# APPENDIX B
# CONSTRUCTION HEALTH RISK ASSESSMENT

# *1491-1493 Oak Grove Avenue Residential Project Construction TAC Assessment Burlingame, CA*

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## Introduction

The purpose of this report is to address air quality community risk impacts associated with the 1491- 1493 Oak Grove Avenue Residential project in the city of Burlingame, California. The project proposes to demolish the two existing single- family residential buildings and construct a new 5- story, 55- feet high, 10- unit condominium with associated surface parking consisting of 5 parking spaces and an underground garage housing 12 parking spaces. The project consists of six two-bedroom units; three one-bedroom units; and one three-bedroom unit for a total of 10 condominium units. The project allocates 1,943 square feet of common open space in the rear yard and private balconies for each unit. Oak Grove Avenue would serve as the primary entrance to the building lobby. A community room attached with allocated outdoor space has also been proposed.

Community risk air quality impacts could occur due to temporary construction emissions from the construction site and exposure of schools and residences in the vicinity. This analysis addresses those issues following the guidance provided by the BAAQMD.

## Setting

The project is located in San Mateo County, which is in the San Francisco Bay Area Air Basin. Toxic air contaminants (TACs) 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 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 diesel particulate matter (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.[1] The regulation requires affected vehicles to meet specific performance requirements between 2014 and 2023, with all affected diesel vehicles

[1] Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: November 21, 2014.

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

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 14, 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, elementary schools, and parks. The closest sensitive receptors include residential buildings (multi-family dwellings) to the north and southwest and an elementary school to the east of the project site.

**Significance Thresholds**

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in *Table 1*.

**Table 1. Air Quality Significance Thresholds**

| Description | Construction Thresholds | Operational Thresholds | |
|---|---|---|---|
| | Average Daily Emissions (lbs./day) | Average Daily Emissions (lbs./day) | Annual Average Emissions (tons/year) |
| **Single-Source Health Risks and Hazards for New Sources and Receptors** | | | |
| Excess Cancer Risk | >10 per one million | | |
| Chronic or Acute Hazard Index | >1.0 | | |
| Incremental annual average $PM_{2.5}$ | >0.3 µg/m$^3$ | | |
| **Cumulative Health Risks and Hazards (Combination of all substantial sources within 1,000 foot zone of influence) for New Sources and New Sensitive Receptors** | | | |
| Excess Cancer Risk | >100 per one million | | |
| Chronic Hazard Index | >10.0 | | |
| Annual Average $PM_{2.5}$ | >0.8 µg/m$^3$ | | |

[2] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May 2011.

## Health Impact Evaluation Methodology

A health risk assessment (HRA) for exposure to TACs requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and CARB develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[3] 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.[4] This health risk assessment used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. While the OEHHA guidelines use substantially more conservative assumptions than the current BAAQMD guidelines, BAAQMD has not formally adopted recommended procedures for applying the newest OEHHA guidelines. BAAQMD is in the process of developing new guidance and has developed proposed HRA Guidelines as part of the proposed amendments to Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[5] Exposure parameters from the OEHHA guidelines and newly proposed 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$^{th}$ percentile breathing rates are used for the third trimester and infant exposures, and 80$^{th}$ percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

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[3] OEHHA, 2015. . Office of Environmental Health Hazard Assessment. February.
[4] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.
[5] BAAQMD, 2016. *Workshop Report. Proposed Amendments to Air District Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants. Appendix C. Proposed Air District 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. BAAQMD recommends using these FAH factors for residential exposures.

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

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

Where:

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

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

Where:

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

The health risk parameters used in this evaluation are summarized in *Table 2*.

**Table 2. Health Risk Parameters Used for Cancer Risk Calculations**

| Parameter | *Exposure Type* | Infant | | Child | Adult |
|---|---|---|---|---|---|
| | *Age Range* | 3rd Trimester | 0<2 | 2 < 16 | 16 - 30 |
| DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$ | | 1.10E+00 | 1.10E+00 | 1.10E+00 | 1.10E+00 |
| Daily Breathing Rate (L/kg-day)* | | 361 | 1,090 | 572 | 261 |
| Inhalation Absorption Factor | | 1 | 1 | 1 | 1 |
| Averaging Time (years) | | 70 | 70 | 70 | 70 |
| Exposure Duration (years) | | 0.25 | 2 | 14 | 14 |
| Exposure Frequency (days/year) | | 350 | 350 | 350 | 350 |
| Age Sensitivity Factor | | 10 | 10 | 3 | 1 |
| Fraction of Time at Home | | 0.85 – 1.0 | 0.72 -1.0 | 0.72 -1.0 | 0.73 |

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

Non-Cancer Hazards

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

Annual $PM_{2.5}$ Concentrations

While not a TAC, $PM_{2.5}$ 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 CEQA. The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

**Project Construction Activity**

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. These exhaust air pollutant emissions would not be considered to contribute substantially to existing or projected air quality violations. Construction exhaust emissions may still 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 $PM_{2.5}$. Diesel exhaust poses both a potential health and nuisance impact to nearby receptors. A health risk assessment of the project construction activities was conducted that evaluated potential health effects of sensitive receptors at these nearby residences from construction emissions of DPM and $PM_{2.5}$.[6] The closest sensitive receptors to the project site are the multi- family dwellings to its north and southwest and an elementary school to the east.

Construction Period Emissions

Construction activity is anticipated to include demolition, grading and site preparation, trenching, building construction, and paving. Construction period emissions were modeled using the California Emissions Estimator Model, Version 2013.2.2 (CalEEMod). The construction schedule provided by the client was used in the model. The proposed project land uses were input into CalEEMod, which included 10 dwelling units entered as “Condo/Townhouse” 5

[6] DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

spaces entered as "Unenclosed Parking Structure," and 12 spaces entered as "Enclosed Parking Structure with Elevator" on a 0.2-acre site over a period of about 7 months. Construction period emissions were modeled using CalEEMod along with the anticipated project construction activity. The number and types of construction equipment and diesel vehicles, along with the anticipated length of their use for different phases of construction, were based on a site-specific construction schedule. The CalEEMod modeling included emissions from truck and worker travel, assumed to occur over a distance of 0.5 miles on or near the site.

Emissions (assumed to be Diesel Particulate Matter) for the off-road construction equipment and for exhaust emissions from on-road vehicles, with total emissions from all construction stages were found to be 0.0437 tons (87.4 pounds). The on-road emissions are a result of haul truck travel during demolition and grading activities, worker travel, and vendor deliveries during construction. A trip length of 1 mile was used to represent vehicle travel while at or near the construction site. It was assumed that these emissions from on-road vehicles traveling at or near the site would occur at the construction site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 0.0204 tons (40.8 pounds) for the overall construction period.

Dispersion Modeling

The EPA ISCST3 dispersion model was also used to predict concentrations of DPM and $PM_{2.5}$ concentrations at existing sensitive receptors (residences) in the vicinity of the project construction area. The Industrial Source Complex- Short Term (ISCST3) dispersion model is a BAAQMD-recommended model used in modeling analysis of these types of emission activities for CEQA projects.[7] 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 $PM_{2.5}$ 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. Figure 1 shows the project site and nearby sensitive receptor (residences) locations where health impacts were evaluated.

The modeling used a four-year data set (2002-2005) of hourly meteorological data from the San Mateo Sewage Treatment Plant that was prepared for use with the ISCST3 model by CARB for use in health risk assessments. Annual DPM and $PM_{2.5}$ concentrations from construction activities for the year 2017 were calculated using the model. DPM and $PM_{2.5}$ concentrations were calculated at nearby sensitive receptors. 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, apartments, and townhomes.

[7] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May 2011.

The maximum-modeled DPM and $PM_{2.5}$ concentrations occurred northwest of the construction site at a residence near the site. The location where the maximum $PM_{2.5}$ and DPM concentrations occurred (and maximum cancer risk) is identified on Figure 1.

Predicted Cancer Risk and Hazards

Increased cancer risks were calculated using the maximum modeled concentrations for 2017 and BAAQMD recommended risk assessment methods for infant exposure (3rd trimester through two years of age) and for an adult exposure. The cancer risk calculations were based on applying the BAAQMD recommended age sensitivity factors to the TAC concentrations, as described above (see discussion regarding *Health Impact Evaluation Methodology*). Age-sensitivity factors reflect the greater sensitivity of infants and small children to cancer causing TACs. Infant, child, and adult exposures were assumed to occur at all residences through the entire construction period.

The maximum community risk impacts associated with project construction are shown in Table 3. Results of the assessment for project construction indicate the maximum incremental residential child cancer risk at the maximally exposed individual (MEI) receptor would be 90.9 in one million and the residential adult incremental cancer risk would be 1.6 in one million. The maximum-modeled annual $PM_{2.5}$ concentration, which is based on combined exhaust and fugitive dust emissions, was $0.73/m^3$. The maximum modeled annual residential DPM concentration (i.e., from construction exhaust) was $0.5532 \mu g/m^3$, which is lower than the REL. The maximum computed HI based on this DPM concentration is 0.11 which is lower than the BAAQMD significance criterion of a HI greater than 1.0.

Combined Construction Risk Assessment

In addition to construction of the project, there are other sources identified within 1,000 feet of the project site that are sources of TACs (see *Figure 1*). The project site is situated in close proximity to El Camino Real. Hence, impacts of emissions from on-road vehicles have been taken into account in the risk assessment. These impacts were predicted using the BAAQMD *Highway Analysis Screening Tool*. Table 3 identifies the cumulative community risk levels. Since, there is an elementary school in the vicinity of the project site, the impacts of the construction emissions and El Camino traffic emissions have been separately modeled. The results have been summarized in Table 4.

Conclusion for Construction Impacts

Cancer risk from construction activities would exceed the single-source significance threshold at the residence with the maximum impact, assuming there is an infant at that receptor site. Exposures for adults would be below the significance threshold. The project construction activities would increase annual $PM_{2.5}$ concentrations above the single-source threshold. Non-cancer hazards would be below the significance thresholds. The combination of construction activities with exposure to other TAC sources in the areas would have cumulative cancer risk and annual $PM_{2.5}$ concentrations below the significance thresholds. Since cancer risk and annual $PM_{2.5}$ concentrations from construction activities exceed the single-source significance threshold, the impact is considered significant. The project would have a *significant* impact with respect to

community risk caused by project construction activities. Hence, certain mitigation measures have been suggested in the following sections. Results of community risk assessment for the mitigated scenario have also been reported in Table 3. *Attachment 1* includes the emission calculations and source information used in the modeling and the cancer risk calculations.

**Table 3. Combined Construction Source Cancer Risks, $PM_{2.5}$ Concentrations, and Hazard Index at the MEI**

| Source | Cancer Risk (per million) | $PM_{2.5}$ Concentration ($\mu g/m^3$) | Acute and Chronic Hazard (HI) |
|---|---|---|---|
| Proposed Project Construction Unmitigated | **Infant = 90.9** Adult = 1.6 | 0.73 | 0.11 |
| Mitigated | **Infant= 2.2 Adult=0.0** | 0.0 | 0.05 |
| El Camino Real at 225 feet east (Link 129, 6ft) | 3.26 | 0.05 | <0.01 |
| **Unmitigated Total** | **Infant = 94.16** Adult = 3.86 | 0.78 | 0.16 |
| **Mitigated Total** | **Infant = 5.46** Adult = 3.26 | 0.047 | 0.058 |
| *BAAQMD Thresholds Single Source* | *10.0* | *0.3* | *1.0* |
| *BAAQMD Thresholds Combined Source* | *100.0* | *0.8* | *10.0* |
| ***Significant?*** | ***No*** | ***No*** | ***No*** |
| | | | |

**Table 4. Combined Construction Source Cancer Risks, $PM_{2.5}$ Concentrations, and Hazard Index at McKinley Elementary School**

| Source | Cancer Risk (per million) | $PM_{2.5}$ Concentration ($\mu g/m^3$) | Acute and Chronic Hazard (HI) |
|---|---|---|---|
| Proposed Project Construction Unmitigated | **Child= 0.9** | 0.05 | 0.1 |
| El Camino Real at 225 feet east (Link 129, 6ft) | 3.26 | 0.047 | <0.01 |
| *BAAQMD Thresholds Single Source* | *10.0* | *0.3* | *1.0* |
| *BAAQMD Thresholds Combined Source* | *100.0* | *0.8* | *10.0* |
| ***Significant?*** | ***No*** | ***No*** | ***No*** |
| | | | |

**Figure 1. Project Construction Site and Locations of Off-Site Sensitive Receptors and TAC Impacts**

Mitigation Measures

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

During any construction period which causes 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 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.

***Mitigation Measure AQ-2:*** **Use Construction equipment that has low diesel particulate matter exhaust emissions.**

The project shall develop a plan demonstrating that the off-road equipment used to on-site to construct the project would achieve a fleet-wide average 90 percent reduction in $PM_{2.5}$ exhaust emissions. One feasible plan to achieve this reduction would include the following:

> All mobile diesel-powered off-road equipment larger than 50 horsepower and operating on the site for more than two days continuously shall meet, at a minimum, U.S. EPA particulate matter emissions standards for Tier 4 engines or equivalent. Note that the construction contractor could use other measures to minimize construction period DPM emission to reduce the predicted cancer risk below the thresholds. The use of equipment that includes CARB-certified Level 3 Diesel Particulate Filters[8] or alternatively-fueled equipment (i.e., non-diesel) would meet this requirement. Other measures may be the use of 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.

[8] See http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm

Effectiveness of Mitigation

Implementation of *Mitigation Measure AQ-1* is considered to reduce fugitive dust emissions by over 50 percent. Based on modeling using CalEEMod (Mitigated Output)**,** emissions from equipment that meets U.S. EPA particulate matter emissions standards for Tier 4 engines for the equipment larger than 50 horsepower would reduce construction exhaust emissions by over 90 percent. Health risk assessment results suggest that the cancer risks would be lowered down to 2.2 chances per million. This cancer risk would be below the BAAQMD thresholds of greater than 10.0 per one million for cancer risk. Accordingly, annual $PM_{2.5}$ concentrations would be reduced to 0.05μg/m$^3$, which is below the single source thresholds. Therefore, *after implementation of these recommended mitigation measures, the project would have a less-than-significant impact with respect to community risk caused by construction activities.*

## Attachment 1: Construction Risk Assessment

**1491-1493 Oak Grove Ave, Burlingame, CA - Health Impact Summary**

**Maximum Impacts at Off-Site Residences**

| Construction Year | UNMITIGATED | | | | | |
|---|---|---|---|---|---|---|
| | Maximum Concentrations | | Cancer Risk (per million) | | Hazard Index (-) | Maximum Annual PM2.5 Concentration ($\mu g/m^3$) |
| | Exhaust PM2.5/DPM ($\mu g/m^3$) | Fugitive PM2.5 ($\mu g/m^3$) | Child | Adult | | |
| 2017 | 0.5532 | 0.1779 | 90.9 | 1.6 | 0.11 | 0.73 |

| Construction Year | MITIGATED | | | | | |
|---|---|---|---|---|---|---|
| | Maximum Concentrations | | Cancer Risk (per million) | | Hazard Index (-) | Maximum Annual PM2.5 Concentration ($\mu g/m^3$) |
| | Exhaust PM2.5/DPM ($\mu g/m^3$) | Fugitive PM2.5 ($\mu g/m^3$) | Child | Adult | | |
| 2017 | 0.0133 | 0.0406 | 2.2 | 0.0 | 0.00 | 0.05 |

**Maximum Impacts at McKinley Elementary School and Preschool - Child Exposures**

| Construction Year | UNMITIGATED | | | | |
|---|---|---|---|---|---|
| | Maximum Concentrations | | Child Cancer Risk (per million) | Hazard Index (-) | Maximum Annual PM2.5 Concentration ($\mu g/m^3$) |
| | Exhaust PM2.5/DPM ($\mu g/m^3$) | Fugitive PM2.5 ($\mu g/m^3$) | | | |
| 2017 | 0.0345 | 0.0199 | 0.9 | 0.01 | 0.05 |

## CalEEMod Results

# 1491-1493 Oak Grove Avenue, Burlingame

**San Mateo County, Annual**

## 1.0 Project Characteristics

### 1.1 Land Usage

| Land Uses | Size | Metric | Lot Acreage | Floor Surface Area | Population |
|---|---|---|---|---|---|
| Enclosed Parking with Elevator | 12.00 | Space | 0.00 | 4,800.00 | 0 |
| Unenclosed Parking Structure | 5.00 | Space | 0.00 | 2,000.00 | 0 |
| Condo/Townhouse High Rise | 10.00 | Dwelling Unit | 0.20 | 10,000.00 | 29 |

### 1.2 Other Project Characteristics

| | | | | | |
|---|---|---|---|---|---|
| **Urbanization** | Urban | **Wind Speed (m/s)** | 2.2 | **Precipitation Freq (Days)** | 70 |
| **Climate Zone** | 5 | | | **Operational Year** | 2014 |
| **Utility Company** | Pacific Gas & Electric Company | | | | |
| **CO2 Intensity (lb/MWhr)** | 429 | **CH4 Intensity (lb/MWhr)** | 0.029 | **N2O Intensity (lb/MWhr)** | 0.006 |

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

Project Characteristics - Revised emission intensity standards

Land Use - proposed lot area is 8774 sq feet i.e. 0.201 acres (obtained from site plan)

Construction Phase - Construction schedule obtained from clients

Off-road Equipment - equipment list (client provided contruction schedule)

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Trips and VMT - Altered trip distance for construction risk assessment
Daily cement trips= 30 round trip=30*2= 60 trips

Demolition -

Grading - 2100 CU exported

Architectural Coating -

Energy Use - 25% reduction in title 24 values for residential uses and 30% reduction for non residential uses

Construction Off-road Equipment Mitigation - BMP
and adjusting engines to tier 4 for vehicles with power rating > 50 hp

Waste Mitigation -

| Table Name | Column Name | Default Value | New Value |
|---|---|---|---|
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 5.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 2.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 1.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 3.00 |
| tblConstEquipMitigation | NumberOfEquipmentMitigated | 0.00 | 4.00 |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstEquipMitigation | Tier | No Change | Tier 4 Final |
| tblConstructionPhase | NumDays | 5.00 | 40.00 |

| | | | |
|---|---|---|---|
| tblConstructionPhase | NumDays | 100.00 | 75.00 |
| tblConstructionPhase | NumDays | 10.00 | 2.00 |
| tblConstructionPhase | NumDays | 2.00 | 10.00 |
| tblConstructionPhase | NumDays | 5.00 | 10.00 |
| tblConstructionPhase | NumDays | 1.00 | 2.00 |
| tblConstructionPhase | PhaseEndDate | 8/16/2017 | 8/9/2017 |
| tblConstructionPhase | PhaseEndDate | 5/15/2017 | 5/3/2017 |
| tblConstructionPhase | PhaseEndDate | 1/31/2017 | 1/30/2017 |
| tblConstructionPhase | PhaseEndDate | 2/9/2017 | 6/21/2017 |
| tblConstructionPhase | PhaseEndDate | 1/5/2017 | 1/17/2017 |
| tblConstructionPhase | PhaseEndDate | 5/8/2017 | 1/26/2017 |
| tblConstructionPhase | PhaseStartDate | 6/22/2017 | 6/15/2017 |
| tblConstructionPhase | PhaseStartDate | 1/31/2017 | 1/19/2017 |
| tblConstructionPhase | PhaseStartDate | 1/18/2017 | 1/17/2017 |
| tblConstructionPhase | PhaseStartDate | 1/27/2017 | 6/8/2017 |
| tblConstructionPhase | PhaseStartDate | 1/4/2017 | 1/14/2017 |
| tblConstructionPhase | PhaseStartDate | 5/4/2017 | 1/24/2017 |
| tblGrading | AcresOfGrading | 0.00 | 0.50 |
| tblGrading | MaterialExported | 0.00 | 2,100.00 |
| tblLandUse | LotAcreage | 0.11 | 0.00 |
| tblLandUse | LotAcreage | 0.05 | 0.00 |
| tblLandUse | LotAcreage | 0.16 | 0.20 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 5.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 4.00 | 0.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |
| 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 | 2.00 | 1.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 2.00 | 0.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 2.00 | 1.00 |
| tblOffRoadEquipment | OffRoadEquipmentUnitAmount | 1.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 4.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 8.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 1.00 | 6.00 |
| tblOffRoadEquipment | UsageHours | 1.00 | 8.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 0.00 |
| tblOffRoadEquipment | UsageHours | 6.00 | 5.60 |
| tblOffRoadEquipment | UsageHours | 7.00 | 0.00 |
| tblProjectCharacteristics | CO2IntensityFactor | 641.35 | 429 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |

| | | | |
|---|---|---|---|
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripLength | 20.00 | 0.50 |
| tblTripsAndVMT | HaulingTripNumber | 0.00 | 60.00 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | VendorTripLength | 7.30 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |
| tblTripsAndVMT | WorkerTripLength | 12.40 | 0.50 |

## 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 | | | | | |
| 2017 | 0.1852 | 0.6056 | 0.5306 | 6.8000e-004 | 0.0395 | 0.0437 | 0.0832 | 0.0204 | 0.0421 | 0.0625 | 0.0000 | 60.5801 | 60.5801 | 0.0115 | 0.0000 | 60.8206 |
| **Total** | **0.1852** | **0.6056** | **0.5306** | **6.8000e-004** | **0.0395** | **0.0437** | **0.0832** | **0.0204** | **0.0421** | **0.0625** | **0.0000** | **60.5801** | **60.5801** | **0.0115** | **0.0000** | **60.8206** |

**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 | | | | | |
| 2017 | 0.1169 | 0.0390 | 0.4825 | 6.8000e-004 | 0.0179 | 1.0200e-003 | 0.0190 | 4.6500e-003 | 1.0100e-003 | 5.6600e-003 | 0.0000 | 60.5800 | 60.5800 | 0.0115 | 0.0000 | 60.8205 |
| **Total** | **0.1169** | **0.0390** | **0.4825** | **6.8000e-004** | **0.0179** | **1.0200e-003** | **0.0190** | **4.6500e-003** | **1.0100e-003** | **5.6600e-003** | **0.0000** | **60.5800** | **60.5800** | **0.0115** | **0.0000** | **60.8205** |

| | **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** | **N20** | **CO2e** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Percent Reduction** | **36.86** | **93.56** | **9.07** | **0.00** | **54.59** | **97.67** | **77.23** | **77.21** | **97.60** | **90.94** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** |

## 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 | 1/1/2017 | 1/3/2017 | 5 | 2 | |
| 2 | Site Preparation | Site Preparation | 1/14/2017 | 1/17/2017 | 5 | 2 | |
| 3 | Grading | Grading | 1/17/2017 | 1/30/2017 | 5 | 10 | |
| 4 | Building Construction | Building Construction | 1/19/2017 | 5/3/2017 | 5 | 75 | |
| 5 | Trenching | Trenching | 1/24/2017 | 1/26/2017 | 5 | 3 | |
| 6 | Paving | Paving | 6/8/2017 | 6/21/2017 | 5 | 10 | |
| 7 | Architectural Coating | Architectural Coating | 6/15/2017 | 8/9/2017 | 5 | 40 | |

**Acres of Grading (Site Preparation Phase): 0.5**

**Acres of Grading (Grading Phase): 0**

**Acres of Paving: 0**

**Residential Indoor: 20,250; Residential Outdoor: 6,750; Non-Residential Indoor: 10,200; Non-Residential Outdoor: 3,400 (Architectural**

### OffRoad Equipment

| Phase Name | Offroad Equipment Type | Amount | Usage Hours | Horse Power | Load Factor |
|---|---|---|---|---|---|
| Demolition | Concrete/Industrial Saws | 0 | 0.00 | 81 | 0.73 |
| Demolition | Excavators | 1 | 6.00 | 162 | 0.38 |
| Demolition | Rubber Tired Dozers | 1 | 6.00 | 255 | 0.40 |
| Demolition | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Site Preparation | Graders | 0 | 0.00 | 174 | 0.41 |
| Site Preparation | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Site Preparation | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| Grading | Concrete/Industrial Saws | 0 | 0.00 | 81 | 0.73 |
| Grading | Excavators | 1 | 5.60 | 162 | 0.38 |
| Grading | Rubber Tired Dozers | 1 | 8.00 | 255 | 0.40 |
| Grading | Tractors/Loaders/Backhoes | 1 | 5.60 | 97 | 0.37 |
| Building Construction | Cranes | 0 | 0.00 | 226 | 0.29 |
| Building Construction | Forklifts | 1 | 8.00 | 89 | 0.20 |
| Building Construction | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| Building Construction | Welders | 0 | 0.00 | 46 | 0.45 |
| Trenching | Tractors/Loaders/Backhoes | 1 | 8.00 | 97 | 0.37 |
| Paving | Cement and Mortar Mixers | 0 | 0.00 | 9 | 0.56 |
| Paving | Pavers | 0 | 0.00 | 125 | 0.42 |
| Paving | Rollers | 0 | 0.00 | 80 | 0.38 |
| Paving | Tractors/Loaders/Backhoes | 0 | 0.00 | 97 | 0.37 |
| Architectural Coating | Air Compressors | 5 | 8.00 | 78 | 0.48 |

### 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 | 2 | 5.00 | 0.00 | 25.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |
| Site Preparation | 2 | 5.00 | 0.00 | 263.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |
| Grading | 3 | 8.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |
| Building Construction | 2 | 10.00 | 2.00 | 60.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |
| Trenching | 1 | 3.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |
| Paving | 0 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | LD_Mix | HDT_Mix | HHDT |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Architectural Coating | 5 | 2.00 | 0.00 | 0.00 | 0.50 | 0.50 | 0.50 | 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 - 2017

**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 | | | | | 2.7100e-003 | 0.0000 | 2.7100e-003 | 4.1000e-004 | 0.0000 | 4.1000e-004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 1.1600e-003 | 0.0129 | 0.0100 | 1.0000e-005 | | 6.1000e-004 | 6.1000e-004 | | 5.6000e-004 | 5.6000e-004 | 0.0000 | 0.9874 | 0.9874 | 3.0000e-004 | 0.0000 | 0.9938 |
| **Total** | **1.1600e-003** | **0.0129** | **0.0100** | **1.0000e-005** | **2.7100e-003** | **6.1000e-004** | **3.3200e-003** | **4.1000e-004** | **5.6000e-004** | **9.7000e-004** | **0.0000** | **0.9874** | **0.9874** | **3.0000e-004** | **0.0000** | **0.9938** |

**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 | 1.5000e-004 | 3.6000e-004 | 2.5000e-003 | 0.0000 | 1.0000e-005 | 0.0000 | 1.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0394 | 0.0394 | 0.0000 | 0.0000 | 0.0395 |
| 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.5400e-003 | 2.5400e-003 | 0.0000 | 0.0000 | 2.5500e-003 |
| **Total** | **1.6000e-004** | **3.6000e-004** | **2.5400e-003** | **0.0000** | **1.0000e-005** | **0.0000** | **1.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0420** | **0.0420** | **0.0000** | **0.0000** | **0.0420** |

**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 | | | | | 1.2200e-003 | 0.0000 | 1.2200e-003 | 9.0000e-005 | 0.0000 | 9.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 1.3000e-004 | 5.6000e-004 | 5.9800e-003 | 1.0000e-005 | | 2.0000e-005 | 2.0000e-005 | | 2.0000e-005 | 2.0000e-005 | 0.0000 | 0.9874 | 0.9874 | 3.0000e-004 | 0.0000 | 0.9938 |
| **Total** | **1.3000e-004** | **5.6000e-004** | **5.9800e-003** | **1.0000e-005** | **1.2200e-003** | **2.0000e-005** | **1.2400e-003** | **9.0000e-005** | **2.0000e-005** | **1.1000e-004** | **0.0000** | **0.9874** | **0.9874** | **3.0000e-004** | **0.0000** | **0.9938** |

**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 | 1.5000e-004 | 3.6000e-004 | 2.5000e-003 | 0.0000 | 1.0000e-005 | 0.0000 | 1.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0394 | 0.0394 | 0.0000 | 0.0000 | 0.0395 |
| 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.5400e-003 | 2.5400e-003 | 0.0000 | 0.0000 | 2.5500e-003 |
| **Total** | **1.6000e-004** | **3.6000e-004** | **2.5400e-003** | **0.0000** | **1.0000e-005** | **0.0000** | **1.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0420** | **0.0420** | **0.0000** | **0.0000** | **0.0420** |

## 3.3 Site Preparation - 2017

### 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 | | | | | 6.4100e-003 | 0.0000 | 6.4100e-003 | 3.3600e-003 | 0.0000 | 3.3600e-003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 1.5100e-003 | 0.0162 | 0.0123 | 1.0000e-005 | | 8.4000e-004 | 8.4000e-004 | | 7.7000e-004 | 7.7000e-004 | 0.0000 | 1.1143 | 1.1143 | 3.4000e-004 | 0.0000 | 1.1214 |
| **Total** | **1.5100e-003** | **0.0162** | **0.0123** | **1.0000e-005** | **6.4100e-003** | **8.4000e-004** | **7.2500e-003** | **3.3600e-003** | **7.7000e-004** | **4.1300e-003** | **0.0000** | **1.1143** | **1.1143** | **3.4000e-004** | **0.0000** | **1.1214** |

### 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 | 1.5600e-003 | 3.7700e-003 | 0.0263 | 1.0000e-005 | 6.0000e-005 | 2.0000e-005 | 7.0000e-005 | 2.0000e-005 | 2.0000e-005 | 3.0000e-005 | 0.0000 | 0.4149 | 0.4149 | 1.0000e-005 | 0.0000 | 0.4151 |
| 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.5400e-003 | 2.5400e-003 | 0.0000 | 0.0000 | 2.5500e-003 |
| **Total** | **1.5700e-003** | **3.7700e-003** | **0.0264** | **1.0000e-005** | **6.0000e-005** | **2.0000e-005** | **7.0000e-005** | **2.0000e-005** | **2.0000e-005** | **3.0000e-005** | **0.0000** | **0.4174** | **0.4174** | **1.0000e-005** | **0.0000** | **0.4176** |

### 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 | | | | | 2.8800e-003 | 0.0000 | 2.8800e-003 | 7.6000e-004 | 0.0000 | 7.6000e-004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 1.5000e-004 | 6.3000e-004 | 6.3000e-003 | 1.0000e-005 | | 2.0000e-005 | 2.0000e-005 | | 2.0000e-005 | 2.0000e-005 | 0.0000 | 1.1143 | 1.1143 | 3.4000e-004 | 0.0000 | 1.1214 |
| **Total** | **1.5000e-004** | **6.3000e-004** | **6.3000e-003** | **1.0000e-005** | **2.8800e-003** | **2.0000e-005** | **2.9000e-003** | **7.6000e-004** | **2.0000e-005** | **7.8000e-004** | **0.0000** | **1.1143** | **1.1143** | **3.4000e-004** | **0.0000** | **1.1214** |

### 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 | 1.5600e-003 | 3.7700e-003 | 0.0263 | 1.0000e-005 | 6.0000e-005 | 2.0000e-005 | 7.0000e-005 | 2.0000e-005 | 2.0000e-005 | 3.0000e-005 | 0.0000 | 0.4149 | 0.4149 | 1.0000e-005 | 0.0000 | 0.4151 |
| 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.5400e-003 | 2.5400e-003 | 0.0000 | 0.0000 | 2.5500e-003 |
| **Total** | **1.5700e-003** | **3.7700e-003** | **0.0264** | **1.0000e-005** | **6.0000e-005** | **2.0000e-005** | **7.0000e-005** | **2.0000e-005** | **2.0000e-005** | **3.0000e-005** | **0.0000** | **0.4174** | **0.4174** | **1.0000e-005** | **0.0000** | **0.4176** |

## 3.4 Grading - 2017

### 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 | | | | | 0.0301 | 0.0000 | 0.0301 | 0.0166 | 0.0000 | 0.0166 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 8.3300e-003 | 0.0907 | 0.0701 | 7.0000e-005 | | 4.5600e-003 | 4.5600e-003 | | 4.1900e-003 | 4.1900e-003 | 0.0000 | 6.8569 | 6.8569 | 2.1000e-003 | 0.0000 | 6.9010 |
| **Total** | **8.3300e-003** | **0.0907** | **0.0701** | **7.0000e-005** | **0.0301** | **4.5600e-003** | **0.0347** | **0.0166** | **4.1900e-003** | **0.0207** | **0.0000** | **6.8569** | **6.8569** | **2.1000e-003** | **0.0000** | **6.9010** |

### 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 | 9.0000e-005 | 3.0000e-005 | 3.6000e-004 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0203 | 0.0203 | 0.0000 | 0.0000 | 0.0204 |
| **Total** | **9.0000e-005** | **3.0000e-005** | **3.6000e-004** | **0.0000** | **1.0000e-005** | **0.0000** | **2.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0203** | **0.0203** | **0.0000** | **0.0000** | **0.0204** |

### 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 | | | | | 0.0136 | 0.0000 | 0.0136 | 3.7200e-003 | 0.0000 | 3.7200e-003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 9.0000e-004 | 3.9000e-003 | 0.0421 | 7.0000e-005 | | 1.2000e-004 | 1.2000e-004 | | 1.2000e-004 | 1.2000e-004 | 0.0000 | 6.8569 | 6.8569 | 2.1000e-003 | 0.0000 | 6.9010 |
| **Total** | **9.0000e-004** | **3.9000e-003** | **0.0421** | **7.0000e-005** | **0.0136** | **1.2000e-004** | **0.0137** | **3.7200e-003** | **1.2000e-004** | **3.8400e-003** | **0.0000** | **6.8569** | **6.8569** | **2.1000e-003** | **0.0000** | **6.9010** |

### 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 | 9.0000e-005 | 3.0000e-005 | 3.6000e-004 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0203 | 0.0203 | 0.0000 | 0.0000 | 0.0204 |
| **Total** | **9.0000e-005** | **3.0000e-005** | **3.6000e-004** | **0.0000** | **1.0000e-005** | **0.0000** | **2.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0203** | **0.0203** | **0.0000** | **0.0000** | **0.0204** |

## 3.5 Building Construction - 2017

### 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 | 0.0198 | 0.1826 | 0.1366 | 1.7000e-004 | | 0.0142 | 0.0142 | | 0.0131 | 0.0131 | 0.0000 | 16.1429 | 16.1429 | 4.9500e-003 | 0.0000 | 16.2468 |
| **Total** | **0.0198** | **0.1826** | **0.1366** | **1.7000e-004** | | **0.0142** | **0.0142** | | **0.0131** | **0.0131** | **0.0000** | **16.1429** | **16.1429** | **4.9500e-003** | **0.0000** | **16.2468** |

### 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 | 3.6000e-004 | 8.6000e-004 | 6.0100e-003 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 1.0000e-005 | 0.0000 | 0.0947 | 0.0947 | 0.0000 | 0.0000 | 0.0947 |
| Vendor | 6.5000e-004 | 1.9200e-003 | 9.8700e-003 | 0.0000 | 3.0000e-005 | 1.0000e-005 | 5.0000e-005 | 1.0000e-005 | 1.0000e-005 | 2.0000e-005 | 0.0000 | 0.2145 | 0.2145 | 0.0000 | 0.0000 | 0.2145 |
| Worker | 8.3000e-004 | 2.5000e-004 | 3.3600e-003 | 0.0000 | 1.4000e-004 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.1907 | 0.1907 | 2.0000e-005 | 0.0000 | 0.1910 |
| **Total** | **1.8400e-003** | **3.0300e-003** | **0.0192** | **0.0000** | **1.8000e-004** | **1.0000e-005** | **2.1000e-004** | **5.0000e-005** | **1.0000e-005** | **7.0000e-005** | **0.0000** | **0.4998** | **0.4998** | **2.0000e-005** | **0.0000** | **0.5003** |

### 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 | 2.1300e-003 | 9.2300e-003 | 0.1314 | 1.7000e-004 | | 2.8000e-004 | 2.8000e-004 | | 2.8000e-004 | 2.8000e-004 | 0.0000 | 16.1429 | 16.1429 | 4.9500e-003 | 0.0000 | 16.2467 |
| **Total** | **2.1300e-003** | **9.2300e-003** | **0.1314** | **1.7000e-004** | | **2.8000e-004** | **2.8000e-004** | | **2.8000e-004** | **2.8000e-004** | **0.0000** | **16.1429** | **16.1429** | **4.9500e-003** | **0.0000** | **16.2467** |

### 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 | 3.6000e-004 | 8.6000e-004 | 6.0100e-003 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 1.0000e-005 | 0.0000 | 0.0947 | 0.0947 | 0.0000 | 0.0000 | 0.0947 |
| Vendor | 6.5000e-004 | 1.9200e-003 | 9.8700e-003 | 0.0000 | 3.0000e-005 | 1.0000e-005 | 5.0000e-005 | 1.0000e-005 | 1.0000e-005 | 2.0000e-005 | 0.0000 | 0.2145 | 0.2145 | 0.0000 | 0.0000 | 0.2145 |
| Worker | 8.3000e-004 | 2.5000e-004 | 3.3600e-003 | 0.0000 | 1.4000e-004 | 0.0000 | 1.4000e-004 | 4.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.1907 | 0.1907 | 2.0000e-005 | 0.0000 | 0.1910 |
| **Total** | **1.8400e-003** | **3.0300e-003** | **0.0192** | **0.0000** | **1.8000e-004** | **1.0000e-005** | **2.1000e-004** | **5.0000e-005** | **1.0000e-005** | **7.0000e-005** | **0.0000** | **0.4998** | **0.4998** | **2.0000e-005** | **0.0000** | **0.5003** |

## 3.6 Trenching - 2017

### 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 | 4.8000e-004 | 4.5700e-003 | 3.5900e-003 | 0.0000 | | 3.4000e-004 | 3.4000e-004 | | 3.2000e-004 | 3.2000e-004 | 0.0000 | 0.4331 | 0.4331 | 1.3000e-004 | 0.0000 | 0.4359 |
| **Total** | **4.8000e-004** | **4.5700e-003** | **3.5900e-003** | **0.0000** | | **3.4000e-004** | **3.4000e-004** | | **3.2000e-004** | **3.2000e-004** | **0.0000** | **0.4331** | **0.4331** | **1.3000e-004** | **0.0000** | **0.4359** |

### 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.2900e-003 | 2.2900e-003 | 0.0000 | 0.0000 | 2.2900e-003 |
| **Total** | **1.0000e-005** | **0.0000** | **4.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **2.2900e-003** | **2.2900e-003** | **0.0000** | **0.0000** | **2.2900e-003** |

### 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 | 6.0000e-005 | 2.5000e-004 | 3.5100e-003 | 0.0000 | | 1.0000e-005 | 1.0000e-005 | | 1.0000e-005 | 1.0000e-005 | 0.0000 | 0.4331 | 0.4331 | 1.3000e-004 | 0.0000 | 0.4359 |
| **Total** | **6.0000e-005** | **2.5000e-004** | **3.5100e-003** | **0.0000** | | **1.0000e-005** | **1.0000e-005** | | **1.0000e-005** | **1.0000e-005** | **0.0000** | **0.4331** | **0.4331** | **1.3000e-004** | **0.0000** | **0.4359** |

### 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 | 1.0000e-005 | 0.0000 | 4.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 2.2900e-003 | 2.2900e-003 | 0.0000 | 0.0000 | 2.2900e-003 |
| **Total** | **1.0000e-005** | **0.0000** | **4.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **2.2900e-003** | **2.2900e-003** | **0.0000** | **0.0000** | **2.2900e-003** |

## 3.7 Paving - 2017

### 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 | 0.0000 | 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 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **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** |

### 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 | 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 |
| **Total** | **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** |

### 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 | 0.0000 | 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 |
| Paving | 0.0000 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **Total** | **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** |

### 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 | 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 |
| **Total** | **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** |

## 3.8 Architectural Coating - 2017

**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 | 0.1059 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 0.0443 | 0.2913 | 0.2491 | 4.0000e-004 | | 0.0231 | 0.0231 | | 0.0231 | 0.0231 | 0.0000 | 34.0434 | 34.0434 | 3.5900e-003 | 0.0000 | 34.1189 |
| **Total** | **0.1502** | **0.2913** | **0.2491** | **4.0000e-004** | | **0.0231** | **0.0231** | | **0.0231** | **0.0231** | **0.0000** | **34.0434** | **34.0434** | **3.5900e-003** | **0.0000** | **34.1189** |

**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 | 9.0000e-005 | 3.0000e-005 | 3.6000e-004 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0203 | 0.0203 | 0.0000 | 0.0000 | 0.0204 |
| **Total** | **9.0000e-005** | **3.0000e-005** | **3.6000e-004** | **0.0000** | **1.0000e-005** | **0.0000** | **2.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0203** | **0.0203** | **0.0000** | **0.0000** | **0.0204** |

**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 | 0.1059 | | | | | 0.0000 | 0.0000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Off-Road | 3.9600e-003 | 0.0172 | 0.2443 | 4.0000e-004 | | 5.3000e-004 | 5.3000e-004 | | 5.3000e-004 | 5.3000e-004 | 0.0000 | 34.0433 | 34.0433 | 3.5900e-003 | 0.0000 | 34.1188 |
| **Total** | **0.1098** | **0.0172** | **0.2443** | **4.0000e-004** | | **5.3000e-004** | **5.3000e-004** | | **5.3000e-004** | **5.3000e-004** | **0.0000** | **34.0433** | **34.0433** | **3.5900e-003** | **0.0000** | **34.1188** |

**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 | 9.0000e-005 | 3.0000e-005 | 3.6000e-004 | 0.0000 | 1.0000e-005 | 0.0000 | 2.0000e-005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0203 | 0.0203 | 0.0000 | 0.0000 | 0.0204 |
| **Total** | **9.0000e-005** | **3.0000e-005** | **3.6000e-004** | **0.0000** | **1.0000e-005** | **0.0000** | **2.0000e-005** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0203** | **0.0203** | **0.0000** | **0.0000** | **0.0204** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Project Name:** | | **1491-1493 Oak Grove** | | | | | | **Complete ALL Portions in Yellow** |
| | **See Equipment Type TAB for type, horsepower and load factor** | | | | | | | |
| | **Existing Project** | 8870 Sq ft Lot | | .2 acres | | | | |
| | **New Project Size** | **22,254** | **square feet bldngs** | **Lot .2** | **acres** | | | **building: basemant and 4.5 floors** |
| | **S.f. parking** | **17** | **Spaces** | **2626 sq ft** | **Spaces** | | | **Garage: 4477 Basement/ 2048 Ground floor sq ft** |
| | **Construction Hours** | **7AM** | **am to** | **5PM** | **pm** | | | |
| **Qty** | **Description** | **HP** | **Load Factor** | **Hours/day** | **Work Days** | **Hours per day** | **Annual Hours** | **Comments** |
| **Qty** | **Demolition** | **Start Date:** | | **Total days:** | 2 | | | |
| | | **End Date:** | | | | | | |
| 0 | Concrete/Industrial Saws | 81 | 0.73 | 0 | 0 | 0 | 0 | **Demolition Volume** |
| 1 | Excavators | 162 | 0.3819 | 6 | 2 | 6 | 12 | Square footage of buildings to be demolished: 3133 Sq Ft |
| 1 | Rubber-Tired Dozers | 255 | 0.3953 | 6 | 2 | 6 | 12 | Buildings are single story, wood frame conventional footing |
| | *Other Equipment?* | | | | | | | Flatwork, Decks, walkways Demo: 2367 sq Ft |
| | **Site Preperation(rough grade, staki** | **Start Date:** | | **Total days:** | 2 | | | |
| | | **End Date:** | | | | | | |
| 1 | Rubber Tired Dozers | 255 | 0.3953 | | 2 | 7 | 0 | |
| 1 | Tractors/Loaders/Backhoes | 97 | 0.3685 | | 2 | 5 | 0 | |
| | *Other Equipment?* | | | | | | | |
| | **Grading / Excavation (Basement)** | **Start Date:** | | **Total days:** | 10 | | | |
| | (including drainage) | **End Date:** | | | | | | **Soil Hauling Volume** |
| 1 | Excavators | 162 | 0.3819 | | 7 | 7 | 0 | Export volume = 2100 Cu Yds |
| 0 | Graders | 174 | 0.4087 | | | 0 | 0 | Import volume = **0** cubic yards? |
| 1 | Rubber Tired Dozers | 255 | 0.3953 | | 10 | 6 | 0 | |
| 1 | Tractors/Loaders/Backhoes | 97 | 0.3685 | | 7 | 5 | 0 | |
| | *Other Equipment?* | | | | | | | |
| | **Trenching (Utility)** | **Start Date:** | | **Total days:** | 3 | | | |
| | | **End Date:** | | | | | | |
| 1 | Tractor/Loader/Backhoe | 97 | 0.3685 | | 3 | 3.5 | 0 | |
| 0 | Excavators | 162 | 0.3819 | | | 0 | | |
| | *Other Equipment?* | | | | | | | |
| | **Building - Exterior** | **Start Date:** | | **Total days:** | 75 | | | **Cement Trucks? 30 Total Round-Trips** |
| | Forming, Steel placement; concrete b | **End Date:** | | | | | | |
| 0 | Cranes | 226 | 0.2881 | | 0 | | 0 | N/A |
| 1 | Forklifts (Gradeall) | 89 | 0.201 | | 75 | 3 | 0 | Deisel |
| 0 | Generator Sets | 84 | 0.74 | | | | 0 | Temp Power: PG&E |
| 1 | Loaders/Backhoes (BobCat) | 97 | 0.3685 | | 75 | 2.5 | 0 | |
| 1 | Welders | 46 | 0.45 | | 10 | 3 | 0 | Welder: Electric |
| | *Other Equipment? (Concrete Pump)* | | | | 15 | 3 | | |
| **Building -** | **Interior/Architectural Coating** | **Start Date:** | | **Total days:** | 40 | | | |
| | Wood Frame, Exterior Sheeting, | **End Date:** | | | | | | |
| 5 | Air Compressors (Nail Guns) | 78 | 0.32 | | 40 | 4 | 0 | Electric Compressors |
| 0 | Aerial Lift | 62 | 0.3 | | | 0 | 0 | |
| | *Other Equipment?* | | | | | | | |
| | **Paving** | **Start Date:** | | **Total days:** | 10 | | | **Drive ways are concrete and included in the foundation; Walkways and other surfaces will be semipermeable paver stones, installed by hand, sub base compacted with gas powered Wacker Tampers** |
| | | **Start Date:** | | | | | | |
| 0 | Cement and Mortar Mixers | 9 | 0.56 | | | 0 | 0 | |
| 0 | Pavers | 125 | 0.4154 | | | 0 | 0 | |
| 0 | Paving Equipment | 130 | 0.3551 | | | 0 | 0 | |

Equipment types listed in "Equipment Types" worksheet tab.
Equipment listed in this sheet is to provide an example of inputs
It is assumed that water trucks would be used during grading
**Add or subtract phases and equipment, as appropriate**
**Modify horepower or load factor, as appropriate**

No Water Trusck; hose from local hydrant w/ meter