

# ***Santa Rosa Memorial Hospital Medical Office Building & Parking Structure Construction TAC Assessment***

## ***Santa Rosa, California***

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Project: 17-009

## Introduction

The purpose of this report is to address toxic air contaminant (TAC) emissions and their impact to nearby sensitive receptors from construction of the proposed Santa Rosa Memorial Hospital's new four story medical office building and an associated new six level parking structure at the southeast corner of Montgomery Drive and Sotoyome Street. This analysis addresses community risk impacts associated with construction emissions. These impacts were computed at sensitive receptors near the site. The analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).

## Setting

The project is located in the southern portion of Sonoma County, which is in the San Francisco Bay Area Air Basin. 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 the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

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. These regulations include the solid waste collection vehicle (SWCV) rule, in-use public and utility fleets, and the heavy-duty diesel truck and bus regulations. In 2008, CARB approved a new regulation to reduce emissions of DPM and nitrogen oxides from existing on-road heavy-duty diesel fueled vehicles.<sup>1</sup> The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles required to have 2010 model-year engines or equivalent by 2023. These requirements are phased in over the compliance period and depend on the model year of the vehicle.

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California Environmental Protection Agency [EPA]) oversees regional air district activities and regulates air quality at the State level. The BAAQMD

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<sup>1</sup> Available online: <http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm>. Accessed: June 9, 2015.

has recently published California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.<sup>2</sup>

### 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 schools. The closest sensitive receptors are the apartments adjacent to the south of the site. Additional residences are located further from the site (see Figure 1). Hospital receptors are located to the west at Sotoyome Hospital and to the north at Santa Rosa Memorial Hospital.

### Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were included in the Air District's updated CEQA Guidelines (updated May 2017). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1.

**Table 1. Air Quality Significance Thresholds**

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
Health Risks and Hazards for Single Sources			
Excess Cancer Risk	>10 per one million		
Chronic or Acute Hazard Index	>1.0		
Incremental annual average PM <sub>2.5</sub>	>0.3 µg/m <sup>3</sup>		
Health Risks and Hazards for Combined Sources (Cumulative from all sources within 1,000 foot zone of influence)			
Excess Cancer Risk	>100 per one million		
Chronic Hazard Index	>10.0		
Annual Average PM <sub>2.5</sub>	>0.8 µg/m <sup>3</sup>		

<sup>2</sup> Bay Area Air Quality Management District, 2017. *BAAQMD CEQA Air Quality Guidelines*. May.

### Fugitive Dust - PM<sub>10</sub>/PM<sub>2.5</sub>

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM<sub>10</sub> and PM<sub>2.5</sub>. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. Project construction impacts are considered significant since they can generate dust that could pose health and nuisance impacts if uncontrolled.

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

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

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Effectiveness of Mitigation: The measures listed above are consistent with those recommended in the BAAQMD CEQA Air Quality Guidelines and would reduce localized health and nuisance impacts caused by project construction.

#### Construction TAC Emissions from Diesel Exhaust

Construction equipment and associated heavy-duty truck traffic generate diesel exhaust, which is a known TAC. Diesel exhaust poses both potential health and nuisance impacts to nearby receptors. A community risk assessment of the project construction activities was conducted that evaluated potential health effects to sensitive receptors at nearby residences from construction emissions of DPM and PM<sub>2.5</sub>.<sup>3</sup> A dispersion model was used to predict the off-site DPM concentrations resulting from project construction so that lifetime cancer risks could be predicted. Figure 1 shows the project site and sensitive receptor locations used in the air quality dispersion modeling analysis where potential community risk impacts were evaluated.

#### Construction Emissions

The California Emissions Estimator Model (CalEEMod) Version 2016.3.1 provided annual emissions for construction. CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling and vendor traffic. A construction build-out scenario, including equipment list and phasing schedule, was developed based on information provided by the project applicant and model defaults for a project of this type and size. The proposed project land uses were input into CalEEMod, which included. *Attachment 1* includes the detailed risk modeling methodology and *Attachment 2* includes the CalEEMod output for construction emissions and risk calculations.

The CalEEMod model provided total annual PM<sub>10</sub> exhaust emissions (assumed to be diesel particulate matter) for the off-road construction equipment and for exhaust emissions from on-road vehicles. The on-road emissions are a result of worker travel and vendor deliveries during construction activities. A trip length of one mile was used to represent vehicle travel while at or near the construction site. For modeling purposes, it was assumed that these emissions from on-road vehicles would occur at the construction site. Fugitive PM<sub>2.5</sub> dust emissions were also calculated by CalEEMod. In modeling the project construction emissions, construction was assumed to take place in one area that encompassed much of the site.

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<sup>3</sup> DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

## Dispersion Modeling

The U.S. EPA ISCST3 dispersion model was used to predict concentrations of DPM and PM<sub>2.5</sub> concentrations at sensitive receptors (residences) in the vicinity of the project construction area. The ISCST3 dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.<sup>4</sup> The ISCST3 modeling utilized two area sources to represent the on-site construction emissions, one for exhaust emissions and one for fugitive dust emissions. To represent the construction equipment exhaust emissions, an emission release height of 6 meters (19.7 feet) was used for the area source. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive PM<sub>2.5</sub> emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area source. Emissions from the construction equipment and on-road vehicle travel were distributed throughout the modeled area sources. Construction emissions were modeled as occurring daily between 7 a.m. to 4 p.m., when the majority of construction activity would occur.

The modeling used a 5-year meteorological data set (2001-2005) from the Santa Rosa Airport prepared for use with the ISCST3 model by the BAAQMD. Annual DPM and PM<sub>2.5</sub> concentrations from construction activities during the 2018 - 2019 period were calculated using the model. DPM and PM<sub>2.5</sub> concentrations were calculated at nearby sensitive receptor locations. Receptor heights of 1.5 meters (4.9 feet) and 4.5 meters (14.8 feet) were used to represent the breathing heights of residents on first and second floor levels of nearby residences and apartments.

## Cancer Risk

The maximum-modeled DPM and PM<sub>2.5</sub> concentrations occurred in the residential area south of the project site, as shown in Figure 1 for the maximally exposed individual (MEI). Community risk at the hospital receptors would be lower. Using the maximum annual modeled DPM concentrations for each type of sensitive receptor, the maximum increased cancer risks were calculated. Due to the anticipated duration of project construction, infant exposures were conservatively assumed in calculating cancer risks for residential exposures. Because an infant (0 to 2 years of age) breathing rate is greater than the breathing rate for the 3<sup>rd</sup> trimester, the contribution to total cancer risk from an infant exposure is greater than if the initial exposure assumed for the 3<sup>rd</sup> trimester is assumed.

Results of this assessment indicate that the maximum increased residential cancer risks would be 15.4 in one million for a child exposure and 0.3 in one million for an adult exposure. The location of the receptor with the maximum increased cancer risk is shown in Figure 1. The maximum residential excess cancer risk would be greater than the BAAQMD significance threshold of 10 in one million.

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<sup>4</sup> Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0*. May.

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

The maximum-modeled annual PM<sub>2.5</sub> concentration, which is based on combined exhaust and fugitive dust emissions, was 0.1 µg/m<sup>3</sup>, occurring at the residential MEI. The annual PM<sub>2.5</sub> concentration would be less than the BAAQMD significance threshold of 0.3 µg/m<sup>3</sup>.

### Non-Cancer Hazards

The maximum modeled annual residential DPM concentration (i.e., from construction exhaust) was 0.083 µg/m<sup>3</sup>. The maximum computed HI based on this DPM concentration is 0.02, which is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

The project would have a *significant impact* with respect to community risk caused by construction activities at nearby receptors. Implementation of *Mitigation Measures AQ-1 and AQ-2* would reduce this impact to a level of less than significant.

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

All diesel-powered off-road equipment larger than 25 horsepower and operating on the site for more than two days continuously shall, at a minimum, meet U.S. EPA particulate matter emissions standards for Tier 2 engines.

Note that the construction contractor could use other measures to minimize construction period DPM emissions to reduce the predicted cancer risk below the thresholds. Such measures may be the use of alternative powered equipment (e.g., LPG-powered lifts), alternative fuels (e.g., biofuels), added exhaust devices, or a combination of measures, provided that these measures are approved by the City and demonstrated to reduce community risk impacts to less than significant.

Effectiveness of Mitigation: Implementation of recommended best management practices (i.e., *Mitigation Measure AQ-1*) is considered to reduce exhaust emissions by 5 percent and fugitive dust emissions by over 50 percent. Implementation of *Mitigation Measure AQ-2* would further reduce on-site diesel exhaust emissions. With this mitigation, the computed maximum increased lifetime residential cancer risk from construction, assuming infant exposure, would be 9.8 in one million. This cancer risk would be below the BAAQMD threshold of 10 per one million for cancer risk. *After implementation of these recommended measures, the project would have a less-than-significant impact with respect to community risk caused by construction activities.*



**Legend**

- Hospital Receptors
- Residential Receptors
- Project Site

Scale: 0 62.5 125 250 375 500 Feet



## 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>5</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>6</sup> This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.<sup>7</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 of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

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

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<sup>5</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>6</sup> CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

<sup>7</sup> BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January 2016.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors 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)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

\* 95<sup>th</sup> percentile breathing rates for 3<sup>rd</sup> trimester and infants and 80<sup>th</sup> percentile for children and adults

## 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 $\text{PM}_{2.5}$ Concentrations

While not a TAC, fine particulate matter ( $\text{PM}_{2.5}$ ) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for  $\text{PM}_{2.5}$  (project level and cumulative) are in terms of an increase in the annual average concentration. When considering  $\text{PM}_{2.5}$  impacts, the contribution from all sources of  $\text{PM}_{2.5}$  emissions should be included. For projects with potential impacts from nearby local roadways, the  $\text{PM}_{2.5}$  impacts should include those from vehicle exhaust emissions,  $\text{PM}_{2.5}$  generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

**Attachment 2: CalEEMod Input and Output Worksheets, Construction Schedule, and Risk Calculations**

Project Name:		SR Memorial Medial Office and Parking Structure					
Project Size		<u>92,000</u> Medical Office Building <u>2.99</u> total project acres disturbed _____ s.f. other, specify: _____					
		<u>25,100</u> sf Building size(s) to be demolished					Complete ALL Portions in Yellow
		<u>151,200</u> s.f. parking structure <u>600</u> spaces					
		s.f. surface parking lot					
		spaces					
Construction Hours		am to		pm			
Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Comments
Demolition		Start Date:	3/1/2018	1/15/1900	15		Overall Import/Export Volumes
		End Date:	3/22/2018				
1	Concrete/Industrial Saws	81	0.73	2	5	0.6666667	Demolition Volume
1	Excavators	162	0.38	7	10	4.6666667	Square footage of buildings to be demolished
1	Rubber-Tired Dozers	255	0.4	8	12	6.4	(or total tons to be hauled)
2	Tractors/Loaders/Backhoes	97	0.37	8	15	8	<u>25,100</u> square feet or
							Hauling volume (tons)
Site Preparation		Start Date:	3/23/2018	Total phase:	15		Any pavement demolished and hauled? <u>yes, 350 tons</u>
		End Date:	4/12/2018				Soil Hauling Volume
1	Graders	174	0.41	8	10	5.3333333	
	Rubber Tired Dozers	255	0.4	0	0	0	Export volume = <u>157</u> cubic yards?
1	Tractors/Loaders/Backhoes	97	0.37	4	10	2.6666667	Import volume = <u>0</u> cubic yards?
Grading / Excavation		Start Date:	9/21/2018	Total phase:	5		
		End Date:	9/27/2018				Soil Hauling Volume
1	Scrapers	361	0.48	7	4	5.6	
	Excavators	162	0.38			0	Export volume = <u>500</u> cubic yards?
1	Graders	174	0.41	8	3	4.8	Import volume = <u>0</u> cubic yards?
	Rubber Tired Dozers	255	0.4			0	
2	Tractors/Loaders/Backhoes	97	0.37	8	8	12.8	
Other Equipment?							
Trenching		Start Date:	4/27/2008	Total phase:	47		
		End Date:	6/28/2018				
3	Tractor/Loader/Backhoe	97	0.37	8	22	3.7446809	
	Excavators	162	0.38	8		0	
Other Equipment?							
Building - Exterior		Start Date:	6/29/2018	Total phase:	80		Cement Trucks? <u>370</u> Total Round-Trips
		End Date:	10/30/2018				
2	Cranes	226	0.29	8	32	3.2	Electric? (Y/N) <u>No, Diesel</u> Otherwise assumed diesel
1	Forklifts	89	0.2	4	80	4	Liquid Propane (LPG)? (Y/N) <u>Yes, LPG</u> Otherwise Assumed diesel
1	Generator Sets	84	0.74	8	25	2.5	Or temporary line power? (Y/N) <u>85% on temp power, 15% diesel</u>
	Tractors/Loaders/Backhoes	97	0.37			0	otherwise, assume diesel generator
3	Welders	46	0.45	8	20	2	
	Concrete Trucks			6	32	2.4	
Other Equipment?							
Building - Interior/Architectural Coating		Start Date:	9/10/2018	Total phase:	165		
		End Date:	4/26/2019				
1	Air Compressors	78	0.48	6	165	6	
1	Aerial Lift	62	0.31	6	100	3.6363636	
3	Scissor Lifts						battery/electric
Other Equipment?							
Paving		Start Date:	10/19/2018	Total phase:	5		Asphalt? _____ cubic yards or _____ 63 _____ round trips?
		Start Date:	10/25/2018				
1	Cement and Mortar Mixers	9	0.56	7	5	7	
1	Pavers	125	0.42	8	5	8	
1	Paving Equipment	130	0.36	8	5	8	
1	Rollers	80	0.38	8	5	8	
1	Tractors/Loaders/Backhoes	97	0.37	8	5	8	
Other Equipment?							

## Santa Rosa Memorial Hospital MOB &amp; Parking - Sonoma-San Francisco County, Annual

## Santa Rosa Memorial Hospital MOB & Parking

### Sonoma-San Francisco County, Annual

## 1.0 Project Characteristics

### 1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Medical Office Building	92.00	1000sqft	2.99	92,000.00	0
Unenclosed Parking with Elevator	600.00	Space	0.00	151,200.00	0

### 1.2 Other Project Characteristics

<b>Urbanization</b>	Urban	<b>Wind Speed (m/s)</b>	2.2	<b>Precipitation Freq (Days)</b>	75
<b>Climate Zone</b>	4			<b>Operational Year</b>	2020
<b>Utility Company</b>	Pacific Gas & Electric Company				
<b>CO2 Intensity (lb/MW hr)</b>	290	<b>CH4 Intensity (lb/MW hr)</b>	0.029	<b>N2O Intensity (lb/MW hr)</b>	0.006

### 1.3 User Entered Comments & Non-Default Data

Land Use - Based on SRMH Proposal statement & site plan

Construction Phase - Default plus trenching and extended site preparation and grading slightly

Off-road Equipment -

Off-road Equipment - Based on equipment list

Off-road Equipment - Based on equipment list

Off-road Equipment - Based on equipment list

Off-road Equipment - Based on equipment list - scissor lift is electric

Off-road Equipment - Based on equipment list

Off-road Equipment - Based on equipment list

Off-road Equipment - Based on equipment list



[illegible]

tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	10.00	165.00
tblConstructionPhase	NumDays	220.00	80.00
tblConstructionPhase	NumDays	20.00	15.00
tblConstructionPhase	NumDays	6.00	5.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	3.00	15.00
tblGrading	MaterialExported	0.00	500.00
tblGrading	MaterialSiltContent	6.90	4.30
tblGrading	MeanVehicleSpeed	7.10	40.00
tblLandUse	BuildingSpaceSquareFeet	240,000.00	151,200.00
tblLandUse	LandUseSquareFeet	240,000.00	151,200.00
tblLandUse	LotAcreage	2.11	2.99
tblLandUse	LotAcreage	5.40	0.00
tblOffRoadEquipment	HorsePower	158.00	187.00
tblOffRoadEquipment	LoadFactor	0.38	0.41
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	8.00	7.00
tblOffRoadEquipment	UsageHours	8.00	0.70



tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00
tblTripsAndVMT	WorkerTripLength	10.80	1.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.3524	0.9783	0.6343	1.1300e-003	0.1042	0.0450	0.1492	0.0251	0.0425	0.0676	0.0000	101.5307	101.5307	0.0234	0.0000	102.1150
2019	0.2737	0.0906	0.1067	1.6000e-004	5.9000e-004	5.7300e-003	6.3200e-003	1.6000e-004	5.7100e-003	5.8700e-003	0.0000	14.2804	14.2804	1.8600e-003	0.0000	14.3268
Maximum	0.3524	0.9783	0.6343	1.1300e-003	0.1042	0.0450	0.1492	0.0251	0.0425	0.0676	0.0000	101.5307	101.5307	0.0234	0.0000	102.1150

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.2983	0.9501	0.6686	1.1300e-003	0.0277	0.0270	0.0547	6.8200e-003	0.0269	0.0337	0.0000	101.5306	101.5306	0.0234	0.0000	102.1149

2019	0.2680	0.1304	0.1097	1.6000e-004	5.9000e-004	5.2500e-003	5.8400e-003	1.6000e-004	5.2500e-003	5.4100e-003	0.0000	14.2804	14.2804	1.8600e-003	0.0000	14.3268
Maximum	0.2983	0.9501	0.6686	1.1300e-003	0.0277	0.0270	0.0547	6.8200e-003	0.0269	0.0337	0.0000	101.5306	101.5306	0.0234	0.0000	102.1149

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction	9.56	-1.09	-5.04	0.00	72.99	36.54	61.10	72.38	33.23	46.70	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	3-1-2018	5-31-2018	0.2047	0.1714
2	6-1-2018	8-31-2018	0.3266	0.2819
3	9-1-2018	9-30-2018	0.2146	0.1873
		Highest	0.3266	0.2819

### 3.0 Construction Detail

#### Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/1/2018	3/21/2018	5	15	
2	Site Preparation	Site Preparation	3/23/2018	4/12/2018	5	15	
3	Utilities	Trenching	4/27/2018	7/2/2018	5	47	
4	Building Construction	Building Construction	6/29/2018	10/18/2018	5	80	
5	Interior	Architectural Coating	9/10/2018	4/26/2019	5	165	
6	Grading	Grading	9/21/2018	9/27/2018	5	5	
7	Paving	Paving	10/19/2018	10/25/2018	5	5	

Acres of Grading (Site Preparation Phase): 4.97

Acres of Grading (Grading Phase): 5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 138,000; Non-Residential Outdoor: 46,000; Striped Parking Area:

#### OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	0.70	81	0.73
Demolition	Excavators	1	4.70	187	0.41
Demolition	Rubber Tired Dozers	1	6.40	247	0.40
Demolition	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation	Graders	1	5.30	187	0.41
Site Preparation	Scrapers	0	5.60	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	2.70	97	0.37
Grading	Graders	1	4.80	187	0.41
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Scrapers	1	5.60	367	0.48
Grading	Tractors/Loaders/Backhoes	2	12.80	97	0.37
Building Construction	Cranes	2	3.20	231	0.29
Building Construction	Forklifts	1	4.00	89	0.20
Building Construction	Generator Sets	1	2.50	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Building Construction	Welders	3	2.00	46	0.45
Paving	Cement and Mortar Mixers	1	7.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Interior	Aerial Lifts	1	3.60	63	0.31
Interior	Air Compressors	1	6.00	78	0.48
Utilities	Tractors/Loaders/Backhoes	3	3.70	97	0.37

**Trips and VMT**

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	184.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT



Site Preparation	2	5.00	0.00	62.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	93.00	40.00	720.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	126.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Interior	2	19.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT
Utilities	3	8.00	0.00	0.00	1.00	1.00	1.00	LD_Mix	HDT_Mix	HHDT

### 3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

### 3.2 Demolition - 2018

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0124	0.0000	0.0124	1.8700e-003	0.0000	1.8700e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0125	0.1328	0.0706	1.3000e-004		7.1000e-003	7.1000e-003		6.5500e-003	6.5500e-003	0.0000	11.9410	11.9410	3.6300e-003	0.0000	12.0319
<b>Total</b>	<b>0.0125</b>	<b>0.1328</b>	<b>0.0706</b>	<b>1.3000e-004</b>	<b>0.0124</b>	<b>7.1000e-003</b>	<b>0.0195</b>	<b>1.8700e-003</b>	<b>6.5500e-003</b>	<b>8.4200e-003</b>	<b>0.0000</b>	<b>11.9410</b>	<b>11.9410</b>	<b>3.6300e-003</b>	<b>0.0000</b>	<b>12.0319</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	0.0100	1.8800e-003	1.0000e-005	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	1.0354	1.0354	1.9000e-004	0.0000	1.0401
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	9.0000e-005	1.1800e-003	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0888	0.0888	1.0000e-005	0.0000	0.0890
Total	4.3000e-004	0.0101	3.0600e-003	1.0000e-005	1.5000e-004	2.0000e-005	1.7000e-004	4.0000e-005	2.0000e-005	6.0000e-005	0.0000	1.1242	1.1242	2.0000e-004	0.0000	1.1291

**Mitigated Construction On-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7800e-003	0.0000	2.7800e-003	4.2000e-004	0.0000	4.2000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.3100e-003	0.1165	0.0803	1.3000e-004		3.4000e-003	3.4000e-003		3.4000e-003	3.4000e-003	0.0000	11.9410	11.9410	3.6300e-003	0.0000	12.0319
Total	4.3100e-003	0.1165	0.0803	1.3000e-004	2.7800e-003	3.4000e-003	6.1800e-003	4.2000e-004	3.4000e-003	3.8200e-003	0.0000	11.9410	11.9410	3.6300e-003	0.0000	12.0319

**Mitigated Construction Off-Site**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	0.0100	1.8800e-003	1.0000e-005	8.0000e-005	2.0000e-005	1.0000e-004	2.0000e-005	2.0000e-005	4.0000e-005	0.0000	1.0354	1.0354	1.9000e-004	0.0000	1.0401

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	9.0000e-005	1.1800e-003	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0888	0.0888	1.0000e-005	0.0000	0.0890
<b>Total</b>	<b>4.3000e-004</b>	<b>0.0101</b>	<b>3.0600e-003</b>	<b>1.0000e-005</b>	<b>1.5000e-004</b>	<b>2.0000e-005</b>	<b>1.7000e-004</b>	<b>4.0000e-005</b>	<b>2.0000e-005</b>	<b>6.0000e-005</b>	<b>0.0000</b>	<b>1.1242</b>	<b>1.1242</b>	<b>2.0000e-004</b>	<b>0.0000</b>	<b>1.1291</b>

### 3.3 Site Preparation - 2018

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0837	0.0000	0.0837	0.0214	0.0000	0.0214	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.2600e-003	0.0421	0.0154	4.0000e-005		1.6200e-003	1.6200e-003		1.4900e-003	1.4900e-003	0.0000	3.7380	3.7380	1.1600e-003	0.0000	3.7671
<b>Total</b>	<b>3.2600e-003</b>	<b>0.0421</b>	<b>0.0154</b>	<b>4.0000e-005</b>	<b>0.0837</b>	<b>1.6200e-003</b>	<b>0.0853</b>	<b>0.0214</b>	<b>1.4900e-003</b>	<b>0.0229</b>	<b>0.0000</b>	<b>3.7380</b>	<b>3.7380</b>	<b>1.1600e-003</b>	<b>0.0000</b>	<b>3.7671</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.0000e-005	3.3800e-003	6.3000e-004	0.0000	3.0000e-005	1.0000e-005	3.0000e-005	1.0000e-005	1.0000e-005	1.0000e-005	0.0000	0.3489	0.3489	6.0000e-005	0.0000	0.3505
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	4.0000e-005	4.6000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0342	0.0342	0.0000	0.0000	0.0342
<b>Total</b>	<b>1.5000e-004</b>	<b>3.4200e-003</b>	<b>1.0900e-003</b>	<b>0.0000</b>	<b>6.0000e-005</b>	<b>1.0000e-005</b>	<b>6.0000e-005</b>	<b>2.0000e-005</b>	<b>1.0000e-005</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>0.3830</b>	<b>0.3830</b>	<b>6.0000e-005</b>	<b>0.0000</b>	<b>0.3847</b>

### Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0188	0.0000	0.0188	4.8200e-003	0.0000	4.8200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.1700e-003	0.0355	0.0234	4.0000e-005		9.0000e-004	9.0000e-004		9.0000e-004	9.0000e-004	0.0000	3.7380	3.7380	1.1600e-003	0.0000	3.7671
Total	1.1700e-003	0.0355	0.0234	4.0000e-005	0.0188	9.0000e-004	0.0197	4.8200e-003	9.0000e-004	5.7200e-003	0.0000	3.7380	3.7380	1.1600e-003	0.0000	3.7671

### Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.0000e-005	3.3800e-003	6.3000e-004	0.0000	3.0000e-005	1.0000e-005	3.0000e-005	1.0000e-005	1.0000e-005	1.0000e-005	0.0000	0.3489	0.3489	6.0000e-005	0.0000	0.3505
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0000e-005	4.0000e-005	4.6000e-004	0.0000	3.0000e-005	0.0000	3.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0342	0.0342	0.0000	0.0000	0.0342
Total	1.5000e-004	3.4200e-003	1.0900e-003	0.0000	6.0000e-005	1.0000e-005	6.0000e-005	2.0000e-005	1.0000e-005	2.0000e-005	0.0000	0.3830	0.3830	6.0000e-005	0.0000	0.3847

## 3.4 Utilities - 2018

### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
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Category	tons/yr										MT/yr					
Off-Road	8.6800e-003	0.0858	0.0762	1.0000e-004		6.0700e-003	6.0700e-003		5.5900e-003	5.5900e-003	0.0000	9.2519	9.2519	2.8800e-003	0.0000	9.3239
<b>Total</b>	<b>8.6800e-003</b>	<b>0.0858</b>	<b>0.0762</b>	<b>1.0000e-004</b>		<b>6.0700e-003</b>	<b>6.0700e-003</b>		<b>5.5900e-003</b>	<b>5.5900e-003</b>	<b>0.0000</b>	<b>9.2519</b>	<b>9.2519</b>	<b>2.8800e-003</b>	<b>0.0000</b>	<b>9.3239</b>

### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	1.8000e-004	2.2800e-003	0.0000	1.4000e-004	0.0000	1.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1713	0.1713	1.0000e-005	0.0000	0.1716
<b>Total</b>	<b>3.7000e-004</b>	<b>1.8000e-004</b>	<b>2.2800e-003</b>	<b>0.0000</b>	<b>1.4000e-004</b>	<b>0.0000</b>	<b>1.4000e-004</b>	<b>4.0000e-005</b>	<b>0.0000</b>	<b>4.0000e-005</b>	<b>0.0000</b>	<b>0.1713</b>	<b>0.1713</b>	<b>1.0000e-005</b>	<b>0.0000</b>	<b>0.1716</b>

### Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.7500e-003	0.0980	0.0764	1.0000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	9.2519	9.2519	2.8800e-003	0.0000	9.3239
<b>Total</b>	<b>4.7500e-003</b>	<b>0.0980</b>	<b>0.0764</b>	<b>1.0000e-004</b>		<b>3.9600e-003</b>	<b>3.9600e-003</b>		<b>3.9600e-003</b>	<b>3.9600e-003</b>	<b>0.0000</b>	<b>9.2519</b>	<b>9.2519</b>	<b>2.8800e-003</b>	<b>0.0000</b>	<b>9.3239</b>

### Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.7000e-004	1.8000e-004	2.2800e-003	0.0000	1.4000e-004	0.0000	1.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1713	0.1713	1.0000e-005	0.0000	0.1716
Total	3.7000e-004	1.8000e-004	2.2800e-003	0.0000	1.4000e-004	0.0000	1.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1713	0.1713	1.0000e-005	0.0000	0.1716

### 3.5 Building Construction - 2018

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0414	0.3516	0.2075	3.7000e-004		0.0186	0.0186		0.0177	0.0177	0.0000	32.3567	32.3567	7.7100e-003	0.0000	32.5494
Total	0.0414	0.3516	0.2075	3.7000e-004		0.0186	0.0186		0.0177	0.0177	0.0000	32.3567	32.3567	7.7100e-003	0.0000	32.5494

#### Unmitigated Construction Off-Site



	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.6000e-004	0.0393	7.3700e-003	4.0000e-005	3.1000e-004	9.0000e-005	3.9000e-004	8.0000e-005	8.0000e-005	1.7000e-004	0.0000	4.0514	4.0514	7.3000e-004	0.0000	4.0698
Vendor	4.0300e-003	0.1217	0.0373	1.2000e-004	1.4600e-003	4.1000e-004	1.8600e-003	4.2000e-004	3.9000e-004	8.1000e-004	0.0000	11.5146	11.5146	1.8800e-003	0.0000	11.5617
Worker	7.2400e-003	3.5700e-003	0.0452	4.0000e-005	2.7400e-003	5.0000e-005	2.7900e-003	7.3000e-004	5.0000e-005	7.8000e-004	0.0000	3.3889	3.3889	2.7000e-004	0.0000	3.3956
Total	0.0122	0.1646	0.0898	2.0000e-004	4.5100e-003	5.5000e-004	5.0400e-003	1.2300e-003	5.2000e-004	1.7600e-003	0.0000	18.9549	18.9549	2.8800e-003	0.0000	19.0270

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0123	0.3025	0.2171	3.7000e-004		0.0102	0.0102		0.0102	0.0102	0.0000	32.3567	32.3567	7.7100e-003	0.0000	32.5494
Total	0.0123	0.3025	0.2171	3.7000e-004		0.0102	0.0102		0.0102	0.0102	0.0000	32.3567	32.3567	7.7100e-003	0.0000	32.5494

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	9.6000e-004	0.0393	7.3700e-003	4.0000e-005	3.1000e-004	9.0000e-005	3.9000e-004	8.0000e-005	8.0000e-005	1.7000e-004	0.0000	4.0514	4.0514	7.3000e-004	0.0000	4.0698
Vendor	4.0300e-003	0.1217	0.0373	1.2000e-004	1.4600e-003	4.1000e-004	1.8600e-003	4.2000e-004	3.9000e-004	8.1000e-004	0.0000	11.5146	11.5146	1.8800e-003	0.0000	11.5617
Worker	7.2400e-003	3.5700e-003	0.0452	4.0000e-005	2.7400e-003	5.0000e-005	2.7900e-003	7.3000e-004	5.0000e-005	7.8000e-004	0.0000	3.3889	3.3889	2.7000e-004	0.0000	3.3956
<b>Total</b>	<b>0.0122</b>	<b>0.1646</b>	<b>0.0898</b>	<b>2.0000e-004</b>	<b>4.5100e-003</b>	<b>5.5000e-004</b>	<b>5.0400e-003</b>	<b>1.2300e-003</b>	<b>5.2000e-004</b>	<b>1.7600e-003</b>	<b>0.0000</b>	<b>18.9549</b>	<b>18.9549</b>	<b>2.8800e-003</b>	<b>0.0000</b>	<b>19.0270</b>

### 3.6 Interior - 2018

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2510					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0129	0.0942	0.0950	1.5000e-004		6.4600e-003	6.4600e-003		6.4300e-003	6.4300e-003	0.0000	13.1339	13.1339	1.8500e-003	0.0000	13.1802
<b>Total</b>	<b>0.2638</b>	<b>0.0942</b>	<b>0.0950</b>	<b>1.5000e-004</b>		<b>6.4600e-003</b>	<b>6.4600e-003</b>		<b>6.4300e-003</b>	<b>6.4300e-003</b>	<b>0.0000</b>	<b>13.1339</b>	<b>13.1339</b>	<b>1.8500e-003</b>	<b>0.0000</b>	<b>13.1802</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	7.4000e-004	9.3500e-003	1.0000e-005	5.7000e-004	1.0000e-005	5.8000e-004	1.5000e-004	1.0000e-005	1.6000e-004	0.0000	0.7010	0.7010	6.0000e-005	0.0000	0.7024
<b>Total</b>	<b>1.5000e-003</b>	<b>7.4000e-004</b>	<b>9.3500e-003</b>	<b>1.0000e-005</b>	<b>5.7000e-004</b>	<b>1.0000e-005</b>	<b>5.8000e-004</b>	<b>1.5000e-004</b>	<b>1.0000e-005</b>	<b>1.6000e-004</b>	<b>0.0000</b>	<b>0.7010</b>	<b>0.7010</b>	<b>6.0000e-005</b>	<b>0.0000</b>	<b>0.7024</b>

### Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2510					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.0600e-003	0.1251	0.0974	1.5000e-004		5.0600e-003	5.0600e-003		5.0600e-003	5.0600e-003	0.0000	13.1339	13.1339	1.8500e-003	0.0000	13.1802
<b>Total</b>	<b>0.2570</b>	<b>0.1251</b>	<b>0.0974</b>	<b>1.5000e-004</b>		<b>5.0600e-003</b>	<b>5.0600e-003</b>		<b>5.0600e-003</b>	<b>5.0600e-003</b>	<b>0.0000</b>	<b>13.1339</b>	<b>13.1339</b>	<b>1.8500e-003</b>	<b>0.0000</b>	<b>13.1802</b>

### Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-003	7.4000e-004	9.3500e-003	1.0000e-005	5.7000e-004	1.0000e-005	5.8000e-004	1.5000e-004	1.0000e-005	1.6000e-004	0.0000	0.7010	0.7010	6.0000e-005	0.0000	0.7024
<b>Total</b>	<b>1.5000e-003</b>	<b>7.4000e-004</b>	<b>9.3500e-003</b>	<b>1.0000e-005</b>	<b>5.7000e-004</b>	<b>1.0000e-005</b>	<b>5.8000e-004</b>	<b>1.5000e-004</b>	<b>1.0000e-005</b>	<b>1.6000e-004</b>	<b>0.0000</b>	<b>0.7010</b>	<b>0.7010</b>	<b>6.0000e-005</b>	<b>0.0000</b>	<b>0.7024</b>

## 3.6 Interior - 2019

### Unmitigated Construction On-Site



Off-Road	6.2800e-003	0.1297	0.1011	1.6000e-004		5.2400e-003	5.2400e-003		5.2400e-003	5.2400e-003	0.0000	13.5739	13.5739	1.8100e-003	0.0000	13.6190
<b>Total</b>	<b>0.2666</b>	<b>0.1297</b>	<b>0.1011</b>	<b>1.6000e-004</b>		<b>5.2400e-003</b>	<b>5.2400e-003</b>		<b>5.2400e-003</b>	<b>5.2400e-003</b>	<b>0.0000</b>	<b>13.5739</b>	<b>13.5739</b>	<b>1.8100e-003</b>	<b>0.0000</b>	<b>13.6190</b>

### Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4100e-003	6.7000e-004	8.6700e-003	1.0000e-005	5.9000e-004	1.0000e-005	6.0000e-004	1.6000e-004	1.0000e-005	1.7000e-004	0.0000	0.7065	0.7065	5.0000e-005	0.0000	0.7078
<b>Total</b>	<b>1.4100e-003</b>	<b>6.7000e-004</b>	<b>8.6700e-003</b>	<b>1.0000e-005</b>	<b>5.9000e-004</b>	<b>1.0000e-005</b>	<b>6.0000e-004</b>	<b>1.6000e-004</b>	<b>1.0000e-005</b>	<b>1.7000e-004</b>	<b>0.0000</b>	<b>0.7065</b>	<b>0.7065</b>	<b>5.0000e-005</b>	<b>0.0000</b>	<b>0.7078</b>

## 3.7 Grading - 2018

### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.6500e-003	0.0000	2.6500e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9200e-003	0.0566	0.0369	6.0000e-005		2.8200e-003	2.8200e-003		2.5900e-003	2.5900e-003	0.0000	5.6023	5.6023	1.7400e-003	0.0000	5.6459
<b>Total</b>	<b>4.9200e-003</b>	<b>0.0566</b>	<b>0.0369</b>	<b>6.0000e-005</b>	<b>2.6500e-003</b>	<b>2.8200e-003</b>	<b>5.4700e-003</b>	<b>2.9000e-004</b>	<b>2.5900e-003</b>	<b>2.8800e-003</b>	<b>0.0000</b>	<b>5.6023</b>	<b>5.6023</b>	<b>1.7400e-003</b>	<b>0.0000</b>	<b>5.6459</b>

### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	2.0000e-005	3.0000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0228	0.0228	0.0000	0.0000	0.0228
Total	5.0000e-005	2.0000e-005	3.0000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0228	0.0228	0.0000	0.0000	0.0228

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.0000e-004	0.0000	6.0000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.0600e-003	0.0531	0.0382	6.0000e-005		1.6300e-003	1.6300e-003		1.6300e-003	1.6300e-003	0.0000	5.6023	5.6023	1.7400e-003	0.0000	5.6459
Total	2.0600e-003	0.0531	0.0382	6.0000e-005	6.0000e-004	1.6300e-003	2.2300e-003	6.0000e-005	1.6300e-003	1.6900e-003	0.0000	5.6023	5.6023	1.7400e-003	0.0000	5.6459

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					



Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-005	2.0000e-005	3.0000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0228	0.0228	0.0000	0.0000	0.0228
<b>Total</b>	<b>5.0000e-005</b>	<b>2.0000e-005</b>	<b>3.0000e-004</b>	<b>0.0000</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>2.0000e-005</b>	<b>0.0000</b>	<b>0.0000</b>	<b>1.0000e-005</b>	<b>0.0000</b>	<b>0.0228</b>	<b>0.0228</b>	<b>0.0000</b>	<b>0.0000</b>	<b>0.0228</b>

### 3.8 Paving - 2018

#### Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.8500e-003	0.0293	0.0250	4.0000e-005		1.6900e-003	1.6900e-003		1.5600e-003	1.5600e-003	0.0000	3.4111	3.4111	1.0400e-003	0.0000	3.4371
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>Total</b>	<b>2.8500e-003</b>	<b>0.0293</b>	<b>0.0250</b>	<b>4.0000e-005</b>		<b>1.6900e-003</b>	<b>1.6900e-003</b>		<b>1.5600e-003</b>	<b>1.5600e-003</b>	<b>0.0000</b>	<b>3.4111</b>	<b>3.4111</b>	<b>1.0400e-003</b>	<b>0.0000</b>	<b>3.4371</b>

#### Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7000e-004	6.8700e-003	1.2900e-003	1.0000e-005	5.0000e-005	2.0000e-005	7.0000e-005	1.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.7090	0.7090	1.3000e-004	0.0000	0.7122
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	3.0000e-005	3.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0296	0.0296	0.0000	0.0000	0.0297
<b>Total</b>	<b>2.3000e-004</b>	<b>6.9000e-003</b>	<b>1.6800e-003</b>	<b>1.0000e-005</b>	<b>7.0000e-005</b>	<b>2.0000e-005</b>	<b>9.0000e-005</b>	<b>2.0000e-005</b>	<b>1.0000e-005</b>	<b>4.0000e-005</b>	<b>0.0000</b>	<b>0.7386</b>	<b>0.7386</b>	<b>1.3000e-004</b>	<b>0.0000</b>	<b>0.7419</b>

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	1.6600e-003	0.0335	0.0282	4.0000e-005		1.1700e-003	1.1700e-003		1.1700e-003	1.1700e-003	0.0000	3.4111	3.4111	1.0400e-003	0.0000	3.4371
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	1.6600e-003	0.0335	0.0282	4.0000e-005		1.1700e-003	1.1700e-003		1.1700e-003	1.1700e-003	0.0000	3.4111	3.4111	1.0400e-003	0.0000	3.4371

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7000e-004	6.8700e-003	1.2900e-003	1.0000e-005	5.0000e-005	2.0000e-005	7.0000e-005	1.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.7090	0.7090	1.3000e-004	0.0000	0.7122
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0000e-005	3.0000e-005	3.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0296	0.0296	0.0000	0.0000	0.0297
Total	2.3000e-004	6.9000e-003	1.6800e-003	1.0000e-005	7.0000e-005	2.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.7386	0.7386	1.3000e-004	0.0000	0.7419

Santa Rosa Memorial MOB, Santa Rosa, California										Santa Rosa Memorial MOB, Santa Rosa, California									
DPM Emissions and Modeling Emission Rates										PM2.5 Fugitive Dust Emissions for Modeling									
Emissions Model	Activity	DPM (ton/year)	Area Source	DPM Emissions			Modeled Area (m <sup>2</sup> )	DPM Emission Rate (g/s/m <sup>2</sup> )		Construction Year	Activity	Area Source	PM2.5 Emissions				Modeled Area (m <sup>2</sup> )	PM2.5 Emission Rate (g/s/m <sup>2</sup> )	
				(lb/yr)	(lb/hr)	(g/s)							(ton/year)	(lb/yr)	(lb/hr)	(g/s)			
2018	Construction	0.0450	DPM	90.0	0.02740	3.45E-03	12,363	2.79E-07		2018	Construction	FUG	0.0251	50.2	0.01528	1.93E-03	12,363	1.56E-07	
2019	Construction	0.0057	DPM	11.5	0.00349	4.40E-04	12,363	3.56E-08		2019	Construction	FUG	0.0002	0.3	0.00010	1.23E-05	12,363	9.93E-10	
Total		0.0507		101.5	0.0309	0.0039				Total			0.0253	50.5	0.0154	0.0019			
Operation Hours										Operation Hours									
hr/day = 9 (7am - 4pm)										hr/day = 9 (7am - 4pm)									
days/yr = 365										days/yr = 365									
hours/year = 3285										hours/year = 3285									

Santa Rosa Memorial MOB, Santa Rosa, California						
Maximum Impacts at Construction MEI Location						
	Maximum Concentrations					Maximum
Emissions	Exhaust	Fugitive	Cancer Risk		Hazard	Annual PM2.5
	PM10/DPM	PM2.5	(per million)			
Year	(µg/m³)	(µg/m³)	Child	Adult	(-)	(µg/m³)
2018	0.0830	0.0451	13.6	0.2	0.017	0.13
2019	0.0106	0.0003	1.7	0.0	0.002	0.01
Maximum	0.0830	0.0451	15.4	0.3	0.017	0.13

Santa Rosa Memorial MOB, Santa Rosa, California																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Impacts at Off-Site Receptors-4.5 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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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<table><tr><td></td><td colspan="4">Infant/Child</td><td>Adult</td></tr><tr><td>Age --&gt;</td><td>3rd Trimester</td><td>0 - 2</td><td>2 - 9</td><td>2 - 16</td><td>16 - 30</td></tr><tr><td>Parameter</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>ASF =</td><td>10</td><td>10</td><td>3</td><td>3</td><td>1</td></tr><tr><td>CPF =</td><td>1.10E+00</td><td>1.10E+00</td><td>1.10E+00</td><td>1.10E+00</td><td>1.10E+00</td></tr><tr><td>DBR* =</td><td>361</td><td>1090</td><td>631</td><td>572</td><td>261</td></tr><tr><td>A =</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>EF =</td><td>350</td><td>350</td><td>350</td><td>350</td><td>350</td></tr><tr><td>AT =</td><td>70</td><td>70</td><td>70</td><td>70</td><td>70</td></tr><tr><td>FAH =</td><td>1.00</td><td>1.00</td><td>1.00</td><td>1.00</td><td>0.73</td></tr></table>													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																																																																																																																																																																																																																																																																																																																																																																																																										
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* 95th percentile breathing rates for infants and 80th percentile for children and adults																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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<table><tr><td rowspan="3">Exposure</td><td rowspan="3">Exposure Duration</td><td colspan="4">Infant/Child - Exposure Information</td><td>Infant/Child</td><td colspan="3">Adult - Exposure Information</td><td rowspan="3">Fugitive PM2.5</td><td rowspan="3">Total PM2.5</td></tr><tr><td rowspan="2">Age</td><td colspan="2">DPM Conc (ug/m3)</td><td rowspan="2">Age Sensitivity Factor</td><td rowspan="2">Cancer Risk (per million)</td><td colspan="2">Modeled</td><td rowspan="2">Age Sensitivity Factor</td><td rowspan="2">Cancer Risk (per million)</td></tr><tr><td>Year</td><td>Annual</td><td>Year</td><td>Annual</td></tr><tr><td>Year</td><td>(years)</td><td>Age</td><td>Year</td><td>Annual</td><td>Factor</td><td>(per million)</td><td>Year</td><td>Annual</td><td>Factor</td><td>(per million)</td><td></td><td></td></tr><tr><td>0</td><td>0.25</td><td>-0.25 - 0*</td><td>-</td><td>-</td><td>10</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td></td><td></td></tr><tr><td>1</td><td>1</td><td>0 - 1</td><td>2018</td><td>0.0830</td><td>10</td><td>13.64</td><td>2018</td><td>0.0830</td><td>1</td><td>0.24</td><td>0.0451</td><td>0.128</td></tr><tr><td>2</td><td>1</td><td>1 - 2</td><td>2019</td><td>0.0106</td><td>10</td><td>1.74</td><td>2019</td><td>0.0106</td><td>1</td><td>0.03</td><td>0.0003</td><td>0.011</td></tr><tr><td>3</td><td>1</td><td>2 - 3</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>4</td><td>1</td><td>3 - 4</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>5</td><td>1</td><td>4 - 5</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>6</td><td>1</td><td>5 - 6</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>7</td><td>1</td><td>6 - 7</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>8</td><td>1</td><td>7 - 8</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>9</td><td>1</td><td>8 - 9</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>10</td><td>1</td><td>9 - 10</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>11</td><td>1</td><td>10 - 11</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>12</td><td>1</td><td>11 - 12</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>13</td><td>1</td><td>12 - 13</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>14</td><td>1</td><td>13 - 14</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>15</td><td>1</td><td>14 - 15</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>16</td><td>1</td><td>15 - 16</td><td></td><td>0.0000</td><td>3</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>17</td><td>1</td><td>16-17</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>18</td><td>1</td><td>17-18</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>19</td><td>1</td><td>18-19</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>20</td><td>1</td><td>19-20</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>21</td><td>1</td><td>20-21</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>22</td><td>1</td><td>21-22</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>23</td><td>1</td><td>22-23</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>24</td><td>1</td><td>23-24</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>25</td><td>1</td><td>24-25</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>26</td><td>1</td><td>25-26</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>27</td><td>1</td><td>26-27</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>28</td><td>1</td><td>27-28</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>29</td><td>1</td><td>28-29</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td>30</td><td>1</td><td>29-30</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td>0.0000</td><td>1</td><td>0.00</td><td></td><td></td></tr><tr><td colspan="6">Total Increased Cancer Risk</td><td>15.38</td><td></td><td></td><td></td><td>0.27</td><td></td><td></td></tr></table>												Exposure	Exposure Duration	Infant/Child - Exposure Information				Infant/Child	Adult - Exposure Information			Fugitive PM2.5	Total PM2.5	Age	DPM Conc (ug/m3)		Age Sensitivity Factor	Cancer Risk (per million)	Modeled		Age Sensitivity Factor	Cancer Risk (per million)	Year	Annual	Year	Annual	Year	(years)	Age	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)			0	0.25	-0.25 - 0*	-	-	10	-	-	-	-	-			1	1	0 - 1	2018	0.0830	10	13.64	2018	0.0830	1	0.24	0.0451	0.128	2	1	1 - 2	2019	0.0106	10	1.74	2019	0.0106	1	0.03	0.0003	0.011	3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00			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						15.38				0.27		
Exposure	Exposure Duration	Infant/Child - Exposure Information				Infant/Child	Adult - Exposure Information			Fugitive PM2.5	Total PM2.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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1	1	0 - 1	2018	0.0830	10	13.64	2018	0.0830	1	0.24	0.0451	0.128																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
2	1	1 - 2	2019	0.0106	10	1.74	2019	0.0106	1	0.03	0.0003	0.011																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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