

# ***JAGUAR WAY EXTENSION COMMUNITY RISK ASSESSMENT***

***Windsor, California***

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## Introduction

The purpose of this report is to address the potential construction community risk impacts associated with the construction of the Jaguar Way extension located in Windsor, California. The analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).<sup>1</sup> 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 source of TACs.

## Project Description

The Town of Windsor is proposing a 0.5-mile extension of Jaguar Way to provide east/west connectivity between Starr Road on the west and Windsor Road on the east. The proposed Jaguar Way Extension Project (Project) would introduce two lanes of travel for vehicles (one in each direction) and provide pedestrian and bicycle facilities, as well as street trees, landscaping, bioretention and low impact development (LID) facilities, and ancillary improvements. The Project would also include a bridge overcrossing of Starr Creek. The Town's existing right-of-way for Jaguar Way would be utilized and may require temporary or permanent encroachment onto adjacent properties to accommodate construction. A new three-way intersection would be created at Starr Road and would be stop sign controlled at Jaguar Way. The existing signalized intersection at Windsor Road would be retained and improvements would be limited to the western leg of this intersection. Three options are currently under consideration for the Project:

- Design Option 1: Town Standard. This design is based on the Town's General Plan vision for Jaguar Way and the Town's Street Design Standards, composed of 6 foot wide sidewalks on both sides of the roadway separated by a landscape strip, two 11 foot wide vehicle travel lanes (one in each direction), Class III bicycle routes, and street trees planted within landscape strip which will be used for bioretention.
- Design Option 2: Class II (On-Street) Bicycle Lanes. Design Option 2 provides for one 6 foot wide contiguous sidewalk on the south side of the roadway west of the high school parking lot and a 10 foot wide contiguous sidewalk on the south side of the roadway along the high school parking lot, two 10 foot wide vehicle travel lanes (one in each direction), and two 5 foot wide Class II bicycle lanes (one in each direction).
- Design Option 3: Separated Multi-Use Path. This design introduces an off-street multi-use path to be shared by pedestrian and bicycles. The right-of-way would be comprised of two 11-foot-wide vehicle travel lanes (one in each direction), and curb separated multi-use path containing an 8-foot-wide two-way Class I bicycle lane, a 6-foot-wide sidewalk, a one-foot separator between the bike and pedestrian travel lanes, and a 6 foot wide bioswale along the southside of Jaguar Way.

The construction limits for all three design options would be the same so only one construction community risk assessment was completed for all the design options.

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<sup>1</sup> Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2017.

## Setting

The project is located in Sonoma 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 with the exception of ground-level ozone, respirable particulate matter (PM<sub>10</sub>), and fine particulate matter (PM<sub>2.5</sub>).

### Toxic Air Contaminants

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

### Regulatory Setting

#### *Federal Regulations*

The United States Environmental Protection Agency (EPA) sets nationwide emission standards for mobile sources, which include on-road (highway) motor vehicles such 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.

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<sub>x</sub> and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and because the EPA has identified 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<sub>x</sub> 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.<sup>2</sup>

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<sup>2</sup> USEPA, 2000. *Regulatory Announcement, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. EPA420-F-00-057. December.

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 substantial contributor to the formation of particulate matter in diesel-fueled engine exhaust. The current 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 (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 of 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.<sup>3</sup> 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 a number of 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 PM<sub>2.5</sub> 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<sub>x</sub> 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<sub>x</sub> 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<sub>x</sub>.

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<sup>3</sup> 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)*

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. The District also has permit authority over most types of stationary equipment 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 California Environmental Quality Act (CEQA) *Air Quality Guidelines*<sup>4</sup> 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.

### Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, 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, and elementary schools. The closest sensitive receptors to the project are single-family homes adjacent to the northern boundary of the project site and east of Starr Road. Windsor High School is also adjacent to the project site with the main buildings of the school approximately 200 feet south of the roadway. Note that parks and recreational fields are adjacent to the proposed Jaguar Way extension. While these land uses may have sensitive receptors present at certain times, they are only present temporarily (unlike residences), such that their exposure is limited. Therefore, these land uses were not considered as sensitive receptors.

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<sup>4</sup> Bay Area Air Quality Management District, 2017. *CEQA Air Quality Guidelines*. May.

## Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA and these significance thresholds were contained in the District's 2011 *CEQA Air Quality Guidelines*. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA. The thresholds were challenged through a series of court challenges and were mostly upheld. BAAQMD updated the *CEQA Air Quality Guidelines* in 2017 to include the latest significance thresholds that were used in this analysis are summarized in Table 1.

**Table 1. Community Risk 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 <sub>x</sub>	54	54	10
PM <sub>10</sub>	82 (Exhaust)	82	15
PM <sub>2.5</sub>	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 per one million	>100 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual PM <sub>2.5</sub>	>0.3 µg/m <sup>3</sup>	>0.8 µg/m <sup>3</sup>	
Note: ROG = reactive organic gases, NO <sub>x</sub> = nitrogen oxides, PM <sub>10</sub> = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, PM <sub>2.5</sub> = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less.			

## Air Quality Impacts and Mitigation Measures

Project impacts related to increased community risk can occur either by generating emissions of TACs and air pollutants during construction and operation or by introducing a new sensitive receptor, such as a residential use, in proximity to an existing source of TACs. In the case for this project, construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors. A construction community health risk assessment was prepared to address project construction impacts on the surrounding off-site sensitive receptors. A cumulative community risk assessment was not included because no stationary sources were identified within the 1,000 feet of the project site using the BAAQMD's *Permitted Stationary Sources 2017* GIS website nor do any of the nearby roadways (i.e. Windsor Road and Starr Road) have an average daily traffic volume (ADT) that exceeds 10,000 vehicles per day based on future plus project traffic volumes completed by the traffic consultant.<sup>5</sup> Operational emissions from the proposed roadway extension are addressed qualitatively.

### Construction-Related Community Risks

Community risk impacts are addressed by predicting increased lifetime cancer risk, the increase in annual PM<sub>2.5</sub> concentrations and computing the Hazard Index (HI) for non-cancer health risks. Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. These exhaust emissions pose health risks for sensitive receptors such as surrounding residents. The primary community risk impact issues associated with construction emissions are cancer risk and exposure to PM<sub>2.5</sub>. A health risk assessment of the project construction activities was conducted that evaluated potential health effects to nearby sensitive receptors from construction emissions of DPM and PM<sub>2.5</sub>.<sup>6</sup> This assessment included dispersion modeling to predict the offsite and onsite concentrations resulting from project construction, so that lifetime cancer risks and non-cancer health effects could be evaluated. The methodology for computing community risks impacts is contained in *Attachment 1*.

### *Road Construction Emissions Model (RCEM)*

Average daily construction exhaust emissions were predicted using the Sacramento Metropolitan Air Quality Management District Road Construction Emissions Model (RCEM), version 9.0.0, April 2018. The BAAQMD CEQA Guidelines recommend the use of RCEM to analyze construction emissions for transportation projects. The model predicts emissions of ozone precursor pollutants (i.e., ROG and NO<sub>x</sub>) and particulate matter (i.e., PM<sub>10</sub> and PM<sub>2.5</sub>). The model also computes emissions of CO<sub>2e</sub>.

Based on project construction details provided by the project applicant, construction of Jaguar Way is expected to take a maximum of 24 months with the presumption that construction would begin in 2020 at the earliest and be complete in 2022. However, the exact construction schedule and equipment list are unknown at the time of this analysis; therefore, RCEM defaults were used. The defaults included a default construction schedule based on a 24-month period, default

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<sup>5</sup> W-Trans, Appendix A: Jaguar Way Extension. Received September 12, 2019.

<sup>6</sup> DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

equipment per phase, and default equipment usage which assumed all equipment would be operating for eight hours a day. Other model inputs such as concrete truck trips, and asphalt truck trips were provided by the project applicant and are listed in Table 2. Note that for this analysis that the earthwork and hauling volume information for Design Option 2 was used due to having the largest volumes out of the three design options. Additionally, the construction of the roadway would result in the removal of up to 90 mature trees. To account for this activity, an aerial lift, off-highway truck, and a rubber-tired dozer were included to characterize the project tree removal activity.

**Table 2. Jaguar Way Earthwork and Hauling Volumes for Each Design Option**

Type	Design Option 1	Design Option 2	Design Option 3
Cut (Cubic Yards)	3,800	4,800	3,600
Fill (Cubic Yards)	400	400	350
Net (Cubic Yards)	3,400 cut	4,400 cut	3,250 cut
Asphalt Concrete (AC)*	1,550 tons or 800 cy	2,100 tons or 1080 cy	1,500 tons or 775 cy
Removal of Existing Roadway	300 cubic yards or 580 tons hauled away (does not include the removal of the existing aggregate base)		

\*All AC estimates are based on assumed sections of 4" AC over 16" of aggregate base.

The RCEM model provided the total PM<sub>10</sub> exhaust emissions (assumed to be DPM) for the off-road construction equipment and for exhaust emissions from on-road vehicles, with total emissions from all construction stages as 0.5167 tons (1,033 pounds). Fugitive PM<sub>2.5</sub> dust emissions were calculated by the RCEM model as 0.9335 tons (1,867 pounds) for the overall construction period. Since the RCEM model does not provide annual emissions (based on the total construction period), the total exhaust and fugitive PM<sub>2.5</sub> emissions were divided in half to align with the proposed two-year construction schedule (2020-2021).

### *Dispersion Modeling*

The U.S. EPA AERMOD dispersion model was used to predict DPM and PM<sub>2.5</sub> concentrations at sensitive receptors (residences) in the vicinity of the project construction area. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.<sup>7</sup> Emission sources for the construction site were grouped into two categories: exhaust emissions of DPM and fugitive PM<sub>2.5</sub> dust emissions. Combustion equipment exhaust emissions were modeled as a series of point sources with a nine-foot release height (construction equipment exhaust stack height) placed at 10-meter (33-foot) intervals throughout the construction site. This resulted in 169 individual point sources being used to represent mobile equipment DPM exhaust emissions in the construction area, with DPM emissions occurring throughout the project construction site. The locations of the point sources used for the modeling and the buildings that were evaluated for potential downwash effects are identified in Figure 1. Emissions from vehicle travel on- and off-site were distributed among the point sources throughout the site. Construction fugitive PM<sub>2.5</sub> dust emissions were modeled as an area source encompassing the entire construction site with a near ground level release height of two meters. Construction emissions were modeled as occurring daily between 7 a.m. to 7 p.m., which are the

<sup>7</sup> Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0*. May.



Town of Windsor's construction hours limits for weekday activity per Town Municipal Code Section 7-1-190.

The modeling used a 5-year meteorological data set (2009-2013) from the Sonoma County Airport prepared for use with the AERMOD model by CARB. Annual DPM and PM<sub>2.5</sub> concentrations from construction activities at the project site during the January 2020 to January 2021 period were calculated using the model. DPM and PM<sub>2.5</sub> concentrations were calculated at nearby sensitive receptor locations. A receptor height of 1.5 meters (4.9 feet) was used to represent the breathing height of residences in nearby single-family homes and of the students at Windsor High School.

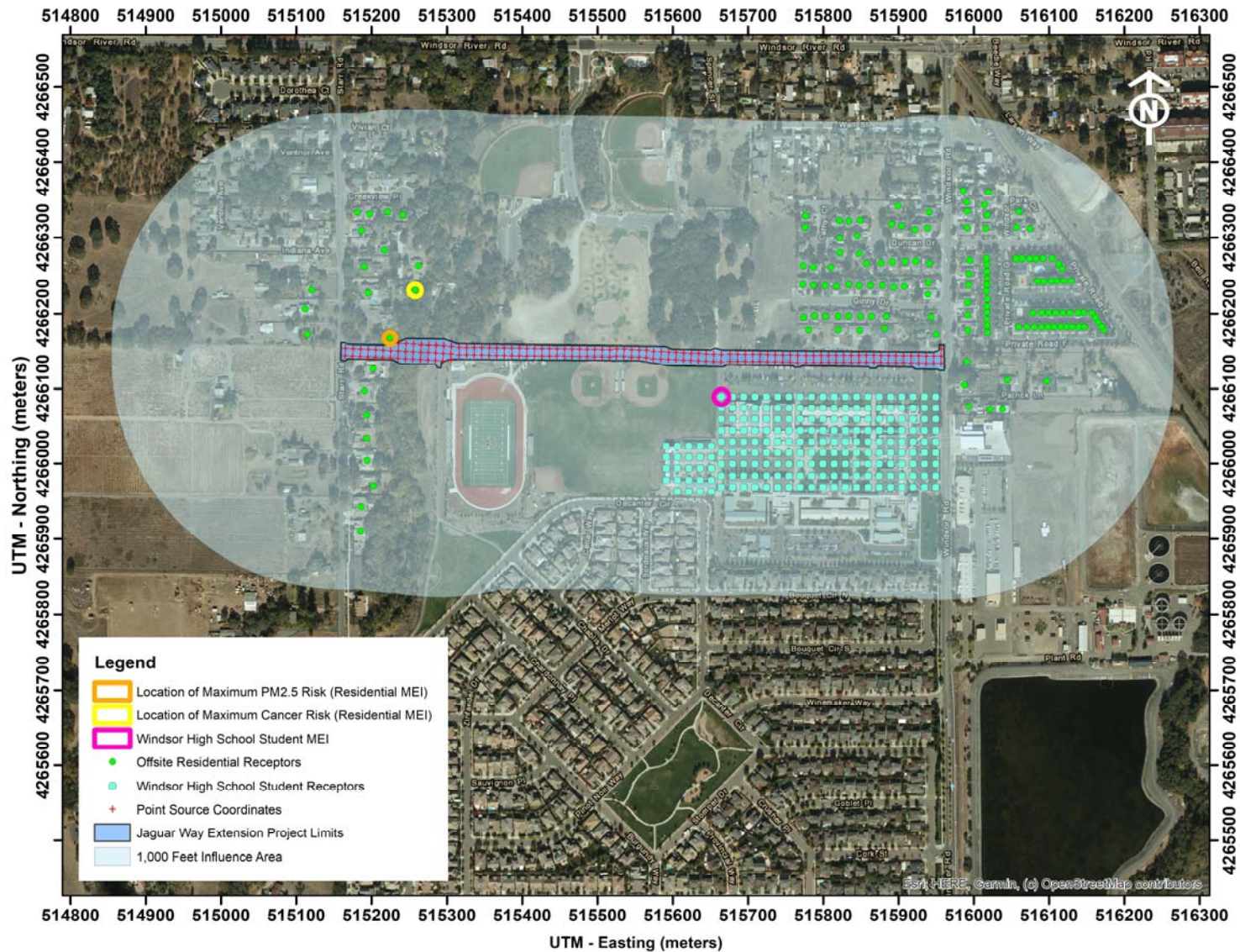
The maximum-modeled annual DPM and PM<sub>2.5</sub> concentrations, which includes both the DPM and fugitive PM<sub>2.5</sub> concentrations, were identified at nearby sensitive receptors (as shown in Figure 1) to find the maximally exposed individuals (MEIs). The maximum increased cancer risks were calculated using BAAQMD recommended methods and exposure parameters described in *Attachment 1*. Non-cancer health hazards and maximum PM<sub>2.5</sub> concentrations were also calculated and identified. *Attachment 3* to this report includes the emission calculations used for the construction area source modeling and the cancer risk calculations.

#### *Construction-Related Community Risk Results*

Results of this assessment indicated that the residential construction MEIs were located at single-family homes in the western portion of the project site, north of Jaguar Way and east of Starr Road, as seen in Figure 1. At these locations, the maximum excess residential cancer risks would exceed the BAAQMD significance threshold of 10 in one million and the maximum PM<sub>2.5</sub> concentrations would exceed the BAAQMD significance threshold of 0.3 µg/m<sup>3</sup>. Table 2 summarizes the maximum cancer risks, PM<sub>2.5</sub> concentrations, and health hazard index value for project related construction activities affecting the residential MEI. *Mitigation Measures AQ-1 and AQ-2 would reduce these impacts to a level of less-than-significant.*

Additionally, modeling was conducted to predict the cancer risks, non-cancer health hazards, and maximum PM<sub>2.5</sub> that would potentially affect the high school students at Windsor High School. It was assumed that students' ages ranged from 13-years-old to 18-years-old. Results of this assessment indicated that the maximum cancer risks (without any mitigation or construction emission controls) would be 2.4 per million for child exposure. The maximum-modeled annual PM<sub>2.5</sub> concentration, which is based on combined exhausted and fugitive dust emissions, would be 0.18 µg/m<sup>3</sup> and the maximum computed Hazard Index (HI) based on the DPM concentration would be 0.01. These risk values do not exceed the BAAQMD single-source significance threshold for annual cancer risk, PM<sub>2.5</sub> concentration, or HI.

**Figure 1. Project Construction Site, Locations of Modeled Construction Equipment Exhaust Stacks (Point Sources), Locations of Off-Site Sensitive Receptors and TAC Impact, and 1,000 Foot Influence Area**



**Table 2. Construction Risk Impacts at the Offsite MEI**

Source	Cancer Risk (per million)		Annual PM <sub>2.5</sub> (µg/m <sup>3</sup> )		Hazard Index	
	Residential	Students	Residential	Student	Residential	Student
Project Construction						
Unmitigated	<b>34.3 (infant)</b>	6.3 (child)	<b>0.86</b>	0.18	0.02	0.01
Mitigated	5.1 (Infant)	-	0.26	-	<0.01	-
<b>BAAQMD Single-Source Threshold</b>	<b>&gt;10.0</b>		<b>&gt;0.3</b>		<b>&gt;1.0</b>	
<i>Exceed Threshold?</i>						
Unmitigated	<b>Yes</b>	<i>No</i>	<b>Yes</b>	<i>No</i>	<i>No</i>	<i>No</i>
Mitigated	<b>No</b>	<i>No</i>	<b>No</b>	<i>No</i>	<i>No</i>	<i>No</i>

### Operational-Related Community Risks

The proposed Jaguar Way extension would add approximately 230 daily vehicle trips to the roadway. Per BAAQMD, surface streets that have ADTs less than 10,000 vehicles per day would have minor impacts and would not pose a significant health impact to nearby sensitive receptors. Therefore, the proposed roadway extension would not have community risk values that exceed the BAAQMD single-source threshold for cancer risk, PM<sub>2.5</sub> concentration, nor HI value.

### Combined Community Risks

The project site is not located within 1,000 feet of any substantial sources of TACs or PM<sub>2.5</sub> that could contribute to adverse community risk impacts. There are no permitted air pollutant sources or roadways within 1,000 feet of the project site. Construction impacts identified above are the only source of community risk.

### ***Mitigation Measure AQ-1: Include 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. Additional measures are identified to reduce construction equipment exhaust emissions. 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. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
9. All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.

#### *Effectiveness of Mitigation Measure AQ-1*

The measures above are consistent with BAAQMD-recommended basic control measures for reducing fugitive particulate matter that are contained in the BAAQMD CEQA Air Quality Guidelines. Implementation of *Mitigation Measure AQ-1* is considered to reduce exhaust emissions by 5 percent and fugitive dust emissions by over 50 to 90 percent. For this assessment, a minimum 50-percent reduction was assumed. Note that the RCEM model only accounts for basic fugitive dust control practices, such as watering, and does not include enhanced best management practices. With the enhanced control measures, fugitive PM<sub>2.5</sub> would be reduced by 65% or greater. This reduction was accounted post-model.

***Mitigation Measure AQ-2: Selection of equipment during construction to minimize emissions. Such equipment selection would include the following:***

The project shall develop a plan demonstrating that the off-road equipment used onsite to construct the project would achieve a fleet-wide average 75-percent reduction in DPM exhaust emissions or greater. One feasible plan to achieve this reduction would include the following:

1. All diesel-powered off-road equipment, larger than 25 horsepower, operating on the site for more than two days continuously shall meet U.S. EPA Tier 4 particulate matter emissions standards. Alternatively, the following types of equipment would also meet this requirement: Tier 3 engines that include CARB-certified Level 3 Diesel Particulate Filters<sup>8</sup> (or equivalent), or the use of equipment that is electrically powered or uses non-diesel fuels.
2. Temporary line power shall be available to minimize use of portable diesel-powered equipment.

***Effectiveness of Mitigation Measure AQ-2***

Project construction activities were analyzed with the assumption of equipment meeting U.S. EPA Tier 4 standards for particulate matter emissions. Use of equipment that meets Tier 3 standards equipped with level 3 diesel particulate matter filters would produce similar results. With implementation of this mitigation, the computed maximum increased lifetime residential cancer risk from construction, assuming infant exposure, would be 5.1 in one million or less. The combination of Mitigation Measure AQ-1 and AQ-2 would reduce exhaust and fugitive PM<sub>2.5</sub> emissions by over 75 percent, reducing the maximum annual PM<sub>2.5</sub> concentration would to 0.26 µg/m<sup>3</sup>. As a result, impacts would be reduced to *less-than-significant* with respect to community risk caused by construction activities.

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<sup>8</sup> See <http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>

## **Supporting Documentation**

*Attachment 1* is the methodology used to compute community risk impacts, including the methods to compute lifetime cancer risk from exposure to project emissions.

*Attachment 2* includes the RCEM model outputs.

*Attachment 3* is the construction health risk assessment. AERMOD dispersion modeling files for this assessment, which are quite voluminous, are available upon request and would be provided in digital format

## Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (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. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.<sup>9</sup> 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.<sup>10</sup> This HRA used the 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.<sup>11</sup> 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 and duration of exposure. 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 for residential exposures, 95<sup>th</sup> percentile breathing rates are used for the third trimester and infant exposures, and 80<sup>th</sup> percentile breathing rates for child and adult exposures. For children at schools and daycare facilities, BAAQMD recommends using the 95<sup>th</sup> percentile breathing rates. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of

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<sup>9</sup> 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.

<sup>10</sup> CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

<sup>11</sup> BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.



30 years for sources with long-term emissions (e.g., roadways). For workers, assumed to be adults, a 25-year exposure period is recommended by the BAAQMD.

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 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).

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

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

Where:

CPF = Cancer potency factor (mg/kg-day)<sup>-1</sup>

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)

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

Where:

C<sub>air</sub> = concentration in air (µg/m<sup>3</sup>)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

10<sup>-6</sup> = Conversion factor

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

Parameter	Exposure Type →	Infant		Child		Adult
	Age Range →	3 <sup>rd</sup> Trimester	0<2	2 < 9	2 < 16	16 - 30
DPM Cancer Potency Factor (mg/kg-day) <sup>-1</sup>		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day) 80 <sup>th</sup> Percentile Rate		273	758	631	572	261
Daily Breathing Rate (L/kg-day) 95 <sup>th</sup> Percentile Rate		361	1,090	861	745	335
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		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73



## Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (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 diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).

## Annual PM<sub>2.5</sub> Concentrations

While not a TAC, fine particulate matter (PM<sub>2.5</sub>) 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 the California Environmental Quality Act (CEQA). The thresholds of significance for PM<sub>2.5</sub> (project level and cumulative) are in terms of an increase in the annual average concentration. When considering PM<sub>2.5</sub> impacts, the contribution from all sources of PM<sub>2.5</sub> emissions should be included. For projects with potential impacts from nearby local roadways, the PM<sub>2.5</sub> impacts should include those from vehicle exhaust emissions, PM<sub>2.5</sub> generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

## **Attachment 2: RCEM Modeling Output**



Data Entry Worksheet

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		2.40		1/1/2020
Grading/Excavation		10.80		3/14/2020
Drainage/Utilities/Sub-Grade		7.20		2/6/2021
Paving		3.60		9/13/2021
Totals (Months)	24			

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

Soil Hauling Emissions	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	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		1	30.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling 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	0.03	0.08	0.50	0.02	0.01	0.00	124.90	0.00	0.02	130.79
Tons per const. Period - Grading/Excavation	0.00	0.01	0.06	0.00	0.00	0.00	14.84	0.00	0.00	15.54
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	0.00	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	0.00	0.01	0.06	0.00	0.00	0.00	14.84	0.00	0.00	15.54

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions		User Override of	Program Estimate of	User Override of Truck	Default Values	Calculated
User Input	Miles/Round Trip	Miles/Round Trip	Round Trips/Day	Round Trips/Day	Daily VMT	
Miles/round trip: Grubbing/Land Clearing		30.00		1	30.00	
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		30.00		1	30.00	

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.03	0.09	0.51	0.02	0.01	0.00	125.14	0.00	0.02	131.04
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.01	0.00	0.00	0.00	3.30	0.00	0.00	3.46
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	0.03	0.08	0.44	0.01	0.01	0.00	123.00	0.00	0.02	128.80
Tons per const. Period - Paving	0.00	0.00	0.02	0.00	0.00	0.00	4.87	0.00	0.00	5.10
Total tons per construction project	0.00	0.01	0.03	0.00	0.00	0.00	8.17	0.00	0.00	8.56

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions		User Override of Worker								
User Input	Commute Default Values		Default Values							
Miles/ one-way trip		20		Calculated						
One-way trips/day		2		Daily Trips	Calculated					
					Daily VMT					
No. of employees: Grubbing/Land Clearing		4		8	160.00					
No. of employees: Grading/Excavation		17		34	680.00					
No. of employees: Drainage/Utilities/Sub-Grade		14		28	560.00					
No. of employees: Paving		10		20	400.00					
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	1.22	0.11	0.05	0.02	0.00	350.90	0.01	0.01	353.67
Grading/Excavation (grams/mile)	0.02	1.21	0.11	0.05	0.02	0.00	349.67	0.01	0.01	352.40
Draining/Utilities/Sub-Grade (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Paving (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Grubbing/Land Clearing (grams/trip)	1.25	3.05	0.37	0.00	0.00	0.00	75.08	0.09	0.04	88.34
Grading/Excavation (grams/trip)	1.24	3.04	0.37	0.00	0.00	0.00	74.83	0.09	0.04	88.01
Draining/Utilities/Sub-Grade (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Paving (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.03	0.48	0.05	0.02	0.01	0.00	125.10	0.00	0.00	126.31
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	3.30	0.00	0.00	3.33

Pounds per day - Grading/Excavation	0.13	2.04	0.19	0.07	0.03	0.01	529.81	0.01	0.02	534.90
Tons per const. Period - Grading/Excavation	0.02	0.24	0.02	0.01	0.00	0.00	62.94	0.00	0.00	63.55
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.54	0.14	0.06	0.02	0.00	424.00	0.01	0.01	427.85
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.12	0.01	0.00	0.00	0.00	33.58	0.00	0.00	33.89
Pounds per day - Paving	0.07	1.10	0.10	0.04	0.02	0.00	302.86	0.01	0.01	305.60
Tons per const. Period - Paving	0.00	0.04	0.00	0.00	0.00	0.00	11.99	0.00	0.00	12.10
Total tons per construction project	0.03	0.42	0.04	0.01	0.01	0.00	111.82	0.00	0.00	112.87

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions										
User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT		
Grubbing/Land Clearing - Exhaust		0		5	0		8.00	0.00		
Grading/Excavation - Exhaust		0		5	0		8.00	0.00		
Drainage/Utilities/Subgrade		0		5	0		8.00	0.00		
Paving		0		5	0		8.00	0.00		
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Fugitive dust default values can be overridden in cells D183 through D185.

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		0.50	10.00	0.26	2.08	0.05
Fugitive Dust - Grading/Excavation		0.50	10.00	1.19	2.08	0.25
Fugitive Dust - Drainage/Utilities/Subgrade		0.50	10.00	0.79	2.08	0.16



Off-Road Equipment Emissions																		
Grubbing/Land Clearing	Default		Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e			
	Number of Vehicles	Override of																
	Default	Default	Equipment Tier	Type														
Override of Default Number of Vehicles		Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day			
1.00					Model Default Tier	Aerial Lifts	0.04	1.09	0.64	0.01	0.01	0.00	162.62	0.05	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			
					Model Default Tier	Bore/Drill Rigs	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			
					Model Default Tier	Concrete/Industrial Saws	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			
		1			Model Default Tier	Crawler Tractors	0.58	2.50	7.45	0.28	0.26	0.01	760.39	0.25	0.01			
					Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		1			Model Default Tier	Excavators	0.25	3.27	2.41	0.12	0.11	0.01	500.12	0.16	0.00			
					Model Default Tier	Forklifts	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			
					Model Default Tier	Graders	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			
1.00					Model Default Tier	Off-Highway Trucks	0.66	3.81	6.32	0.23	0.21	0.01	1,278.62	0.41	0.01			
					Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Other Material Handling Equiprr	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			
					Model Default Tier	Paving Equipment	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			
					Model Default Tier	Pressure Washers	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			
					Model Default Tier	Rollers	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			
1.00					Model Default Tier	Rubber Tired Dozers	1.08	4.13	11.33	0.55	0.51	0.01	827.34	0.27	0.01			
					Model Default Tier	Rubber Tired Loaders	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			
		1			Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00			
					Model Default Tier	Skid Steer Loaders	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			
					Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Trenchers	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			
User-Defined Off-road Equipment																		
Number of Vehicles		If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab				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						N/A		0	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						N/A		0	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						N/A		0	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	
						N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
						Grubbing/Land Clearing	pounds per day		2.66	15.10	28.52	1.21	1.12	0.04	3,578.41	1.15	0.03	3,616.68
						Grubbing/Land Clearing	tons per phase		0.07	0.40	0.75	0.03	0.03	0.00	94.47	0.03	0.00	95.48
Grading/Excavation																		
Grading/Excavation	Default		Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e			
	Number of Vehicles	Override of																
	Default	Default	Equipment Tier	Type														
Override of Default Number of Vehicles		Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/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			
					Model Default Tier	Air Compressors	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			
					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			
					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			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		1			Model Default Tier	Crawler Tractors	0.58	2.49	7.39	0.28	0.26	0.01	760.39	0.25	0.01			
					Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		3			Model Default Tier	Excavators	0.73	9.80	7.15	0.35	0.32	0.02	1,500.38	0.49	0.01			
					Model Default Tier	Forklifts	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			
		1			Model Default Tier	Graders	0.47	1.81	6.28	0.20	0.18	0.01	642.60	0.21	0.01			
					Model Default Tier	Off-Highway Tractors	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			
					Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
					Model Default Tier	Other Material Handling Equiprr	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			
					Model Default Tier	Paving Equipment	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			
					Model Default Tier	Pressure Washers	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			
		2			Model Default Tier	Rollers	0.41	3.78	4.13	0.26	0.24	0.01	508.14	0.16	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			
					Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		1			Model Default Tier	Rubber Tired Loaders	0.37	1.63	4.35	0.14	0.13	0.01	605.17	0.20	0.01			
		2			Model Default Tier	Scrapers	1.97	14.82	23.27	0.91	0.83	0.03	2,934.23	0.95	0.03			
		1			Model Default Tier													

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	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	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	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	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	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	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	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	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	0.00
			Grading/Excavation	pounds per day	5.00	39.19	57.10	2.41	2.22	0.08	7,601.79	2.45	0.07	7,683.45
			Grading/Excavation	tons per phase	0.59	4.66	6.78	0.29	0.26	0.01	903.09	0.29	0.01	912.79

Drainage/Utilities/Subgrade		Default Number of Vehicles	Mitigation Option Override of	Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
		Override of Default Number of Vehicles	Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
					Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1			Model Default Tier	Air Compressors	0.29	2.42	2.04	0.13	0.13	0.00	375.26	0.03
					Model Default Tier	Bore/Drill Rigs	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
					Model Default Tier	Concrete/Industrial Saws	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
					Model Default Tier	Crawler Tractors	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
					Model Default Tier	Excavators	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
		1			Model Default Tier	Generator Sets	0.36	3.68	3.17	0.17	0.17	0.01	623.04	0.03
		1			Model Default Tier	Graders	0.45	1.77	5.92	0.19	0.17	0.01	641.68	0.21
					Model Default Tier	Off-Highway Tractors	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
					Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Model Default Tier	Other General Industrial Equipmn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Model Default Tier	Other Material Handling Equiprr	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
					Model Default Tier	Paving Equipment	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
					Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1			Model Default Tier	Pumps	0.38	3.74	3.21	0.18	0.18	0.01	623.04	0.03
					Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1			Model Default Tier	Rough Terrain Forklifts	0.12	2.29	1.61	0.06	0.06	0.00	333.77	0.11
					Model Default Tier	Rubber Tired Dozers	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
		2			Model Default Tier	Scrapers	1.86	14.01	21.41	0.83	0.77	0.03	2,935.83	0.95
		1			Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01
					Model Default Tier	Skid Steer Loaders	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
					Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2			Model Default Tier	Tractors/Loaders/Backhoes	0.37	4.52	3.79	0.22	0.21	0.01	601.80	0.19
					Model Default Tier	Trenchers	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

User-Defined Off-road Equipment		If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
		Number of Vehicles	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	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
		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
			Drainage/Utilities/Sub-Grade	pounds per day	3.94	32.95	41.76	1.80	1.70	0.07	6,218.21	1.56	0.05	6,273.19
			Drainage/Utilities/Sub-Grade	tons per phase	0.31	2.61	3.31	0.14	0.13	0.01	492.48	0.12	0.00	496.84

Paving		Default Number of Vehicles	Mitigation Option Override of	Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
		Override of Default Number of Vehicles	Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
					Model Default Tier	Aerial Lifts	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
					Model Default Tier	Bore/Drill Rigs	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
					Model Default Tier	Concrete/Industrial Saws	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
					Model Default Tier	Crawler Tractors	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
					Model Default Tier	Excavators	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
					Model Default Tier	Generator Sets	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
					Model Default Tier	Off-Highway Tractors	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
					Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Model Default Tier	Other General Industrial Equipmn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Model Default Tier	Other Material Handling Equiprr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1			Model Default Tier	Pavers	0.25	2.90	2.60	0.13	0.12	0.00	455.06	0.15
		1			Model Default Tier	Paving Equipment	0.19	2.54	1.94	0.10	0.09	0.00	394.46	0.13
					Model Default Tier	Plate Compactors	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
					Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		3			Model Default Tier	Rollers	0.57	5.64	5.77	0.35	0.32	0.01	762.27	0.25
					Model Default Tier	Rough Terrain Forklifts	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
					Model Default Tier	Rubber Tired Loaders	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
		1			Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01
					Model Default Tier	Skid Steer Loaders	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



			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	0.00
	2		Model Default Tier	Tractors/Loaders/Backhoes	0.37	4.52	3.79	0.22	0.21	0.01	601.80	0.19	0.01	608.28	0.00
			Model Default Tier	Trenchers	0.00	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	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	
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	
				Paving	pounds per day	1.44	15.91	14.46	0.81	0.75	0.02	2,262.90	0.72	0.02	2,287.00
				Paving	tons per phase	0.06	0.63	0.57	0.03	0.03	0.00	89.61	0.03	0.00	90.57
Total Emissions all Phases (tons per construction period) =>					1.03	8.29	11.42	0.49	0.46	0.02	1,579.66	0.47	0.01	1,595.68	

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

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		221		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		231		8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89		8
Generator Sets		84		8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130		8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET

# Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Jaguar Way Extension - Mitigated																																																						
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	1.27	22.11	4.99	5.19	0.19	5.00	1.20	0.16	1.04	0.04	3,995.50	1.15	0.08	4,048.75																																								
Grading/Excavation	2.63	50.37	6.64	5.37	0.37	5.00	1.34	0.30	1.04	0.09	8,423.04	2.47	0.13	8,523.53																																								
Drainage/Utilities/Sub-Grade	2.04	40.05	5.25	5.31	0.31	5.00	1.29	0.25	1.04	0.07	6,806.22	1.57	0.09	6,872.77																																								
Paving	0.86	19.10	3.01	0.17	0.17	0.00	0.13	0.13	0.00	0.03	2,852.77	0.73	0.07	2,893.13																																								
Maximum (pounds/day)	2.63	50.37	6.64	5.37	0.37	5.00	1.34	0.30	1.04	0.09	8,423.04	2.47	0.13	8,523.53																																								
Total (tons/construction project)	0.54	10.50	1.46	1.20	0.08	1.12	0.30	0.06	0.23	0.02	1,758.16	0.48	0.03	1,778.37																																								
<div>Notes:</div> <div>Project Start Year -&gt; 2020</div> <div>Project Length (months) -&gt; 24</div> <div>Total Project Area (acres) -&gt; 4</div> <div>Maximum Area Disturbed/Day (acres) -&gt; 1</div> <div>Water Truck Used? -&gt; Yes</div> <table><tr><th colspan="2">Total Material Imported/Exported Volume (yd³/day)</th><th colspan="4">Daily VMT (miles/day)</th></tr><tr><th>Soil</th><th>Asphalt</th><th>Soil Hauling</th><th>Asphalt Hauling</th><th>Worker Commute</th><th>Water Truck</th></tr><tr><td>Grubbing/Land Clearing</td><td>0</td><td>6</td><td>0</td><td>30</td><td>160</td><td>40</td></tr><tr><td>Grading/Excavation</td><td>14</td><td>0</td><td>30</td><td>0</td><td>680</td><td>40</td></tr><tr><td>Drainage/Utilities/Sub-Grade</td><td>0</td><td>0</td><td>0</td><td>0</td><td>560</td><td>40</td></tr><tr><td>Paving</td><td>0</td><td>14</td><td>0</td><td>30</td><td>400</td><td>40</td></tr></table>															Total Material Imported/Exported Volume (yd³/day)		Daily VMT (miles/day)				Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck	Grubbing/Land Clearing	0	6	0	30	160	40	Grading/Excavation	14	0	30	0	680	40	Drainage/Utilities/Sub-Grade	0	0	0	0	560	40	Paving	0	14	0	30	400	40
															Total Material Imported/Exported Volume (yd³/day)		Daily VMT (miles/day)																																					
															Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck																																		
															Grubbing/Land Clearing	0	6	0	30	160	40																																	
															Grading/Excavation	14	0	30	0	680	40																																	
															Drainage/Utilities/Sub-Grade	0	0	0	0	560	40																																	
															Paving	0	14	0	30	400	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 -> Jaguar Way Extension - Mitigated																																																						
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	0.03	0.58	0.13	0.14	0.01	0.13	0.03	0.00	0.03	0.00	105.48	0.03	0.00	96.97																																								
Grading/Excavation	0.31	5.98	0.79	0.64	0.04	0.59	0.16	0.04	0.12	0.01	1,000.66	0.29	0.02	918.62																																								
Drainage/Utilities/Sub-Grade	0.16	3.17	0.42	0.42	0.02	0.40	0.10	0.02	0.08	0.01	539.05	0.12	0.01	493.81																																								
Paving	0.03	0.76	0.12	0.01	0.01	0.00	0.01	0.01	0.00	0.00	112.97	0.03	0.00	103.94																																								
Maximum (tons/phase)	0.31	5.98	0.79	0.64	0.04	0.59	0.16	0.04	0.12	0.01	1000.66	0.29	0.02	918.62																																								
Total (tons/construction project)	0.54	10.50	1.46	1.20	0.08	1.12	0.30	0.06	0.23	0.02	1758.16	0.48	0.03	1,613.33																																								
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.																																																						

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		2.40		1/1/2020
Grading/Excavation		10.80		3/14/2020
Drainage/Utilities/Sub-Grade		7.20		2/6/2021
Paving		3.60		9/13/2021
Totals (Months)	24			

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

Soil Hauling Emissions		User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	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		1	30.00	
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00	
Miles/round trip: Paving		30.00		0	0.00	

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling 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	0.03	0.08	0.50	0.02	0.01	0.00	124.90	0.00	0.02	130.79
Tons per const. Period - Grading/Excavation	0.00	0.01	0.06	0.00	0.00	0.00	14.84	0.00	0.00	15.54
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	0.00	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	0.00	0.01	0.06	0.00	0.00	0.00	14.84	0.00	0.00	15.54

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions		User Override of	Program Estimate of	User Override of Truck	Default Values	Calculated
User Input	Miles/Round Trip	Miles/Round Trip	Round Trips/Day	Round Trips/Day	Daily VMT	
Miles/round trip: Grubbing/Land Clearing		30.00		1	30.00	
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		30.00		1	30.00	

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.03	0.09	0.51	0.02	0.01	0.00	125.14	0.00	0.02	131.04
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.01	0.00	0.00	0.00	3.30	0.00	0.00	3.46
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	0.03	0.08	0.44	0.01	0.01	0.00	123.00	0.00	0.02	128.80
Tons per const. Period - Paving	0.00	0.00	0.02	0.00	0.00	0.00	4.87	0.00	0.00	5.10
Total tons per construction project	0.00	0.01	0.03	0.00	0.00	0.00	8.17	0.00	0.00	8.56

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions		User Override of Worker									
User Input		Commute Default Values		Default Values							
Miles/ one-way trip			20		Calculated		Calculated				
One-way trips/day			2		Daily Trips		Daily VMT				
No. of employees: Grubbing/Land Clearing			4		8		160.00				
No. of employees: Grading/Excavation			17		34		680.00				
No. of employees: Drainage/Utilities/Sub-Grade			14		28		560.00				
No. of employees: Paving			10		20		400.00				
Emission Rates		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)		0.02	1.22	0.11	0.05	0.02	0.00	350.90	0.01	0.01	353.67
Grading/Excavation (grams/mile)		0.02	1.21	0.11	0.05	0.02	0.00	349.67	0.01	0.01	352.40
Draining/Utilities/Sub-Grade (grams/mile)		0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Paving (grams/mile)		0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Grubbing/Land Clearing (grams/trip)		1.25	3.05	0.37	0.00	0.00	0.00	75.08	0.09	0.04	88.34
Grading/Excavation (grams/trip)		1.24	3.04	0.37	0.00	0.00	0.00	74.83	0.09	0.04	88.01
Draining/Utilities/Sub-Grade (grams/trip)		1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Paving (grams/trip)		1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Emissions		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing		0.03	0.48	0.05	0.02	0.01	0.00	125.10	0.00	0.00	126.31
Tons per const. Period - Grubbing/Land Clearing		0.00	0.01	0.00	0.00	0.00	0.00	3.30	0.00	0.00	3.33

Pounds per day - Grading/Excavation	0.13	2.04	0.19	0.07	0.03	0.01	529.81	0.01	0.02	534.90
Tons per const. Period - Grading/Excavation	0.02	0.24	0.02	0.01	0.00	0.00	62.94	0.00	0.00	63.55
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.54	0.14	0.06	0.02	0.00	424.00	0.01	0.01	427.85
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.12	0.01	0.00	0.00	0.00	33.58	0.00	0.00	33.89
Pounds per day - Paving	0.07	1.10	0.10	0.04	0.02	0.00	302.86	0.01	0.01	305.60
Tons per const. Period - Paving	0.00	0.04	0.00	0.00	0.00	0.00	11.99	0.00	0.00	12.10
Total tons per construction project	0.03	0.42	0.04	0.01	0.01	0.00	111.82	0.00	0.00	112.87

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions										
User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT		
Grubbing/Land Clearing - Exhaust		1		5	5		8.00	40.00		
Grading/Excavation - Exhaust		1		5	5		8.00	40.00		
Drainage/Utilities/Subgrade		1		5	5		8.00	40.00		
Paving		1		5	5		8.00	40.00		
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.53	1.30	7.55	0.24	0.17	0.02	1,892.05	0.02	0.30	1,981.28
Grading/Excavation (grams/mile)	0.52	1.28	7.44	0.24	0.17	0.02	1,888.46	0.02	0.30	1,977.52
Draining/Utilities/Sub-Grade (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Paving (grams/mile)	0.43	1.14	6.49	0.21	0.15	0.02	1,859.78	0.02	0.29	1,947.39
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.05	0.11	0.70	0.02	0.02	0.00	166.85	0.00	0.03	174.72
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.02	0.00	0.00	0.00	4.40	0.00	0.00	4.61
Pounds per day - Grading/Excavation	0.05	0.11	0.69	0.02	0.01	0.00	166.53	0.00	0.03	174.39
Tons per const. Period - Grading/Excavation	0.01	0.01	0.08	0.00	0.00	0.00	19.78	0.00	0.00	20.72
Pounds per day - Drainage/Utilities/Sub-Grade	0.04	0.10	0.61	0.02	0.01	0.00	164.00	0.00	0.03	171.73
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.05	0.00	0.00	0.00	12.99	0.00	0.00	13.60
Pounds per day - Paving	0.04	0.10	0.61	0.02	0.01	0.00	164.00	0.00	0.03	171.73
Tons per const. Period - Paving	0.00	0.00	0.02	0.00	0.00	0.00	6.49	0.00	0.00	6.80
Total tons per construction project	0.01	0.03	0.17	0.01	0.00	0.00	43.67	0.00	0.01	45.73

Note: Fugitive dust default values can be overridden in cells D183 through D185.

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		0.50	5.00	0.13	1.04	0.03
Fugitive Dust - Grading/Excavation		0.50	5.00	0.59	1.04	0.12
Fugitive Dust - Drainage/Utilities/Subgrade		0.50	5.00	0.40	1.04	0.08



Off-Road Equipment Emissions														
Grubbing/Land Clearing	Default	Mitigation Option	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
	Number of Vehicles	Override of												
		Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)												
	Override of Default Number of Vehicles	Program-estimate		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
	1.00			Tier 4	Aerial Lifts	0.06	1.27	1.15	0.01	0.01	0.00	162.62	0.05	164.37
				Tier 4	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1		Tier 4	Crawler Tractors	0.24	4.18	0.48	0.02	0.02	0.01	760.39	0.25	768.59
				Tier 4	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1		Tier 4	Excavators	0.16	3.92	0.32	0.02	0.01	0.01	500.12	0.16	505.51
				Tier 4	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1.00			Tier 4	Off-Highway Trucks	0.40	7.00	0.81	0.04	0.04	0.01	1,278.62	0.41	1,292.39
				Tier 4	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Other Material Handling Equiprr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1.00			Tier 4	Rubber Tired Dozers	0.26	4.53	0.52	0.03	0.02	0.01	827.34	0.27	836.25
				Tier 4	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Signal Boards	0.03	0.52	0.46	0.03	0.02	0.00	49.31	0.01	49.56
		1		Tier 4	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment														
Number of Vehicles		If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
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
		Grubbing/Land Clearing		pounds per day	1.15	21.43	3.74	0.14	0.13	0.04	3,578.41	1.15	0.03	3,616.68
		Grubbing/Land Clearing		tons per phase	0.03	0.57	0.10	0.00	0.00	0.00	94.47	0.03	0.00	95.48
Grading/Excavation														
Grading/Excavation	Default	Mitigation Option	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
	Number of Vehicles	Override of												
		Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)												
	Override of Default Number of Vehicles	Program-estimate		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
				Tier 4	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0		Tier 4	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1		Tier 4	Crawler Tractors	0.24	4.18	0.48	0.02	0.02	0.01	760.39	0.25	768.58
				Tier 4	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		3		Tier 4	Excavators	0.48	11.75	0.95	0.05	0.04	0.02	1,500.38	0.49	1,516.56
				Tier 4	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1		Tier 4	Graders	0.20	3.52	0.41	0.02	0.02	0.01	642.60	0.21	649.52
				Tier 4	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Other Material Handling Equiprr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2		Tier 4	Rollers	0.16	3.97	0.32	0.02	0.01	0.01	508.14	0.16	513.61
				Tier 4	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1		Tier 4	Rubber Tired Loaders	0.19	3.35	0.39	0.02	0.02	0.01	605.17	0.20	611.70
		2		Tier 4	Scrapers	0.93	16.16	1.86	0.09	0.09	0.03	2,934.23	0.95	2,965.87
		1		Tier 4	Signal Boards	0.03	0.52	0.46	0.03	0.02	0.00	49.31	0.01	49.56
				Tier 4	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2		Tier 4	Tractors/Loaders/Backhoes	0.19	4.68	0.38	0.02	0.02	0.01	601.57	0.19	608.04
				Tier 4	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				Tier 4	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment														
Number of Vehicles		If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2			

Drainage/Utilities/Subgrade	Mitigation Option				ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
	Default	Override of	Default												
	Number of Vehicles														
		Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier												
	Override of Default Number of Vehicles	Program-estimate			pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Tier 4	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	Tier 4	Air Compressors	0.10	2.44	0.20	0.01	0.01	0.00	375.26	0.03	0.00	0.00	376.75
			Tier 4	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1	Tier 4	Generator Sets	0.16	4.06	0.33	0.02	0.02	0.01	623.04	0.03	0.00	0.00	625.23
		1	Tier 4	Graders	0.20	3.52	0.41	0.02	0.02	0.01	641.68	0.21	0.01	0.00	648.60
			Tier 4	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Other General Industrial Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Other Material Handling Equiprr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1	Tier 4	Plate Compactors	0.02	0.36	0.32	0.02	0.02	0.00	34.48	0.00	0.00	0.00	34.65
			Tier 4	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1	Tier 4	Pumps	0.16	4.06	0.33	0.02	0.02	0.01	623.04	0.03	0.00	0.00	625.28
			Tier 4	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1	Tier 4	Rough Terrain Forklifts	0.11	2.61	0.21	0.01	0.01	0.00	333.77	0.11	0.00	0.00	337.37
			Tier 4	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	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	Tier 4	Scrapers	0.93	16.16	1.86	0.09	0.09	0.03	2,935.83	0.95	0.03	0.00	2,967.48
		1	Tier 4	Signal Boards	0.03	0.52	0.46	0.03	0.02	0.00	49.31	0.01	0.00	0.00	49.56
			Tier 4	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		2	Tier 4	Tractors/Loaders/Backhoes	0.19	4.68	0.38	0.02	0.02	0.01	601.80	0.19	0.01	0.00	608.28
			Tier 4	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Tier 4	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[illegible]



			Tier 4	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2		Tier 4	Tractors/Loaders/Backhoes	0.19	4.68	0.38	0.02	0.02	0.01	601.80	0.19	0.01	608.28	
			Tier 4	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Tier 4	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															
Number of Vehicles		If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
		Equipment Tier	Type		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	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	
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	
		Paving	pounds per day		0.73	17.82	1.86	0.10	0.09	0.02	2,262.90	0.72	0.02	2,287.00	
		Paving	tons per phase		0.03	0.71	0.07	0.00	0.00	0.00	89.61	0.03	0.00	90.57	
Total Emissions all Phases (tons per construction period) =>					0.50	10.03	1.15	0.06	0.05	0.02	1,579.66	0.47	0.01	1,595.68	

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

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		221		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		231		8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89		8
Generator Sets		84		8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130		8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET

### Attachment 3: Construction Health Risk Calculations

#### Jaguar Way Roadway Extension, Windsor CA

##### DPM Construction Emissions and Modeling Emission Rates

Construction		DPM	Source	No.	DPM Emissions			Emissions per Point Source
Year	Activity	(ton/year)	Type	Sources	(lb/yr)	(lb/hr)	(g/s)	(g/s)
2020	Construction	0.2583	Point	169	516.7	0.11796	1.49E-02	8.79E-05
2021	Construction	0.2583	Point	169	516.7	0.11796	1.49E-02	8.79E-05
	<b>TOTAL</b>	<b>0.5167</b>			<b>1033</b>	<b>0.2359</b>	<b>0.0297</b>	

hr/day = 12 (7am - 7pm)  
 days/yr = 365  
 hours/year = 4380

##### PM2.5 Fugitive Dust Construction Emissions for Modeling

Construction		Area	PM2.5 Emissions				Modeled Area	DPM Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m <sup>2</sup> )	g/s/m <sup>2</sup>
2020	Construction	CON_FUG	0.2329	465.7	0.10633	1.34E-02	17,755	7.55E-07
2021	Construction	CON_FUG	0.2329	465.7	0.10633	1.34E-02	17,755	7.55E-07
	<b>TOTAL</b>		<b>0.4657</b>	<b>931</b>	<b>0.2127</b>	<b>0.0268</b>		

hr/day = 12 (7am - 7pm)  
 days/yr = 365  
 hours/year = 4380

##### DPM Construction Emissions and Modeling Emission Rates - With Mitigation

Construction		DPM	Source	No.	DPM Emissions			Emissions per Point Source
Year	Activity	(ton/year)	Type	Sources	(lb/yr)	(lb/hr)	(g/s)	(g/s)
2020	Construction	0.0381	Point	169	76.2	0.01739	2.19E-03	1.30E-05
2021	Construction	0.0381	Point	169	76.2	0.01739	2.19E-03	1.30E-05
	<b>TOTAL</b>	<b>0.0762</b>			<b>152</b>	<b>0.0348</b>	<b>0.0044</b>	

hr/day = 12 (7am - 7pm)  
 days/yr = 365  
 hours/year = 4380

# **PM2.5 Fugitive Dust Construction Emissions for Modeling - With Mitigation**

Construction		Area	PM2.5 Emissions				Modeled Area	DPM Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m <sup>2</sup> )	g/s/m <sup>2</sup>
<b>2020</b>	Construction	CON_FUG	0.1167	233.4	0.05328	6.71E-03	17,755	3.78E-07
<b>2021</b>	Construction	CON_FUG	0.1167	233.4	0.05328	6.71E-03	17,755	3.78E-07
<b>TOTAL</b>			<b>0.2334</b>	<b>467</b>	<b>0.1066</b>	<b>0.0134</b>		

hr/day = 12 (7am - 7pm)  
 days/yr = 365  
 hours/year = 4380

**Jaguar Way Roadway Extension, Windsor CA**  
**Maximum DPM Cancer Risk Calculations From Construction - Unmitigated Emissions**  
**Impacts at Off-Site Receptors-1.5 meter**

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-day)<sup>-1</sup>  
 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<sub>air</sub> x DBR x A x (EF/365) x 10<sup>-6</sup>

Where: C<sub>air</sub> = concentration in air (µg/m<sup>3</sup>)  
 DBR = daily breathing rate (L/kg body weight-day)  
 A = Inhalation absorption factor  
 EF = Exposure frequency (days/year)  
 10<sup>-6</sup> = Conversion factor

**Values**

Age --> Parameter	Infant/Child				Adult
	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
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**

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information			Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)	Maximum Risk		
			DPM Conc (ug/m3)		Sensitivity Factor		Modeled		Sensitivity Factor		Hazard Index	Fugitive PM2.5	Total PM2.5
			Year	Annual			Year	Annual					
0	0.25	-0.25 - 0*	2020	0.1003	10	1.36	2020	0.1003	-	-			
1	1	0 - 1	2020	0.1003	10	16.47	2020	0.1003	1	0.29	0.020	0.8011	0.858
2	1	1 - 2	2021	0.1003	10	16.47	2021	0.1003	1	0.29	0.020	0.8011	0.858
3	1	2 - 3	0	0.0000	3	0.00		0.0000	1	0.00	0.020	0.801	0.858
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00			
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00			
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00			
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00			
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00			
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00			
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00			
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00			
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00			
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00			
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00			
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00			
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00			
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00			
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00			
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00			
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00			
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00			
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00			
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00			
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00			
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00			
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00			
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00			
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00			
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00			
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00			
Total Increased Cancer Risk						34.3				0.58			

\* Third trimester of pregnancy

**Jaguar Way Roadway Extension, V- Unmitigated Emissions**  
**Maximum DPM Cancer Risk Calculations From Construction - Mitigated Emissions**  
**Impacts at Off-Site Receptors-1.5 meter**

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-day)<sup>-1</sup>  
 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<sub>air</sub> x DBR x A x (EF/365) x 10<sup>-6</sup>

Where: C<sub>air</sub> = concentration in air (µg/m<sup>3</sup>)  
 DBR = daily breathing rate (L/kg body weight-day)  
 A = Inhalation absorption factor  
 EF = Exposure frequency (days/year)  
 10<sup>-6</sup> = Conversion factor

**Values**

Age --> Parameter	Infant/Child				Adult
	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
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**

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information			Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)	Maximum Risk		
			DPM Conc (ug/m3)		Sensitivity Factor		Modeled		Sensitivity Factor		Hazard Index	Fugitive PM2.5	Total PM2.5
			Year	Annual			Year	Annual					
0	0.25	-0.25 - 0*	2020	0.0148	10	0.20	2020	0.0148	-	-			
1	1	0 - 1	2020	0.0148	10	2.43	2020	0.0148	1	0.04	0.003	0.4006	0.409
2	1	1 - 2	2021	0.0148	10	2.43	2021	0.0148	1	0.04	0.003	0.4006	0.409
3	1	2 - 3	0	0.0000	3	0.00		0.0000	1	0.00	0.003	0.401	0.409
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00			
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00			
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00			
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00			
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00			
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00			
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00			
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00			
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00			
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00			
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00			
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00			
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00			
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00			
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00			
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00			
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00			
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00			
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00			
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00			
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00			
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00			
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00			
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00			
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00			
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00			
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00			
Total Increased Cancer Risk						5.1				0.08			

\* Third trimester of pregnancy

**Jaguar Way Roadway Extension, Windsor, CA - Construction Impacts - Without Mitigation**  
**Maximum DPM Cancer Risk Calculations From Construction**  
**Windsor High School- 1.5 meters - Student Exposure**

$$\text{Cancer Risk (per million)} = \text{CPF} \times \text{Inhalation Dose} \times \text{ASF} \times \text{ED/AT} \times \text{FAH} \times 1.0\text{E}6$$

Where: CPF = Cancer potency factor (mg/kg-day)<sup>-1</sup>  
 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)

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

Where: C<sub>air</sub> = concentration in air (µg/m<sup>3</sup>)  
 DBR = daily breathing rate (L/kg body weight-day)  
 A = Inhalation absorption factor  
 EF = Exposure frequency (days/year)  
 10<sup>-6</sup> = 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**

Exposure Year	Exposure Duration (years)	Child - Exposure Information			Child Cancer Risk (per million)
		DPM Conc (ug/m3)		Age* Sensitivity	
		Year	Annual	Factor	
1	1	2020	0.0458	3	1.2
2	1	2021	0.0458	3	1.2
Total Increased Cancer Risk					2.37

\* Students assumed to be from 13 to 18 years of age

Maximum		
Hazzrd Index	Fugitive PM2.5	Total PM2.5
0.009	0.1369	0.1826
0.009	0.1369	0.1826
<b>0.009</b>	<b>0.137</b>	<b>0.183</b>