Appendix C: Air Quality and Greenhouse Gas Assessment

DUBLIN BOULEVARD NORTH CANYONS PARKWAY EXTENSION AIR QUALITY and GREENHOUSE GAS ASSESSMENT

Dublin, California

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Introduction

The City of Dublin, in coordination with the City of Livermore, Alameda County Transportation Commission, and Alameda County, proposes to construct an extension of Dublin Boulevard in Dublin, across an unincorporated area in Alameda County, to North Canyons Parkway in Livermore. The purpose of the project is to improve east-west local roadway connectivity between the City of Dublin and the City of Livermore and to improve mobility, multimodal access, and efficiency for all roadway users. The purpose of the project is also to support an integrated corridor management strategy. The total length of the project is approximately 1.5 miles (2.4 km). The City of Dublin is the lead agency under the California Environmental Quality Act (CEQA).

Project Description

The project would include the extension of Dublin Boulevard approximately 1.5 miles (2.4 km) eastward through eastern Dublin and an unincorporated portion of the County. The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore. This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would narrow to four travel lanes (two in each direction) at the intersection of Croak Road. From Croak Road to Doolan Road, the roadway extension would remain in the four-lane configuration. The permanent area needed for the project, including the roadway, sidewalks, intersections, and land acquired for right-of-way, is estimated at approximately 29 acres.

Project design features and components include (from west to east):

- Intersection improvements at Fallon Road (including the modification of the signalized intersection) and the elimination of the existing intersection of Croak Road and Fallon Road
- Grading and earthwork northeast of the Dublin Boulevard/Fallon Road intersection, including grading at the base of the hills to the north, to allow for the roadway extension, and more minor grading throughout the road alignment to meet engineering and safety requirements
- Abandonment of a north-south (frontage road) portion of Croak Road parallel to Fallon Road

- The addition of a ”T” shaped hammerhead turnaround at the new terminus of Croak Road adjacent to Fallon Road
- Removal of overhead utility lines between Fallon Road and Croak Road
- Creation of a new signalized intersection at the Dublin Boulevard extension and Croak Road
- Construction of a new bridge over Cottonwood Creek
- Construction staging and laydown between the extension and Collier Canyon Road, along Doolan Road
- Intersection improvements at Doolan Road and North/Canyons parkway, including the creation of a new signalized intersection
- The extension of underground utility lines into the Project site, within the operational footprint (Figure Ref)
- Construction of the new roadway, which would include a median, inside shoulder at few locations, vehicle travel lanes, street bicycle facilities, a parkway strip and separated sidewalk or a separated Class I bike path/MUP, lighting, and cut/fill embankments
- Retaining walls may be use in addition to, or as an alternative to, cut/fill embankments associated with roadway and hillside grading. If used, retaining walls would be placed outside of the sidewalk and path areas on either side of the roadway cross section, within the construction footprint and within the permanent right-of-way. Retaining walls would measure 3 feet to 10 feet in height and would generally require a smaller area of grading or ground disturbance in comparison to cut/fill slopes.
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Setting

Climate and Topography

Meteorology (weather) and terrain can influence air quality. Certain weather parameters are highly correlated to air quality, including temperature, the amount of sunlight, and the type of winds at the surface and above the surface. Winds can transport O_3 and O_3 precursors from one region to another, contributing to air quality problems downwind of source regions. Furthermore, mountains can act as a barrier that prevents O_3 from dispersing.

The project site is in the San Francisco Bay Area Air Basin and is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The project site is situated in the Livermore Valley which is a valley in eastern Alameda County in the San Francisco Bay Area Air Basin. The

valley is located about 30 miles (48 km) east of the first coastal range of foothills that surround the San Francisco Bay Area. The Livermore Valley has an east-west orientation with mountain passes on the west and east connecting the Bay Area and the Central Valley. The passes are used by railroads and highways to connect the two regions. Livermore Valley is about 15 miles (24 km) long (east to west), 10 miles (16 km) wide (north to south) and surrounded by California coastal range mountains and foothills.

Livermore Valley has a Mediterranean climate, although it is close to a semi-arid climate because of its relatively low annual precipitation. It features warm to hot, dry summers and mild to cool, wet winters. Summer (June–October) daytime temperatures average in the 75 to 85°F (24 to 29°C) range, but sometimes reach 100°F (38°C) and can occasionally approach 110°F (43°C). Summer nights, however, are normally much cooler, with lows in the 50 to 60°F (10 to 16°C) range. The valley's passes direct the normal west to east flow of air through the valley. Usually there is a strong evening wind in the summer that brings cool air off the Pacific Ocean into the Livermore valley as it heads towards the much hotter Central Valley. This wind is strong enough with an average summer wind speed of about 9 miles per hour (14 km/h) and predictable enough to make the Livermore hills covered with wind turbines mounted in Altamont Pass. The period from June to September is extremely dry and is characterized by clear skies, but in late summer, subtropical moisture occasionally surges into the Livermore Valley, bringing high humidity, monsoon clouds, and, much less commonly, thunderstorms.

Nearly all the 14.6 inches (370 mm) of annual Livermore rainfall comes between September and May, but about 50 percent of the days are sunny during this period with no appreciable cloud cover. The peak rainy months are December to March. Most rainstorms are classified as 50 percent light rain, 32 percent moderate rain, 11 percent heavy rain, and less than 6 percent thunder showers. The coldest months are December and January, with a mean high of about 56°F (13°C) and a low of about 38°F (3°C) with some occasional frost possible on clear mornings. The temperature can drop to as low as the 20 to 25°F (−7 to −4°C) range on an exceptionally cold night. Snow is very rare, but light dustings do occur on the surrounding hills and occasionally in the valley.

The record high temperature is 115°F (46 °C), recorded on September 3, 1950, and the record low temperature is 18°F (−8°C), recorded on January 5, 1961, and December 9, 1972.

The Lawrence Livermore National Laboratory climatological station, maintained by Lawrence Livermore National Laboratory, is located near the project site and is representative of meteorological conditions near the project

Air Pollutants of Primary Concern

The project is in the northern central portion of Alameda County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards apart from ground-level ozone,

respirable particulate matter (PM10), and fine particulate matter (PM2.5). Health effects of criteria pollutants and their potential sources are described below and summarized in Table 1.

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (NO_X). The main sources of ROG and NO_X, often referred to as ozone precursors, are combustion processes (including combustion in motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, shortness of breath, and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Table 1 - Health Effects of Air Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood functions and nerve construction. • Behavioral and hearing problems in children.
Suspended Particulate Matter (PM2.5 and PM10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardiorespiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility.

		• Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.
Toxic Air Contaminants	• Cars and trucks, especially diesels. • Industrial sources such as chrome platers. • Neighborhood businesses such as dry cleaners and service stations. • Building materials and product.	• Cancer. • Chronic eye, lung, or skin irritation. • Neurological and reproductive disorders.

Source: CARB, 2008

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. While CO transport is limited, it disperses with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors (e.g., residents, schoolchildren, the elderly, hospital patients, etc.). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service (LOS) or with extremely high traffic volumes. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a reddish-brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 also contribute to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. NO_2 decreases lung function and may reduce resistance to infection. On January 22, 2010 the Environmental Protection Agency (EPA) strengthened the health-based the National Ambient Air Quality Standards (NAAQS) for NO_2.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels in the region. SO_2

irritates the respiratory tract, can injure lung tissue when combined with fine particulate matter, and reduces visibility and the level of sunlight.

Particulate Matter

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles are those that are larger than 2.5 microns but smaller than 10 microns or PM10. PM2.5 refers to finer suspended particulate matter with an aerodynamic diameter of 2.5 microns or less that is not readily filtered out by the lungs. Nitrates, sulfates, dust, and combustion particulates are major components of PM10 and PM2.5. These small particles can be directly emitted into the atmosphere as by-products of fuel combustion, through abrasion, such as tire or brake lining wear, or through fugitive dust (wind or mechanical erosion of soil). They can also be formed in the atmosphere through chemical reactions. Particulates may transport carcinogens and other toxic compounds that adhere to the particle surfaces and can enter the human body through the lungs.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufactures.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the U.S. EPA established national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated by the EPA and the California Air Resources Board (CARB). Some examples of TACs include: benzene, butadiene, formaldehyde, and hydrogen sulfide. The identification, regulation, and monitoring of TACs is relatively recent compared to that for criteria pollutants.

High volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution

centers, large retail or industrial facilities, high volume transit centers, or schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

Sensitive Receptors

Some groups of people are more affected by air pollution than others. The State has identified the following people who are most likely to be affected by air pollution: children under 16, the elderly over 65, people conducting athletic activities, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, outdoor athletic fields, and elementary schools. Air quality studies evaluate impacts to sensitive receptors that are within 1,000 feet of a project that emits TACs. Sensitive receptors for this project were identified as residences along the north side of Dublin Boulevard, west of the project and residences 550 to 1,000 feet to the north of the proposed Dublin Boulevard extension between Fallon Road and Croak Road. There is a private school along North Canyons Parkway, west of the project that is now unoccupied. This analysis considered this as a sensitive receptor since the infrastructure for a school remains and it could be reoccupied in the future with the project present.

Current Ambient Air Quality

Table 2 lists the State and federal attainment status for all regulated pollutants. The current designation of the Basin shows that the area is nonattainment for the State O_3, PM10, and PM2.5 standards, nonattainment for the federal O_3 and PM2.5 standards, and unclassified for the national PM10. The closest air monitoring station to the project site is in the City of Livermore approximately 4 miles to the east of the project site; however, it does not collect data for CO or PM10. The nearest PM10 and carbon monoxide monitoring site is in San Jose, approximately 24 miles southwest of the project site. The data show that during the past few years, the project area has exceeded the State and/or federal O_3, PM10, and PM2.5 ambient air quality standards. Table 3 lists air quality trends in data collected at the Livermore station and the San Jose Station for the past 5 years (2013 through 2017) and published by the BAAQMD, which is the most recent time-period available.

Table 2 - State and Federal Attainment Status

Pollutant	State Attainment Status	Federal Attainment Status
Ozone (O_3)	Nonattainment	Nonattainment (Moderate)
Respirable Particulate Matter (PM10)	Nonattainment	Unclassified[1]
Fine Particulate Matter (PM2.5)	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified (EPA Attainment designation expected) [2]
Sulfur Dioxide (SO_2)	Attainment	Unclassified (EPA Attainment designation expected) [2]
Lead (Pb)	Attainment	Attainment
Visibility-Reducing Particles	Unclassified	N/A
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Vinyl Chloride	No Information Available	N/A

Source: Bay Area Air Quality Management District, 2018; WWW.ARB.ca.gov/desig/adm/adm.htm

1 U.S. EPA designates the region as unclassified, recognizing that monitoring data indicate the area likely attains the standard.

2 U.S. EPA was expected to make an attainment designation by the end of 2017; however, these designations have not yet been made. Monitoring data indicate the region meets the standard (attainment)

Table 3 - Air Quality Concentrations for the Past 5 Years

Pollutant	Standard	2013	2014	2015	2016	2017
Ozone – From the Livermore Station						
Max 1-hr concentration		0.096 ppm	0.093 ppm	0.105 ppm	0.102 ppm	0.109 ppm
No. days exceeded: State	0.09 ppm	3	0	1	2	5
Max 8-hr concentration		0.077 ppm	0.080 ppm	0.081 ppm	0.085 ppm	0.086 ppm
No. days exceeded: State	0.070 ppm	2	4	7	4	6
Federal	0.070 ppm	1	7	7	6	6
Carbon Monoxide – From the San Jose Station						
Max 1-hr concentration		3.1 ppm	2.4 ppm	2.4 ppm	2.0 ppm	2.1 ppm
No. days exceeded: State	20 ppm	0	0	0	0	0
Federal	35 ppm	0	0	0	0	0
Max 8-hr concentration		2.5 ppm	1.9 ppm	1.8 ppm	1.4 ppm	1.8 ppm
No. days exceeded: State	9.0 ppm	0	0	0	0	0
Federal	9 ppm	0	0	0	0	0
PM10 – San Jose Monitoring Data						
Max 24-hr concentration		58 µg/m^3	55 µg/m^3	58 µg/m^3	41 µg/m^3	70 µg/m^3
No. days exceeded: State	50 µg/m^3	5	1	1	0	6
Federal	150 µg/m^3	0	0	0	0	0
Max annual concentration		22.3 µg/m^3	19.9 µg/m^3	22.0 µg/m^3	18.5 µg/m^3	21.6 µg/m^3
No. days exceeded: State	20 µg/m^3					
PM2.5 – From the Livermore Station						
Max 24-hr concentration		40.1 µg/m^3	42.9 µg/m^3	31.1 µg/m^3	22.3 µg/m^3	41.5 µg/m^3
No. days exceeded: Federal	35 µg/m^3	4	1	0	0	2
Max annual concentration		8.4 µg/m^3	7.6µg/m^3	8.8 µg/m^3	7.5 µg/m^3	8.5 µg/m^3
No. days exceeded: State	12 µg/m^3	0	0	0	0	0
Federal	12.0 µg/m^3	0	0	0	0	0
Nitrogen Dioxide – From the Livermore Station						
Max 1-hr concentration		51 ppb	49 ppb	50 ppb	41 ppb	45 ppb
No. days exceeded: State	0.18 ppm	0	0	0	0	0
Federal	100 ppb	0	0	0	0	0
Max annual concentration		12 ppb	10 ppb	10ppb	9ppb	9 ppb
No. days exceeded: State	0.030 ppm	0	0	0	0	0
Federal	53 ppb	0	0	0	0	0

Source: Bay Area Air Quality Management District, 2018

Regulatory Agencies

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California EPA) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published CEQA Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects. The principal air quality regulatory mechanisms include the following:

- Federal Clean Air Act (FCAA);
- California Clean Air Act (CCAA);
- California Health and Safety Code (H&SC), Chapter 3.5 (Toxic Air Contaminants) (H&SC Section 39650 et. seq.) and Part 6 (Air Toxics "Hot Spots" Information and Assessment) (H&SC Section 44300 et. seq.).
- BAAQMD's Rules and Regulations and air quality planning documents

Regulatory Setting

Federal Regulations

The United States EPA sets nationwide emission standards for mobile sources, which include on-road (highway) motor vehicles such as trucks, buses, and automobiles, and non-road (off-road) vehicles and equipment used in construction, agricultural, industrial, and mining activities (such as bulldozers and loaders). The EPA also sets nationwide fuel standards. California also has the ability to set motor vehicle emission standards and standards for fuel used in California, as long as they are the same or more stringent than the federal standards.

In the past decade the EPA has established a number of emission standards for on- and non-road heavy-duty diesel engines used in trucks and other equipment. This was done in part because diesel engines are a significant source of NO_X and particulate matter (PM10 and PM2.5) and because the EPA has identified diesel particulate matter (DPM) as a probable carcinogen. Implementation of the heavy-duty diesel on-road vehicle standards and the non-road diesel engine standards are estimated to reduce particulate matter and NO_X emissions from diesel engines up to 95 percent in 2030 when the heavy-duty vehicle fleet is completely replaced with newer heavy-duty vehicles that comply with these emission standards.[1]

In concert with the diesel engine emission standards, the EPA has also substantially reduced the amount of sulfur allowed in diesel fuels. The sulfur contained in diesel fuel is a significant contributor to the formation of particulate matter in diesel-fueled engine exhaust. The new standards reduced the amount of sulfur allowed by 97 percent for highway diesel fuel (from 500 parts per million by weight [ppmw] to 15 ppmw), and by 99 percent for off-highway diesel fuel

[1] USEPA, 2000. *Regulatory Announcement, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. EPA420-F-00-057. December.

(from about 3,000 ppmw to 15 ppmw). The low sulfur highway fuel (15 ppmw sulfur), also called ultra-low sulfur diesel (ULSD), is currently required for use by all vehicles in the U.S.

All the above federal diesel engine and diesel fuel requirements have been adopted by California, in some cases with modifications making the requirements more stringent or the implementation dates sooner.

State Regulations

To address the issue of diesel emissions in the state, CARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.[2] In addition to requiring more stringent emission standards for new on-road and off-road mobile sources and stationary diesel-fueled engines to reduce particulate matter emissions by 90 percent, a significant component of the plan involves application of emission control strategies to existing diesel vehicles and equipment. Many of the measures of the Diesel Risk Reduction Plan have been approved and adopted, including the federal on-road and non-road diesel engine emission standards for new engines, as well as adoption of regulations for low sulfur fuel in California.

CARB has adopted and implemented several regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy-duty diesel trucks that represent the bulk of DPM emissions from California highways. CARB regulations require on-road diesel trucks to be retrofitted with particulate matter controls or replaced to meet 2010 or later engine standards that have much lower DPM and PM2.5 emissions. This regulation will substantially reduce these emissions between 2013 and 2023. While new trucks and buses will meet strict federal standards, this measure is intended to accelerate the rate at which the fleet either turns over so there are more cleaner vehicles on the road or is retrofitted to meet similar standards. With this regulation, older, more polluting trucks would be removed from the roads sooner.

CARB has also adopted and implemented regulations to reduce DPM and NO_X emissions from in-use (existing) and new off-road heavy-duty diesel vehicles (e.g., loaders, tractors, bulldozers, backhoes, off-highway trucks, etc.). The regulations apply to diesel-powered off-road vehicles with engines 25 horsepower (hp) or greater. The regulations are intended to reduce particulate matter and NO_X exhaust emissions by requiring owners to turn over their fleet (replace older equipment with newer equipment) or retrofit existing equipment in order to achieve specified fleet-averaged emission rates. Implementation of this regulation, in conjunction with stringent federal off-road equipment engine emission limits for new vehicles, will significantly reduce emissions of DPM and NO_X.

[2] California Air Resources Board, 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October.

Bay Area Air Quality Management District

BAAQMD has jurisdiction over an approximately 5,600-square mile area, commonly referred to as the San Francisco Bay Area (Bay Area). The District's boundary encompasses the nine San Francisco Bay Area counties, including Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County, and southern Sonoma County.

BAAQMD is the lead agency in developing plans to address attainment and maintenance of the National Ambient Air Quality Standards and California Ambient Air Quality Standards in the nine-county Bay Area. The District also has permit authority over most types of stationary equipment that would be utilized for the proposed project. The BAAQMD is responsible for permitting and inspection of stationary sources; enforcement of regulations, including setting fees, levying fines, and enforcement actions; and ensuring that public nuisances are minimized.

The BAAQMD 2017 *CEQA Air Quality Guidelines*[3] were prepared to assist in the evaluation of air quality impacts of projects and plans proposed within the Bay Area. The guidelines provide recommended procedures for evaluating potential air impacts during the environmental review process consistent with CEQA requirements including thresholds of significance, mitigation measures, and background air quality information. They also include assessment methodologies for air toxics, odors, and greenhouse gas emissions.

Air Quality Attainment Status

Air quality conditions in the Bay Area are compared against ambient air quality standards set at the Federal level (i.e., NAAQS) and at the State level (CAAQS). The attainment status is classified for each pollutant.

Under the NAAQS, the Bay Area is classified as nonattainment for ozone and PM2.5. Note that in 2013, EPA issued a final rule to determine that the Bay Area attains the 24-hour PM2.5 national standard. Despite this EPA action, the Bay Area continues to be designated as "nonattainment" for the 24-hour PM2.5 NAAQS standard until such time as BAAQMD submits a "redesignation request" and a "maintenance plan" to EPA, and EPA approves the proposed redesignation. For the pollutants NO_2, CO and SO_2, the area is designated as attainment. Note that the region was designated Attainment for CO beginning on June 1, 2018. While monitoring data shows the region meets the PM10 NAAQS, the area is technically designated "unclassified."

At the State level, the area is considered nonattainment for ozone, PM2.5 and PM10 and considered "attainment" for all other criteria air pollutants.

[3] Bay Area Air Quality Management District, 2017. *CEQA Air Quality Guidelines*. May.

State Implementation Plan (SIP) Conformity

Transportation projects are typically evaluated for their effects on regional air quality as a whole, in response to Federal requirements. The Dublin Boulevard/North Canyons Parkway Extension project is listed in the 2019 Transportation Improvement Program (TIP), as Project TIP ID ALA150003. The 2019 TIP was evaluated to demonstrate air quality conformity with the State Implementation Plan or SIP.[4]

The Federal Clean Air Act, as amended in 1990, outlines the requirements for ensuring that federal transportation plans, programs and projects are consistent with or conform to the purpose of the SIP in reducing transportation-related emissions for non-attainment or maintenance air pollutants. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards. A conformity finding demonstrates that the total emissions projected for the TIP are within the emissions budgets established by the SIP, and that transportation control measures (TCMs) are implemented in a timely fashion. The conformity analysis for the 2019 TIP addresses the pollutants ozone (through ROG and NO_x modeling), carbon monoxide or CO (through modeling of CO emissions) and PM2.5 (through directly emitted PM2.5 and emissions of NOx). The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) approved the 2019 TIP (and air quality conformity analysis) in December 2018.

Bay Area 2017 Clean Air Plan

The Bay Area 2017 Clean Air Plan (CAP) is a multi-pollutant plan prepared by the BAAQMD that addresses GHG emissions along with other air emissions in the San Francisco Bay Area Air Basin. One of the key objectives in the CAP is climate protection. The 2017 CAP includes emission control measures in five categories: Stationary Source Measures, Mobile Source Measures, Transportation Control Measures, Land Use and Local Impact Measures, and Energy and Climate Measures. Consistency of a project with current emissions control measures is one measure of its consistency with the CAP. The current CAP also includes performance objectives, consistent with the State's climate protection goals under SB 32, designed to reduce emissions of GHGs to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

Greenhouse Gas Emissions

This section provides a general discussion of global climate change and focuses on emissions from human activities that alter the chemical composition of the atmosphere. The discussion on global climate change and greenhouse gas (GHG) emissions is based in part upon the California Global

[4] MTC. 2016. *Final Transportation-Air Quality Conformity Analysis for the Amended Plan Bay Area and the 2017 Transportation Improvement Program*. Final: September 28, 2016

Warming Solutions Act of 2006 (Assembly Bill (AB) 32) and research, information and analysis completed by the International Panel on Climate Change (IPCC), the U.S. EPA, and the CARB.

Global climate change refers to changes in weather including temperatures, precipitation, and wind patterns. Global temperatures are modulated by naturally occurring and anthropogenic (generated by mankind) atmospheric gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO_x).[5] These gases allow sunlight into the earth's atmosphere but prevent heat from radiating back out into outer space and escaping from the earth's atmosphere, thus altering the earth's energy balance. This phenomenon is known as the greenhouse effect.

Naturally occurring GHGs include water vapor,[6] CO_2, CH_4, NO_x, and O_3. Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also GHGs, but are for the most part solely a product of industrial activities.

Unlike emissions of criteria and toxic air pollutants, which have local or regional impacts, emissions of GHGs have a broader, global impact. Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural sectors.

Impacts to California from climate change include shifting precipitation patterns, increasing temperatures, increasing severity and duration of wildfires, earlier melting of snow pack and effects on habitats and biodiversity. Sea levels along the California coast have risen up to seven inches over the last century, and average annual temperatures have been increasing. These and other effects will likely intensify in the coming decades and significantly impact the State's public health, natural and manmade infrastructure, and ecosystems.[7]

Agencies at the international, national, State, and local levels are considering strategies to control emissions of gases that contribute to global warming. There is no comprehensive strategy that is being implemented on a global scale that addresses climate change; however, in California a multi-agency "Climate Action Team," has identified a range of strategies and the CARB, under AB 32, has approved the *Climate Change Scoping Plan* (Scoping Plan), which was updated in 2017. AB 32 requires achievement by 2020 of a Statewide greenhouse gas emissions limit equivalent to 1990

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[5] [19] IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Bases. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: <http://ipcc.ch/ >. Accessed March 25, 2013

[6] Concentrations of water are highly variable in the atmosphere over time, with water occurring as vapor, cloud droplets and ice crystals. Changes in its concentration are also considered to be a result of climate feedbacks rather than a direct result of industrialization or other human activities. For this reason, water vapor is not discussed further as a greenhouse gas

[7] State of California Energy Commission. *2009 California Climate Adaptation Strategy Discussion Draft. Frequently Asked Questions.* August 3, 2009. <www.climatechange.ca.gov/adaptation/documents/2009-07-31_Discussion_Draft-Adaptation_FAQs.pdf>. Accessed March 25, 2013.

emission levels, and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions. The CARB and other State agencies are currently working on regulations and other initiatives to implement the Scoping Plan. By 2050, the State plans to reduce emissions to 80 percent below 1990 levels.

In April 2015, Governor Brown signed Executive Order B-30-15 which extended the goals of AB 32, setting a greenhouse gas emissions target at 40 percent of 1990 levels by 2030. On September 8, 2016, Governor Brown signed Senate Bill 32 (SB 32), which legislatively established the GHG reduction target of 40 percent of 1990 levels by 2030. In November 2017, CARB issued *California's 2017 Climate Change Scoping Plan*. While the State is on track to exceed the AB 32 scoping plan 2020 targets, this plan is an update to reflect the enacted SB 32 reduction target for 2030.

The 2017 Scoping Plan establishes a strategy that will reduce GHG emissions in California to meet the 2030 target (note that the AB 32 Scoping Plan only addressed 2020 targets and a long-term goal). Key features of this plan are:

- Cap and Trade program places a firm limit on 80 percent of the State's emissions;
- Achieving a 50-percent Renewable Portfolio Standard by 2030 (currently at about 29 percent statewide);
- Increase energy efficiency in existing buildings;
- Develop fuels with an 18-percent reduction in carbon intensity;
- Develop more high-density, transit oriented housing;
- Develop walkable and bikeable communities;
- Greatly increase the number of electric vehicles on the road and reduce oil demand in half;
- Increase zero-emissions transit so that 100 percent of new buses are zero emissions;
- Reduce freight-related emissions by transitioning to zero emissions where feasible and near-zero emissions with renewable fuels everywhere else; and
- Reduce "super pollutants" by reducing methane and hydrofluorocarbons or HFCs by 40 percent.

In the updated Scoping Plan, CARB recommends statewide targets of no more than 6 metric tons CO_2e per capita (statewide) by 2030 and no more than 2 metric tons CO_2e per capita by 2050. The statewide per capita targets account for all emissions sectors in the State, statewide population forecasts, and the statewide reductions necessary to achieve the 2030 statewide target under SB 32 and the longer-term State emissions reduction goal of 80 percent below 1990 levels by 2050.

Plan Bay Area

Senate Bill 375 (SB 375) requires the Bay Area regional planning agencies to include a Sustainable Communities Strategy (SCS) in their regional transportation plan (RTP) updates to describe how the GHG emissions reductions set by CARB would be met through land-use and transportation planning. In 2010, the Metropolitan Transportation Commission (MTC) approved a set of "*Bay Area Principles for Establishing Regional Greenhouse Gas Reduction Targets*" (Resolution 3970) that proposed per-capita GHG emission reductions of 7 percent from 1990 by 2020 and 15 percent by 2035. Subsequently, MTC, along with the Association of Bay Area Governments (ABAG), developed the SCS plans to meet state targets for reducing greenhouse gas emissions from light-duty vehicles. Plan Bay Area 2040 is the update to this plan, which includes implementation of transportation projects and Climate Initiatives Program that, together, would result in emissions from light-duty vehicles that meet the region's GHG reduction targets, per SB 375.[8] The proposed project, being part of the 2019 TIP is part of the Plan Bay Area 2040 transportation network.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in their updated CEQA Guidelines (updated 2011 and recently in May 2017). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 4.

For GHG emissions, BAAQMD identified either an emissions-based threshold or considered a project that complied with a qualified GHG reduction plan to have less-than-significant emissions.

BAAQMD's approach to developing a threshold of significance for GHG emissions in their CEQA Air Quality Guidelines is to identify the emissions level for which a project would not be expected to substantially conflict with existing California legislation that was adopted to reduce statewide GHG emissions. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact and would be considered significant at a project level. BAAQMD identified a bright-line threshold of 1,100 metric tons per year. Since the guidelines were developed, California has established more aggressive GHG emission reduction goals. Note that BAAQMD's recommended GHG threshold of 1,100 metric tons was developed based on meeting the 2020 GHG targets set in the AB 32 Scoping Plan. Operation of the project would occur beyond 2020, so a threshold that addresses a future target is appropriate. Although BAAQMD has not yet published a quantified threshold to meet the statewide 2030 GHG reduction target, this assessment uses a "Substantial Progress" adjustment. This adjustment assumes that 2020 statewide emissions will be equivalent to or lower than 1990

[8] MTC and ABAG. 2017. *Plan Bay Area 2040 Draft EIR SCH# 2016052041*. April.

levels and adjusts for the State's goal to reduce GHG emissions in 2030 by 40 percent. **Therefore, a protective threshold would be one that is 40 percent below the 1,100 metric tons per year, or 660 metric tons.** This is a threshold that addresses the GHG reduction goals of the new SB 32 Scoping Plan developed by CARB that takes into account the 1990 inventory and the projected 2030 statewide population and employment levels.[9]

Alternatively, the BAAQMD CEQA Guidelines consider projects that are in compliance with a qualified greenhouse gas reduction strategy, generally a local Climate Action Plan, to have less-than-significant GHG emissions. Both Dublin and Livermore have adopted Climate Action Plans that meet BAAQMD criteria to be considered "qualified" GHG reduction strategies. In addition, the project is included in the latest TIP and Plan Bay Area, which is the region's SCS plan to meet state targets for reducing GHG emissions from light-duty vehicles.

Table 4 - Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
ROG	54	54	10
NO_x	54	54	10
PM10	82 (Exhaust)	82	15
PM2.5	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	**Single Sources Within 1,000-foot Zone of Influence**	**Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)**	
Excess Cancer Risk	>10.0 per one million	>100.0 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual PM2.5	>0.3 µg/m^3	>0.8 µg/m^3	
Greenhouse Gas Emissions			
GHG Annual Emissions	None	Compliance with a Qualified GHG Reduction Strategy OR 660 metric tons annually or 2.8 metric tons per capita	

Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM10 = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, PM2.5 = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less, and GHG = greenhouse gases.

Source: Bay Area Air Quality Management District, 2017

[9] Association of Environmental Professionals, 2016. *Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California*. April.

CEQA Checklist – Air Quality and GHG

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
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?	☐	☒	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐
VII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Impact a: Conflict with or obstruct implementation of the applicable air quality plan? ***Less-than-significant.***

The most recent Clean Air Plan is the *2017 Bay Area Clean Air Plan* that was adopted by BAAQMD on April 19, 2017. The proposed project would not conflict with the latest Clean Air Plan's efforts since the project would have emissions below the BAAQMD criteria pollutant thresholds (see Impact c). It should also be noted that, as described previously, the project is included in the 2019 TIP that was evaluated with respect to air pollutant emissions and conformity to the region's SIP[10]. In other words, the project is part of a plan that conforms with the region's air quality planning efforts. The project would not interfere with the control measures described in the 2017 CAP. Furthermore, the project would provide transportation benefits that reduce pollutant

[10] FHWA and FTA determined that the RTP conforms to the SIP on August 23, 2017. FHWA and FTA determined that the TIP conforms to the SIP on December 16, 2016.

emissions, by improving traffic operations and efficiency. Finally, it is important to note that the extension of Dublin Boulevard/North Canyons Parkway extension, as proposed, is included as part of the adopted *City of Dublin General Plan* roadway network and *City of Livermore General Plan* planned roadway network.

Impact b: Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less-than-significant.***

As discussed under Impact c, the project would have emissions less than the BAAQMD thresholds for ozone (i.e., ozone precursors) and particulate matter. Therefore, the project would not contribute substantially to existing or projected violations of those standards. CO emissions from traffic generated by the project would be the pollutant of greatest concern at the local level.

Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of CO. Air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below State and federal standards) in the Bay Area since the early 1990s. As a result, the region has been designated as attainment for the standard. The highest measured level over any 8-hour averaging period during the last three years in the Bay Area is less than 3.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm. Intersections affected by the project would have traffic volumes would have a maximum of 5,376 vehicles per hour, less than the BAAQMD screening criteria of 44,000 vehicles per hour and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[11]

Impact c: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable State or federal ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less-than-significant with construction-period mitigation measures.***

The Bay Area is considered a non-attainment area for ground-level ozone and PM2.5 under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM10 under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM10, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NO_x), PM10, and PM2.5 and apply to both construction period and operational period impacts. They are intended to assess whether or not a

[11] The BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less-than-significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections with more than 44,000 vehicles per hour.

project would cause a cumulatively considerable net increase in emissions that affect non-attainment pollutants.

Road Construction and Operational Modeling

Emissions of air pollutants that could affect both regional and local air quality were addressed by modeling emissions and comparing them to the significance thresholds identified in Table 4. This included emissions for both construction and operational periods.

Construction Period Emissions

Average daily construction exhaust emissions were predicted using the Sacramento Metropolitan Air Quality Management District Road Construction Emissions Model (RoadMod), version 8.1.0. The BAAQMD recommends the use of RoadMod to analyze construction emissions for transportation projects. Inputs to the model included the construction year, total expected duration and proposed equipment usage. Other model inputs such as soil import and export, concrete truck trips, and asphalt truck trips were input to the model. The model predicts emissions of ozone precursor pollutants (i.e., ROG and NO_x) and particulate matter (i.e., PM10 and PM2.5). The model also computes emissions of CO_2e. The project would be built out over a period of approximately 18 months where construction was assumed to begin in 2020, or an estimated 396 construction workdays (based on an average of 22 workdays per month). As the estimated opening year for the project is 2025, and construction is estimated to take 1.5 years, but the exact date for beginning construction is not known, 2020 was selected as the beginning construction year to ensure the maximum impacts are captured. Average daily emissions were computed by dividing the total construction emissions by the number of construction days. Table 5 shows average daily construction emissions of ROG, NO_x, PM10 exhaust, and PM2.5 exhaust during construction of the project. As indicated in Table 5, predicted project emissions would not exceed the BAAQMD significance thresholds. *Attachment 1* includes the construction assumptions (schedule and equipment) and RoadMod model output for construction emissions.

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM10 and PM2.5. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

Project Operational Period Emissions

Operational air pollutant emissions from the project would be generated by changes in traffic patterns and traffic conditions (e.g., speed). Predicted traffic conditions along with vehicle emission rates were combined to predict the daily change in traffic emissions.

Table 5 - Construction Period Emissions

Scenario	ROG	NO_x	PM10 Exhaust	PM2.5 Exhaust
Construction emissions (tons)	0.90 tons	9.36 tons	0.48 tons	0.42 tons
Average daily emissions (pounds)[1]	4.6 lbs.	47.3 lbs.	2.4 lbs.	2.1 lbs.
BAAQMD Thresholds (pounds per day)	*54 lbs.*	*54 lbs.*	*82 lbs.*	*54 lbs.*
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018
Note: [1] Assumes 396 workdays

Traffic Modeling

Kittelson & Associates, Inc. used the Alameda County Transportation Commission countywide travel demand model (TDM) with Plan Bay Area Projections (BART Livermore Extension Version – No BART Scenario) and updated land uses from local general plans to predict the effects of the proposed Dublin Boulevard/North Canyons Parkway extension on the roadway system traffic conditions. The TDM model accounts for background traffic growth between existing conditions and 2040 and approved but not yet constructed and occupied changes to the land use in the area. The TDM model has the ability to project the diversion of traffic and change in travel patterns due to roadway network changes such as the proposed project. In addition to providing traffic volume projections, the model also provides information on vehicle-miles and vehicle-hours of travel as well as projected average speeds for the roadway network. The City of Dublin General Plan TDM model was updated to reflect land use development and roadway projects that have been completed since the completion of the City of Dublin's General Plan EIR.

The TDM model predicted the daily vehicle miles travelled (VMT), vehicle hours travelled (VHT), and computed travel speed for roadways in the study area without and with the Dublin Boulevard/North Canyons Parkway extension. The changes in VMT attributable to the project were negligible, from a regional standpoint (i.e., well below a fraction of 1 percent).

A focused VMT analysis was conducted by *Kittelson & Associates, Inc.* that used select links with the Alameda CTC model to identify more localized changes in VMT. The changes shown were based on modeling of localized traffic with origins and destinations north of the I-580 freeway.

Emissions Modeling

Caltrans developed the Caltrans Emission Factor 2014 (CT-EMFAC2014) model to analyze transportation projects. The CT-EMFAC2014 Version 6.0 model was used to predict vehicle emission rates. CT-EMFAC2014 models on-road vehicle emissions for criteria pollutants, mobile source air toxics (MSATs), and CO_2. The tool's underlying data are based on CARB's Motor Vehicle Emissions Model (EMFAC2014) on-road emissions model and CARB-supplied/EPA-supplied MSAT speciation factors. Inputs to the model include region (i.e., Alameda County), default traffic mix assigned by CT-EMFAC2014 for that county, year of analysis and season.

Emissions associated with vehicle travel depend on the year of analysis because emission control technology requirements are phased-in over time. Therefore, the earlier the year analyzed in the model, the higher the emission rates utilized by CT-EMFAC. This analysis was based on the baseline year (2017), near-term conditions (2025), and long-term conditions (2040). Emission rates were predicted for annual conditions.

Emission processes modeled include running exhaust for all pollutants, running losses for organic compounds (e.g., ROG), tire wear and brake wear for PM10 and PM2.5. CT-EMFAC2014 provides vehicles emissions for speeds in 5 mph increments, so emissions rates were interpolated to account for the predicted average speed.

Project Air Pollutant Emissions

The predicted daily traffic conditions were combined with CT-EMFAC2014 emissions factors to predict emission in pounds per day. Table 6 reports the predicted air pollutant emission in terms of average daily emissions for both the No-Project and Project scenarios for the three analysis years (i.e., 2017, 2025, and 2040). *Attachment 2* to this report includes the traffic and CT-EMFAC model output files for the proposed project emission factors and modeling calculations.

The BAAQMD CEQA Air Quality Guidelines provide recommended emission thresholds for projects. These are intended to be applied to land-use type projects but provide an informative comparison in determining the magnitude of roadway project emissions. For transportation projects, there is a process that air quality is considered looking at the entire transportation sector of emissions. This is done through the SIP conformity process, where transportation projects are evaluated at the regional level. Most public transportation projects are included in the TIP. The TIP is evaluated for conformance with the SIP that is intended to attain and maintain national ambient air quality standards. This is an emissions analysis conducted by MTC and approved by the U.S. Department of Transportation's FHWA. The purpose of this "conformity determination" is to ensure that transportation emissions associated with the transportation network do not exceed the emissions budget established by the region to obtain and maintain ambient quality standards. It can be concluded that the change in emissions caused by the project are less-than-significant since the project is included in the most recent TIP that has been determined by FHWA and FTP to conform with the SIP and the change in emissions from the project alone would be well below the emission thresholds recommended by the BAAQMD.

Table 6 - Daily Project Operational Emissions in pounds per day

Scenario	ROG	NO_x	CO	PM10 Total	PM2.5 Total
2017 Project	4.8	20.8	48.8	1.6	0.9
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**
2025 No Project	2.8	8.0	26.3	1.9	0.8
2025 Project	6.2	17.4	57.5	4.1	1.7
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**
2040 No Project	3.8	11.3	35.3	4.0	1.6
2040 Project	5.3	15.6	48.6	5.5	2.3
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018
Note: CO impacts, which are expressed in parts-per-million, were described previously in this report.

Applicable BAAQMD Construction Best Management Practices

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

***Mitigation Measure AQ-1*: Include basic measures to control dust and exhaust during construction.**

During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction to a less-than-significant level. The contractor shall implement the following best management practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. 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 [CCR]). Clear signage shall be provided for construction workers at all access points.
7. 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.
8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Effectiveness of Mitigation Measure AQ-1

Implementation of Mitigation Measure AQ-1 would be consistent with recommendations in the BAAQMD CEQA Air Quality Guidelines for controlling fugitive dust emissions that contribute to localized elevated concentrations of PM10 and PM2.5. The impact would be reduced to a less-than-significant level.

Impact d: Expose sensitive receptors to substantial pollutant concentrations? ***Less-than-significant with construction-period mitigation measures.***

Project impacts related to increased community risk can occur by introducing a source of TACs with the potential to adversely affect existing sensitive receptors in the project vicinity. The BAAQMD recommends using a 1,000-foot screening radius around a project site for purposes of identifying community health risk from siting a new sensitive receptor or a new source of TACs. There are thresholds that address both the impact of single and cumulative TAC sources upon sensitive receptors (see Table 4). Construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors, while operation would expose these receptors to long-term emissions from traffic.

Sensitive receptors potentially affected by the proposed project include residences closest to the proposed road construction area, north of the project footprint along Central Parkway. This community risk assessment models concentrations of DPM and PM2.5, which are then used to evaluate potential cancer risk, non-cancer health hazards, and annual concentrations of PM2.5.

Community Risk from Project Operation

The project would be constructed within 1,000 feet of existing sensitive receptors including residences to the north along Central Parkway. Substantial sources of air pollution such as roadways can adversely affect nearby sensitive receptors as part of implementing new projects.

For local roadways, BAAQMD has provided the *Roadway Screening Analysis Calculator* to assess whether roadways with traffic volumes of over 10,000 vehicles per day may have a potentially significant effect on sensitive receptors. Two adjustments were made to the cancer risk predictions made by this calculator: (1) adjustment for latest vehicle emissions rates and (2) adjustment of cancer risk to reflect new Office of Environmental Health Hazard Assessment (OEHHA) guidance described in Attachment 3.

The *Roadway Screening Analysis Calculator* uses EMFAC2011 emission rates for the year 2014. Overall, emission rates will decrease by the time the project is constructed and operational. The project is not likely to be operational prior to 2020. In addition, a new version of the emissions factor model, EMFAC2014 is available. This version predicts much lower emission rates than EMFAC2011 and the rates for later years are lower than the rates for 2014. Using a fleet mix typical of local roadways operating at 30 mph, EMFAC2014 predicts diesel (DSL) PM2.5 aggregate emission rates in 2018 that are 46 percent of EMFAC2011 rates for 2014.[12] TOG for gasoline-powered vehicle rates are 56 percent of EMFAC2011 year 2014 rates. An adjustment factor of 0.5 was applied to the *Roadway Screening Analysis Calculator* results.

The adjusted predicted cancer risk was then adjusted again using a factor of 1.3744 to account for new OEHHA guidance (see discussion regarding cancer risk calculation methodology in Attachment 3). This factor was provided by BAAQMD for use with their CEQA screening tools that are used to predict cancer risk.[13]

Traffic for Dublin Boulevard/North Canyons Parkway extension was based on the traffic data prepared for this project. The study segment of Fallon Road and Doolan Road was used to describe traffic conditions, where the increase in average daily traffic (ADT) ranges from 11,525 vehicles for "2025 Project" and 19,145 vehicles for "2040 Project." This assessment conservatively used the highest "2040 Project" condition. The edge of the travel way for this east-west roadway was entered based on the distance from the nearest receptor. The roadway orientation, distance and direction, and traffic volume were input to the BAAQMD *Roadway Screening Analysis Calculator* for Alameda County. Based on the BAAQMD screening calculator, potential excess cancer risk would range from one to 4 chances in one million at existing sensitive receptors, which is below the BAAQMD significance threshold of 10.0 in one million. Annual PM2.5 concentration would be 0.12μg/m^3, which would not exceed the BAAQMD significance threshold of greater than

[12] Comprised mostly of light- and medium-duty vehicles.
[13] Email from Virginia Lau, BAAQMD to Bill Popenuck of Illingworth & Rodkin, Inc, dated November 15, 2015.

0.3µg/m^3. The maximum community risks from project operation are summarized in Table 7. Note that these results are based on a screening calculation that assume current emission rates and poor dispersion characteristics. A refined modeling the scenario would likely predicted lower impacts.

Table 7 - Maximum Community Risks from Project Operation

Scenario	Fallon Rd. and Dublin Blvd.		Croak Rd & Dublin Blvd. Extension	Doolan Rd. & N. Canyons Parkway
	ADT west	ADT east	ADT east	ADT east
Existing 2017	7,565	0	0	895
No Build 2025	9,705	0	0	985
Build 2025	16,480	11,525	9,850	10,770
2025 ADT Increase	6,775	11,525	9,850	9,785
No Build 2040	11,835	0	0	895
Build 2040	18,555	19,145	15,780	16,460
2040 ADT Increase	6,720	19,145	15,780	15,565
Closest Sensitive Receptor	40ft North	>800ft North	>700ft South	>150ft North
Cancer Risk	**3.56**	**1.30**	**0.66**	**<4.15[3]**
PM2.5	**0.10**	**0.04**	**0.02**	**0.12**
BAAQMD Significance Threshold[2]	**Cancer Risk (per million)**		**Annual PM2.5 (µg/m^3)[1]**	
	Less than 10.0 ppm		less than 0.3 ppm	
Exceed Threshold	**No**		**No**	

Source: Illingworth & Rodkin, Inc., 2018

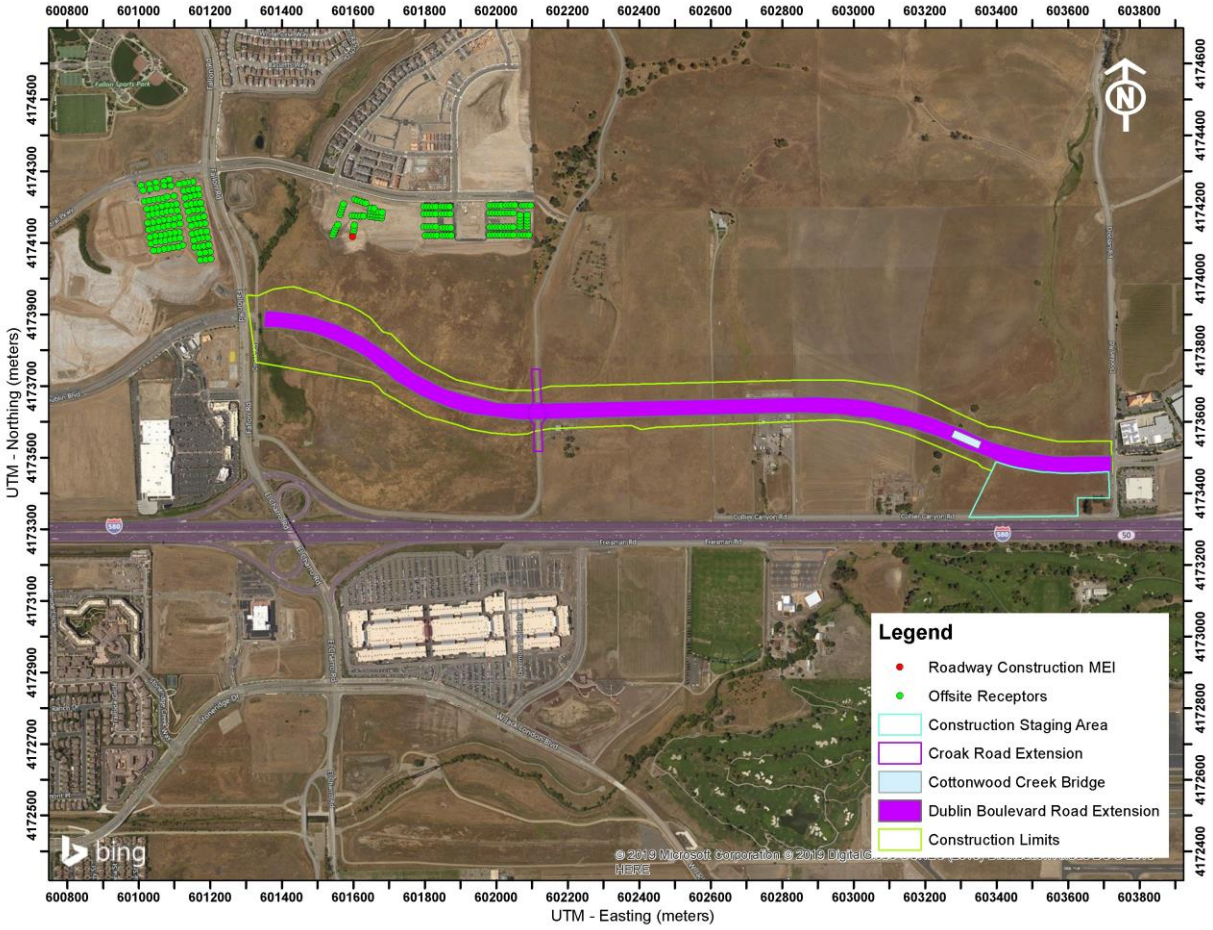
Note: [1]The annual PM2.5 concentration is the sum of the DPM and fugitive PM2.5 concentrations. BAAQMD [2]Roadway Screening Calculator does not consider roadways to be sources of substantial HI.

[3] Note screening cancer risk prediction based on residential exposure (i.e., infant, child and adult exposure over 30 years), where nearest receptor is a school and with less exposure duration (i.e., child exposure over 9 years).

Project Construction Activity

A community risk assessment of the project construction activities was conducted that evaluated potential health effects on sensitive receptors from construction emissions of DPM and PM2.5. Sensitive receptors potentially affected by the proposed road construction include residences near the proposed new road (north along North Canyons Parkway) or portions of the existing roadways affected by traffic from the project. A dispersion model was used to predict the off-site DPM concentrations resulting from project construction so that increased cancer risks could be predicted. Figure 1 shows the areas where project construction would occur, and the nearby sensitive receptor locations used in the air quality dispersion modeling analysis where potential community risk impacts were evaluated.

Figure 1 - Project Construction Sites, Locations of Modeled Sensitive Receptors, and Locations of Maximum Cancer Risk and PM2.5 Impacts



Construction Period Emissions

Construction period emissions were computed using the RoadMod emissions model along with projected construction activity, as described above. The RoadMod model provided total annual PM10 exhaust emissions (assumed to be DPM) from the off-road construction equipment and worker, vendor and hauling trucks used for the proposed road construction (both the bridge and roadwork) of 0.4600 tons (920 pounds) over the construction period. Fugitive dust PM2.5 emissions were also computed and included in this analysis. The model predicts emissions of 0.42 tons (840 pounds) of fugitive PM2.5 over the construction period. These emissions were used in modeling DPM and PM2.5 concentrations at residences and sensitive receptors near the construction areas.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict DPM and PM2.5 concentrations at residential and sensitive receptor locations near the project construction areas. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling these types of emission activities for CEQA projects.[14] Emission sources for the roadway construction were grouped into two categories, exhaust emissions of DPM and fugitive PM2.5 dust emissions.

The AERMOD modeling utilized area sources to represent all construction activities. For modeling both DPM and fugitive PM2.5 dust emissions from eight area sources were used for modeling the road expansion construction, and for the work to construct a new bridge over Cottonwood Creek. For exhaust emissions from construction equipment, an emission release height of 6 meters (20 feet) was used for the area sources. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive PM2.5 emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area sources. Construction emissions were modeled as occurring daily between 8 a.m. and 5 p.m., when most of the construction activity involving equipment usage would occur.

The modeling used a five-year data set (2009 to 2013) of hourly meteorological data from the Livermore Municipal Airport that was prepared for use with CARB's AERMOD model. Annual DPM and PM2.5 concentrations from construction activities during 2020 were calculated using the model. DPM and PM2.5 concentrations were calculated at sensitive receptors in the vicinity of the road construction work areas at a receptor height of 1.5 meters (4.9 feet)[15].

Predicted Cancer Risk and Hazards

The maximum modeled residential DPM concentrations, or maximally exposed individual (MEI) are shown on Figure 1, as are the residential maximum annual PM2.5 concentrations. The cancer risk calculations were based on using the maximum modeled DPM concentrations for each type of sensitive receptor and applying the methods described in *Attachment 3*. Results of this assessment are summarized in Table 8. As shown in Table 8, the maximum increased residential risk would be below the BAAQMD significance threshold of a cancer risk of 10 in one million or greater. The maximum annual $PM_{2.5}$ concentration and computed hazard index (HI) are also lower than the significance criterion. The maximum levels for each sensitive receptor type are reported in Table 8. *Attachment 3* includes the emission calculations used for the modeling and the cancer risk calculations.

[14] Bay Area Air Quality Management District, 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.
[15] The earliest year of construction was assumed to be 2020.

Table 8 - Maximum Community Risks from Project Construction Activities

Location and Exposure Type	Cancer Risk (per million)	Annual PM2.5 ($\mu g/m^3$)[1]	Chronic Hazard Index
Maximum Residential			
Infant/Child	1.1	0.03	<0.01
Adult	0.02		
BAAQMD Significance Threshold	*> 10.0*	*> 0.3*	*> 1.0*
Exceed Threshold	**No**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018

Note: [1]The annual PM2.5 concentration is the sum of the DPM and fugitive PM2.5 concentrations.

Combined Construction and Operation Cancer Risk

The combination of construction activity and roadway operation were computed by adding the construction cancer risk for an infant (see Table 8) to the lifetime screening cancer risk for "2040 Project" project conditions for the roadway. This is a conservative assessment since both modeling scenarios assume infant exposure. Under this condition, the increased cancer risk would be 5.8 chances per million, which is less than the BAAQMD threshold. The annual PM2.5 concentration would be 0.13µg/m3 and the HI would be less than 0.1. These levels are compared to the significance thresholds for single sources (see Table 4) and are considered *less-than-significant*.

Cumulative Construction Risk

Cumulative TAC impacts associated with construction of the project were assessed by predicting the combined community risk impacts from the project (both construction and operation) and nearby sources at the sensitive receptor most affected by the project, or MEI. A review of the project area identified I-580 traffic and a gasoline fueling station (Plant #200043) as the only sources of TAC emissions within 1,000 feet of the project site that could affect the project construction MEI. TAC and PM2.5 impacts from I-580 were characterized using the BAAQMD *Highway Screening Tool*. This tool predicts cancer risk and PM2.5 concentrations at various distances both north and south of the freeway. The project MEI was estimated at 2,500 feet north of the nearest I-580 traffic lanes. BAAQMD's Stationary Source Screening Tool was used to identify source level risks from Plant 200043. These risk levels were adjusted for distance using the District's Gas Station Distance Multiplier. The combined maximum cancer risk, non-cancer HI, and annual PM2.5 concentration at this receptor are reported in Table 9. The predicted cumulative cancer risk, non-cancer hazard, and annual PM2.5 concentration from construction would be below the cumulative-source significance thresholds (see Table 4) and the project impact is considered *less-than-significant*.

Table 9 - Combined Community Risk Impacts at MEI (within 1,000 feet of project)

Source	Maximum Cancer Risk (per million)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)	Maximum Hazard Index
Unmitigated Project Construction	1.1 (Infant)	0.03	<0.01
Dublin Boulevard (Roadway Screening Calculator 700ft north)	1.3	0.02	<0.01
I-580 (Highway Screening Tool 2,500ft north)	16.1	0.08	0.01
Facility G200043 (CJC Fallon Gateway LLC (Gasoline Station using BAAQMD Stationary Source Tool, 1,800 feet)	2.6	0.00	0.01
Cumulative Total	21.1	0.12	0.04
BAAQMD Threshold – Cumulative Sources	***>100***	***>0.8***	***>10.0***
Significant	***No***	***No***	***No***

Source: Illingworth & Rodkin, Inc., 2018

Impact e: Create objectionable odors affecting a substantial number of people? ***Less-than-significant.***

The BAAQMD lists types of land uses typically associated with odor complaints these include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. This is a new roadway and as such does not include any uses identified by the BAAQMD as being associated with odors. Since there are no substantial odorous emissions proposed as part of this project, this would be a less-than-significant impact.

Greenhouse Gases

For the purposes of this report, a greenhouse gas emissions impact is considered significant if the project would exceed or conflict with any of the following:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. A less-than-significant impact would occur if the project is consistent with a qualified GHG reduction strategy or has GHG emissions that are below 660 metric tons per year.

2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. In this case, the project is contained in the most recent TIP and Plan Bay Area 2040 that makes up the Bay Area's Sustainable Communities Strategy (or SCS). The project is also consistent with the City's Climate Action Plan.

The BAAQMD thresholds were developed specifically for the Bay Area after considering the latest Bay Area GHG inventory and the effects of AB 32 scoping plan measures that would reduce

regional emissions. BAAQMD intends to achieve GHG reductions from new land use developments to close the gap between projected regional emissions with AB 32 scoping plan measures and the AB 32 targets. This study uses a reduced threshold level to address recently enacted State legislation that identifies a GHG reduction goal of 40 percent below 1990 levels (assumed to be similar to 2020 levels). This reduced threshold was developed for this project specifically and is not intended to be a significance threshold that would be applied to development projects generally in the City of Dublin.

Impact a: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ***Less-than-significant.***

GHG emissions associated with development of the proposed project would occur over the short-term from construction activities, consisting primarily of emissions from equipment exhaust and worker and vendor trips. There would also be long-term operational emissions associated with vehicular traffic on the new roadway. GHG emission impacts for the proposed project are discussed below and were analyzed using the methodology recommended in the BAAQMD CEQA Air Quality Guidelines.[16]

Existing Conditions

Under existing conditions, there is no extended roadway and the potential for a direct change in GHG emissions is nonexistent. Indirect emissions are generated from the burning of fuel required for site maintenance (e.g., infrequent disking and/or mowing to control fire hazards, etc.).

Construction Greenhouse Gas Emissions (Temporary Emissions)

GHG emissions for transportation projects can be divided into those produced during construction and those produced during operations. Currently, neither Dublin, Livermore, or the County of Alameda nor BAAQMD have adopted GHG significance thresholds that apply to construction projects. For informational purposes, GHG emissions from project roadway construction are estimated to be 989 metric tons of CO_2e and from the bridge construction the GHG emissions are estimated to be 406 metric tons of CO_2e over the course of the entire construction project based on RoadMod modeling described above. This would equate to an annual average emission of 930 metric tons of CO_2e, based on 18 months of construction. This is for information only as the BAAQMD does not recommend a threshold of significance for construction generated GHG emissions. Note that prorated over a 30-year period, construction GHG emissions would be 31 metric tons per year.

[16] BAAQMD, 2017. *Op cit.*

Operational Greenhouse Gas Emissions (Ongoing Emissions)

GHG (e.g., carbon dioxide, methane, and nitrogen dioxide) from operation of the project will include fuel burned while traveling on the new roadway, there will be a shift in traffic from other congested routes which will increase the overall effectiveness of the transportation system. There are no thresholds identified for evaluating the effect of roadway projects on GHG emissions since these types of projects do not generate emissions on their own.

As previously discussed for air quality, there is a process that air quality for transportation projects is considered looking at the entire transportation sector of emissions. This is done through the SIP conformity process, where transportation projects are evaluated at the regional level. Most public transportation projects are included in the TIP. The project is included in the TIP. Projects included in the TIP are also part of the Bay Area Plan 2040 plan that includes the region's SCS. MTC and ABAG identified GHG reduction targets that are included in the SCS. The proposed project, being part of the 2019 TIP is part of the Plan Bay Area 2040 transportation network, and therefore, is consistent with the SCS.

To analyze the effects of the project regarding GHG emissions, the emissions were measured in two ways: (1) using the VMT for the region and (2) a focused analysis using the VMT local to the project based on the traffic data provided by Kittelson & Associates, Inc.

The regional analysis showed that there would be a decrease in the GHG emissions due to lower emission rates of motor vehicles in future years when comparing the existing emissions with the 2025 and 2040 No Project scenarios. Table 10 shows the metric tons of GHG emissions from the roadway system with and without the project. In the year 2025 there will be a reduction in the VMT between the build and no-build scenarios, with the project GHG emissions will be 19 tons or 0.004 percent lower. In the horizon year of 2040 there will be an increase in the region's VMT with the project and the GHG emissions will increase by 123 metric tons or 0.029 percent when comparing the no-build and build scenarios.

The focused-VMT analysis indicates a slight reduction in VMT in 2040 with the project. The daily VMT would be reduced by 328 miles with the project. This would result in an annual reduction of approximately 35 metric tons per year of GHG emissions in the project area.

Project emissions are considered to be *less-than-significant* because the project would have annual emissions that are below the thresholds and the project is consistent with qualified GHG emission reduction strategies. GHG emissions associated with the project are predicted to change slightly and likely decrease. Regardless of the change, the project would not increase emissions above the significance threshold of 660 metric tons per year. Both Dublin and Livermore have Climate Action Plans that are considered qualified GHG reduction strategies. The project assumed in the General Plan that makes up the basis for transportation emissions forecasting. Both Climate Action Plans address 2020 conditions.

Table 10 – Annual Operational GHG Emissions - Regionally

Measure	Existing	2025 No-Build	2025 Build	2040 No-Build	2040 Build
Based on Regional VMT Analysis					
GHG emissions Metric Tons	505,694	438,115	438,096	424,796	424,919
Change Over Existing	--	-67,579	-67,598	-80,898	-80,775
Prorated Construction			31		31
Difference between Build and No Build	--	--	+19 metric tons	--	+123 metric tons
Based on Focused VMT Analysis (2040 only)					
Difference between Build and No Build (including prorated construction)	--	--	--	--	-4 metric tons
Does the project exceed the Bright-Line Threshold of Significance - 660 Metric tons per year			No	--	No

Source: Illingworth & Rodkin, Inc. and Kittelson & Associates, Inc., 2018

Impact b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***Less-than-significant.***

On a regional scale the project was included in the MTC Regional Transportation Plan, Plan Bay Area 2040, the Alameda Countywide Transportation Plan. At the local level, the project would not conflict with the City of Dublin General Plan and Climate Action Plan, and the City of Livermore General Plan and Climate Action Plan. The extension of Dublin Boulevard/North Canyons Parkway extension, as proposed, is included as part of the adopted City of Dublin General Plan roadway network and City of Livermore General Plan planned roadway network. Project level emissions were computed and were found to be below significance thresholds and are consistent with and the supporting the goals of the Plan Bay Area 2040. The project is included in the 2019 TIP that was evaluated with respect to air pollutant emissions and conformity to the region's SIP. In other words, the project is part of a plan that conforms with the region's air quality planning efforts. These air quality planning efforts include SCS plan to meet region's targets for reducing greenhouse gas emissions from light-duty vehicles.

Dublin Climate Action Plan

The City's Climate Action Plan Update identifies transportation, energy and Solid Waste and Recycling Measures to reduce community-wide GHG emissions. GHG reduction features that apply to the project are described below.

A.1.5 Streetscape Master Plan. The City adopted a streetscape master plan that encourages the planting of trees along roadways to encourage the use of non-motorized transportation modes and capture and store CO_2. The project design includes a landscape plan that includes tree plantings consistent with the City's plan.

A.1.10 Bicycle and Pedestrian Master Plan. The City's *Bicycle and Pedestrian Master Plan* includes polices that include the continued development of successful bicycle and pedestrian trail corridors, improved bicycle access to parks and open space areas, improved bicycle lanes and/or routes on several key cross-city corridors, bikeways on key freeway crossings, the development of education and enforcement programs, and improvements to the City's Bicycle Parking Ordinance. The Project includes bicycle and pedestrian pathways along the entire length of the roadway.

A.1.12 City Design Strategy. The City's design strategy has been incorporated into the City's General Plan as part of the Community Design and Sustainability Element. The goals that relate to the project include promoting walking and cycling by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging daily physical activity. As previously mentioned, the project includes bicycle and pedestrian pathways along the entire length of the roadway.

A.2.5 LED Streetlight Specifications for New Projects. The project would be required to meet the City's LED streetlight specification that requires all future development projects to install LED streetlights.

Livermore Climate Action Plan

The City of Livermore's Climate Action Plan targets six sectors: Building Energy, Transportation and Land Use, Water Conveyance, Wastewater Treatment, Solid Waste Generation, and Urban Forestry and Conservation. The goal of the plan is to reduce GHG emissions by 15 percent below 2008 levels. The following GHG emissions reduction measures would apply to the project:

On-Road 4 - Traffic Signal Synchronization. Under this measure, the City will improve travel speed by enhanced signal synchronization. This measure would reduce idling time for vehicles traveling on City roads. Traffic signals with the proposed project would be synchronized to meet optimum traffic flow projections.

On-Road 5 - Bicycles and Pedestrian Improvements. This measure includes enhancements to the city's bike and pedestrian network that provides facilities for bicycle commuters, encouraging bicycling for short and medium-length trips. The project includes bicycle and pedestrian pathways along the entire length of the roadway.

Summary

The climate action plans serves as qualified GHG reductions plans for the City of Dublin and Livermore and can be used for programmatic tiering document for the purposes of CEQA for analysis of impacts of greenhouse gas emissions and climate change. The City has determined that the reduction target under the Plan will reduce the impact from activities under the Plan to less-than-significant under CEQA. Furthermore, the project would have GHG emissions below any

significance threshold. The proposed project is consistent with the applicable emission reduction measures identified in the CAP. Therefore, this would be considered a *less-than-significant* impact.

Attachment 1 –

Road Construction Emissions Model Version 8.1.0 Output

Road Construction Emissions Model, Version 8.1.0

Daily Emission Estimates for -> Dublin Road Extension - Road Work Only

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	9.70	77.54	97.27	44.96	4.96	40.00	12.90	4.58	8.32	0.11	10,586.50	2.96	0.10	10,689.75
Grading/Excavation	4.68	35.17	48.87	42.45	2.45	40.00	10.44	2.12	8.32	0.10	9,546.68	1.93	0.16	9,642.18
Drainage/Utilities/Sub-Grade	3.17	34.85	29.36	41.70	1.70	40.00	9.84	1.52	8.32	0.06	6,227.38	1.35	0.08	6,284.27
Paving	3.05	30.84	30.19	1.79	1.79	0.00	1.56	1.56	0.00	0.07	6,390.19	1.30	0.10	6,453.35
Maximum (pounds/day)	9.70	77.54	97.27	44.96	4.96	40.00	12.90	4.58	8.32	0.11	10,586.50	2.96	0.16	10,689.75
Total (tons/construction project)	0.59	5.10	5.95	4.80	0.31	4.49	1.21	0.28	0.93	0.01	1,079.94	0.23	0.02	1,090.48

Notes:

Project Start Year ->	2020
Project Length (months) ->	12
Total Project Area (acres) ->	23
Maximum Area Disturbed/Day (acres) ->	4
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	10	0	25	0	280	20
Grading/Excavation	650	0	825	0	760	20
Drainage/Utilities/Sub-Grade	180	0	225	0	680	20
Paving	0	400	0	500	520	20

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dublin Road Extension - Road Work Only

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.13	1.02	1.28	0.59	0.07	0.53	0.17	0.06	0.11	0.00	139.74	0.04	0.00	128.01
Grading/Excavation	0.28	2.09	2.90	2.52	0.15	2.38	0.62	0.13	0.49	0.01	567.07	0.11	0.01	519.59
Drainage/Utilities/Sub-Grade	0.13	1.38	1.16	1.65	0.07	1.58	0.39	0.06	0.33	0.00	246.60	0.05	0.00	225.76
Paving	0.06	0.61	0.60	0.04	0.04	0.00	0.03	0.03	0.00	0.00	126.53	0.03	0.00	115.92
Maximum (tons/phase)	0.28	2.09	2.90	2.52	0.15	2.38	0.62	0.13	0.49	0.01	567.07	0.11	0.01	519.59
Total (tons/construction project)	0.59	5.10	5.95	4.80	0.31	4.49	1.21	0.28	0.93	0.01	1079.94	0.23	0.02	989.28

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 8.1.0**

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Dublin Road Extension - Road Work Only	
Construction Start Year	2020	Enter a Year between 2014 and 2025 (inclusive)
Project Type	1	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	12.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Ione formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	1.33	miles
Total Project Area	23.00	acres
Maximum Area Disturbed/Day	4.00	acres
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells ~~E18 to E20 are specific to Sacramento County. Maps~~ available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	20.00		10.00
	Grading/Excavation	20.00		650.00
	Drainage/Utilities/Sub-Grade	20.00		180.00
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	400.00	

Mitigation Options

On-road Fleet Emissions Mitigation	2010 and Newer On-road Vehicles Fleet	Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/ceqa/mitigation.shtml). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing		1.20		1/1/2020
Grading/Excavation		5.40		2/7/2020
Drainage/Utilities/Sub-Grade		3.60		7/21/2020
Paving		1.80		11/8/2020
Totals (Months)	12			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Grubbing/Land Clearing	25.00	30.00		1	25.00
Miles/round trip: Grading/Excavation	25.00	30.00		9	225.00
Miles/round trip: Drainage/Utilities/Sub-Grade	25.00	30.00		0	0.00
Miles/round trip: Paving	25.00	30.00		0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.02	0.08	0.01	0.00	0.00	86.60	0.00	0.00	87.46
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.14	0.00	0.00	1.15
Pounds per day - Grading/Excavation	0.12	0.67	2.66	0.19	0.07	0.03	2,857.91	0.01	0.09	2,886.07
Tons per const. Period - Grading/Excavation	0.01	0.04	0.16	0.01	0.00	0.00	169.76	0.00	0.01	171.43
Pounds per day - Drainage/Utilities/Sub-Grade	0.03	0.18	0.73	0.05	0.02	0.01	779.43	0.00	0.03	787.11
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.03	0.00	0.00	0.00	30.87	0.00	0.00	31.17
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.01	0.05	0.19	0.01	0.01	0.00	201.77	0.00	0.01	203.76

Note: Asphalt Hauling emission default values can be overridden in cells D87 through D90, and F87 through F90.

Asphalt Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving	25.00	30.00		20	500.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.07	0.40	1.61	0.11	0.04	0.02	1,731.66	0.00	0.06	1,748.72
Tons per const. Period - Paving	0.00	0.01	0.03	0.00	0.00	0.00	34.29	0.00	0.00	34.62
Total tons per construction project	0.00	0.01	0.03	0.00	0.00	0.00	34.29	0.00	0.00	34.62

Note: Worker commute default values can be overridden in cells D113 through D118.

		20	Calculated	Calculated
Worker Commute Emissions		2	Daily Trips	Daily VMT
User Input		Default Values	14	280.00
Miles/ one-way trip		19	38	760.00
One-way trips/day		17	34	680.00
No. of employees: Grubbing/Land Clearing		13	26	520.00
No. of employees: Grading/Excavation				
No. of employees: Drainage/Utilities/Sub-Grade				
No. of employees: Paving				

Emission Rates	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Grubbing/Land Clearing (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Grading/Excavation (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Draining/Utilities/Sub-Grade (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Paving (grams/mile)	0.02	1.07	0.11	0.05	0.02	0.00	371.10	0.01	0.00	372.71
Grubbing/Land Clearing (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Grading/Excavation (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Draining/Utilities/Sub-Grade (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Paving (grams/trip)	0.99	2.54	0.20	0.00	0.00	0.00	83.97	0.01	0.01	86.76
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.04	0.74	0.08	0.03	0.01	0.00	231.90	0.01	0.00	232.98
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	3.06	0.00	0.00	3.08
Pounds per day - Grading/Excavation	0.12	2.02	0.21	0.08	0.03	0.01	629.43	0.02	0.01	632.37
Tons per const. Period - Grading/Excavation	0.01	0.12	0.01	0.00	0.00	0.00	37.39	0.00	0.00	37.56
Pounds per day - Drainage/Utilities/Sub-Grade	0.11	1.80	0.19	0.07	0.03	0.01	563.18	0.01	0.01	565.81
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.07	0.01	0.00	0.00	0.00	22.30	0.00	0.00	22.41
Pounds per day - Paving	0.08	1.38	0.14	0.05	0.02	0.00	430.24	0.01	0.01	432.25
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	8.52	0.00	0.00	8.56
Total tons per construction project	0.01	0.23	0.02	0.01	0.00	0.00	71.27	0.00	0.00	71.60

Note: Water Truck default values can be overridden in cells D145 through D148, and F145 through F148.

Water Truck Emissions		4	20.00	40.00	20.00
User Input		Program Estimate of Number of Water Trucks	20.00	Default Values Miles Traveled/Vehicle/Day	Calculated Daily VMT 20.00
Grubbing/Land Clearing - Exhaust		1	20.00	40.00	20.00
Grading/Excavation - Exhaust		1	20.00	40.00	20.00
Drainage/Utilities/Subgrade					
Paving					

2010+ Model Year Mitigation Option Emission Rates	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.92
Pounds per day - Grading/Excavation	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	4.12	0.00	0.00	4.16
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	2.77
Pounds per day - Paving	0.00	0.02	0.06	0.00	0.00	0.00	69.27	0.00	0.00	69.95
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.38
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	9.14	0.00	0.00	9.24

Note: Fugitive dust default values can be overridden in cells D171 through D173.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		4.00	40.00	0.53	8.32	0.11
Fugitive Dust - Grading/Excavation		4.00	40.00	2.38	8.32	0.49
Fugitive Dust - Drainage/Utilities/Subgrade		4.00	40.00	1.58	8.32	0.33

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Concrete/Industrial Saws	0.84	7.37	6.60	0.40	0.40	0.01	1,185.33	0.08	0.01	1,189.86
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Crawler Tractors	0.57	2.45	7.31	0.28	0.25	0.01	746.04	0.24	0.01	754.08
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	1		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Graders	2.87	18.33	27.99	1.56	1.44	0.02	2,419.75	0.78	0.02	2,445.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Rubber Tired Dozers	3.85	31.74	40.59	1.86	1.72	0.04	3,452.28	1.12	0.03	3,489.36
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment

If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing	pounds per day	9.65	76.76	97.05	4.92	4.56	0.11	10,198.71	2.96	0.09	10,299.35
Grubbing/Land Clearing	tons per phase	0.13	1.01	1.28	0.06	0.06	0.00	134.62	0.04	0.00	135.95

Grading/Excavation Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	1		Model Default Tier	Graders	1.43	9.16	14.00	0.78	0.72	0.01	1,209.88	0.39	0.01	1,222.88
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	1		Model Default Tier	Rubber Tired Loaders	1.47	6.45	17.38	0.58	0.53	0.02	2,384.87	0.77	0.02	2,410.61
0.00	2		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grading/Excavation	pounds per day	4.43	32.47	45.94	2.18	2.01	0.06	5,990.05	1.90	0.05	6,053.77
Grading/Excavation	tons per phase	0.26	1.93	2.73	0.13	0.12	0.00	355.81	0.11	0.00	359.59

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Excavators	1.01	13.48	9.96	0.48	0.44	0.02	2,063.78	0.67	0.02	2,086.03
2.00			Model Default Tier	Forklifts	0.29	2.36	2.60	0.19	0.18	0.00	296.06	0.10	0.00	299.26
0.00	1		Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Plate Compactors	0.04	0.21	0.25	0.01	0.01	0.00	34.48	0.00	0.00	34.65
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pumps	0.42	3.76	3.53	0.21	0.21	0.01	623.04	0.04	0.00	625.36
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Rough Terrain Forklifts	0.13	2.30	1.73	0.07	0.07	0.00	333.68	0.11	0.00	337.28
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Drainage/Utilities/Sub-Grade	pounds per day	3.03	32.85	28.38	1.57	1.47	0.05	4,815.49	1.33	0.04	4,861.38
Drainage/Utilities/Sub-Grade	tons per phase	0.12	1.30	1.12	0.06	0.06	0.00	190.69	0.05	0.00	192.51

Paving

Override of Default Number of Vehicles	Default Number of Vehicles	Mitigation Option: Override of Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
	Program-estimate		Equipment Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
2.00			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.51	5.62	5.43	0.26	0.24	0.01	882.52	0.29	0.01	892.03
2.00	1		Model Default Tier	Paving Equipment	0.41	5.03	4.24	0.21	0.19	0.01	783.07	0.25	0.01	791.52
2.00	1		Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.84	7.67	8.41	0.54	0.49	0.01	1,028.97	0.33	0.01	1,040.06
4.00	3		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
	3		Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.84	9.21	8.48	0.54	0.49	0.01	1,215.49	0.39	0.01	1,228.58
4.00	2		Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier											

User-Defined Off-road Equipment

If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A											

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Paving	pounds per day	2.89	29.05	28.38	1.62	1.49	0.04	4,159.03	1.29	0.04	4,202.43
Paving	tons per phase	0.06	0.58	0.56	0.03	0.03	0.00	82.35	0.03	0.00	83.21
Total Emissions all Phases (tons per construction period) =>		0.57	4.82	5.70	0.29	0.27	0.01	763.47	0.23	0.01	771.26

Equipment default values for horsepower and hours/day can be overridden in cells D391 through D424 and F391 through F424.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		85		8
Excavators		163		8
Forklifts		89		8
Generator Sets		84		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		46		8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 8.1.0

Daily Emission Estimates for -> Dublin Road Extension - Bridge Work Only

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Bridge Foundations	9.57	76.72	96.52	14.92	4.92	10.00	6.62	4.54	2.08	0.11	10,404.29	2.95	0.10	10,506.57
Bridge Abutments and Piers	4.94	36.94	50.93	12.49	2.49	10.00	4.31	2.23	2.08	0.08	7,504.27	2.09	0.08	7,579.08
Bridge Superstructure/Barriers	3.04	34.19	27.99	11.63	1.63	10.00	3.56	1.48	2.08	0.06	5,451.73	1.34	0.05	5,501.28
Landscaping/Lighting	2.84	29.33	27.95	1.64	1.64	0.00	1.49	1.49	0.00	0.05	4,463.99	1.29	0.04	4,509.50
Maximum (pounds/day)	9.57	76.72	96.52	14.92	4.92	10.00	6.62	4.54	2.08	0.11	10,404.29	2.95	0.10	10,506.57
Total (tons/construction project)	0.30	2.57	2.98	0.72	0.15	0.56	0.26	0.14	0.12	0.00	443.68	0.12	0.00	448.01

Notes:

Project Start Year ->	2020
Project Length (months) ->	6
Total Project Area (acres) ->	2
Maximum Area Disturbed/Day (acres) ->	1
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Bridge Foundations	0	0	0	0	200	40
Bridge Abutments and Piers	0	0	0	0	1,120	40
Bridge Superstructure/Barriers	0	0	0	0	720	40
Landscaping/Lighting	0	0	0	0	320	40

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dublin Road Extension - Bridge Work Only

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Bridge Foundations	0.06	0.51	0.64	0.10	0.03	0.07	0.04	0.03	0.01	0.00	68.67	0.02	0.00	62.91
Bridge Abutments and Piers	0.15	1.10	1.51	0.37	0.07	0.30	0.13	0.07	0.06	0.00	222.88	0.06	0.00	204.21
Bridge Superstructure/Barriers	0.06	0.68	0.55	0.23	0.03	0.20	0.07	0.03	0.04	0.00	107.94	0.03	0.00	98.82
Landscaping/Lighting	0.03	0.29	0.28	0.02	0.02	0.00	0.01	0.01	0.00	0.00	44.19	0.01	0.00	40.50
Maximum (tons/phase)	0.15	1.10	1.51	0.37	0.07	0.30	0.13	0.07	0.06	0.00	222.88	0.06	0.00	204.21
Total (tons/construction project)	0.30	2.57	2.98	0.72	0.15	0.56	0.26	0.14	0.12	0.00	443.68	0.12	0.00	406.43

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.
The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 8.1.0**

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Dublin Road Extension - Bridge	Work Only
Construction Start Year	2020	Enter a Year between 2014 and 2025 (inclusive)
Project Type	3	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	6.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Ione formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	0.20	miles
Total Project Area	2.00	acres
Maximum Area Disturbed/Day	1.00	acre
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Bridge Foundations	20.00		
	Bridge Abutments and Piers	20.00		0.00
	Bridge Superstructure/Barriers	20.00		
	Landscaping/Lighting	20.00		0.00
Asphalt	Bridge Foundations	20.00		
	Bridge Abutments and Piers	20.00		
	Bridge Superstructure/Barriers	20.00		
	Landscaping/Lighting	20.00	0.00	

Mitigation Options

On-road Fleet Emissions Mitigation	2010 and Newer On-road Vehicles Fleet	Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/ceqa/mitigation.shtml). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Bridge Foundations		0.60		1/1/2020
Bridge Abutments and Piers		2.70		1/20/2020
Bridge Superstructure/Barriers		1.80		4/12/2020
Landscaping/Lighting		0.90		6/6/2020
Totals (Months)	6			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Bridge Foundations		30.00		0	0.00
Miles/round trip: Bridge Abutments and Piers		30.00		0	0.00
Miles/round trip: Bridge Superstructure/Barriers		30.00		0	0.00
Miles/round trip: Landscaping/Lighting		30.00		0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Asphalt Hauling emission default values can be overridden in cells D87 through D90, and F87 through F90.

Asphalt Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Bridge Foundations		30.00		0	0.00
Miles/round trip: Bridge Abutments and Piers		30.00		0	0.00
Miles/round trip: Bridge Superstructure/Barriers		30.00		0	0.00
Miles/round trip: Landscaping/Lighting		30.00	0	0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Worker commute default values can be overridden in cells D113 through D118.

Worker Commute Emissions		20	Calculated	Calculated
		2	Daily Trips	Daily VMT
User Input		5	10	200.00
Miles/ one-way trip		28	56	1,120.00
One-way trips/day		18	36	720.00
No. of employees: Bridge Foundations		8	16	320.00
No. of employees: Bridge Abutments and Piers				
No. of employees: Bridge Superstructure/Barriers				
No. of employees: Landscaping/Lighting				

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Bridge Abutments and Piers (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Draining/Utilities/Sub-Grade (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Landscaping/Lighting (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Bridge Foundations (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Bridge Abutments and Piers (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Draining/Utilities/Sub-Grade (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Landscaping/Lighting (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.03	0.53	0.05	0.02	0.01	0.00	165.64	0.00	0.00	166.41
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	1.10
Pounds per day - Bridge Abutments and Piers	0.17	2.97	0.30	0.12	0.05	0.01	927.59	0.02	0.01	931.92
Tons per const. Period - Bridge Abutments and Piers	0.01	0.09	0.01	0.00	0.00	0.00	27.55	0.00	0.00	27.68
Pounds per day - Bridge Superstructure/Barriers	0.11	1.91	0.20	0.07	0.03	0.01	596.30	0.01	0.01	599.09
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.04	0.00	0.00	0.00	0.00	11.81	0.00	0.00	11.86
Pounds per day - Landscaping/Lighting	0.05	0.85	0.09	0.03	0.01	0.00	265.02	0.01	0.00	266.26
Tons per const. Period - Landscaping/Lighting	0.00	0.01	0.00	0.00	0.00	0.00	2.62	0.00	0.00	2.64
Total tons per construction project	0.01	0.14	0.01	0.01	0.00	0.00	43.07	0.00	0.00	43.27

Note: Water Truck default values can be overridden in cells D145 through D148, and F145 through F148.

Water Truck Emissions		4		40.00	40.00
		Program Estimate of		Default Values	Calculated
User Input		Number of Water Trucks		Miles Traveled/Vehicle/Day	Daily VMT
Bridge Foundations - Exhaust		1		40.00	40.00
Bridge Abutments and Piers - Exhaust		1		40.00	40.00
Drainage/Utilities/Subgrade					
Landscaping/Lighting					

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.92
Pounds per day - Bridge Abutments and Piers	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	4.12	0.00	0.00	4.16
Pounds per day - Bridge Superstructure/Barriers	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	2.77
Pounds per day - Landscaping/Lighting	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.39
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	9.15	0.00	0.00	9.24

Note: Fugitive dust default values can be overridden in cells D171 through D173.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Bridge Foundations		1.00	10.00	0.07	2.08	0.01
Fugitive Dust - Bridge Abutments and Piers		1.00	10.00	0.30	2.08	0.06
Fugitive Dust - Drainage/Utilities/Subgrade		1.00	10.00	0.20	2.08	0.04

Off-Road Equipment Emissions

Bridge Foundations

Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option: Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Concrete/Industrial Saws	0.84	7.37	6.60	0.40	0.40	0.01	1,185.33	0.08	0.01	1,189.86
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Crawler Tractors	0.57	2.45	7.31	0.28	0.25	0.01	746.04	0.24	0.01	754.08
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Graders	2.87	18.33	27.99	1.56	1.44	0.02	2,419.75	0.78	0.02	2,445.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Rubber Tired Dozers	3.85	31.74	40.59	1.86	1.72	0.04	3,452.28	1.12	0.03	3,489.36
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment

If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations	pounds per day	9.53	76.15	96.33	4.89	4.53	0.10	10,100.09	2.95	0.09	10,200.22
Bridge Foundations	tons per phase	0.06	0.50	0.64	0.03	0.03	0.00	66.66	0.02	0.00	67.32

Bridge Abutments and Piers Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Cranes	0.44	2.07	5.27	0.22	0.20	0.01	546.70	0.18	0.00	552.59
0.00	2		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	4		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Graders	1.43	9.16	14.00	0.78	0.72	0.01	1,209.88	0.39	0.01	1,222.88
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	3		Model Default Tier	Rubber Tired Loaders	1.47	6.45	17.38	0.58	0.53	0.02	2,384.87	0.77	0.02	2,410.61
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment

If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Abutments and Piers	pounds per day	4.76	33.94	50.49	2.37	2.18	0.07	6,438.12	2.07	0.06	6,507.23
Bridge Abutments and Piers	tons per phase	0.14	1.01	1.50	0.07	0.06	0.00	191.21	0.06	0.00	193.26

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Excavators	1.01	13.48	9.96	0.48	0.44	0.02	2,063.78	0.67	0.02	2,086.03
2.00			Model Default Tier	Forklifts	0.29	2.36	2.60	0.19	0.18	0.00	296.06	0.10	0.00	299.26
0.00	1		Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Plate Compactors	0.04	0.21	0.25	0.01	0.01	0.00	34.48	0.00	0.00	34.65
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pumps	0.42	3.76	3.53	0.21	0.21	0.01	623.04	0.04	0.00	625.36
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Rough Terrain Forklifts	0.13	2.30	1.73	0.07	0.07	0.00	333.68	0.11	0.00	337.28
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bridge Superstructure/Barriers		pounds per day		2.92	32.25	27.66	1.55	1.44	0.05	4,716.86	1.32	0.04	4,762.26
Bridge Superstructure/Barriers		tons per phase		0.06	0.64	0.55	0.03	0.03	0.00	93.39	0.03	0.00	94.29

Landscaping/Lighting	Default Number of Vehicles	Mitigation Option Override of Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*				pounds/day	pounds/day p	ounds/day p	ounds/day po	unds/day po	unds/day	pounds/day po	unds/day po	unds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
2.00			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.51	5.62	5.45	0.26	0.24	0.01	882.53	0.29	0.01	892.04
2.00	1		Model Default Tier	Landscaping/Lighting	0.41	5.03	4.25	0.21	0.20	0.01	783.08	0.25	0.01	791.53
2.00	1		Model Default Tier	Equipment Plate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Compactors Pressure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Washers Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.84	7.67	8.43	0.54	0.49	0.01	1,028.97	0.33	0.01	1,040.06
4.00	1		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
	1		Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
4.00	2		Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier											

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A												

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Landsca	pounds per day	2.79	28.45	27.73	1.60	1.47	0.04	4,060.40	1.28	0.04	4,103.30
Landsca	tons per phase	0.03	0.28	0.27	0.02	0.01	0.00	40.20	0.01	0.00	40.62
Total Emissions all Phases (tons per construction period) =>		0.29	2.43	2.96	0.15	0.14	0.00	391.46	0.12	0.00	395.50

Equipment default values for horsepower and hours/day can be overridden in cells D391 through D424 and F391 through F424.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		85		8
Excavators		163		8
Forklifts		89		8
Generator Sets		84		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Landscaping/Lighting Equipment		131		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		46		8

END OF DATA ENTRY SHEET

Attachment 2 –

EMFAC2014 and Traffic Data

2013

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.395832	0.269879	0.178157	0.122708	0.092408	0.073302	0.060657	0.052489	0.047649	0.045515	0.045845	0.048849	0.054741	0.059098	0.059098
ROG	0.354341	0.245502	0.160626	0.109264	0.082215	0.06519	0.053782	0.046314	0.041806	0.039718	0.039826	0.042328	0.0473	0.050997	0.050997
TOG	0.46088	0.31732	0.207902	0.141775	0.106575	0.084415	0.069623	0.059973	0.054165	0.051486	0.051643	0.054885	0.061347	0.066159	0.066159
CO	2.881601	2.441114	2.075955	1.806535	1.608079	1.453072	1.329244	1.230924	1.15489	1.099935	1.06691	1.060125	1.086181	1.115483	1.115483
NOx	1.495171	1.246539	0.934433	0.738628	0.6354	0.576353	0.536856	0.509897	0.49207	0.481562	0.477394	0.481413	0.491771	0.499515	0.499515
CO2	1274.458	983.3876	764.9698	621.2769	527.6522	464.1201	422.1933	395.1004	380.1992	377.154	385.3012	405.6262	440.8327	464.7993	464.7993
CH4	0.084665	0.056258	0.037359	0.025998	0.019504	0.015406	0.012736	0.011035	0.010041	0.009612	0.009696	0.01033	0.011589	0.012526	0.012526
PM10	0.026014	0.01957	0.013773	0.009975	0.008048	0.006887	0.006135	0.005713	0.005577	0.005705	0.006091	0.006497	0.006848	0.007181	0.007181
PM2.5	0.024496	0.018474	0.013009	0.009425	0.007612	0.00652	0.005812	0.005416	0.00529	0.005415	0.005783	0.006169	0.006498	0.006812	0.006812
Benzene	0.010819	0.007399	0.004884	0.003358	0.002533	0.002009	0.001663	0.001441	0.001306	0.00125	0.001258	0.001338	0.001493	0.001493	0.001493
Acrolein	0.000436	0.000284	0.000194	0.00014	0.000107	0.000085	0.000071	0.000063	0.000058	0.000057	0.000058	0.000063	0.000071	0.000071	0.000071
Acetaldehyde	0.011812	0.008991	0.005476	0.003357	0.002478	0.001933	0.001535	0.00125	0.001054	0.000933	0.000879	0.000888	0.000935	0.000935	0.000935
Formaldehyde	0.026662	0.01996	0.012307	0.007688	0.005696	0.004455	0.003565	0.002936	0.002512	0.002261	0.002163	0.00221	0.002359	0.002359	0.002359
Butadiene	0.002107	0.001406	0.000946	0.000667	0.000505	0.000402	0.000335	0.000294	0.000269	0.000261	0.000265	0.000284	0.000319	0.000319	0.000319
Naphthalene	0.000333	0.000233	0.000152	0.000102	0.000077	0.000061	0.00005	0.000043	0.000039	0.000037	0.000036	0.000039	0.000043	0.000043	0.000043
POM	0.000535	0.000382	0.000242	0.000157	0.000118	0.000094	0.000078	0.000067	0.00006	0.000057	0.000057	0.00006	0.000065	0.000065	0.000065
Diesel PM	0.015234	0.012712	0.009182	0.00674	0.005646	0.005008	0.004587	0.00437	0.004348	0.004519	0.004882	0.005178	0.005323	0.005323	0.005323
DEOG	0.141558	0.109795	0.065903	0.039469	0.028983	0.022512	0.017695	0.01418	0.011717	0.010127	0.009338	0.009245	0.009506	0.009506	0.009506

2025

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.211625	0.143105	0.096044	0.067341	0.050285	0.039381	0.032197	0.027544	0.024729	0.023369	0.023304	0.02475	0.027851	0.030135	0.030135
ROG	0.181651	0.124326	0.083456	0.058395	0.043556	0.034037	0.027712	0.023573	0.021027	0.019739	0.019561	0.020711	0.02328	0.025182	0.025182
TOG	0.242212	0.165348	0.110788	0.077413	0.057707	0.045079	0.036698	0.031219	0.02785	0.02615	0.025919	0.027437	0.030825	0.033333	0.033333
CO	1.545686	1.324905	1.120452	0.970352	0.860883	0.774565	0.704427	0.647293	0.601148	0.564883	0.538241	0.523309	0.521688	0.526744	0.526744
NOx	1.368577	1.068678	0.694853	0.449802	0.304677	0.234379	0.194514	0.170037	0.154444	0.144568	0.13874	0.13855	0.142596	0.145709	0.145709
CO2	1006.251	782.1453	611.2952	499.2885	427.2873	378.4869	346.0193	324.7563	312.6662	309.4284	314.6661	329.4139	355.639	373.5124	373.5124
CH4	0.049854	0.033456	0.022296	0.015544	0.01158	0.009055	0.007396	0.006324	0.005676	0.005363	0.005348	0.005673	0.006371	0.006886	0.006886
PM10	0.013296	0.009022	0.006218	0.004489	0.003478	0.002839	0.002418	0.002147	0.001989	0.001921	0.001939	0.002052	0.002275	0.002468	0.002468
PM2.5	0.012343	0.008394	0.005791	0.004184	0.003245	0.002652	0.002261	0.002009	0.001861	0.001798	0.001814	0.001919	0.002127	0.002307	0.002307
Benzene	0.005581	0.003787	0.002545	0.001784	0.001334	0.001045	0.000855	0.000732	0.000657	0.000622	0.000621	0.000659	0.00074	0.00074	0.00074
Acrolein	0.000227	0.000146	0.000099	0.000071	0.000054	0.000043	0.000036	0.000031	0.000029	0.000028	0.000029	0.000031	0.000035	0.000035	0.000035
Acetaldehyde	0.005493	0.004238	0.002777	0.001855	0.001356	0.001026	0.000789	0.000619	0.000498	0.000416	0.000369	0.000362	0.000384	0.000384	0.000384
Formaldehyde	0.012605	0.009518	0.006261	0.004215	0.003092	0.002354	0.00183	0.001459	0.001201	0.001031	0.000943	0.000944	0.001016	0.001016	0.001016
Butadiene	0.001105	0.000731	0.000494	0.00035	0.000263	0.000207	0.000172	0.000149	0.000136	0.000131	0.000133	0.000142	0.00016	0.00016	0.00016
Naphthalene	0.000169	0.000118	0.000079	0.000055	0.000041	0.000032	0.000026	0.000022	0.000019	0.000018	0.000018	0.000019	0.000021	0.000021	0.000021
POM	0.000248	0.000172	0.000113	0.000077	0.000057	0.000045	0.000036	0.000031	0.000027	0.000025	0.000025	0.000026	0.000029	0.000029	0.000029
Diesel PM	0.003144	0.002617	0.001956	0.001497	0.001263	0.00111	0.000995	0.000913	0.000859	0.000832	0.000831	0.000857	0.000909	0.000909	0.000909
DEOG	0.064493	0.051005	0.033245	0.021993	0.015984	0.012002	0.009092	0.006969	0.005431	0.004338	0.003677	0.003467	0.003563	0.003563	0.003563

2040

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.155851	0.107209	0.072049	0.050514	0.037542	0.029147	0.023544	0.01985	0.017538	0.016311	0.016026	0.016905	0.018994	0.020507	0.020507
ROG	0.137725	0.095825	0.064404	0.045084	0.033457	0.025894	0.020807	0.017418	0.015262	0.014067	0.013703	0.014384	0.016123	0.017384	0.017384
TOG	0.181003	0.125906	0.084522	0.059092	0.043824	0.0339	0.027222	0.022771	0.019937	0.018362	0.017872	0.01875	0.02101	0.022648	0.022648
CO	1.047369	0.884924	0.72399	0.610725	0.532873	0.473486	0.426295	0.388653	0.358877	0.33601	0.319755	0.312079	0.313841	0.318566	0.318566
NOx	1.453449	1.109039	0.677417	0.392937	0.227027	0.152078	0.111909	0.088221	0.073357	0.063686	0.057327	0.055453	0.056608	0.057408	0.057408
CO2	816.3367	642.6877	505.5261	415.7059	358.9012	320.7901	295.1651	277.8361	267.7899	264.227	266.7674	276.7834	296.0614	309.1992	309.1992
CH4	0.034984	0.024078	0.016105	0.011231	0.008325	0.006447	0.005192	0.004362	0.003839	0.003556	0.003481	0.003662	0.004108	0.004431	0.004431
PM10	0.005655	0.003867	0.002732	0.002038	0.001611	0.001337	0.001154	0.001033	0.000957	0.000915	0.000906	0.00094	0.00102	0.001084	0.001084
PM2.5	0.005246	0.003596	0.002545	0.001902	0.001506	0.001251	0.001081	0.000969	0.000897	0.000858	0.000849	0.00088	0.000954	0.001014	0.001014
Benzene	0.004231	0.002918	0.001963	0.001376	0.001025	0.000796	0.000644	0.000544	0.00048	0.000448	0.000442	0.000468	0.000525	0.000525	0.000525
Acrolein	0.000158	0.000102	0.000069	0.000049	0.000037	0.000029	0.000025	0.000022	0.00002	0.00002	0.00002	0.000022	0.000025	0.000025	0.000025
Acetaldehyde	0.005162	0.004028	0.002674	0.001818	0.001322	0.000986	0.000744	0.000569	0.000442	0.000352	0.000298	0.000283	0.000296	0.000296	0.000296
Formaldehyde	0.011419	0.008762	0.005827	0.003977	0.002901	0.002177	0.001659	0.001288	0.001023	0.000839	0.000734	0.000716	0.000762	0.000762	0.000762
Butadiene	0.000809	0.00054	0.000365	0.000258	0.000193	0.000152	0.000125	0.000108	0.000098	0.000094	0.000094	0.000101	0.000114	0.000114	0.000114
Naphthalene	0.000139	0.000098	0.000066	0.000046	0.000034	0.000026	0.000021	0.000018	0.000015	0.000014	0.000013	0.000014	0.000016	0.000016	0.000016
POM	0.000167	0.000118	0.000079	0.000055	0.000041	0.000031	0.000025	0.000021	0.000018	0.000016	0.000016	0.000016	0.000018	0.000018	0.000018
Diesel PM	0.001216	0.001072	0.000876	0.000738	0.000651	0.000588	0.000539	0.000499	0.000468	0.000444	0.000426	0.000424	0.000434	0.000434	0.000434
DEOG	0.062395	0.049723	0.032936	0.022268	0.016121	0.01194	0.008885	0.006644	0.004999	0.003792	0.003025	0.002742	0.002759	0.002759	0.002759

Regional Traffic (Annual VMT) and Emissions (Yearly)

Metric Tons per year

	Existing 2013	**2025**	**2040**	**2025 Build**	**2040 Build**
	1,197,741,358	1,349,057,818	1,528,944,016	1,348,999,732	1,529,387,024
HC	72.65	37.16	30.35	37.16	30.36
ROG	64.42	31.80	26.63	31.80	26.64
TOG	83.39	42.12	34.82	42.11	34.83
CO	1,754.98	962.58	655.02	962.53	655.21
NOx	708.80	252.86	148.69	252.85	148.73
CO2	505,678.34	438,115.01	424,795.87	438,096.14	424,918.96
CH4	15.25	8.53	6.67	8.53	6.67
PM10	8.10	3.19	1.74	3.19	1.74
PM2.5	7.67	2.99	1.63	2.99	1.63
Benzene	1.99	0.99	0.83	0.99	0.83
Acrolein	0.09	0.04	0.03	0.04	0.03
Acetaldehyde	1.84	0.84	0.87	0.84	0.87
Formaldehyde	4.27	1.97	1.97	1.97	1.97
Butadiene	0.40	0.20	0.17	0.20	0.17
Naphthalene	0.06	0.03	0.03	0.03	0.03
POM	0.09	0.04	0.03	0.04	0.03
Diesel PM	5.49	1.23	0.76	1.23	0.76
DEOG	21.19	9.40	10.16	9.40	10.16

Regional Traffic (Daily VMT) and Emissions (Daily)

Pounds per day

Pollutant	**Existing 2013**	**2025**	**2040**	**2025 Build**	**2040 Build**
	4,589,047	5,168,804	5,858,023	5,168,581	5,859,720
HC	613.67	313.87	256.35	313.85	256.43
ROG	544.11	268.62	224.95	268.61	225.01
TOG	704.38	355.75	294.08	355.73	294.16
CO	13,447.98	7,376.00	5,019.30	7,375.68	5,020.75
NOx	5,431.38	1,937.60	1,139.34	1,937.51	1,139.67
CO2	1,937.46	1,678.60	1,627.57	1,678.53	1,628.04
CH4	0.06	0.03	0.03	0.03	0.03
PM10	62.07	24.47	13.34	24.46	13.34
PM2.5	58.80	22.89	12.51	22.89	12.52
Benzene	16.82	8.34	7.03	8.34	7.03
Acrolein	0.72	0.35	0.28	0.35	0.28
Acetaldehyde	15.53	7.05	7.35	7.05	7.35
Formaldehyde	36.07	16.63	16.63	16.62	16.64
Butadiene	3.39	1.70	1.39	1.70	1.40
Naphthalene	0.51	0.25	0.23	0.25	0.23
POM	0.79	0.35	0.27	0.35	0.27
Diesel PM	46.41	10.40	6.44	10.40	6.45
DEOG	179.02	79.41	85.80	79.41	85.83

Attachment 3: Health Risk Calculations

Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to TACs requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. OEHHA and CARB recommend methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[17] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[18] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[19] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

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[17] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[18] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[19] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment Guidelines*. December 2016.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors for children is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0). An analysis to determine health risk at area schools has not been performed.

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

	Exposure Type →	**Infant**		**Child**		**Adult**
Parameter	***Age Range →***	**3rd Trimester**	**0<2**	**2 < 9**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		1.0	1.0	1.0	1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults.

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of HI, which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is DPM. For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual PM2.5 Concentrations

While not a TAC, fine particulate matter (PM2.5) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under CEQA. The thresholds of significance for PM2.5 (project level and cumulative) are in terms of an increase in the annual average concentration. When considering PM2.5 impacts, the contribution from all sources of PM2.5 emissions should be included. For projects with potential impacts from nearby local roadways, the PM2.5 impacts should include those from vehicle exhaust emissions, PM2.5 generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Operational Screening Health Risk Assessment

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Alameda
Roadway Direction	East-West
Side of the Roadway	North
Distance from Roadway	40 feet
Annual Average Daily Traffic (ADT)	6,775

Results

Alameda County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.102 ($\mu g/m^3$)

Cancer Risk

5.18 (per million)

Dublin Road Extension

Data for Alameda County based on meteorological data collected from Pleasanton in 2005

Adjusted for EMFAC2014 for 2018

3.56
(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Alameda
Roadway Direction	East-West
Side of the Roadway	North
Distance from Roadway	800 feet
Annual Average Daily Traffic (ADT)	19,145

Results

Alameda County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.034 ($\mu g/m^3$)

Cancer Risk

1.90 (per million)

Dublin Road Extension

Data for Alameda County based on meteorological data collected from Pleasanton in 2005

Adjusted to EMFAC2014 for 2018

1.30
(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Dublin Road Extension (Road Work), Dublin, CA

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Const-Area 1	0.0723	CON1_DPM	144.5	0.04399	5.54E-03	71,606	7.74E-08
2020	Const-Area 2	0.0454	CON2_DPM	90.8	0.02764	3.48E-03	44,995	7.74E-08
2020	Const-Area 3	0.0425	CON1_DPM	85.0	0.02586	3.26E-03	42,094	7.74E-08
2020	Const-Area 4	0.0354	CON2_DPM	70.9	0.02158	2.72E-03	35,124	7.74E-08
2020	Const-Area 5	0.0344	CON1_DPM	68.7	0.02092	2.64E-03	34,050	7.74E-08
2020	Const-Area 6	0.0350	CON2_DPM	69.9	0.02128	2.68E-03	34,636	7.74E-08
2020	Const-Area 7	0.0355	CON1_DPM	71.0	0.02161	2.72E-03	35,173	7.74E-08
2020	Const-Area 8	0.0196	CON2_DPM	39.2	0.01194	1.50E-03	19,429	7.74E-08
		0.3200					317,109	
Total		***0.3200***		***640***	***0.1948***	***0.0245***		
		hr/day =	9	(8am - 5pm)				
		days/yr =	365					
		hours/year =	3285					

Dublin Road Extension (Road Work), Dublin, CA

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Const-Area 1	CON1_FUG	0.2100	420.0	0.12786	1.61E-02	71,606	2.25E-07
2020	Const-Area 2	CON2_FUG	0.1320	263.9	0.08034	1.01E-02	44,995	2.25E-07
2020	Const-Area 3	CON1_FUG	0.1235	246.9	0.07516	9.47E-03	42,094	2.25E-07
2020	Const-Area 4	CON2_FUG	0.1030	206.0	0.06272	7.90E-03	35,124	2.25E-07
2020	Const-Area 5	CON1_FUG	0.0999	199.7	0.06080	7.66E-03	34,050	2.25E-07
2020	Const-Area 6	CON2_FUG	0.1016	203.2	0.06184	7.79E-03	34,636	2.25E-07
2020	Const-Area 7	CON1_FUG	0.1032	206.3	0.06280	7.91E-03	35,173	2.25E-07
2020	Const-Area 8	CON2_FUG	0.0570	114.0	0.03469	4.37E-03	19,429	2.25E-07
			0.9300				317,109	
Total			***0.9300***	***1860.0***	***0.5662***	***0.0713***		
		hr/day =	9	(8am - 5pm)				
		days/yr =	365					
		hours/year =	3285					

Dublin Road Extension (Bridge Work), Dublin, CA

DPM Emissions and Modeling Emission Rates

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Construction	0.1600	CON_DPM	320.0	0.09741	1.23E-02	1,792	6.85E-06

Construction Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension (Bridge Work), Dublin, CA

PM2.5 Fugitive Dust Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Construction	CON_FUG	0.12000	240.0	0.07306	9.21E-03	1,792	5.14E-06

Construction Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension, Dublin, CA - Construction Health Impact Summary

Maximum Impacts at MEI Location - Unmitigated

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Infant/Child	Cancer Risk (per million): Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2020	0.0069	0.0203	**1.1**	**0.02**	**0.001**	**0.03**

Dublin Road Extension, Dublin, CA - Construction Impacts - Without Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

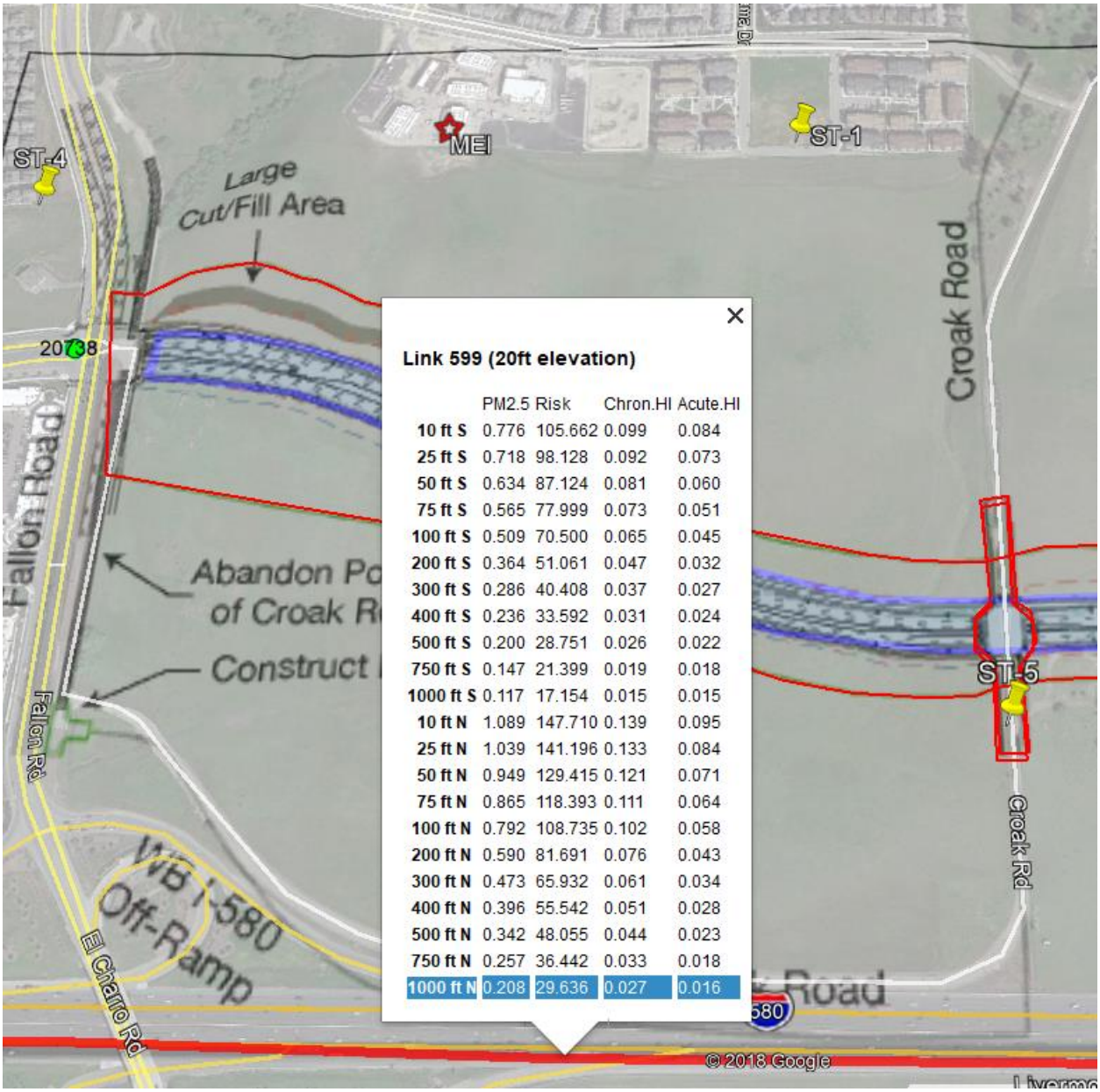
	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information				Maximum	
							Modeled					
Exposure Year	Exposure Duration (years)	Age	DPM Conc (ug/m3) Year	DPM Conc (ug/m3) Annual	Age Sensitivity Factor	Infant/Child Cancer Risk (per million)	DPM Conc (ug/m3) Year	DPM Conc (ug/m3) Annual	Age Sensitivity Factor	Adult Cancer Risk (per million)	Fugitive PM2.5	Total PM2.5
0	0.25	-0.25 - 0*	-	-	10	-	-	-	-	-		
1	1	0 - 1	2020	0.0069	10	1.13	2020	0.0069	1	0.02	0.0203	0.0272
2	1	1 - 2			10	0.00			1	0.00		
3	1	2 - 3			3	0.00			1	0.00		
4	1	3 - 4			3	0.00			1	0.00		
5	1	4 - 5			3	0.00			1	0.00		
6	1	5 - 6			3	0.00			1	0.00		
7	1	6 - 7			3	0.00			1	0.00		
8	1	7 - 8			3	0.00			1	0.00		
9	1	8 - 9			3	0.00			1	0.00		
10	1	9 - 10			3	0.00			1	0.00		
11	1	10 - 11			3	0.00			1	0.00		
12	1	11 - 12			3	0.00			1	0.00		
13	1	12 - 13			3	0.00			1	0.00		
14	1	13 - 14			3	0.00			1	0.00		
15	1	14 - 15			3	0.00			1	0.00		
16	1	15 - 16			3	0.00			1	0.00		
17	1	16-17			1	0.00			1	0.00		
18	1	17-18			1	0.00			1	0.00		
19	1	18-19			1	0.00			1	0.00		
20	1	19-20			1	0.00			1	0.00		
21	1	20-21			1	0.00			1	0.00		
22	1	21-22			1	0.00			1	0.00		
23	1	22-23			1	0.00			1	0.00		
24	1	23-24			1	0.00			1	0.00		
25	1	24-25			1	0.00			1	0.00		
26	1	25-26			1	0.00			1	0.00		
27	1	26-27			1	0.00			1	0.00		
28	1	27-28			1	0.00			1	0.00		
29	1	28-29			1	0.00			1	0.00		
30	1	29-30			1	0.00			1	0.00		
Total Increased Cancer Risk						**1.13**				**0.02**		

* Third trimester of pregnancy



	PM2.5 Risk	Chron.HI	Acute.HI
10 ft S	0.776 105.662	0.099	0.084
25 ft S	0.718 98.128	0.092	0.073
50 ft S	0.634 87.124	0.081	0.060
75 ft S	0.565 77.999	0.073	0.051
100 ft S	0.509 70.500	0.065	0.045
200 ft S	0.364 51.061	0.047	0.032
300 ft S	0.286 40.408	0.037	0.027
400 ft S	0.236 33.592	0.031	0.024
500 ft S	0.200 28.751	0.026	0.022
750 ft S	0.147 21.399	0.019	0.018
1000 ft S	0.117 17.154	0.015	0.015
10 ft N	1.089 147.710	0.139	0.095
25 ft N	1.039 141.196	0.133	0.084
50 ft N	0.949 129.415	0.121	0.071
75 ft N	0.865 118.393	0.111	0.064
100 ft N	0.792 108.735	0.102	0.058
200 ft N	0.590 81.691	0.076	0.043
300 ft N	0.473 65.932	0.061	0.034
400 ft N	0.396 55.542	0.051	0.028
500 ft N	0.342 48.055	0.044	0.023
750 ft N	0.257 36.442	0.033	0.018
1000 ft N	0.208 29.636	0.027	0.016

Adjusted for 2015 OEHHA *1.3744
Adjusted for 2,500 distance using 1,000ft level/2,500
3106165.1