BUTTERFIELD – KEENAN GENERAL PLAN AMENDMENT DRAFT TAC AND GHG EMISSIONS ASSESSMENT MORGAN HILL, CALIFORNIA

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INTRODUCTION

The purpose of this report is to address community health risk and greenhouse gas (GHG) emission impacts associated with the proposed Butterfield – Keenan General Plan Amendment project in Morgan Hill, California. The project would facilitate the development of residential uses on the 19.5 acre site, which is located at the southwest corner of Butterfield Boulevard and Jarvis Drive (North) and extends west along Jarvis Drive (North) to Monterey Road. The General Plan designation would shift from *Industrial* to *Multi-family Medium* and the site could accommodate up to 410 multi-family units.

Community health risk and GHG impacts could occur due to existing sources of air pollution near the site and as a result of direct and indirect emissions from new occupants. This analysis was conducted following guidance provided by the Bay Area Air Quality Management District (BAAQMD).

SETTING

The project is located in Santa Clara County, which is in the San Francisco Bay Area Air Basin. The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the California Air Resources Board (CARB) (a part of the California Environmental Protection Agency) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has published the California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[1]

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 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 CARB, diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by CARB, and are listed as carcinogens either under the state's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

[1] 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 (one hundred year). Methane and nitrous oxide have GWPs of 21 and 310, respectively.[2] In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of equivalent CO_2 (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.

[2] These are the GWP values used for methane and nitrous oxide in the California Emissions Estimator Model (CalEEMod) version 2013.2.2, a land use development air quality emissions model recommended for use by BAAQMD. The model used GWP values from the IPCC Second Assessment Report (SAR), since it was the basis used in regulations and international protocols at the time (e.g., California and Federal GHG Reporting Programs, The Climate Registry). SAR available online: https://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf

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.

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 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. However, this litigation remains pending as the California Supreme Court recently accepted a portion of CBIA's petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The specific portion of the argument to be considered is in regard to whether CEQA requires consideration of the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment). Therefore, 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)
Health Risks and Hazards for New Sources			
Excess Cancer Risk	10 per one million	10 per one million	
Chronic or Acute Hazard Index	1.0	1.0	
Incremental annual average $PM_{2.5}$	0.3 µg/m^3	0.3 µg/m^3	
Health Risks and Hazards for Sensitive Receptors (Cumulative from all sources within 1,000 foot zone of influence) and Cumulative Thresholds for New Sources			
Excess Cancer Risk	100 per one million		
Chronic Hazard Index	10.0		
Annual Average $PM_{2.5}$	0.8 µg/m^3		
Greenhouse Gas Emissions			
GHG Annual Emissions	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.

IMPACTS AND MITIGATION MEASURES

Impact: Expose sensitive receptors to substantial pollutant concentrations? ***Less than significant***

Sensitive receptors are locations where an identifiable subset of the general population (children, asthmatics, the elderly, and the chronically ill) that is at greater risk than the general population to the effects of air pollutants are likely to be exposed. These locations include residences, schools, playgrounds, childcare centers, retirement homes, hospitals, and medical clinics. Operation of the project is not expected to cause any localized emissions that could expose sensitive receptors to unhealthy air pollutant levels. There are nearby sources of air pollutant emissions, such as roadways, railroads, and stationary sources of TACs. Impacts from existing sources of air pollution are addressed.

Operational TAC Impacts

Operation of the project is not considered a source of TAC or $PM_{2.5}$ emissions and no stationary sources are proposed, such as emergency back-up diesel generators. As a result, the project operation would not cause emissions that expose sensitive receptors to unhealthy air pollutant levels. Because the project would not be a source of TACs, it would not contribute cumulatively to unhealthy exposure to TACs.

The project would include new sensitive receptors in the form of future residences. Substantial sources of air pollution can adversely affect sensitive receptors proposed as part of new projects. A review of the area indicates that there are two local roadways, one railroad and four stationary sources of air pollution within 1,000 feet of the site that could adversely affect new residences. There are thresholds that address both the impact of single and cumulative TAC sources upon projects that include new sensitive receptors. The future location of these units has not yet been determined. As such, this analysis used screening data provided by BAAQMD to identify the potential cancer risk and $PM_{2.5}$ exposure risks at various distances.

<u>Butterfield Boulevard</u>

Busy roadways are a source of TAC emissions that could affect new sensitive receptors developed at the project site. Butterfield Boulevard is an arterial roadway near the project site with over 10,000 average daily traffic trips (ADT). There are 23,500 daily trips (2-way) projected on Butterfield Boulevard for 2030 in the vicinity of the project according to City's General Plan Circulation Element traffic study.[3] The BAAQMD provides screening tables that indicate predicted community risk impacts that roadways pose.[4] At 10 feet from Butterfield Boulevard, these tables indicate the cancer risk would be less than 6.3 chances per million and $PM_{2.5}$ concentrations would be less than 0.24 $\mu g/m^3$. Since future residences developed on the project sites under the proposed and evaluated land use designations would be further than 10

[3] Fehr & Peers Transportation Consultants, 2009. *City of Morgan Hill General Plan Circulation Element Network & Policy Revisions Traffic Impact Assessment*.
[4] BAAQMD Roadway Analysis Tables can be accessed from BAAQMD's website at *http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx*

feet from Butterfield Boulevard, the cancer risk and $PM_{2.5}$ levels would be even less. These levels are below BAAQMD's thresholds for significant community risk impacts.

Monterey Road

Monterey Road is an arterial roadway near the project site with over 10,000 average daily traffic trips (ADT). There are 24,300 daily trips (2-way) projected on Monterey Road for 2030 in the vicinity of the project according to City's General Plan Circulation Element traffic study. At 10 feet from Monterey, BAAQMD screening tables indicate the cancer risk would be less than 6.3 chances per million and $PM_{2.5}$ concentrations would be less than 0.24 $\mu g/m^3$. Since future residences developed on the project sites under the proposed and evaluated land use designations would be further than 10 feet from Butterfield Boulevard, the cancer risk and $PM_{2.5}$ levels would be even less. These levels are below BAAQMD's thresholds for significant community risk impacts. It is assumed that Jarvis Drive has an ADT of less than 10,000.

It should be noted that traffic counts were conducted in support of noise measurements. These counts did not reveal high volumes of truck traffic that would adversely affect sensitive receptors. Truck traffic was not observed on Jarvis Drive.

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 to identify the location of stationary sources and their estimated risk and hazard impacts. This tool identified four sources that could affect the project site:

- Plant 19960, which is an emergency back-up generator located at 18300 Old Monterey Road operated by the Santa Clara County Fire Department about 250 feet southwest of the project site. At BAAQMD's direction, risk and $PM_{2.5}$ concentrations from a diesel generator was adjusted based on BAAQMD's *Risk and Hazards Emissions Screening Calculator (Beta Version)*. According to BAAQMD, this facility would result in an excess cancer risk of <0.6 per million, $PM_{2.5}$ concentration of <0.01 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.
- Plant 12093, which is an emergency back-up generator located at 400 Jarvis Drive operated by Andpak EMA, Inc., about 500 feet northeast of the project site. At BAAQMD's direction, risk and $PM_{2.5}$ concentrations from a diesel generator was adjusted for distance based on BAAQMD's *Distance Adjustment Multiplier Tool for Diesel Internal Combustion (IC) Engines*. According to BAAQMD (and adjusted for the 500-foot distance), this facility would result in an excess cancer risk of 2.3 per million, $PM_{2.5}$ concentration of <0.01 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.
- Plant 17684, which is an emergency back-up generator located at Cochrane Road and Monterey Road operated by the City of Morgan Hill Public Works Department about 900 feet northeast of the project site. According to BAAQMD (and adjusted for the 900-foot distance), this facility would result in an excess cancer risk of 1.1 per million, $PM_{2.5}$

concentration of <0.01 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.

- Plant G11756, which is a gas station located at 18605 Monterey Road operated by Arco AM/PM about 700 feet southwest of the project site. At BAAQMD's direction, risk from the source was adjusted for distance based on BAAQMD's *Distance Adjustment Multiplier Tool for Gasoline Dispensing Facilities*. According to BAAQMD (and adjusted for the 700-foot distance), this facility would result in an excess cancer risk of 1.1 per million, $PM_{2.5}$ concentration of 0.00 and HI of <0.01, all of which would be below BAAQMD thresholds of significance.

Railroad Emissions

The Union Pacific Rail Road (UPRR) line runs west of the site. This rail line is used by trains for passenger and freight service. Along this portion of the UPRR line, Caltrain operates 3 trains per weekday between Gilroy and San Jose, Amtrak has one passenger train daily, and there about six freight trains daily.[5]

Impacts from trains upon future residential development on the site were predicted based on the results of modeling completed in Morgan Hill for the Hale-Signature project. Diesel particulate matter (DPM) and $PM_{2.5}$ emissions from trains on the UPPR rail line were computed using EPA emission factors for locomotives and CARB adjustment factors to account for fuels used in California. The Hale-Signature project assumed the following:

- Each passenger train was assumed to use one locomotive. Although the freight trains may have more than one locomotive, it was assumed that for this section of the rail line, which is relatively level, only one locomotive would be powering the trains.
- Emissions from the freight trains were calculated assuming they would use locomotives with 4,300 hp engines and would be traveling at about 60 mph with the engines operating at about 60% load. Passenger train locomotives were assumed to have 3,200 hp engines operating at 60% load and would be traveling at 60 mph.
- Emissions were calculated for years 2014, 2015, 2020, and 2025.

Dispersion modeling of locomotive emissions at the Hale-Signature site was conducted using EPA's ISCST3 model and a five-year set of hourly meteorological data for the San Martin Airport. Locomotive emissions were modeled as a line source (series of volume sources) along the rail line in the vicinity of the Hale-Signature site. Concentrations were calculated at receptor locations within the Hale-Signature site where residential development would occur.

Using the maximum modeled long-term average DPM concentration, the maximum individual cancer risk at the Hale-Signature site was computed. The factors used to compute cancer risk are highly dependent on modeled concentrations, exposure period or duration, and the type of receptor. The exposure level is determined by the modeled concentration. This assessment conservatively assumed long-term residential exposures for a nearly-continuous exposure of 70 years. The cancer risk calculations applied the BAAQMD-recommended Age Sensitivity

[5] Metropolitan Transportation Commission, 2006. *Bay Area Regional Rail Plan, Technical Memorandum 4a, Conditions, Configuration & Traffic on Existing System,* , November 15.

Factors to the cancer risks for residential exposures, accounting for age sensitivity to toxic air contaminants.

The maximum increased cancer risk from train traffic was computed as 4.2 per million for the Hale-Signature property. The annual $PM_{2.5}$ concentration was predicted at less than 0.01 $\mu g/m^3$. This was modeled at the receptor closest to railroad line, about midway along the northeastern portion of the Hale-Signature site closest to Monterey Road. The maximally exposed receptor was about 80 feet from the train line. Cancer risks and $PM_{2.5}$ concentrations further from the tracks would be lower.

Community risk and hazard impacts associated with TACs and $PM_{2.5}$ emissions are greatly influenced by location of the receptor in relation to the prevailing wind direction and emission source. Community risk and hazard impacts are greater for receptors located downwind of the emission source. The prevailing wind direction in Morgan Hill is generally north to south parallel to the rail line. The Hale-Signature site is located southwest of the UPRR tracks. The project site is located northeast of the UPRR tracks. Because wind generally flows parallel to the tracks, application of the modeling results for the Hale-Signature project are applicable to the Butterfield-Keenan project. For these reasons, community risk and hazard impacts at the project site associated with TACs and $PM_{2.5}$ emissions from UPRR activity are considered less than significant.

Based on the Hale-Signature project results, the maximum predicted cancer risk and $PM_{2.5}$ concentration for this project would be below the BAAQMD significance thresholds for cancer risk and $PM_{2.5}$ exposure if new homes are 80 feet or further from the railroad tracks. The Butterfield-Keenan project site is located over 150 feet from the railroad tracks.

Cumulative TAC Sources

Table 2 summarizes the TAC sources in the project area and their impact upon project sensitive receptors. BAAQMD significance thresholds for single and cumulative TAC sources are included. As shown in Table 2, TAC sources in the project area would not exceed the BAAQMD significance thresholds individually or cumulatively. As a result, the single-source and cumulative TAC impacts would be less than significant.

Table 2. Cumulative Risk Impacts

Source	Closest Distance (feet)	Maximum Cancer Risk[3] (per million)	Maximum Hazard Index	Maximum Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
UPRR Railroad[1]	>80	4.2	<0.10	<0.01
Butterfield Boulevard[2]	>10	6.3	<0.03	0.24
Monterey Road[2]	>10	6.3	<0.03	0.24
Plant 19960 (generator) Santa Clara Fire Department 18300 Old Monterey Road	250	<0.6	<0.01	<0.01
Plant 12093 (generator) Andpak, EMA, Inc. 400 Jarvis Drive	500	2.3	<0.01	<0.01

Plant 17684 (generator) City of Morgan Hill Public Works Department Cochrane Rd. & Old Monterey Rd.	900	1.1	<0.01	<0.01
Plant G11756 (gas station) Arco AM/PM 18605 Monterey Road	700	1.1	<0.01	0.00
Highest nearby single source		6.3	<0.10	0.24
BAAQMD Threshold - Single Source		10	1.0	0.3
Significant?		No	No	No
Sum of All Sources		<21.9	<0.20	<0.52
BAAQMD Threshold - Cumulative		100	10.0	0.8
Significant?		No	No	No

Notes:
[1] Based on modeling of railroad emissions for Hale-Signature Project.
[2] Based on BAAQMD roadway screening tables for north-south roadways.
[3] The risks reported represent lifetime cancer risks and annual $PM_{2.5}$ concentrations.

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

The BAAQMD May 2011 CEQA Guidelines included GHG emissions-based significance thresholds. These thresholds include a "bright-line" emissions level of 1,100 metric tons per year for land-use type projects and 10,000 metric tons per year for stationary sources. Land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita. Projects with emissions above the thresholds would be considered to have an impact, which, cumulatively, would be significant.

The California Emissions Estimator Model (CalEEMod) version 2013.2.2 was used to predict GHG emissions from operation of the site assuming full build-out of the project. The project land use types and size, trip generation rate and other project-specific information were input to the model. The use of this model for evaluating emissions from land use projects is recommended by the BAAQMD. Unless otherwise noted below, the CalEEMod model defaults for Santa Clara County were used. CalEEMod provides emissions for transportation, areas sources, electricity consumption, natural gas combustion, electricity usage associated with water usage and wastewater discharge, and solid waste land filling and transport. CalEEMod output worksheets are included in *Attachment 1*.

Land Use Descriptions
The proposed project land uses were input into CalEEMod, which included 410 dwelling units of "Apartments Low Rise" on a 19.5-acre site.

Trip Generation Rates
Trip generation rates were input to CalEEMod using the daily trip numbers provided in the project traffic report. The default trip lengths and trip types specified by CalEEMod for Santa Clara County were used.

Model Year
The model uses mobile emission factors from the California Air Resources Board's

EMFAC2011 model. This model is sensitive to the year selected, since vehicle emissions have and continue to be reduced due to fuel efficiency standards and low carbon fuels. The year 2017 was analyzed since it is the first full year that the project could conceivably be occupied.

Energy
Default rates for energy consumption were assumed in the model. Emissions rates associated with electricity consumption were adjusted to account for Pacific Gas & Electric utility's (PG&E) projected 2017 CO_2 intensity rate. This 2017 rate is based, in part, on the requirement of a renewable energy portfolio standard of 33 percent by the year 2020. CalEEMod uses a default rate of 641.35 pounds of CO_2 per megawatt of electricity produced. The derived 2017 rate for PG&E was estimated at 349 pounds of CO_2 per megawatt of electricity delivered and is based on the California Public Utilities Commission (CPUC) GHG Calculator.[6]

Other Inputs
Default model assumptions for GHG emissions associated with area sources, solid waste generation and water/wastewater use were applied to the project.

Service Population
Project service population is the sum of future residences. The future number of residences was estimated at 1,246 and was based on the latest U.S. Census data for average persons per household in Morgan Hill from 2008 to 2012 (3.04 persons).[7]

Operational Emissions

The CalEEMod model, along with the project vehicle trip generation rates, was used to predict daily emissions associated with operation of the fully-developed site under the proposed project. In 2017, annual emissions resulting from operation of the proposed project are predicted to be 3,049 MT of CO_2e. These emissions would exceed the BAAQMD threshold of 1,100 MT of CO_2e/yr. As discussed above, land use projects with emissions above the 1,100 metric ton per year threshold would then be subject to a GHG efficiency threshold of 4.6 metric tons per year per capita to determine impact significance. Computed project per capita emissions are 2.4 MT of CO_2e/year/service population, which would not exceed the BAAQMD threshold of 4.6 MT of CO_2e/year/service population. *This would be a less than significant impact*. Table 3 shows predicted project GHG emissions.

Table 3. Annual Project GHG Emissions in Metric Tons

Source Category	2017 Project Emissions
Area	23
Energy Consumption	478
Mobile	2,396
Solid Waste Generation	86

[6] California Public Utilities Comissions GHG Calculator version 3c, October 7, 2010. Available on-line at: http://ethree.com/public_projects/cpuc2.php. Accessed: June 16, 2014.
[7] United States Census Bureau, 2014. *Morgan Hill (city), California Quick Facts*. Available online: http://quickfacts.census.gov/qfd/states/06/0649278.html. Accessed: June 25, 2014.

Water Usage	66
Project Total	3,049
GHG Per Capita Emissions[1]	2.4
BAAQMD Threshold	4.6 MT CO_2e/year/S.P.

Note: [1]Based on service population of 1,246. S.P. = service population.

Impact: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***No Impact.***

The project would be subject to new requirements under rule making developed at the State and local level, regarding greenhouse gas emissions and be subject to local policies that may regulate emissions of greenhouse gases including the City Climate Action Plan, if adopted,.

Attachment 1: CalEEMod Output Data

Butterfield-Keenan GPA, Morgan Hill

Santa Clara County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Low Rise	410.00	Dwelling Unit	19.50	410,000.00	1173

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	4			**Operational Year**	2017
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	349	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Assume PG&E 2017 rates (2 years of construction before 1st complete year of occupancy)

Land Use - Based on project description and proposed GPA - Multi-Family Medium (14-21 dwelling units per acre)

Construction Phase - GPA only, no construction, but left in CalEEMod defaults

Architectural Coating - Assume low VOC content per BAAQMD Rules and Regs

Vehicle Trips - TIA trip generation rate, similar to CalEEMod default

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	150.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	150.00
tblLandUse	LotAcreage	25.63	19.50
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	349

tblProjectCharacteristics	OperationalYear	2014	2017
tblVehicleTrips	WD_TR	6.59	6.65

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	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					
Area	2.3036	0.0413	3.5299	5.5000e-004		0.0829	0.0829		0.0829	0.0829	6.7107	15.8138	22.5245	0.0175	5.6000e-004	23.0644
Energy	0.0238	0.2037	0.0867	1.3000e-003		0.0165	0.0165		0.0165	0.0165	0.0000	474.8492	474.8492	0.0244	8.4300e-003	477.9753
Mobile	1.5339	3.2639	14.9892	0.0313	2.2555	0.0419	2.2974	0.6030	0.0385	0.6415	0.0000	2,394.0588	2,394.0588	0.0988	0.0000	2,396.1335
Waste						0.0000	0.0000		0.0000	0.0000	38.2841	0.0000	38.2841	2.2625	0.0000	85.7971
Water						0.0000	0.0000		0.0000	0.0000	8.4749	32.2129	40.6878	0.8731	0.0211	65.5666
Total	**3.8613**	**3.5089**	**18.6058**	**0.0331**	**2.2555**	**0.1412**	**2.3968**	**0.6030**	**0.1379**	**0.7409**	**53.4696**	**2,916.9347**	**2,970.4043**	**3.2763**	**0.0301**	**3,048.5369**

4.0 Operational Detail - Mobile

	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					
Unmitigated	1.5339	3.2639	14.9892	0.0313	2.2555	0.0419	2.2974	0.6030	0.0385	0.6415	0.0000	2,394.0588	2,394.0588	0.0988	0.0000	2,396.1335

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Low Rise	2,726.50	2,935.60	2488.70	6,077,393	6,077,393
Total	2,726.50	2,935.60	2,488.70	6,077,393	6,077,393

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Low Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.551854	0.058218	0.185395	0.123453	0.029544	0.004438	0.012761	0.022956	0.001780	0.001269	0.006045	0.000523	0.001763

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

	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					
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	238.9597	238.9597	0.0199	4.1100e-003	240.6502
NaturalGas Unmitigated	0.0238	0.2037	0.0867	1.3000e-003		0.0165	0.0165		0.0165	0.0165	0.0000	235.8895	235.8895	4.5200e-003	4.3200e-003	237.3251

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	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

Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Low Rise	4.4204e+006	0.0238	0.2037	0.0867	1.3000e-003		0.0165	0.0165		0.0165	0.0165	0.0000	235.8895	235.8895	4.5200e-003	4.3200e-003	237.3251
Total		**0.0238**	**0.2037**	**0.0867**	**1.3000e-003**		**0.0165**	**0.0165**		**0.0165**	**0.0165**	**0.0000**	**235.8895**	**235.8895**	**4.5200e-003**	**4.3200e-003**	**237.3251**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Low Rise	1.5095e+006	238.9597	0.0199	4.1100e-003	240.6502
Total		**238.9597**	**0.0199**	**4.1100e-003**	**240.6502**

6.0 Area Detail

	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					
Unmitigated	2.3036	0.0413	3.5299	5.5000e-004		0.0829	0.0829		0.0829	0.0829	6.7107	15.8138	22.5245	0.0175	5.6000e-004	23.0644

6.2 Area by SubCategory

Unmitigated

	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
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2886					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.6013					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.3180	5.4000e-003	0.4550	3.9000e-004		0.0662	0.0662		0.0662	0.0662	6.7107	10.8410	17.5517	0.0125	5.6000e-004	17.9868
Landscaping	0.0957	0.0358	3.0750	1.6000e-004		0.0167	0.0167		0.0167	0.0167	0.0000	4.9728	4.9728	4.9900e-003	0.0000	5.0776
Total	**2.3036**	**0.0412**	**3.5299**	**5.5000e-004**		**0.0829**	**0.0829**		**0.0829**	**0.0829**	**6.7107**	**15.8138**	**22.5245**	**0.0175**	**5.6000e-004**	**23.0644**

7.0 Water Detail

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Unmitigated	40.6878	0.8731	0.0211	65.5666

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Low Rise	26.7132 / 16.8409	40.6878	0.8731	0.0211	65.5666

Total		**40.6878**	**0.8731**	**0.0211**	**65.5666**

8.0 Waste Detail

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Unmitigated	38.2841	2.2625	0.0000	85.7971

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Low Rise	188.6	38.2841	2.2625	0.0000	85.7971
Total		**38.2841**	**2.2625**	**0.0000**	**85.7971**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Attachment 2: Stationary TAC Source Data

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. Also see the District's Recommended Methods for Screening a

Table A: Requestor Contact Information	
Contact Name:	James Reyff
Affiliation:	Illingworth & Rodkin, Inc.
Phone:	707-794-0400
Email:	jreyff@illingworthrodkin.com
Date of Request	
Project Name:	Butterfield-Keenan GPA
Address:	Jarvis and Butterfield
City:	Morgazn Hill
County:	Santa Clara
Type (residential, commercial, mixed use, industrial, etc.):	Residential
Project size (# of units, or building square feet):	up to 410 apartments
Comments:	
Sources that don't include data on Google Earth Tool See aerial	

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

1. Complete all the contact and project information requested in Table A. Incomplete forms will not be processed. Please include a project site map.
2. 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.
3. Find the project site in Google Earth by inputting the site's address in the Google Earth search box.
4. Identify stationary sources near the project. 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 the source's address location. Please report any mapping errors to the District.
5. List the stationary source information in Table B Section 1 below.
6. 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.
7. Email this completed form to District staff. 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 SSF request.

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

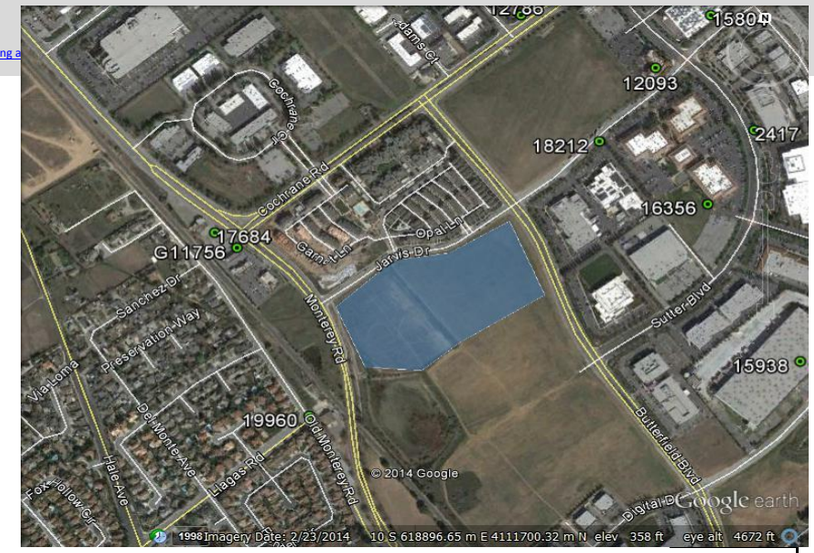

Table B: Stationary Sources

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**	**Screening Level Cancer Risk (1)**	**Screening Level Hazard Index (1)**	**Screening Level PM2.5 (1)**	**Permit #s (2)**	**Source #s (2)**	**Fuel Code (3)**	**Type of Source(s) (4)**	**HRSA Ap # (5)**	**HRSA Date (6)**	**HRSA Engineer (7)**	**HRSA Cancer Risk in a million**	**Age Sensitivity Factor (8)**	**HRSA Adjusted Cancer Risk**	**HRSA Chronic Health (9)**	**HRSA PM2.5 Risk**	**Status/Comments**
350	19960	Santa Clara County Fire Dept	18300 OLD MONTEREY ROAD	No data			21239	1		diesel gen								0	see attached sheet
																		0	
																		0	
																		0	

Footnotes:

1. These Cancer Risk, Hazard Index, and PM2.5 columns represent the values in the Google Earth Plant Information Table.

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:
5/30/12

BAY AREA AIR QUALITY MANAGEMENT DISTRICT Printed: JUN 17, 2014
DETAIL POLLUTANTS - ABATED
MOST RECENT P/O APPROVED (2014)

Morgan Hill Fire Department (P# 19960)

S# SOURCE NAME
MATERIAL SOURCE CODE
THROUGHPUT DATE POLLUTANT CODE LBS/DAY

---

1 Emergency Standby Diesel Generator Set
C22AG098

Benzene	41	1.09E-05
Formaldehyde	124	9.06E-07
Organics (part not spec el	990	5.29E-04
Arsenic (all)	1030	9.53E-09
Beryllium (all) pollutant	1040	5.59E-09
Cadmium	1070	2.38E-08
Chromium (hexavalent)	1095	4.93E-10
Lead (all) pollutant	1140	2.02E-08
Manganese	1160	3.17E-08
Nickel pollutant	1180	3.86E-07
Mercury (all) pollutant	1190	6.74E-09
Diesel Engine Exhaust Part	1350	5.51E-04
PAH's (non-speciated)	1840	5.03E-08
Nitrous Oxide (N2O)	2030	2.93E-06
Nitrogen Oxides (part not	2990	7.71E-03
Sulfur Dioxide (SO2)	3990	3.58E-06
Carbon Monoxide (CO) pollu	4990	1.68E-03
Carbon Dioxide, non-biogen	6960	3.67E-01
Methane (CH4)	6970	1.47E-05

Plant #:
Plant Name:
Number of Sources:

Pollutant Name	Emissions/lbs per day	Cancer Risk (in millions)
ACETALDEHYDE		0.00E+00
ACETAMIDE		0.00E+00
ACRYLAMIDE		0.00E+00
ACRYLONITRILE		0.00E+00
ALLYL CHLORIDE		0.00E+00
2-AMINOANTHRAQUINONE		0.00E+00
ANILINE		0.00E+00
ARSENIC AND COMPOUNDS (INORGANIC)[1,2]	9.53E-09	4.81E-10
ASBESTOS[3]		0.00E+00
BENZENE[1]	1.09E-05	1.05E-09
BENZIDINE (AND ITS SALTS) values also apply to:		0.00E+00
Benzidine based dyes		0.00E+00
Direct Black 38		0.00E+00
Direct Blue 6		0.00E+00
Direct Brown 95 (technical grade)		0.00E+00
BENZYL CHLORIDE		0.00E+00
BERYLLIUM AND COMPOUNDS[2]	5.59E-09	4.34E-11
BIS(2-CHLOROETHYL)ETHER (Dichloroethyl ether)		0.00E+00
BIS(CHLOROMETHYL)ETHER		0.00E+00
POTASSIUM BROMATE		0.00E+00
1,3-BUTADIENE		0.00E+00
CADMIUM AND COMPOUNDS[2]	2.38E-08	3.30E-10
CARBON TETRACHLORIDE[1] (Tetrachloromethane)		0.00E+00
CHLORINATED PARAFFINS		0.00E+00
4-CHLORO-O-PHENYLENEDIAMINE		0.00E+00
CHLOROFORM[1]		0.00E+00
PENTACHLOROPHENOL		0.00E+00
2,4,6-TRICHLOROPHENOL		0.00E+00
p-CHLORO-o-TOLUIDINE		0.00E+00
CHROMIUM 6+2	4.93E-10	2.33E-10
Barium chromate2		0.00E+00
Calcium chromate2		0.00E+00
Lead chromate2		0.00E+00
Sodium dichromate2		0.00E+00
Strontium chromate2		0.00E+00
CHROMIC TRIOXIDE (as chromic acid mist)		0.00E+00
p-CRESIDINE		0.00E+00
CUPFERRON		0.00E+00
2,4-DIAMINOANISOLE		0.00E+00
2,4-DIAMINOTOLUENE		0.00E+00
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)		0.00E+00
1,4-DICHLOROBENZENE		0.00E+00
3,3-DICHLOROBENZIDINE		0.00E+00
1,1,-DICHLOROETHANE (Ethylidene dichloride)		0.00E+00
DI(2-ETHYLHEXYL)PHTHALATE (DEHP)		0.00E+00
p-DIMETHYLAMINOAZOBENZENE		0.00E+00
2,4-DINITROTOLUENE		0.00E+00
1,4-DIOXANE (1,4-Diethylene dioxide)		0.00E+00
EPICHLOROHYDRIN (1-Chloro-2,3-epoxypropane)		0.00E+00
ETHYL BENZENE		0.00E+00
ETHYLENE DIBROMIDE (1,2-Dibromoethane)		0.00E+00
ETHYLENE DICHLORIDE (1,2-Dichloroethane)		0.00E+00
ETHYLENE OXIDE (1,2-Epoxyethane)		0.00E+00
ETHYLENE THIOUREA		0.00E+00
FORMALDEHYDE	9.06E-07	1.84E-11
HEXACHLOROBENZENE		0.00E+00
HEXACHLOROCYCLOHEXANES (mixed or technical grade)		0.00E+00
alpha-HEXACHLOROCYCLOHEXANE		0.00E+00
beta- HEXACHLOROCYCLOHEXANE		0.00E+00
gamma-HEXACHLOROCYCLOHEXANE (Lindane)		0.00E+00
HYDRAZINE		0.00E+00
LEAD AND COMPOUNDS 2,4 (inorganic) values also apply to:	2.02E-08	2.31E-12
Lead acetate2		0.00E+00
Lead phosphate2		0.00E+00
Lead subacetate2		0.00E+00
METHYL tertiary-BUTYL ETHER		0.00E+00
4,4'-METHYLENE BIS (2-CHLOROANILINE) (MOCA)		0.00E+00
METHYLENE CHLORIDE (Dichloromethane)		0.00E+00
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)		0.00E+00
MICHLER'S KETONE (4,4'-Bis(dimethylamino)benzophenone)		0.00E+00
N-NITROSODI-n-BUTYLAMINE		0.00E+00
N-NITROSODI-n-PROPYLAMINE		0.00E+00
N-NITROSODIETHYLAMINE		0.00E+00
N-NITROSODIMETHYLAMINE		0.00E+00
N-NITROSODIPHENYLAMINE		0.00E+00
N-NITROSO-N-METHYLETHYLAMINE		0.00E+00
N-NITROSOMORPHOLINE		0.00E+00
N-NITROSOPIPERIDINE		0.00E+00
N-NITROSOPYRROLIDINE		0.00E+00
NICKEL AND COMPOUNDS2 (values also apply to:)	3.86E-07	3.26E-10
Nickel acetate2		0.00E+00
Nickel carbonate2		0.00E+00
Nickel carbonyl2		0.00E+00
Nickel hydroxide2		0.00E+00
Nickelocene2		0.00E+00
NICKEL OXIDE2		0.00E+00
Nickel refinery dust from the pyrometallurgical process2		0.00E+00
Nickel subsulfide2		0.00E+00
p-NITROSODIPHENYLAMINE		0.00E+00
PARTICULATE EMISSIONS FROM DIESEL-FUELED ENGINES	5.51E-04	5.85E-07
PERCHLOROETHYLENE (Tetrachloroethylene)		0.00E+00
PCB (POLYCHLORINATED BIPHENYLS) [low risk] 2,6		0.00E+00
PCB (POLYCHLORINATED BIPHENYLS) [high risk] 2,6		0.00E+00
POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD)(AS 2,3,7,8-PCDD EQUIV) 2,7		0.00E+00
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN2,7		0.00E+00
POLYCHLORINATED DIBENZOFURANS (PCDF)(AS 2,3,7,8-PCDD EQUIV) 2,7		0.00E+00
2,3,7,8-TETRACHLORODIBENZOFURAN2,7		0.00E+00
POLYCYCLIC AROMATIC HYDROCARBON2 (PAH) (AS B(a)P-EQUIV)5		0.00E+00
BENZO(A)PYRENE2,5		0.00E+00
NAPHTHALENE		0.00E+00
1,3-PROPANE SULTONE		0.00E+00
PROPYLENE OXIDE		0.00E+00
1,1,2,2-TETRACHLOROETHANE		0.00E+00
THIOACETAMIDE		0.00E+00
Toluene diisocyantates		0.00E+00
TOLUENE-2,4-DIISOCYANATE		0.00E+00
TOLUENE-2,6-DIISOCYANATE		0.00E+00
1,1,2-TRICHLOROETHANE (Vinyl trichloride)		0.00E+00
TRICHLOROETHYLENE		0.00E+00
URETHANE (Ethyl carbamate)		0.00E+00
VINYL CHLORIDE (Chloroethylene)		0.00E+00
	TOTAL:	5.87E-07

Plant #:

Plant Name:

Number of Sources:

Diesel PM Concentrations	Emissions (lbs/day)	M2.5 Concentration (ug/m3)
	5.51E-04	0.001063898
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
		0
TOTAL:		0.001063898

Plant #:
Plant Name:
Number of Sources:

Pollutant Name	Emission/lbs per day	Chronic Hazard
ACETALDEHYDE	0	0
ACROLEIN		0
ACRYLONITRILE		0
AMMONIA		0
ARSENIC AND COMPOUNDS (INORGANIC)1,2	9.53E-09	4.53361E-05
ARSINE		0
BENZENE1	1.09E-05	3.42946E-07
BERYLLIUM AND COMPOUNDS2	5.59E-09	1.50903E-06
1,3-BUTADIENE		0
CADMIUM AND COMPOUNDS2	2.38E-08	2.51154E-06
CARBON DISULFIDE1		0
CARBON TETRACHLORIDE1 (Tetrachloromethane)		0
CHLORINE		0
CHLORINE DIOXIDE		0
CHLOROBENZENE		0
CHLOROFORM1		0
2,3,4,6-Tetrachlorophenol		0
CHLOROPICRIN		0
CHROMIUM 6+2	4.93E-10	4.65337E-09
Barium chromate2		0
Calcium chromate2		0
Lead chromate2		0
Sodium dichromate2		0
Strontium chromate2		0
CHROMIC TRIOXIDE (as chromic acid mist)		0
CRESOLS		0
M-CRESOL		0
O-CRESOL		0
P-CRESOL		0
Cyanide And Compounds (inorganic)		0
HYDROGEN CYANIDE (Hydrocyanic acid)		0
1,4-DICHLOROBENZENE		0
DIETHANOLAMINE		0
DIMETHYLAMINE		0
N,N-DIMETHYL FORMAMIDE		0
1,4-DIOXANE (1,4-Diethylene dioxide)		0
EPICHLOROHYDRIN (1-Chloro-2,3-epoxypropane)		0
1,2-EPOXYBUTANE		0
ETHYL BENZENE		0
ETHYL CHLORIDE (Chloroethane)		0
ETHYLENE DIBROMIDE (1,2-Dibromoethane)		0
ETHYLENE DICHLORIDE (1,2-Dichloroethane)		0
ETHYLENE GLYCOL		0
ETHYLENE OXIDE (1,2-Epoxyethane)		0
Fluorides		0
HYDROGEN FLUORIDE (Hydrofluoric acid)		0
FORMALDEHYDE	9.06E-07	1.90036E-07
GASOLINE VAPORS		0
GLUTARALDEHYDE		0
ETHYLENE GLYCOL ETHYL ETHER – EGEE1		0
ETHYLENE GLYCOL ETHYL ETHER ACETATE – EGEEA1		0
ETHYLENE GLYCOL METHYL ETHER – EGME1		0
ETHYLENE GLYCOL METHYL ETHER ACETATE – EGMEA		0
n-HEXANE		0
HYDRAZINE		0
HYDROCHLORIC ACID (Hydrogen chloride)		0
HYDROGEN SULFIDE		0
ISOPHORONE		0
ISOPROPYL ALCOHOL (Isopropanol)		0
MALEIC ANHYDRIDE		0
MANGANESE AND COMPOUNDS	3.17E-08	6.64917E-07
MERCURY AND COMPOUNDS (INORGANIC) values also apply to:	6.74E-09	1.79403E-06
Mercuric chloride		0
METHANOL		0
METHYL BROMIDE (Bromomethane)		0
METHYL tertiary-BUTYL ETHER		0
METHYL CHLOROFORM (1,1,1-Trichloroethane)		0
METHYL ISOCYANATE		0
METHYLENE CHLORIDE (Dichloromethane)		0
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)		0
METHYLENE DIPHENYL ISOCYANATE		0
NICKEL AND COMPOUNDS2 (values also apply to:)	3.86E-07	1.45736E-05
Nickel acetate2		0
Nickel carbonate2		0
Nickel carbonyl2		0
Nickel hydroxide2		0
Nickelocene2		0
NICKEL OXIDE2		0
Nickel refinery dust from the pyrometallurgical process2		0
Nickel subsulfide2		0
NITROGEN DIOXIDE	7.71E-03	3.09676E-05
PARTICULATE EMISSIONS FROM DIESEL-FUELED ENGINES	5.51E-04	0.000208033
PERCHLOROETHYLENE (Tetrachloroethylene)		0
PHENOL		0
PHOSPHINE		0
PHOSPHORIC ACID		0
PHOSPHORUS (WHITE)		0
PHTHALIC ANHYDRIDE		0
POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD)(AS 2,3,7,8-PCDD EQUIV) 2,7		0
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN2,7		0
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN2,7		0
POLYCHLORINATED DIBENZOFURANS (PCDF)(AS 2,3,7,8-PCDD EQUIV) 2,7		0
2,3,7,8-TETRACHLORODIBENZOFURAN2,7		0
1,2,3,7,8-PENTACHLORODIBENZOFURAN2,7		0
2,3,4,7,8-PENTACHLORODIBENZOFURAN2,7		0
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN2,7		0
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN2,7		0
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN2,7		0
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN2,7		0
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN2,7		0
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN2,7		0
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN2,7		0
NAPHTHALENE		0
PROPYLENE (PROPENE)		0
PROPYLENE GLYCOL MONOMETHYL ETHER		0
PROPYLENE OXIDE		0
SELENIUM AND COMPOUNDS		0
Selenium sulfide		0
SILICA (Crystalline, Respirable)		0
STYRENE		0
SULFUR DIOXIDE	3.58E-06	1.02398E-08
SULFURIC ACID AND OLEUM		0
SULFURIC ACID		0
SULFUR TRIOXIDE		0
OLEUM		0
TOLUENE		0
Toluene diisocyantates		0
TOLUENE-2,4-DIISOCYANATE		0
TOLUENE-2,6-DIISOCYANATE		0
TRICHLOROETHYLENE		0
TRIETHYLAMINE		0
VINYL ACETATE		0
VINYLIDENE CHLORIDE (1,1-Dichloroethylene)		0
XYLENES (mixed isomers)		0
m-XYLENE		0
o-XYLENE		0
p-XYLENE		0
	TOTAL:	3.06E-04

Plant #:
Plant Name:
Number of Sources:

Pollutant Name	Emission/lbs per day	Acute Hazard
ACETALDEHYDE	0	0
ACROLEIN		0
ACRYLIC ACID		0
AMMONIA		0
ARSENIC AND COMPOUNDS (INORGANIC)1,2	9.53E-09	8.99526E-07
ARSINE		0
BENZENE1	1.09E-05	1.58283E-07
BENZYL CHLORIDE		0
CARBON DISULFIDE1		0
CARBON MONOXIDE	1.68E-03	1.3789E-06
CARBON TETRACHLORIDE1 (Tetrachloromethane)		0
CHLORINE		0
CHLOROFORM1		0
CHLOROPICRIN		0
COPPER AND COMPOUNDS		0
Cyanide And Compounds (inorganic)		0
HYDROGEN CYANIDE (Hydrocyanic acid)		0
1,4-DIOXANE (1,4-Diethylene dioxide)		0
EPICHLOROHYDRIN (1-Chloro-2,3-epoxypropane)		0
Fluorides		0
HYDROGEN FLUORIDE (Hydrofluoric acid)		0
FORMALDEHYDE	9.06E-07	3.10969E-07
ETHYLENE GLYCOL BUTYL ETHER – EGBE		0
ETHYLENE GLYCOL ETHYL ETHER – EGEE1		0
ETHYLENE GLYCOL ETHYL ETHER ACETATE – EGEEA1		0
ETHYLENE GLYCOL METHYL ETHER – EGME1		0
HYDROCHLORIC ACID (Hydrogen chloride)		0
HYDROGEN SULFIDE		0
ISOPROPYL ALCOHOL (Isopropanol)		0
MERCURY AND COMPOUNDS (INORGANIC) values also apply to:	6.74E-09	2.1206E-07
Mercuric chloride		0
METHANOL		0
METHYL BROMIDE (Bromomethane)		0
METHYL CHLOROFORM (1,1,1-Trichloroethane)		0
METHYL ETHYL KETONE (2-Butanone)		0
METHYLENE CHLORIDE (Dichloromethane)		0
NICKEL AND COMPOUNDS2 (values also apply to:)	3.86E-07	1.21447E-06
Nickel acetate2		0
Nickel carbonate2		0
Nickel carbonyl2		0
Nickel hydroxide2		0

Nickelocene2		0
NICKEL OXIDE2		0
Nickel refinery dust from the pyrometallurgical process2		0
Nickel subsulfide2		0
NITRIC ACID		0
OZONE		0
PROPYLENE OXIDE		0
HYDROGEN SELENIDE		0
SODIUM HYDROXIDE		0
STYRENE		0
SULFATES		0
SULFUR DIOXIDE	3.58E-06	1.02398E-07
SULFURIC ACID AND OLEUM		0
SULFURIC ACID		0
SULFUR TRIOXIDE		0
OLEUM		0
TOLUENE		0
TRIETHYLAMINE		0
Vanadium (fume or dust)		0
VANADIUM PENTOXIDE		0
VINYL CHLORIDE (Chloroethylene)		0
XYLENES (mixed isomers)		0
m-XYLENE		0
o-XYLENE		0
p-XYLENE		0
	TOTAL:	4.28E-06

Attachment 3: Rail Line Information and DPM and $PM_{2.5}$ Emission Rates

Railroad Locomotive Emissions

Signature Homes, Madrone Villages - Morgan Hill
DPM Modeling - Rail Line Information and DPM and PM2.5 Emission Rates

Year	Trains on UPRR Rail Line	No. Lines	Link Width (ft)	Link Width (m)	Link Length (ft)	Link Length (miles)	Link Length (m)	Volume Vertical Dimension (m)	Release Height (m)	Average No. Trains per Day	Link Emission Rate (g/day)	Link Emission Rate (g/s)	Link Emission Rate (lb/hr)
2014	Passenger	1	12	3.7	3,937	0.75	1,200	8	4	6.3	19.5	2.26E-04	1.79E-03
	Freight	1	12	3.7	3,937	0.75	1,200	8	4	6.0	20.8	2.41E-04	1.91E-03
	Total									12.3	40.3	4.67E-04	3.70E-03
2015	Passenger	1	12	3.7	3,937	0.75	1,200	8	4	6.3	10.5	1.21E-04	9.63E-04
	Freight	1	12	3.7	3,937	0.75	1,200	8	4	6.0	13.9	1.61E-04	1.28E-03
	Total									12.3	24.4	2.83E-04	2.24E-03
2020	Passenger	1	12	3.7	3,937	0.75	1,200	8	4	6.3	3.3	3.78E-05	3.00E-04
	Freight	1	12	3.7	3,937	0.75	1,200	8	4	6.0	4.6	5.38E-05	4.27E-04
	Total									12.3	7.9	9.16E-05	7.27E-04
2025	Passenger	1	12	3.7	3,937	0.75	1,200	8	4	6.3	1.5	1.69E-05	1.34E-04
	Freight	1	12	3.7	3,937	0.75	1,200	8	4	6.0	2.2	2.58E-05	2.05E-04
	Total									12.3	3.7	4.27E-05	3.39E-04

Notes: Emission based on Emission Factors for Locomotives, USEPA 2009 (EPA-420-F-09-025) and adjusted for California fuel (CARB 2006)
DPM & PM2.5 calculated as 92% of PM emissions (CARB CEIDERS PM2.5 fractions)
Passenger trains assumed to be 3,400 hp locomotive engines, at 60% load, 60 mph
Freight trains assumed to be 4,300 hp locomotive engines, at 60% load, 60 mph

Passenger

Passenger trains - weekday =	8
Passenger trains - weekend =	2
Passenger trains - Sat only =	0
Total Trains =	10
Annual average daily trains =	6.3
Locomotive horsepower =	3200
Locomotives per train =	1
Locomotive engine load =	0.6

Freight

Freight trains per day =	6	7 days/week
Locomotive horsepower =	4300	
Locomotives per train =	1	
Locomotive engine load =	0.6	
Train Speed (mph) =	60	

Emission Factors	(g/hp-hr)
Tier 0+	0.20
Tier 2+	0.08
Tier 3	0.08
Tier 4	0.015
PM2.5 to PM ratio =	0.92

Engine Tier Level Distribution

	Passenger Trains				Freight Trains			
Engine	**2014**	**2015**	**2020**	**2025**	**2014**	**2015**	**2020**	**2025**
Tier 0+	100%	50%	10%		50%	25%		
Tier 2+					50%	50%	25%	
Tier 3								
Tier 4		50%	90%	100%		25%	75%	100%
Composite Emission Factor (g/hp-hr) =	***0.20***	***0.108***	***0.03***	***0.015***	***0.14***	***0.09***	***0.03***	***0.015***

	CARB Fuel Adj Factor 2011+
Passenger	0.709
Freight	0.840

Maximum On-site Residential Cancer Risk Calculations

ISCST3 Railroad DPM Risk Modeling Parameters and Maximum Cancer Risk in Project Area
Signature Homes, Madrone Villages - Morgan Hill

Receptor Information

Number of Receptors	103
Receptor Height =	1.5 m
Receptor distances =	varaible

Meteorological Conditions

San Martin Hourly Met Data	2001 - 2005
Land Use Classification	rural
Wind speed =	variable
Wind direction =	variable

Cancer Risk Calculation Method

Inhalation Dose = C_{air} x DBR x A x EF x ED x 10^{-6} / AT

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)
ED = Exposure duration (years)
AT = Averaging time period over which exposure is averaged.
10^{-6} = Conversion factor

Inhalation Dose Factors

Exposure Type	Value[1]							
	DBR (L/kg BW-day)	A (-)	Exposure (hr/day)	Exposure (days/week)	Exposure (week/year)	EF (days/yr)	ED (Years)	AT (days)
Residential (70-Year)	302	1	24	7	50	350	70	25,550

[1] Default values recommended by OEHHA& Bay Area Air Quality Management District

Cancer Risk (per million) = Inhalation Dose x CRAF x CPF x 10^6
= URF x Cair

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
URF =Unit risk factor (cancer risk per $\mu g/m^3$)

Unit Risk Factors (Unadjusted for age sensitivity) for DPM

Exposure Type	CPF $(mg/kg\text{-}day)^{-1}$	*DPM*	Exhaust TOG TACs	Evaporative TOG TACs
Residential (70-Yr Exposure)	1.10E+00	318.5	1.8	0.11

MEI Cancer Risk Calculations

Meteorological Data Year	Maximum Annual DPM Concentration ($\mu g/m^3$)			
	2014	2015	2020	2025
2001 - 2005	0.0272	0.0165	0.0053	0.0025
Cancer Risk[a]	8.65	5.24	1.70	0.79
Sensitivity Weighting Factor	0.143	0.339	0.214	0.993
Contribution to Total Cancer Risk	1.24	1.78	0.4	0.8
70-yr Cumulative Risk[b]	4.16			

Notes:
Receptor Heights = 1.5 m
Maximum DPM & PM2.5 concentrations occur at the residences closest to the railroad line north of the project site (Receptor No.14)
a Cancer risk (per million) calculated assuming constant 70-year exposure to concentration for year of analysis.
b Cumulative cancer risk (per million) calculated assuming variable exposure over a 70-year period due to decreased concentrations over time.