2131 SAND HILL OFFICE DEVELOPMENT AIR QUALITY AND GREENHOUSE GAS EMISSIONS ASSESSMENT

Menlo Park, California

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Introduction

The purpose of this report is to address air quality and greenhouse gas (GHG) impacts associated with the 2131 Sand Hill Road office development project in Menlo Park. The project site is a part of an 11.9-acre site along Sand Hill Road. 8.3 acres of this site are currently occupied by the Stanford's Meyer-Buck House residences and the Hewlett Foundation Headquarters. The remaining 3.6 acres are currently undeveloped. The project proposes to construct a two-story office building with two levels of underground parking on this undeveloped part of the site.

Air pollutant and GHG emissions associated with construction and operation of the project were modeled. In addition, the potential construction health risk impact to nearby sensitive receptors and the impact of existing toxic air contaminant (TAC) sources affecting the proposed residences were evaluated. This analysis addresses those issues following the guidance provided by the Bay Area Air Quality Management District (BAAQMD).

Setting

The project is located in the San Mateo County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$).

Air Pollutants of Concern

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NOx). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic Air Contaminants

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically

found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by 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.[1] 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 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] *Attachment 1* includes detailed community risk modeling methodology.

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, elementary schools, and parks. For cancer risk assessments, children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Residential locations are assumed to include infants and small children. The closest sensitive receptors to the project site are residences to the south of the project boundary.

[1] Available online: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed: November 21, 2014.
[2] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

Greenhouse Gases

Gases that trap heat in the atmosphere, GHGs, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide (CO_2) and water vapor but there are also several others, most importantly methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These are released into the earth's atmosphere through a variety of natural processes and human activities. Sources of GHGs are generally as follows:

- CO_2 and N_2O are byproducts of fossil fuel combustion.
- N_2O is associated with agricultural operations such as fertilization of crops.
- CH_4 is commonly created by off-gassing from agricultural practices (e.g., keeping livestock) and landfill operations.
- Chlorofluorocarbons (CFCs) were widely used as refrigerants, propellants, and cleaning solvents but their production has been stopped by international treaty.
- HFCs are now used as a substitute for CFCs in refrigeration and cooling.
- PFCs and sulfur hexafluoride emissions are commonly created by industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect upon the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with CO_2 being assigned a value of 1 and sulfur hexafluoride being several orders of magnitude stronger with a GWP of 23,900. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of CO_2 equivalents (CO_2e).

An expanding body of scientific research supports the theory that global warming is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California could be adversely affected by the global warming trend. Increased precipitation and sea level rise could increase coastal flooding, saltwater intrusion, and degradation of wetlands. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes and drought; and increased levels of air pollution.

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.

The BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693). The order requires the BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds (Cal. Court of Appeal, First Appellate District, Case Nos. A135335 & A136212). CBIA sought review by the California Supreme Court on three issues, including the appellate court's decision to uphold the BAAQMD's adoption of the thresholds, and the Court granted review on just one: Under what circumstances, if any, does CEQA require an analysis of how existing environmental conditions will impact future residents or users of a proposed project? In December 2015, the Supreme Court determined that an analysis of the impacts of the environment on a project – known as "CEQA-in-reverse" – is only required under two limited circumstances: (1) when a statute provides an express legislative directive to consider such impacts; and (2) when a proposed project risks exacerbating environmental hazards or conditions that already exist (Cal. Supreme Court Case No. S213478). The Supreme Court reversed the Court of Appeal's decision and remanded the matter back to the appellate court to reconsider the case in light of the Supreme Court's ruling. Accordingly, the case is currently pending back in the Court of Appeal. Because the Supreme Court's holding concerns the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment), and not the science behind the thresholds, the significance thresholds contained in the 2011 CEQA Air Quality Guidelines are applied to this project.

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)
Criteria Air Pollutants			
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (Exhaust)	82	15
$PM_{2.5}$	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards for Single Sources			
Excess Cancer Risk	>10 per one million		
Hazard Index	>1.0		
Incremental annual $PM_{2.5}$	>0.3 µg/m^3		
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		
Hazard Index	>10.0		
Annual Average $PM_{2.5}$	>0.8 µg/m^3		
Greenhouse Gas Emissions			
GHG Annual Emissions	Compliance with a Qualified GHG Reduction Strategy OR 1,100 metric tons or 4.6 metric tons per capita		

Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less; and GHG = greenhouse gas.

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

The Bay Area is considered a non-attainment area for ground-level ozone and fine particulate matter ($PM_{2.5}$) under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for respirable particulates or particulate matter with a diameter of less than 10 micrometers (PM_{10}) under the California Clean Air Act, but not the Federal act. The area has attained both State and Federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the

BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NOx), PM_{10} and $PM_{2.5}$ and apply to both construction period and operational period impacts.

Due to the project size, construction exhaust and operational period emissions would be less than significant. In their 2011 update to the *CEQA Air Quality Guidelines*, BAAQMD identified the size of land use projects that could result in significant air pollutant emissions. For construction exhaust impacts, the general office building size was identified at 277,000 square feet (sf). Since the project proposes construction of a 39,510 sf. office building, it is concluded that emissions would be below the BAAQMD significance thresholds for construction exhaust emissions.

However, construction activities, particularly during site preparation and grading would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. The BAAQMD *CEQA Air Quality Guidelines* consider these impacts to be less than significant if best management practices are employed to reduce these emissions. Implementation of Mitigation Measure AQ-1 would reduce this impact to a level of *less than significant*.

Mitigation Measure AQ-1: Include measures to control dust emissions.

Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality and fugitive dust-related impacts associated with grading and new construction to a less than significant. 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.

For operational impacts, the project screening size was identified at 346,000 sf. Since the project proposes 39,510 sf, it is concluded that emissions would be below the BAAQMD significance thresholds for operational emissions.

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

Project impacts related to increased community risk can occur either by introducing a new sensitive receptor, such as a residential use, in proximity to an existing source of TACs or by introducing a new source of TACs with the potential to adversely affect existing sensitive receptors in the project vicinity. The BAAQMD recommends using a 1,000-foot screening radius around a project site for purposes of identifying community health risk from siting a new sensitive receptor or a new source of TACs. Operation of the project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. No stationary sources of TACs, such as generators, are proposed as part of the project. The project would not introduce new sensitive receptors to the area. Construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors (residences).

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 $PM_{2.5}$.[3] The closest sensitive receptors to the project site are the residences to the south of the project boundary (see Figure 1). Emissions and dispersion modeling was conducted to predict the off-site concentrations resulting from project construction, so that lifetime cancer risks and non-cancer health effects could be evaluated.

Construction activities, particularly during site preparation and grading would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. Fugitive dust emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. Fugitive dust emissions would also depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less than significant if best management practices are employed to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-required best management practices.*

Construction Period Emissions

Construction activity is anticipated to include grading, site preparation, trenching, building construction, paving, and architectural coating. Construction period emissions were modeled using the California Emissions Estimator Model, Version 2013.2.2 (CalEEMod). A construction buildout schedule, including proposed equipment list, was provided by the project applicant and input to the model. The proposed project land use was entered into CalEEMod, which included 39,510 sf entered as "General Office Building", 116 spaces as "Enclosed Parking with Elevator", and 42 spaces as "Parking Lot" on a 3.6-acre site. Construction of the project is anticipated to take about 15 months. The CalEEMod modeling included emissions from truck and worker travel on or near the site, assumed to occur over a distance of 0.5 miles. During the construction phase, 1,200 cement truck trips are anticipated. During paving, 20 asphalt truck trips are expected and were entered into the model. Export of 25,800 cubic yard (cy) of soil is expected for the garage and was entered into the model. Additionally, import of 1,500 cy of base rock is anticipated for the site hardscape and was also entered into the model. CalEEMod computes truck hauling trips based on the amount of material hauled.

Emissions (assumed to be Diesel Particulate Matter) for the off-road construction equipment and exhaust emissions from on-road vehicles, with total emissions from all construction stages were computed by CalEEMod as 0.0837 tons (167 pounds). The on-road emissions are a result of haul truck travel during demolition and grading activities, worker travel, and vendor deliveries during construction. These emissions from on-road vehicles traveling at or near the site were modeled as occurring at the construction site. Fugitive $PM_{2.5}$ dust emissions were calculated by CalEEMod as 6.5 pounds for the overall construction period.

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

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was 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 AERMOD dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[4] The AERMOD 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 five-year data set (2006-2010) of hourly meteorological data from the Palo Alto Airport that was prepared for use with the AERMOD model by BAAQMD for use in health risk assessments. Annual DPM and $PM_{2.5}$ concentrations from construction activities during 2017 and 2018 were calculated using the model.

The maximum-modeled DPM concentration occurred just south of the construction site at a single-family residence near the site. The maximum $PM_{2.5}$ concentration occurred at the same location as the cancer risk MEI. The location where the maximum $PM_{2.5}$ and DPM concentrations occurred (and maximum cancer risk) is identified on Figure 1.

The detailed emission modeling results and health risk calculations can be found in *Attachment 2*.

Cancer Risks

Results of this assessment indicate that the maximum excess residential cancer risks would be 58.7 in one million for an infant exposure and 1.0 in one million for an adult exposure. The maximum residential excess cancer risk would be greater than the BAAQMD significance threshold of 10 in one million. *Implementation of Mitigation Measures 1 and 2 would reduce this impact to a level of less than significant.*

Predicted Annual $PM_{2.5}$ Concentration

The maximum-modeled annual $PM_{2.5}$ concentration, which is based on combined exhaust and fugitive dust emissions, was 0.21 $\mu g/m^3$, occurring at the residential MEI. The maximum annual

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

$PM_{2.5}$ concentration at the MEI residential receptor location would not exceed the BAAQMD significance threshold of 0.3 $\mu g/m^3$.

Non-Cancer Hazards

The maximum modeled annual residential DPM concentration (i.e., from construction exhaust) was 0.18 $\mu g/m^3$. The maximum computed HI based on this DPM concentration is 0.036, which is much lower than the BAAQMD significance criterion of a HI greater than 1.0.

Combined Construction Risk Assessment

Community health risk assessments also typically look at all substantial sources of TACs that can affect sensitive receptors that are located within 1,000 feet of a project site. These sources include freeways or highways, busy surface streets and stationary sources identified by BAAQMD. Traffic on high volume roadways is a source of TAC emissions that may adversely affect sensitive receptors in close proximity to the roadway. For local roadways, BAAQMD considers roadways with traffic volumes of over 10,000 vehicles per day to have a potentially significant impact on a proposed project. A review of the project area indicates that traffic on Sand Hill Road is the only substantial source of mobile TAC emissions within 1,000 feet of project site. A review of BAAQMD's Google Earth map tool used to identify stationary sources revealed one source with the potential to affect the project site. Cumulative risk impacts from these sources upon the construction MEI (i.e., location where maximum construction health risk impacts occurred) are reported in Table 2.

Roadway- Sand Hill Road Impacts

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

The calculator uses EMFAC2011 emission rates for the year 2014. Overall, emission rates will decrease by the time the project is constructed and occupied. The project is not likely to be occupied prior to 2018. In addition, a new version of the emissions factor model, EMFAC2014 is available. This version predicts lower emission rates. An adjustment factor of 0.5 was developed by comparing emission rates of total organic gases (TOG) for running exhaust and running losses developed using EMFAC2011 for year 2014 and those from EMFAC2014 for year 2018.

The predicted cancer risk was then adjusted using a factor of 1.3744 to account for new OEHHA guidance. This factor was provided by BAAQMD for use with their CEQA screening tools that are used to predict cancer risk.[5]

[5] Correspondence with Alison Kirk, BAAQMD, November 23, 2015.

There are several local roadways near the project site, with the busiest being Sand Hill Road. The Annual Average Daily Traffic on Sand Hill Road was estimated based on the average of peak AM and PM traffic volumes at the Sand Hill Road and Santa Cruz Avenue Intersection which is situated to the north of the project site[6]. Using the BAAQMD *Roadway Screening Analysis Calculator* for San Mateo County for east-west directional roadways and at a distance of approximately 330 feet south of the roadway, estimated cancer risk from Sand Hill Road at the construction MEI would be 1.75 per million and $PM_{2.5}$ concentration would be 0.06 $\mu g/m^3$. Chronic or acute HI for the roadway would be below 0.02.

Stationary Sources

Permitted stationary sources of air pollution near the project site were identified using BAAQMD's *Stationary Source Risk & Hazard Analysis Tool*. This mapping tool uses Google Earth and identified the location of two stationary sources and their estimated risk and hazard impacts. The identified sources were entered into a Risk & Hazard Stationary Source Inquiry Form that was submitted to BAAQMD to confirm these sources and obtain updated risk and hazard information, which the District provided.[7]

Plant G2945, which is a Gasoline Dispensing Station operated by Shell located at 125 Sharon Park Drive, is about 550 feet northeast of the cancer risk and PM 2.5 MEI. At BAAQMD's direction, risk and $PM_{2.5}$ concentrations from the facility were adjusted based on BAAQMD's *Distance Adjustment Multiplier Tool for Gasoline Dispensing Facilities*. According to the BAAQMD screening data (and adjusted for the 550-foot distance and 2015 OEHHA methodology), this facility would result in an adjusted adult cancer risk of 1.9 per million, $PM_{2.5}$ concentration of 0.01 $\mu g/m^3$ HI of <0.01, which would all be below BAAQMD thresholds of significance

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[6] The ADT is assumed to be 10 percent of the average peak-hour traffic volume.
[7] Email correspondence from Alison Kirk, BAAQMD to Illingworth & Rodkin, Inc. on September 28, 2016 (See *Attachment 2*).

Table 2. Cumulative Construction Risk Assessment

Source	Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	Acute or Chronic Hazard Index
Unmitigated Project Construction	58.7	0.21	0.01
Mitigated Project Construction[1]	4.7	0.02	0.00
Sand Hill Road	1.8	0.06	<0.02
Plant #G2945 at ~550 feet (Gasoline Dispensing Facility distance multiplier)	1.9	0.01	<0.01
Total			
Unmitigated	**62.4**	0.27	<0.04
Mitigated	8.4	0.09	<0.03
BAAQMD Single Source Threshold	*10.0*	*0.8*	*10.0*
Significant?	***Yes – unmitigated No - Mitigated***	***No***	***No***
BAAQMD Cumulative Source Threshold	***100***	***0.8***	***10.0***
Significant?	***No***	***No***	***No***

[1] See Mitigation Measure 2

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

The project shall develop a plan demonstrating that the off-road equipment used on-site to construct the project would achieve a fleet-wide average 85 percent reduction in $PM_{2.5}$ exhaust emissions or more. One feasible plan to achieve this reduction would include the following:

- All mobile diesel-powered off-road equipment larger than 25 horsepower and operating on the site for more than two days shall be equipped with CARB-certified Level 3 Diesel Particulate Filters[8] or meet U.S. EPA particulate matter emissions standards for Tier 4 engines or equivalent.

- Use of alternatively-fueled equipment (i.e., non-diesel) would also 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.

Effectiveness of Mitigation Measures 1 and 2

Implementation of Mitigation Measure 1 is considered to reduce exhaust emissions by 5 percent. Implementation of Mitigation Measures 2 would further reduce on-site diesel exhaust emissions. This would reduce the cancer risk proportionally, such that the mitigated risk would be less than 4.7 in one million. After implementation of these mitigation measures, the project would have a *less-than-significant* impact with respect to community risk caused by construction activities.

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

Figure 1. Project Construction Site and Locations of Off-Site Sensitive Receptors and Maximum TAC and $PM_{2.5}$ Impacts

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

For operational GHG emissions, the screening size was identified as 53,000 square feet (sf) for general office buildings. Since, the proposes 39,510 sf of office space, it is concluded that the operational GHG emissions would not exceed the BAAQMD significance thresholds and no quantitative assessment of project GHG impacts was conducted.

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

AB 32, the Global Warming Solutions Act of 2006, codifies the State of California's GHG emissions target by directing CARB to reduce the state's global warming emissions to 1990 levels by 2020. AB 32 was signed and passed into law by Governor Schwarzenegger on September 27, 2006. Since that time, CARB, CEC, the California Public Utilities Commission (CPUC), and the Building Standards Commission have all been developing regulations that will help meet the goals of AB 32 and Executive Order S-3-05.

A Scoping Plan for AB 32 was adopted by CARB in December 2008. It contains the State of California's main strategies to reduce GHGs from BAU emissions projected in 2020 back down to 1990 levels. BAU is the projected emissions in 2020, including increases in emissions caused by growth, without any GHG reduction measures. The Scoping Plan has a range of GHG reduction actions, including direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. It required CARB and other state agencies to develop and adopt regulations and other initiatives reducing GHGs by 2012.

As directed by AB 32, CARB has also approved a statewide GHG emissions limit. On December 6, 2007, CARB staff resolved an amount of 427 MMT of CO_2e as the total statewide GHG 1990 emissions level and 2020 emissions limit. The limit is a cumulative statewide limit, not a sector- or facility-specific limit. CARB updated the future 2020 BAU annual emissions forecast, in light of the economic downturn, to 545 MMT of CO_2e. Two GHG emissions reduction measures currently enacted that were not previously included in the 2008 Scoping Plan baseline inventory were included, further reducing the baseline inventory to 507 MMT of CO_2e. Thus, an estimated reduction of 80 MMT of CO_2e is necessary to reduce statewide emissions to meet the AB 32 target by 2020.

The proposed project would not conflict or otherwise interfere with the statewide GHG reduction measures identified in CARB's Scoping Plan. The project would comply with requirements of the Green Building Code. For example, proposed buildings would be constructed in conformance with CALGreen and the Title 24 Building Code, which requires high-efficiency water fixtures and water-efficient irrigation systems.

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.[9] 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.[10] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. While the OEHHA guidelines use substantially more conservative assumptions than the current Bay Area Air Quality Management District (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.[11] 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, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD

[9] 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.
[10] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.
[11] 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.

recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

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 as follows:

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 diesel particulate matter (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, fine particulate matter ($PM_{2.5}$) 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 $PM_{2.5}$ (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.

Attachment 2: Construction Schedule, CalEEMod Output, Health Risk Calculations, Stationary Source Information

Construction Schedule

Project Name: 2131 Sand Hill Road					
Construction Phase	**Equipment (*See next page for example of commonly used equipment*)**	**Quantity**	**Average Hours Used Per Day**	**How Many Work Days**	**Fuel Type - if other than Diesel**
Demolition *N/A (Site Vacant)* **Start Date:** **End Date**:	•				
	•				
	•				
	•				
	•				
Site Preparation **Start Date:** 6/1/17 **End Date**: 7/1/17	• Excavators	1	8	22	
	• Graders	1	8	22	
	•				
	•				
	•				
Grading/Excavation **Start Date:** 7/1/17 **End Date**: 9/1/17	• Excavators	1	8	45	
	• Crawler Tractors	1	8	45	
	• Bore/Drill Rigs	1	8	15	
	•				
	•				
Trenching **Start Date:** _____ **End Date**: _____	• Excavators	1	8	5	
	• Tractors/Loaders/Backhoes	1	8	5	
	•				
	•				
	•				
Building – Exterior **Start Date:** 9/1/17 **End Date**: 7/1/18	• Cranes	1	4	216	
	• Other const. equip,	1	8	216	
	•				
	•				
	•				
Building – Interior/ Architectural Coating *N/A* **Start Date:** 7/1/18 **End Date**: 9/1/18	•				
	•				
	•				
	•				
	•				
Finish Grading/ Paving **Start Date:** 7/1/18 **End Date**:9/1/18	• Graders	1	8	45	
	• Tractors/Loaders/Backhoes	1	8	45	
	•				
	•				
	•				
OTHER – Provide as Applicable					
Soil Hauling Volume	Export volume = 25,800 cubic yards – Garage soil Import volume =1,500 cubic yards – Base rock for site hardscape				

Project Name: 2131 Sand Hill Road					
Construction Phase	**Equipment (*See next page for example of commonly used equipment*)**	**Quantity**	**Average Hours Used Per Day**	**How Many Work Days**	**Fuel Type - if other than Diesel**
Demolition Volume	0 – No existing structures				
Power	Line Power (Y/N) Y or Generator use (Y/N) N? If generator use, then fuel type (diesel/gasoline/propane) N/A				
Cement	Cement Trucks = 600 Total Round-Trips OR Cement = __ cubic yards				
Asphalt	____ cy or 10 round trips				

Example of Equipment Commonly Used for Each Construction Phase
Demolition
Concrete/Industrial Saws
Excavators
Rubber-Tired Dozers
Site Preparation
Rubber Tired Dozers
Tractors/Loaders/Backhoes
Grading / Excavation
Excavators
Graders
Scrapers
Rubber Tired Dozers
Tractors/Loaders/Backhoes
Trenching
Excavator
Tractor/Loader/Backhoe
Building - Exterior
Cranes
Forklifts
Generator Sets
Tractors/Loaders/Backhoes
Welders
Building – Interior/ Architectural Coating
Air Compressors
Aerial Lift
Paving
Cement and Mortar Mixers
Pavers
Paving Equipment

Rollers
Tractors/Loaders/Backhoes

CalEEMod Output

2131 Sand Hill, TAC

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	39.51	1000sqft	3.60	39,510.00	0
Enclosed Parking with Elevator	116.00	Space	0.00	46,400.00	0
Parking Lot	42.00	Space	0.00	16,800.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	429.6	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Revised Co2 Emission Intensity

Land Use - From project description and new set of Architectural Plans date August, 2016

Construction Phase - From the applicant provided construction schedule

Off-road Equipment - Applicant provided construction schedule

Off-road Equipment - Applicant provided construction schedule

Off-road Equipment - Applicant provided construction schedule

Off-road Equipment - Applicant provided construction schedule

Off-road Equipment - Applicant provided construction schedule

Trips and VMT - 1200 truck trips during the building construction phase
20 paving trips

Grading - 28500 cy soil exported
1500 cy of base rock imported

Construction Off-road Equipment Mitigation - Best Management Practices and Tier 2 mitigation

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	DPF	No Change	Level 3
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
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
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	230.00	216.00
tblConstructionPhase	NumDays	8.00	45.00
tblConstructionPhase	NumDays	18.00	45.00

tblConstructionPhase	NumDays	5.00	22.00
tblConstructionPhase	PhaseEndDate	7/2/2018	7/1/2018
tblConstructionPhase	PhaseEndDate	12/8/2017	9/1/2018
tblConstructionPhase	PhaseEndDate	6/30/2017	7/1/2017
tblConstructionPhase	PhaseEndDate	7/6/2018	10/6/2017
tblConstructionPhase	PhaseStartDate	9/2/2017	9/1/2017
tblConstructionPhase	PhaseStartDate	7/2/2017	7/1/2017
tblConstructionPhase	PhaseStartDate	10/7/2017	7/1/2018
tblConstructionPhase	PhaseStartDate	7/2/2018	10/1/2017
tblGrading	MaterialExported	0.00	28,500.00
tblGrading	MaterialImported	0.00	1,500.00
tblLandUse	LotAcreage	0.91	3.60
tblLandUse	LotAcreage	1.04	0.00
tblLandUse	LotAcreage	0.38	0.00
tblOffRoadEquipment	HorsePower	162.00	174.00
tblOffRoadEquipment	LoadFactor	0.38	0.41
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	7.00	4.00

tblProjectCharacteristics	CO2IntensityFactor	641.35	429.6
tblProjectCharacteristics	OperationalYear	2014	2019
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	1,200.00
tblTripsAndVMT	HaulingTripNumber	0.00	20.00
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	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	0.1189	1.0442	1.0386	1.0100e-003	0.0216	0.0461	0.0677	2.7500e-003	0.0424	0.0452	0.0000	92.7063	92.7063	0.0257	0.0000	93.2452

2018	0.0971	0.8929	0.7385	8.6000e-004	1.7400e-003	0.0449	0.0466	4.8000e-004	0.0413	0.0418	0.0000	77.9085	77.9085	0.0227	0.0000	78.3852
Total	**0.2161**	**1.9371**	**1.7771**	**1.8700e-003**	**0.0233**	**0.0910**	**0.1143**	**3.2300e-003**	**0.0837**	**0.0870**	**0.0000**	**170.6147**	**170.6147**	**0.0484**	**0.0000**	**171.6304**

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	0.0654	0.8452	1.1343	1.0100e-003	0.0109	3.5000e-003	0.0144	1.0700e-003	3.4600e-003	4.5300e-003	0.0000	92.7062	92.7062	0.0257	0.0000	93.2451
2018	0.0471	0.7233	0.7918	8.6000e-004	1.7400e-003	3.2500e-003	4.9800e-003	4.8000e-004	3.2300e-003	3.7100e-003	0.0000	77.9084	77.9084	0.0227	0.0000	78.3851
Total	**0.1126**	**1.5685**	**1.9261**	**1.8700e-003**	**0.0126**	**6.7500e-003**	**0.0193**	**1.5500e-003**	**6.6900e-003**	**8.2400e-003**	**0.0000**	**170.6145**	**170.6145**	**0.0484**	**0.0000**	**171.6302**

	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	**47.91**	**19.03**	**-8.38**	**0.00**	**45.94**	**92.58**	**83.09**	**52.01**	**92.01**	**90.52**	**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	Site Preparation	Site Preparation	6/1/2017	7/1/2017	5	22	
2	Grading	Grading	7/1/2017	9/1/2017	5	45	
3	Building Construction	Building Construction	9/1/2017	7/1/2018	5	216	
4	Trenching	Trenching	10/1/2017	10/6/2017	5	5	
5	Paving	Paving	7/1/2018	9/1/2018	5	45	

Acres of Grading (Site Preparation Phase): 11

Acres of Grading (Grading Phase): 22.5

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Excavators	1	8.00	162	0.38
Site Preparation	Graders	1	8.00	174	0.41
Site Preparation	Rubber Tired Dozers	0	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Bore/Drill Rigs	1	2.70	205	0.50
Grading	Crawler Tractors	1	8.00	208	0.43
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	0	8.00	174	0.41
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Cranes	1	4.00	226	0.29
Building Construction	Forklifts	0	8.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Other Construction Equipment	1	8.00	171	0.42
Building Construction	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Trenching	Excavators	1	8.00	174	0.41
Trenching	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Paving	Graders	1	8.00	174	0.41
Paving	Pavers	0	8.00	125	0.42
Paving	Paving Equipment	0	6.00	130	0.36
Paving	Rollers	0	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	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
Site Preparation	2	5.00	0.00	3,750.00	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	39.00	17.00	1,200.00	0.50	0.50	0.50	LD_Mix	HDT_Mix	HHDT
Trenching	2	5.00	0.00	0.00	0.50	0.50	0.50	LD_Mix	HDT_Mix	HHDT
Paving	2	5.00	0.00	20.00	0.50	0.50	0.50	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use DPF for Construction Equipment

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 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					7.5300e-003	0.0000	7.5300e-003	8.9000e-004	0.0000	8.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0145	0.1502	0.0909	1.3000e-004		8.1300e-003	8.1300e-003		7.4800e-003	7.4800e-003	0.0000	11.7639	11.7639	3.6000e-003	0.0000	11.8396
Total	**0.0145**	**0.1502**	**0.0909**	**1.3000e-004**	**7.5300e-003**	**8.1300e-003**	**0.0157**	**8.9000e-004**	**7.4800e-003**	**8.3700e-003**	**0.0000**	**11.7639**	**11.7639**	**3.6000e-003**	**0.0000**	**11.8396**

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	0.0223	0.0538	0.3756	7.0000e-005	8.2000e-004	2.5000e-004	1.0700e-003	2.3000e-004	2.2000e-004	4.5000e-004	0.0000	5.9158	5.9158	1.1000e-004	0.0000	5.9181
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	1.2000e-004	4.0000e-005	4.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0280	0.0280	0.0000	0.0000	0.0280
Total	**0.0224**	**0.0538**	**0.3761**	**7.0000e-005**	**8.4000e-004**	**2.5000e-004**	**1.0900e-003**	**2.4000e-004**	**2.2000e-004**	**4.6000e-004**	**0.0000**	**5.9437**	**5.9437**	**1.1000e-004**	**0.0000**	**5.9461**

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					3.3900e-003	0.0000	3.3900e-003	2.0000e-004	0.0000	2.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9000e-003	0.1075	0.0954	1.3000e-004		5.0000e-004	5.0000e-004		5.0000e-004	5.0000e-004	0.0000	11.7639	11.7639	3.6000e-003	0.0000	11.8396
Total	**4.9000e-003**	**0.1075**	**0.0954**	**1.3000e-004**	**3.3900e-003**	**5.0000e-004**	**3.8900e-003**	**2.0000e-004**	**5.0000e-004**	**7.0000e-004**	**0.0000**	**11.7639**	**11.7639**	**3.6000e-003**	**0.0000**	**11.8396**

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	0.0223	0.0538	0.3756	7.0000e-005	8.2000e-004	2.5000e-004	1.0700e-003	2.3000e-004	2.2000e-004	4.5000e-004	0.0000	5.9158	5.9158	1.1000e-004	0.0000	5.9181
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	1.2000e-004	4.0000e-005	4.9000e-004	0.0000	2.0000e-005	0.0000	2.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0280	0.0280	0.0000	0.0000	0.0280
Total	**0.0224**	**0.0538**	**0.3761**	**7.0000e-005**	**8.4000e-004**	**2.5000e-004**	**1.0900e-003**	**2.4000e-004**	**2.2000e-004**	**4.6000e-004**	**0.0000**	**5.9437**	**5.9437**	**1.1000e-004**	**0.0000**	**5.9461**

3.3 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					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0258	0.3294	0.1539	3.6000e-004		0.0133	0.0133		0.0122	0.0122	0.0000	33.2957	33.2957	0.0102	0.0000	33.5100
Total	**0.0258**	**0.3294**	**0.1539**	**3.6000e-004**	**0.0119**	**0.0133**	**0.0252**	**1.2900e-003**	**0.0122**	**0.0135**	**0.0000**	**33.2957**	**33.2957**	**0.0102**	**0.0000**	**33.5100**

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	4.0000e-004	1.2000e-004	1.6100e-003	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0915	0.0915	1.0000e-005	0.0000	0.0917

Total	**4.0000e-004**	**1.2000e-004**	**1.6100e-003**	**0.0000**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0915**	**0.0915**	**1.0000e-005**	**0.0000**	**0.0917**

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					5.3700e-003	0.0000	5.3700e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0106	0.3061	0.2184	3.6000e-004		1.1200e-003	1.1200e-003		1.1200e-003	1.1200e-003	0.0000	33.2957	33.2957	0.0102	0.0000	33.5099
Total	**0.0106**	**0.3061**	**0.2184**	**3.6000e-004**	**5.3700e-003**	**1.1200e-003**	**6.4900e-003**	**2.9000e-004**	**1.1200e-003**	**1.4100e-003**	**0.0000**	**33.2957**	**33.2957**	**0.0102**	**0.0000**	**33.5099**

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	4.0000e-004	1.2000e-004	1.6100e-003	0.0000	7.0000e-005	0.0000	7.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0915	0.0915	1.0000e-005	0.0000	0.0917
Total	**4.0000e-004**	**1.2000e-004**	**1.6100e-003**	**0.0000**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0915**	**0.0915**	**1.0000e-005**	**0.0000**	**0.0917**

3.4 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	0.0412	0.4647	0.2411	3.9000e-004		0.0232	0.0232		0.0213	0.0213	0.0000	35.7638	35.7638	0.0110	0.0000	35.9939
Total	**0.0412**	**0.4647**	**0.2411**	**3.9000e-004**		**0.0232**	**0.0232**		**0.0213**	**0.0213**	**0.0000**	**35.7638**	**35.7638**	**0.0110**	**0.0000**	**35.9939**

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	2.8300e-003	6.8500e-003	0.0479	1.0000e-005	2.2000e-004	3.0000e-005	2.5000e-004	6.0000e-005	3.0000e-005	9.0000e-005	0.0000	0.7537	0.7537	1.0000e-005	0.0000	0.7540
Vendor	6.3300e-003	0.0187	0.0962	2.0000e-005	3.4000e-004	1.0000e-004	4.4000e-004	1.0000e-004	9.0000e-005	1.9000e-004	0.0000	2.0905	2.0905	3.0000e-005	0.0000	2.0911
Worker	3.7100e-003	1.1100e-003	0.0150	1.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.7000e-004	2.0000e-005	1.8000e-004	0.0000	0.8527	0.8527	7.0000e-005	0.0000	0.8543
Total	**0.0129**	**0.0267**	**0.1591**	**4.0000e-005**	**1.1900e-003**	**1.5000e-004**	**1.3300e-003**	**3.3000e-004**	**1.4000e-004**	**4.6000e-004**	**0.0000**	**3.6969**	**3.6969**	**1.1000e-004**	**0.0000**	**3.6994**

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	0.0133	0.3303	0.2662	3.9000e-004		1.3700e-003	1.3700e-003		1.3700e-003	1.3700e-003	0.0000	35.7637	35.7637	0.0110	0.0000	35.9938
Total	**0.0133**	**0.3303**	**0.2662**	**3.9000e-004**		**1.3700e-003**	**1.3700e-003**		**1.3700e-003**	**1.3700e-003**	**0.0000**	**35.7637**	**35.7637**	**0.0110**	**0.0000**	**35.9938**

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	2.8300e-003	6.8500e-003	0.0479	1.0000e-005	2.2000e-004	3.0000e-005	2.5000e-004	6.0000e-005	3.0000e-005	9.0000e-005	0.0000	0.7537	0.7537	1.0000e-005	0.0000	0.7540
Vendor	6.3300e-003	0.0187	0.0962	2.0000e-005	3.4000e-004	1.0000e-004	4.4000e-004	1.0000e-004	9.0000e-005	1.9000e-004	0.0000	2.0905	2.0905	3.0000e-005	0.0000	2.0911
Worker	3.7100e-003	1.1100e-003	0.0150	1.0000e-005	6.3000e-004	2.0000e-005	6.4000e-004	1.7000e-004	2.0000e-005	1.8000e-004	0.0000	0.8527	0.8527	7.0000e-005	0.0000	0.8543
Total	**0.0129**	**0.0267**	**0.1591**	**4.0000e-005**	**1.1900e-003**	**1.5000e-004**	**1.3300e-003**	**3.3000e-004**	**1.4000e-004**	**4.6000e-004**	**0.0000**	**3.6969**	**3.6969**	**1.1000e-004**	**0.0000**	**3.6994**

3.4 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	0.0541	0.6084	0.3489	5.8000e-004		0.0300	0.0300		0.0276	0.0276	0.0000	53.1966	53.1966	0.0166	0.0000	53.5444
Total	**0.0541**	**0.6084**	**0.3489**	**5.8000e-004**		**0.0300**	**0.0300**		**0.0276**	**0.0276**	**0.0000**	**53.1966**	**53.1966**	**0.0166**	**0.0000**	**53.5444**

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	3.9600e-003	9.8400e-003	0.0697	1.0000e-005	2.3000e-004	5.0000e-005	2.8000e-004	6.0000e-005	4.0000e-005	1.0000e-004	0.0000	1.1191	1.1191	2.0000e-005	0.0000	1.1196
Vendor	8.8400e-003	0.0266	0.1390	4.0000e-005	5.1000e-004	1.4000e-004	6.5000e-004	1.5000e-004	1.3000e-004	2.8000e-004	0.0000	3.1063	3.1063	5.0000e-005	0.0000	3.1072
Worker	5.2000e-003	1.5100e-003	0.0206	2.0000e-005	9.5000e-004	3.0000e-005	9.7000e-004	2.6000e-004	2.0000e-005	2.8000e-004	0.0000	1.2423	1.2423	1.0000e-004	0.0000	1.2445
Total	**0.0180**	**0.0380**	**0.2292**	**7.0000e-005**	**1.6900e-003**	**2.2000e-004**	**1.9000e-003**	**4.7000e-004**	**1.9000e-004**	**6.6000e-004**	**0.0000**	**5.4677**	**5.4677**	**1.7000e-004**	**0.0000**	**5.4713**

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	0.0202	0.4992	0.4023	5.8000e-004		2.0800e-003	2.0800e-003		2.0800e-003	2.0800e-003	0.0000	53.1965	53.1965	0.0166	0.0000	53.5443
Total	**0.0202**	**0.4992**	**0.4023**	**5.8000e-004**		**2.0800e-003**	**2.0800e-003**		**2.0800e-003**	**2.0800e-003**	**0.0000**	**53.1965**	**53.1965**	**0.0166**	**0.0000**	**53.5443**

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	3.9600e-003	9.8400e-003	0.0697	1.0000e-005	2.3000e-004	5.0000e-005	2.8000e-004	6.0000e-005	4.0000e-005	1.0000e-004	0.0000	1.1191	1.1191	2.0000e-005	0.0000	1.1196
Vendor	8.8400e-003	0.0266	0.1390	4.0000e-005	5.1000e-004	1.4000e-004	6.5000e-004	1.5000e-004	1.3000e-004	2.8000e-004	0.0000	3.1063	3.1063	5.0000e-005	0.0000	3.1072
Worker	5.2000e-003	1.5100e-003	0.0206	2.0000e-005	9.5000e-004	3.0000e-005	9.7000e-004	2.6000e-004	2.0000e-005	2.8000e-004	0.0000	1.2423	1.2423	1.0000e-004	0.0000	1.2445
Total	**0.0180**	**0.0380**	**0.2292**	**7.0000e-005**	**1.6900e-003**	**2.2000e-004**	**1.9000e-003**	**4.7000e-004**	**1.9000e-004**	**6.6000e-004**	**0.0000**	**5.4677**	**5.4677**	**1.7000e-004**	**0.0000**	**5.4713**

3.5 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	1.8400e-003	0.0193	0.0159	2.0000e-005		1.1400e-003	1.1400e-003		1.0500e-003	1.0500e-003	0.0000	2.1444	2.1444	6.6000e-004	0.0000	2.1582
Total	**1.8400e-003**	**0.0193**	**0.0159**	**2.0000e-005**		**1.1400e-003**	**1.1400e-003**		**1.0500e-003**	**1.0500e-003**	**0.0000**	**2.1444**	**2.1444**	**6.6000e-004**	**0.0000**	**2.1582**

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	3.0000e-005	1.0000e-005	1.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	6.3600e-003	6.3600e-003	0.0000	0.0000	6.3700e-003

Total	**3.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**6.3600e-003**	**6.3600e-003**	**0.0000**	**0.0000**	**6.3700e-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	9.6000e-004	0.0206	0.0175	2.0000e-005		1.1000e-004	1.1000e-004		1.1000e-004	1.1000e-004	0.0000	2.1444	2.1444	6.6000e-004	0.0000	2.1582
Total	**9.6000e-004**	**0.0206**	**0.0175**	**2.0000e-005**		**1.1000e-004**	**1.1000e-004**		**1.1000e-004**	**1.1000e-004**	**0.0000**	**2.1444**	**2.1444**	**6.6000e-004**	**0.0000**	**2.1582**

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	3.0000e-005	1.0000e-005	1.1000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	6.3600e-003	6.3600e-003	0.0000	0.0000	6.3700e-003
Total	**3.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**6.3600e-003**	**6.3600e-003**	**0.0000**	**0.0000**	**6.3700e-003**

3.6 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	0.0247	0.2462	0.1576	2.1000e-004		0.0147	0.0147		0.0135	0.0135	0.0000	19.1581	19.1581	5.9600e-003	0.0000	19.2834
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0247**	**0.2462**	**0.1576**	**2.1000e-004**		**0.0147**	**0.0147**		**0.0135**	**0.0135**	**0.0000**	**19.1581**	**19.1581**	**5.9600e-003**	**0.0000**	**19.2834**

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	1.1000e-004	2.7000e-004	1.9300e-003	0.0000	0.0000	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0310	0.0310	0.0000	0.0000	0.0310
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	2.3000e-004	7.0000e-005	9.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0551	0.0551	0.0000	0.0000	0.0552
Total	**3.4000e-004**	**3.4000e-004**	**2.8400e-003**	**0.0000**	**4.0000e-005**	**0.0000**	**5.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0861**	**0.0861**	**0.0000**	**0.0000**	**0.0862**

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	8.6500e-003	0.1857	0.1574	2.1000e-004		9.5000e-004	9.5000e-004		9.5000e-004	9.5000e-004	0.0000	19.1581	19.1581	5.9600e-003	0.0000	19.2833
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.6500e-003**	**0.1857**	**0.1574**	**2.1000e-004**		**9.5000e-004**	**9.5000e-004**		**9.5000e-004**	**9.5000e-004**	**0.0000**	**19.1581**	**19.1581**	**5.9600e-003**	**0.0000**	**19.2833**

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	1.1000e-004	2.7000e-004	1.9300e-003	0.0000	0.0000	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0310	0.0310	0.0000	0.0000	0.0310
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	2.3000e-004	7.0000e-005	9.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0551	0.0551	0.0000	0.0000	0.0552
Total	**3.4000e-004**	**3.4000e-004**	**2.8400e-003**	**0.0000**	**4.0000e-005**	**0.0000**	**5.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0861**	**0.0861**	**0.0000**	**0.0000**	**0.0862**

Emission Summary

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Construction	0.0424	1_DPM	84.8	0.02581	3.25E-03	10,186	3.19E-07
2018	Construction	0.0413	1_DPM	82.6	0.02514	3.17E-03	10,186	3.11E-07
Total		***0.0837***		***167***	***0.0510***	***0.0064***		

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	Construction	1_FUG	0.0027	5.4	0.00165	2.08E-04	10,186	2.04E-08
2018	Construction	1_FUG	0.0005	1.0	0.00029	3.68E-05	10,186	3.61E-09
Total			***0.0032***	***6.4***	***0.0019***	***0.0002***		

Health Risk Calculations

Off-Site Residential Receptor Locations - 1.5 meters

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

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

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

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

Values

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

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
			DPM Conc (ug/m3)		Age	Cancer	Modeled DPM Conc (ug/m3)		Age	Cancer		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	-	0.0000	10	-	-	-	-	-		
1	1	0 - 1	2017	0.1810	10	29.72	2017	0.1810	1	0.52	0.0254	0.206
2	1	1 - 2	2018	0.1764	10	28.98	2018	0.1764	1	0.51	0.0045	0.181
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						**58.7**				**1.03**		

* Third trimester of pregnancy

Results Summary

Maximum Impacts at Off- Site Residences

Construction Year	Unmitigated					
	Maximum Concentrations		Cancer Risk (per million)		Hazard Index	Maximum Annual PM2.5 Concentration
	Exhaust PM2.5/DPM ($\mu g/m^3$)	Fugitive PM2.5 ($\mu g/m^3$)	Child	Adult	(-)	($\mu g/m^3$)
2017	0.1810	0.0254	29.72	0.52	0.036	0.206
2018	0.1764	0.0045	28.98	0.51	0.035	0.181
Total	-	-	**58.7**	**1.0**	-	-
Maximum Annual	0.1810	0.0254	-	-	**0.036**	**0.206**

Stationary Source Information Form (SSIF)

Bay Area Air Quality Management District

Risk & Hazard Stationary Source Inquiry Form

This form is required when users request stationary source data from BAAQMD. This form is to be used with the BAAQMD's Google Earth stationary source screening tables.

For guidance on conducting a risk & hazard screening, including for roadways & freeways, refer to the District's Risk & Hazard Analysis flow chart.

Table A: Requestor Contact Information	
Contact Name:	Tanushree Ganguly
Affiliation:	Illingworth & Rodkin, Inc.
Phone:	707-794-0400
Email:	tganguly@illingworthrodkin.com
Date of Request	9/26/2016
Project Name:	2131 Sand Hill Rd
Address:	2131 Sand Hill Rd
City:	Menlo Park
County:	San Mateo
Type (residential, commercial, mixed use, industrial, etc.):	Commercial
Project size (# of units, or building square feet):	3.6 Acres
Comments:	

For Air District assistance, the following steps must be completed:

Complete all the contact and project information requested in Table A. Incomplete forms will not be processed. Please include a project site map.

Download and install the free program Google Earth, http://www.google.com/earth/download/ge/, and then download the county specific Google Earth stationary source application files from the District's website, http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

The small points on the map represent stationary sources permitted by the District (Map A on right). These permitted sources include diesel back-up generators, gas stations, dry cleaners, boilers, printers, auto spray booths, etc. Click on a point to view the source's Information Table, including the name, location, and preliminary estimated cancer risk, hazard index, and PM2.5 concentration.

Find the project site in Google Earth by inputting the site's address in the Google Earth search box.

Using the Google Earth ruler function, measure the distance in feet between the project's fenceline and the stationary source's fenceline for all the sources that are within 1,000 feet of the project's fenceline. Verify that the location of the source on the map matches with the source's address in the Information Table, by using the Google Earth address search box to confirm that the source is within 1,000 feet of the project. Please report any mapping errors to the District (District contact information in Step 9).

If the stationary source is within 1,000 feet of the project's fenceline and the stationary source's information table does not list the cancer risk, hazard index, and PM2.5 concentration, and instead says to "Contact District Staff", list the stationary source information in Table B Section 1 below.

Note that a small percentage of the stationary sources have Health Risk Screening Assessment (HRSA) data INSTEAD of screening level data. These sources will be noted by an asterisk next to the Plant Name (Map B on right). If HRSA values are presented, these values have already been modeled and cannot be adjusted further.

Email this completed form to District staff (Step 9). District staff will provide the most recent risk, hazard, and PM2.5 data that are available for the source(s). If this information or data are not available, source emissions data will be provided. Staff will respond to inquiries within three weeks.

Note that a public records request received for the same stationary source information will cancel the processing of your SSIF request.

Submit forms, maps, and questions to Alison Kirk at 415-749-5169, or akirk@baaqmd.gov .

Table B: Stationary Sources within 1,000 feet of Receptor that say "Contact District Staff"

Table B Section 1: Requestor fills out these columns based on Google Earth data				Table B Section 2: BAAQMD returns form with additional information in these columns as needed								
Distance from Receptor (feet)	**Plant # or Gas Dispensary #**	**Facility Name**	**Street Address**	**2011 Screening Level Cancer Risk (1)**	**2011 Screening Level Hazard Index (1)**	**2011 Screening Level PM2.5 (1)**	**2014 Screening Level Cancer Risk (1)**	**2014 Screening Level Hazard Index (1)**	**2014 Screening Level PM2.5 (1)**	**Distance to Threshold Cancer Risk**	**Multiplier**	**Distance Adjusted PM2.5 Level**
650	4306	Sharon Height Drycleaning Center	325 Sharon Park Dr	21	0.056	0	1.33	0.002	0			
550	G2945	Sharon Heights Shell	125 Sharon Park	29.668	0.049	na	36.5	0.18	n/a			

Footnotes:

1. These Cancer Risk, Hazard Index, and PM2.5 columns represent the rows in the Google Earth Plant Information Table that say "Contact District Staff" (Map A above). BAAQMD will return this form to you with this screening level information entered in these columns.
2. Each plant may have multiple permits and sources.
3. Fuel codes: 98 = diesel, 189 = Natural Gas.
4. Permitted sources include diesel back-up generators, gas stations, dry cleaners, boilers, printers, auto spray booths, etc.
5. If a Health Risk Screening Assessment (HRSA) was completed for the source, the application number will be listed here.
6. The date that the HRSA was completed.
7. Engineer who completed the HRSA. For District purposes only.
8. All HRSA completed before 1/5/2010 need to be multiplied by an age sensitivity factor of 1.7.
9. The HRSA "Chronic Health" number represents the Hazard Index.
10. Further information about common sources:
    a. Sources that only include diesel internal combustion engines can be adjusted using the BAAQMD's Diesel Multiplier worksheet.
    b. The risk from natural gas boilers used for space heating when <25 MM BTU/hr would have an estimated cancer risk of one in a million or less, and a chronic hazard index of 0.003 or less. To be conservative, requestor should assume the cancer risk is 1 in a million and the hazard index is 0.003 for these sources.
    c. BAAQMD Reg 11 Rule 16 required that all co-residential (sharing a wall, floor, ceiling or is in the same building as a residential unit) dry cleaners cease use of perc on July 1, 2010.
    Therefore, there is no cancer risk, hazard or PM2.5 concentrations from co-residential dry cleaning businesses in the BAAQMD.
    d. Non co-residential dry cleaners must phase out use of perc by Jan. 1, 2023. Therefore, the risk from these dry cleaners does not need to be factored in over a 70-year period, but instead should reflect the number of years perc use will continue after the project's residents or other sensitive receptors (such as students, patients, etc) take occupancy.
    e. Gas stations can be adjusted using BAAQMD's Gas Station Distance Mulitplier worksheet.
    f. Unless otherwise noted, exempt sources are considered insignificant. See BAAQMD Reg 2 Rule 1 for a list of exempt sources.
    g. This spray booth is considered to be insignificant.

Date last updated:
3/12/12