**.

Nevertheless, the YSAQMD recommends a number of Best Management Practices (even for projects that do not exceed the construction thresholds) that can be reasonably implemented to reduce construction fugitive dust PM_{10} emissions for all construction projects within the District. Common measures include watering, chemical stabilization of soils or stockpiles, and reducing surface wind speeds with windbreaks. To further minimize fugitive dust emissions of PM_{10}, **Mitigation Measure 3.2-2a** shall be implemented.

Furthermore, emission reduction measures of construction equipment exhaust are also recommended to focus on strategies that reduce NOx, ROG, and PM_{10} emissions. In order to ensure that emission reduction measures are following, **Mitigation Measure 3.2-2b** shall be implemented.

Operation

The Proposed Project would generate air pollutant emissions from area and mobile sources as well as aircraft, GSE, APU, and fuel storage tanks. **Table 3.2-6** presents the operational emissions associated with the Proposed Project during Phase I. Supporting information, assumptions, detailed methodologies concerning the air emission calculations (including the aircraft data) are contained in **Appendix B**. These emission estimates reflect the projected increase in emissions with operation of the Proposed Project compared to the existing baseline conditions.

TABLE 3.2-6
OPERATIONAL EMISSIONS FOR THE PROPOSED PROJECT

	Annual (tons)					Daily (pounds)
Project	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**
Phase I						
Area and Mobile Sources	5.64	6.59	16.7	2.45	0.27	18.4
Aircraft	0.52	0.06	32.1	<0.01	<0.01	<0.01
Ground Support Equipment	0.01	0.14	0.04	<0.01	<0.01	0.03
Auxiliary Power Units	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fuel Storage	0.01	-	-	-	-	-
Total	**6.18**	**6.79**	**48.8**	**2.45**	**0.27**	**18.4**
YSAQMD Significance Threshold	10	10	-	-	-	80
Significant Impact?	No	No	-	-	-	No

SOURCE: KB Environmental Sciences, Inc, 2012.

Area and Indirect Sources

Area sources associated with the Proposed Project would primarily be related to natural gas combustion, maintenance application of architectural coatings and landscape maintenance. These emissions were estimated using the CalEEMod. CalEEMod calculates landscape maintenance emissions (i.e. gasoline operated landscaping equipment) based on the acreage of the land use site. Because on-site landscaping is primarily located along the perimeter of the site, this estimate is conservative. CalEEMod calculates natural gas and architectural coating emissions based on building area. **Table 3.2.-6** includes the area source operational emissions.

Mobile Emission Sources

The Proposed Project would generate mobile source emissions as a result of the increase in motor vehicle trips generated by new employees and additional visitors accessing the Airport. During Phase I, the daily vehicle trip generation rate associated with the Proposed Project is 1,093 trips using trip generation rates provided by the Institute of Transportation Engineers (ITE) *Trip Generation*, 8th Edition.

Emissions from these vehicle trips were estimated based on the CalEEMod. These emission calculations apply the default assumptions regarding vehicle fleet mix, vehicle speed and other data associated with the District. **Table 3.2.-6** presents the motor vehicle operational emissions.

Aircraft Sources

Emissions from increased aircraft operations associated with the Proposed Project were estimated using the FAA's EDMS model. Aircraft emission inventories generally include aircraft emissions related to ground-based taxiing as well as the entire Landing and Takeoff (LTO) cycle (approach, takeoff, and climb out).

Aircraft activity levels (aircraft arrival and departure operations) and aircraft/engine assignments were developed based on the Master Plan and correspondence with the Airport and are consistent with the data used for the noise analyses within this EIR. Aircraft emissions were based on specific engine types and times in each of the four aircraft operating modes: approach, climb out, takeoff, and taxi/idle-delay. The taxi/idle-delay mode includes the landing roll, which is the movement of an aircraft from touchdown through deceleration to taxi speed or full stop. GSE and APU were assigned to each aircraft based on EDMS default assignments, where applicable. For example, the Cessna 172 does not contain an APU and includes a fuel truck for GSE.

Rather than using default aircraft taxi times, estimates were derived using actual Nut Tree Airport taxiway distances obtained from the Airport Layout Plan (ALP) and nominal speeds for aircraft. Taxiway distances were adjusted for future conditions such as the runway shift and runway extension. **Table 3.2.-6** presents the operational emissions associated with aircraft, GSE, and APU.

Lead emissions due to the use of aviation gasoline are also quantified for this analysis so that they may be compared to the air monitoring requirement threshold of 1.0 ton per year. For Phase I, lead emissions are estimated to be 0.17 tons (an increase of 0.01 tons from the baseline condition).

Stationary Sources

Stationary source emissions associated with the Proposed Project would result from additional fuel throughput associated with the 10,000 gallon aircraft fuel storage tanks due to additional aircraft operations. Emissions from the storage tanks were calculated using FAA's EDMS. Fuel tank emissions are presented in **Table 3.2-6**.

As shown in **Table 3.2-6**, the operational emissions during Phase I would not exceed any of the YSAQMD significance thresholds for ROG and NOx nor the significance thresholds for PM_{10}. Therefore, Phase I operational emission impacts would be *less than significant*.

Project Build-out

The following presents a programmatic-level assessment of potential impacts associated with Phases II and III projects.

Construction

Construction emissions from the Proposed Project were estimated using the CALEEMod emissions model. For Phase II and III, construction-related emissions for the Proposed Project are presented in **Table 3.2-7**. The construction projects range from aviation-related activities such as construction of hangars and the runway extension.

TABLE 3.2-7
UNMITIGATED CONSTRUCTION EMISSIONS FOR THE PROPOSED PROJECT

	Annual (tons)					Daily (pounds)
Project	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**
Phase II						
Aviation Projects	2.87	2.46	2.7	0.36	0.20	20.3
Phase III						
Aviation Projects	2.15	1.69	2.47	0.37	0.20	19.6
Worst-case Phase						
Total	**2.87**	**2.46**	**2.70**	**0.37**	**0.20**	**20.3**
YSAQMD Significance Threshold	10	10	-	-	-	80
Significant Impact?	No	No	-	-	-	No

SOURCE: KB Environmental Sciences, Inc, 2012.

As shown, the worst case construction emissions during Phase II and III would not exceed any of the YSAQMD significance thresholds for ROG and NOx nor the significance thresholds for PM_{10}. Therefore, construction emission impacts would be *less than significant*. Supporting information, assumptions, detailed methodologies concerning the air emission calculations (including the CALEEMod output files) are contained in **Appendix B**.

Operation

The Proposed Project would generate air pollutant emissions from area and mobile sources as well as aircraft, GSE, APU, and fuel storage tanks. During Phase III, the daily vehicle trip generation rate associated with the Proposed Project is 1,093 trips using trip generation rates. **Table 3.2-8** presents the operational emissions associated with the Proposed Project during Phases II and III.

The data in **Table 3.2-8** are cumulative in that emissions for Phase II in year 2022 include emissions from Phase I, while emissions from Phase III in year 2031 are inclusive of both Phase I and II emissions. Supporting information, assumptions, detailed methodologies concerning the air emission calculations (including the aircraft data) are contained in **Appendix B**.

TABLE 3.2-8
OPERATIONAL EMISSIONS FOR THE PROPOSED PROJECT

	Annual (tons)					Daily (pounds)
Project	**ROG**	**NO_X**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**
Phase II (2022)						
Area and Mobile Sources	6.87	7.11	18.0	2.75	0.29	20.7
Aircraft	1.35	0.14	72.4	<0.01	<0.01	0.01
Ground Support Equipment	0.03	0.32	0.08	0.01	0.01	0.06
Auxiliary Power Units	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fuel Storage	0.04	-	-	-	-	-
Total	**8.29**	**7.57**	**90.5**	**2.76**	**0.30**	**20.8**
YSAQMD Significance Threshold	10	10	-	-	-	80
Significant Impact?	No	No	-	-	-	No
Phase III (2031)						
Area and Mobile Sources	7.72	7.24	18.3	2.84	0.30	21.3
Aircraft	2.18	0.21	113	<0.01	<0.01	0.02
Ground Support Equipment	0.05	0.50	0.13	0.02	0.02	0.09
Auxiliary Power Units	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fuel Storage	0.06	-	-	-	-	-
Total	**10.0**	**7.95**	**131**	**2.86**	**0.32**	**21.4**
YSAQMD Significance Threshold	10	10	-	-	-	80
Significant Impact?	No	No	-	-	-	No

SOURCE: KB Environmental Sciences, Inc, 2012.

Lead emissions due to the use of aviation gasoline are also quantified for this analysis so that they may be compared to the air monitoring requirement threshold of 1.0 ton per year. For Phase III, lead emissions are estimated to be 0.20 tons (an increase of 0.03 tons from the baseline conditions).

As shown in **Table 3.2-8**, the operational emissions during Phase II and III would not exceed the YSAQMD significance thresholds for ROG, NOx, and PM_{10}. Therefore, Phase II and III operational emission impacts would be *less than significant*.

Mitigation Measures

Measure 3.2-2a: Implement YSAQMD Best Management Practices. The following BMPs will be implemented during the construction process:

- All active construction sites shall be watered at least twice daily. Frequency shall be based on the type of operation, soil, and wind exposure and the ability to eliminate visible fugitive dust.
- Haul trucks shall maintain at least 2 feet of freeboard.
- Cover all trucks hauling dirt, sand, or loose materials.
- Between the time of completing construction and the onset of winter rains, reinstate typical agricultural irrigation practices as a means to wet soils so they do not generate dust, as feasible.
- Cover inactive storage piles.
- Sweep streets if visible soil material is carried out from the construction site.
- Treat accesses to a distance of 100 feet from the paved road with a 6-inch layer of gravel.
- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities in the same area at any one time shall be limited.

Measure 3.2-2b: Implement Emission Reduction Measures. The following measures will be implemented during the construction process:

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

Impact Significance after Mitigation: Even though any impacts associated with violation of an air quality standard or contribution to an existing violation as a result of the Proposed Project are considered less-than-significant, implementation of these mitigation measures will further ensure that the Proposed Project is consistent with all YSAQMD air quality policies. Furthermore, as described above, the Proposed Project would be consistent with all other applicable AQMPs and air quality goals and policies; therefore, the impact of the Proposed Project is considered *less than significant*.

Roadway Carbon Monoxide Analysis

According to the YSAQMD, if either of the following criteria is true of any intersection affected by the project traffic, then the project can be said to have the potential to create a violation of the CO standard.

- A traffic study for the project indicates that the peak-hour level of service (LOS) on one or more streets or at one or more intersections in the project vicinity will be reduced to an unacceptable level of service (typically LOS E or F); or

- A traffic study indicates that the project will substantially worsen an already existing peak-hour LOS F on one or more streets or at one or more intersections in the project vicinity. "Substantially worsen" includes situations where delay would increase by 10 seconds or more when project generated traffic is included.

A total of nine intersections were evaluated. According to the traffic analysis prepared for the project (Table 3.16-8), no intersections in the project vicinity would meet the previous criteria. Therefore, CO impacts near roadway intersection are *less than significant*.

Impact 3.2-3: Could the Proposed Project create objectionable odors? (*Less Than Significant*)

The Proposed Project would not result in the construction of new sources of potential odors.

The general nuisance rule (H&SC §41700 and District Rule 2.5) is the basis for the odor impact threshold for the YSAQMD. A project may reasonably be expected to have a significant adverse odor impact where it "generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property."

The YSAQMD has developed a list of potential land uses associated with odor generation. Airport land uses are not identified as a potential odor source. Proposed non-aviation uses such as professional office building, two general commercial/light industrial developments, and a joint-use airport administration and retail building that will include a restaurant and public lobby/meeting space are also not identified as potential odor sources.

The nearest sensitive receptors to these operations are the single-family residential dwellings located approximately 4,200 feet west of the site. YSAQMD was contacted to determine if there are any documented odor complaints relative to the existing facility. YSAQMD has received no odor complaints relative to operations of the Nut Tree Airport.[15] Therefore, the Proposed Project impacts would be *less than significant* with regard to odorous emissions.

Mitigation Measures: None required.

Impact 3.2-4: Could the Proposed Project expose persons to substantial levels of toxic air contaminants and an associated substantial increase in the risk of cancer? (*Less Than Significant*)

To determine the risk of cancer as a result of the Proposed Project, a health risk assessment (HRA)[16] was conducted. The Project is expected to include construction activities, operation of

[15] YSAQMD, e-mail communication to ESA, September 27, 2012.
[16] An analysis designed to predict the generation and dispersion of air toxics in the outdoor environment, evaluate the potential for exposure of human populations, and to assess and quantify both the individual and population-wide health risks associated with those levels of exposure (see Appendix C).

aviation-related projects, commercial projects, and increased aircraft operations. The Proposed Project is expected to result in emissions of TAC due to aircraft operations, GSE and APU usage, and fuel storage tanks. To estimate these emissions, the emissions module of FAA's EDMS and its internal databases were used. In September of 2009, as part of the EDMS program, FAA incorporated the quantification of air toxics emissions for airport-related sources.[17]

The AERMOD dispersion model (Version 09292) was used to estimate air concentrations of TAC for the baseline condition and future Proposed Project. AERMOD is the USEPA preferred dispersion model for general industrial sources. AERMOD produces short-term and annual concentrations which were used to develop risk and health impact estimates per California Office of Environmental Health Hazards Assessment (OEHHA) guidance. The estimated TAC emissions were combined with the AERMOD dispersion model using hourly meteorological data to calculate ambient air concentrations in the area surrounding the Project site. Hourly meteorological data from Nut Tree Airport were used in the analysis. **Appendix B** provides details on methodologies and assumptions for the health risk assessment and dispersion modeling analysis.

Cancer Risk

Cancer risk is defined as the lifetime probability (i.e., 70 years based on constant exposure) of developing cancer from exposure to carcinogenic substances. Cancer risks are expressed as the chance in one million of contracting cancer (i.e., number of cancer cases among one million people exposed).

Following guidelines established by OEHHA, the incremental cancer risks attributable to the Proposed Project were calculated by applying exposure parameters to modeled TAC concentrations in order to determine the inhalation dose[18] (milligrams per kilogram of body weight per day [mg/kg-day]). The analysis used guidance from OEHHA to select exposure parameter values, including breathing rate, exposure periods, inhalation absorption factor, and age sensitivity factors, as described fully in **Appendix B**. Different sensitive populations are associated with different exposure parameter data. For example, an adult residential receptor is assumed to have a different breathing rate than a school child or an adult offsite worker receptor. These exposure parameters define the amount of pollutants inhaled as a function of on receptor type.

To determine incremental cancer risk, the estimated inhalation dose attributed to the Proposed Project was multiplied by the cancer potency slope factor (cancer risk per mg/kg-day). The cancer potency slope factor is the upper bound on the increased cancer risk from a lifetime exposure to a pollutant. These slope factors are based on epidemiological studies and are different values for different pollutants. This allows the estimated inhalation dose to be equated to a cancer risk.

According to CalEPA guidelines, the results of a HRA should not be interpreted as the expected rates of cancer or other potential human health effects, but rather as estimates of probability of potential risk based on current knowledge, a number of highly conservative (i.e., overestimation) assumptions, models, and techniques, and the best assessment tools presently available. **Appendix B** provides

[17] FAA, Guidance for Quantifying Speciated Organic Gas Emissions from Airport Sources, September 2, 2009.
[18] The amount of pollutants inhaled per body weight mass per day.

additional information on the limitations and conservative nature of the models and techniques within a HRA.

Construction

As a result of construction activities, the maximum cancer risk for a residential-adult receptor would be 0.14 per million, while the risk for a residential-child would be 0.24 per million. The maximum cancer risk for a school child receptor would be less than 0.01 per million. The maximum cancer risk for an off-site worker receptor would be less than 0.27 per million. This would represent a *less than significant* impact.

Operation

The project increment cancer risk is summarized in **Table 3.2-8**. The project increment cancer risk is due to air toxics emissions from aircraft operations, GSE, APU, and fuel storage tanks. For Phase I, the incremental cancer risk due to the Proposed Project is estimated to be 0.48 (offsite worker), 1.12 (residence), and 0.08 (school child) in one million. For Phase III, the incremental cancer risk due to the Proposed Project is estimated to be 0.57 (offsite worker), 1.40 (residence), and 0.10 (school child) in one million. Since the estimated cancer risk is less than 10 in one million, the impact is *less than significant*.

TABLE 3.2-8
ESTIMATED PROJECT INCREMENT CANCER RISK

Source	Project Increment Cancer Risk (per million) Offsite Worker	Project Increment Cancer Risk (per million) at Residence	Project Increment Cancer Risk (per million) at School
Phase I			
Aircraft	0.05	0.20	0.02
Ground Support Equipment	0.43	0.89	0.06
Auxiliary Power Units	<0.01	<0.01	<0.01
Fuel Storage Tanks	<0.01	0.03	<0.01
Total Cancer Risks	**0.48**	**1.12**	**0.08**
Phase III			
Aircraft	0.06	0.26	0.02
Ground Support Equipment	0.50	1.10	0.08
Auxiliary Power Units	<0.01	<0.01	<0.01
Fuel Storage Tanks	0.01	0.04	<0.01
Total Cancer Risks	**0.57**	**1.40**	**0.10**
Significance Criteria	**10.0**	**10.0**	**10.0**

Values reflect rounding
SOURCE: KB Environmental Sciences, Inc.; 2012.

Mitigation Measures: None required.

Impact 3.2-5: Could the Proposed Project expose persons to substantial levels of toxic air contaminants and substantial increase in acute and chronic health impacts? (*Less Than Significant*)

Non-cancer adverse health risks, both for acute (short-term) and chronic (long-term) risks, are measured against a Hazard Index, which is defined by OEHHA as the ratio of the predicted incremental exposure concentrations of the various non-carcinogens from the Project to published reference exposure levels (RELs) that can cause adverse health effects. The RELs are established by OEHHA based on epidemiological evidence.

Thus, the estimated pollutant concentration is divided by the REL to determine the Hazard Quotient. For example, an annual concentration of 0.0000824 $\mu g/m^3$ and a chronic REL of 0.35 results in a chronic Hazard Quotient of 0.00235 (which is compared to 1 to determine significance). Secondly, a maximum 1-hour concentration of 0.33 $\mu g/m^3$ and an acute REL of 2.5 results in an acute Hazard Quotient of 0.13. Unlike cancer risk, the chronic and acute impacts are not adjusted for lifetime exposure or exposure parameters such as breathing rates; the impacts are only a function of the estimated concentration and the REL for each pollutant.

The ratio (referred to as the Hazard Quotient) of each substance with a non-carcinogenic effect that affects a certain organ system is added to produce an overall Hazard Index for that organ system. As a worst case, it was assumed that all of the toxic air contaminants with established RELs would affect the same target organ and the individual Hazard Quotients were summed to calculate an overall Hazard Index. If the Hazard Index exceeds 1.0, the impact is considered to be significant.

Construction

As a result of construction activities, the maximum chronic impact for a residential-adult receptor and a school child receptor would be less than 0.01. The maximum chronic impact for an off-site worker receptor would be 0.05. This would represent a *less than significant* impact.

The maximum acute impact for a residential-adult receptor would be less than 0.04. The maximum acute impact for a school child receptor would be 0.01. The maximum acute impact for an off-site worker receptor would be 0.25. The maximum acute impact for a recreational area receptor would be 0.35.This would represent a *less than significant* impact.

Operations

The project operational increment chronic and acute health impacts are summarized in **Table 3.2-9**. The chronic impacts are primarily due to aircraft operations and the acute impacts are due to aircraft, GSE, and APU operations. For Phase I, the total incremental chronic hazard due to the Proposed Project is 0.01 for all receptors. For Phase I, the total incremental acute hazard due to the Proposed Project is 0.17 (offsite worker), 0.15 (residence), 0.11 (school child), and 0.23 (recreational areas).

For Phase III, the total incremental chronic hazard due to the Proposed Project is 0.01 (offsite worker), less than 0.01 (residence), and less than 0.01 (school child). For Phase III, the total incremental acute hazard due to the Proposed Project is estimated to be 0.20 (offsite worker), 0.17 (residence), 0.12 (school child), and 0.24 (recreational areas).

The total chronic and acute Hazard Indices are below the significance threshold of 1.0. The chronic and acute health impacts are therefore *less than significant*, and no mitigation is required.

TABLE 3.2-9
ESTIMATED PROJECT INCREMENT HEALTH IMPACTS

	Offsite Worker		Residence		School	
Source	**Chronic**	**Acute**	**Chronic**	**Acute**	**Chronic**	**Acute**
Phase I						
Aircraft	0.01	0.10	<0.01	0.12	<0.01	0.09
Ground Support Equipment	<0.01	0.06	<0.01	0.03	<0.01	0.02
Auxiliary Power Units	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fuel Storage Tanks	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Hazard Index	**<0.01**	**0.17**	**<0.01**	**0.15**	**<0.01**	**0.11**
Phase III						
Aircraft	0.01	0.14	<0.01	0.14	<0.01	0.09
Ground Support Equipment	<0.01	0.06	<0.01	0.03	<0.01	0.03
Auxiliary Power Units	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fuel Storage Tanks	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Hazard Index	**0.01**	**0.20**	**<0.01**	**0.17**	**<0.01**	**0.12**
Significance Criteria	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**

Values reflect rounding
SOURCE: KB Environmental Sciences, Inc.; 2012.

Mitigation Measures: None required.

Cumulative Impacts

Impact 3.2-6: Could the Proposed Project result in a cumulatively considerable net increase of any criteria pollutant for which the project is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed qualitative thresholds for ozone precursors)? (*Less than Significant*)

An air quality analysis should address a project's cumulative impact on ozone and localized pollutants. Based on the YSAQMD guidance, any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative impact. Therefore, given that the operational emissions for all phases would be less than significant for

ROG and NOx, the Proposed Project would have a *less-than-significant* cumulative impact with respect ozone precursors.

CO impacts are cumulatively significant when modeling shows that the combined emissions from the project and other existing and planned projects (i.e., background concentration) will exceed air quality standards. Per YSAQMD guidance, the potential for a cumulative localized CO impact is assessed using the screening methodology used for the project level analysis but analyzing the LOS of roadways in the cumulative scenario.

A total of nine intersections were evaluated in the transportation section. According to the traffic analysis prepared for the project (Table 3.16-10), eight intersections in the project vicinity would remain at an unacceptable level of service (F) with the project with mitigation but the project would not result in an increase in delay times by 10 seconds or more. Therefore, cumulative CO impacts near roadway intersection are *less than significant*.

3.2.4 References

Federal Aviation Administration, 2009. *Emissions and Dispersion Modeling System (EDMS) User's Manual*. FAA-AEE-07-01. Revision 7. November 6, 2009.

Federal Aviation Administration, 2009. *Guidance for Quantifying Speciated Organic Gas Emissions from Airport Sources*, September 2, 2009.

Federal Aviation Administration, 2004, *Air Quality Procedures for Civilian Airports and Air Force Bases with Addendum*, April 1997 and September 2004.

Yolo Solano Air Quality Management District, *Handbook for Accessing and Mitigating Air Quality Impacts*, July 11, 2007.

California Air Resources Board, *California Emissions Estimator Model*, February 2011.