Air Quality Impact Analysis and Health Risk Assessment

Flahavan Estates Project

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ACRONYMS AND ABBREVIATIONS

BAAQMD	Bay Area Air Quality Management District
CAA	Clean Air Act
CalEEMod	California Emissions Estimate Model
CAP	Climate Action Plan
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CY	cubic yards
DPM	diesel particulate matter
EPA	U.S. Environmental Protection Agency
EV	electric vehicle
GHG	greenhouse gas
MEI	maximally exposed individual
NOx	nitrogen oxides
$PM_{2.5}$	particulate matter with a diameter less than 2.5 microns
PM_{10}	particulate matter with a diameter less than 10 microns
ROG	reactive organic gas
SF Air Basin	San Francisco Bay Area Air Basin
TAC	toxic air contaminant

1 INTRODUCTION

This section identifies the site location and proposed project description.

1.1 SITE LOCATION

The project site is located in the southern portion of the City of Cotati, in Sonoma County, California (Figure 1). The project site is located along the southern boundary of the city limits at 8841 Old Redwood Highway and south of an existing residential development on Clothier Lane. Old Redwood Highway, which fronts the subject property, is maintained by the City of Cotati within city limits and Sonoma County in unincorporated regions. Old Redwood Highway provides regional access via its connection to U.S. 101 in northern Cotati and to the south in Petaluma.

The project site is comprised of one parcel that occupies approximately 7.1 acres. The project site is bounded by Old Redwood Highway to the east, single family residential development directly adjacent to the north and east, rural residential to the west, and agriculture and rural residential uses to the south within Sonoma County. The project site is currently occupied by grassland, orchard trees, several structures near the site frontage to Old Redwood Highway, and gravel driveways. The site was formerly used for agricultural purposes and contains remnants of former chicken coops at the rear of the property. The front of the property is occupied by two residential structures, gravel-compacted driveways, and landscaping.

1.2 PROJECT DESCRIPTION

The proposed project is to construct a 35-lot subdivision with 35 single-family dwelling units, varying from 1 to 2 stories in height and containing 2-car garages, on a 7.1-acre sloped lot (Figure 2). The project proposes demolition/removal of all existing structures (which consists of 3 single family homes and garages, at approximately 4,000 ft^2 total) and fencing within the project boundary as well as the existing well and septic system, new grading, construction of a hillside retaining wall on lots 14-18, landscaping, a new access road terminating in a cul-de-sac and stub road to the southern property line, utility connections, and ancillary improvements. All existing trees (approximately 60) will be removed, and 280 trees are planned to be planted.

The project includes grading of the site to achieve level building pads on each lot and to accommodate infrastructure with gravity flows; a series of retaining walls will be used to create relatively flat areas for the residential structures. Grading activities are expected to generate up to 30,500 cubic yards (CY) of net cut material to be exported. All construction material and equipment would be staged onsite, or through issuance of an encroachment permit, at abutting rights-of-way.

2 AIR QUALITY SETTING

This section describes the regional air quality setting and outlines the regulatory background relevant to the project.

2.1 REGIONAL CLIMATE

The project site is located within the City of Cotati which is in Sonoma County, California. Sonoma County is part of the nine-county San Francisco Bay Area Air Basin (SF Air Basin). Federal, state, and regional agencies regulate air quality in the SF Air Basin. At the federal level, the U.S. Environmental Protection Agency (EPA) is responsible for overseeing implementation of the federal Clean Air Act (CAA). The California Air Resources Board (CARB) is the state agency that regulates mobile sources throughout the state and oversees implementation of the state air quality laws and regulations, including the California CAA. The local air quality regulatory agency responsible for the SF Air Basin is the Bay Area Air Quality Management District (BAAQMD).

The air quality of the SF Air Basin is a product of sources of air pollution within the basin, transport of pollutants to and from surrounding areas, local and regional meteorological conditions, and the surrounding topography. Air quality is described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million or micrograms per cubic meter. The significance of a pollutant concentration is determined by comparing the concentration to an appropriate ambient air quality standard. The standards represent the allowable pollutant concentrations and are intended to protect public health and welfare. The standards are designed to include a reasonable margin of safety to protect the more sensitive individuals in the population.

The project site is located in the Cotati Valley Region. Wind patterns in the Cotati Valley are strongly influenced by the Petaluma Gap, with winds flowing predominantly from the west (BAAQMD 2017a). Cotati Valley has a potential for reduced air quality due to a larger population, industrial facilities in and around Santa Rosa, and increased motor vehicle traffic and the associated air contaminants.

2.2 CRITERIA AND OTHER POLLUTANTS

The federal and California CAAs have established ambient air quality standards for common pollutants, also known as criteria pollutants. The ambient air quality standards are intended to protect human health and the environment. At the federal level, national ambient air quality standards have been established for criteria pollutants. These criteria pollutants include carbon monoxide (CO), ozone, nitrogen oxides (NO_x), respirable particulate matter with a diameter less than 10 microns (PM_{10}), fine particulate matter with a diameter less than 2.5 microns ($PM_{2.5}$), sulfur dioxide, and lead.

The State of California has adopted ambient air quality standards that are, in general, more stringent than the national ambient air quality standards, and include pollutants not regulated at the federal level (i.e., sulfates, hydrogen sulfide, and vinyl chloride). Federal and California ambient air quality standards are presented in Table 2-1.

In addition to criteria air pollutants, there is another group of substances found in ambient air; this group is referred to as toxic air contaminants (TACs). These contaminants tend to be localized and are found in relatively low concentrations in ambient air. However, they can result in adverse chronic health effects, including cancer. Sources of TACs include industrial processes, such as petroleum refining and manufacturing; commercial operations, such as gasoline stations and dry cleaners; and motor vehicle exhaust. One of the TACs of greatest concern in California is diesel particulate matter, which is classified as a carcinogen (i.e., causes cancer). TACs are regulated at the local, state, and federal levels.

2.3 GREENHOUSE GASES

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). The process of heat being trapped in the atmosphere is similar to the effect greenhouses have in raising the internal temperature, hence the name “greenhouse gas.” Both natural processes and human activities emit GHGs. The accumulation of GHGs in the atmosphere regulates the Earth’s temperature; however, emissions from human activities—such as fossil fuel-based electricity production and the use of motor vehicles—have elevated the concentration of GHGs in the atmosphere. GHGs are not monitored in the same manner as air quality pollutants, so there are no background data to characterize the baseline conditions of a given area in terms of GHG levels.

GHGs from fossil fuel combustion include CO_2, methane, and nitrous oxide. CO_2 is the most common reference gas for climate change. To account for warming potential, GHGs are often quantified and reported as CO_2 equivalents (CO_2eq), based on their warming potential relative to CO_2.

2.4 EXISTING AIR QUALITY

BAAQMD monitors ambient concentrations of criteria pollutants in the SF Air Basin. The Sebastopol monitoring station is the closest to the site. Table 2-1 includes a summary of the monitored maximum concentrations and the number of occurrences of exceedances of the state and national ambient air quality standards for the 3-year period from 2017 through 2019.[1]

Table 2-1 shows that over the 3-year period from 2017–2019, the following exceedances were reported: the 8-hour state and national ozone standards were both exceeded 1 time, the 24-hour $PM_{2.5}$ national standard was exceeded 17 times, and the 24-hour PM_{10} state and national standards were exceeded 4 times and 1 time, respectively.

Table 2-1. State and National Air Quality Standards and Summary of Measured Air Quality Exceedances (2017–2019)

Pollutant/Averaging Period	Primary Standard State	Primary Standard National	Year	Maximum Concentration [a]	Days Exceeding State/National Standard
Ozone 1-hour	0.09 ppm	none	2017	0.087	0/NA
			2018	0.071	0/NA
			2019	0.070	0/NA
Ozone 8-hour	0.070 ppm	0.070 ppm	2017	0.071	1/1
			2018	0.053	0/0
			2019	0.059	0/0
Carbon Monoxide (CO) 1-hour	20 ppm	35 ppm	2017	2.1	0/0
			2018	1.4	0/0
			2019	1.4	0/0
Carbon Monoxide (CO) 8-hour	9.0 ppm	9 ppm	2017	1.6	0/0
			2018	1.3	0/0
			2019	1.0	0/0
Nitrogen Dioxide (NO_2) 1-hour	0.18 ppm	0.100 ppm	2017	0.035	0/0
			2018	0.065	0/0
			2019	0.032	0/0
Nitrogen Dioxide (NO_2) Annual	0.030 ppm	0.053 ppm	2017	0.005	NP/NP
			2018	0.004	NP/NP
			2019	0.004	NP/NP
Sulfur Dioxide (SO_2) [b] 1-hour	0.25 ppm	0.075 ppm	2017	0.006	NP/0
			2018	0.007	NP/0
			2019	0.011	NP/0
Sulfur Dioxide (SO_2) [b] 24-hour	0.04 ppm	none	2017	0.002	0/NA
			2018	0.002	0/NA
			2019	0.002	0/NA
Respirable Particulate Matter (PM_{10}) [c] 24-hour	50 µg/m^3	150 µg/m^3	2017	94	2/0
			2018	166	2/1
			2019	33	0/0
Respirable Particulate Matter (PM_{10}) [c] Annual	20 µg/m^3	none	2017	17.7	0/NA
			2018	19.0	0/NA
			2019	14.3	0/NA
Fine Particulate Matter ($PM_{2.5}$) 24-hour	None	35 µg/m^3	2017	81.1	NA/4
			2018	175.3	NA/13
			2019	28.0	NA/0

[1] The BAAQMD has not published monitoring results for years 2020-2022. The data shown in Table 2-1 is the most recent data available.

Table 2-1. State and National Air Quality Standards and Summary of Measured Air Quality Exceedances (2017–2019)

Pollutant/Averaging Period	Primary Standard		Year	Maximum Concentration [a]	Days Exceeding State/National Standard
	State	National			
Fine Particulate Matter ($PM_{2.5}$) Annual	12 µg/m^3	12.0 µg/m^3	2017	8.1	NP/NP
			2018	8.3	NP/NP
			2019	5.7	NP/NP

Source: BAAQMD (2019)

Notes:
µg/m^3 = micrograms per cubic meter
NA = not applicable, no national and/or state standard established
NP = data not provided
ppm = parts per million

[a] Unless otherwise noted, pollutant concentrations were measured at the Sebastopol monitoring station located at 103 Morris Street, Sebastopol, CA 95472 (10 miles northwest of the site).
[b] Sulfur dioxide concentrations are not collected at Sebastopol monitoring station. Concentrations shown in table are from closest monitoring station with sulfur dioxide data which is the Vallejo station located at 304 Tuolumne St, Vallejo, CA 94590 (35 miles southeast of the site).
[c] PM_{10} concentrations are not collected at Sebastopol monitoring station. Concentrations shown in table are from closest monitoring station with sulfur dioxide data which is the San Rafael station located at 534 4th Street, San Rafael, CA 94901 (30 miles south of the site).

2.5 REGULATORY BACKGROUND

Federal Air Quality Regulations

The federal CAA requires CARB, based on air quality monitoring data, to designate portions of the state where the national ambient air quality standards are not met as nonattainment areas. Because of the differences between the national and state ambient air quality standards, the designation of nonattainment areas is different under the federal and state legislation. Areas that meet all air quality standards are in attainment of the standards. Areas where there are no monitoring data available or insufficient data to classify the area are considered unclassified, which for regulatory purposes is treated as an attainment area.

The San Francisco Bay Area attainment status relative to California and national ambient air quality standards is shown in Table 2-2. The Bay Area is classified as nonattainment for ozone, PM_{10}, and $PM_{2.5}$. The Bay Area is considered as in attainment or unclassifiable with respect to the national air quality standards for all other pollutants.

Table 2-2. San Francisco Bay Area Air Basin Designation Status

Pollutant	Averaging Period	California Designation Status	National Designation Status
Ozone	1-hour	N	--
	8-hour	N	N
Carbon Monoxide (CO)	1-hour	A	U/A
	8-hour	A	U/A
Respirable Particulate Matter (PM_{10})	24-hour	N	U
	Annual	N	--
Fine Particulate Matter ($PM_{2.5}$)	24-hour	--	N
	Annual	N	U/A
Sulfur Dioxide (SO_2)	1-hour	A	U/A
	24-hour	A	--
Nitrogen Dioxide (NO_2)	Annual	A	U
	1-hour	A	U/A
Lead	3-month rolling average	--	U/A
	30-day average	A	--

Source: BAAQMD 2023
Notes:
- - = No standard
A = Attainment
N = Non-attainment
U = Unclassified

EPA requires states that have areas that are not in compliance with the national standards to prepare and submit air quality plans showing how the standards would be met. If the states cannot show how the standards would be met, then they must show progress toward meeting the standards. These plans are referred to as the State Implementation Plans. On January 9, 2013, EPA issued a final rule to determine that the Bay Area has attained the national 24-hour $PM_{2.5}$ air quality standard. This action suspends federal State Implementation Plan planning requirements for the Bay Area. BAAQMD has permit authority over stationary sources, acts as the primary reviewing agency for environmental documents, and develops regulations that must be consistent with or more stringent than federal and state air quality laws and regulations.

California Air Quality Regulations

The California CAA outlines a program for areas in the state to attain the California ambient air quality standards by the earliest practical date. The California CAA set more stringent air quality standards for most of the pollutants covered under national standards, and additionally regulates other pollutants. If an area does not meet the California ambient air quality standards, CARB designates the area as a nonattainment area. With respect to the state air quality standards, the Bay Area is a nonattainment area for ozone and particulate matter (PM_{10} and $PM_{2.5}$) and either attainment or unclassified for other pollutants. The California CAA requires local air pollution control districts to prepare air quality attainment plans for pollutants, except for particulate matter, that are not in attainment with the state standards. These plans must provide for district-wide emission reductions of 5 percent per year averaged over consecutive 3-year periods or if not, provide for adoption of all feasible measures on an expeditious schedule.

2.5.1 Bay Area Air Quality Management District

Air quality where the project site is located is regulated by BAAQMD. The role of BAAQMD as an agency is to ensure that the national and California ambient air quality standards are attained and maintained in the SF Air Basin region. BAAQMD regulates stationary sources (with respect to federal, state, and local regulations), monitors regional air pollutant levels (including measurement of TACs), develops air quality control strategies, and conducts public awareness programs.

Clean Air Plan

The most recent air quality air plan is the 2017 Clean Air Plan, which BAAQMD adopted in April 2017 (BAAQMD 2017b). The 2017 Clean Air Plan provides a regional strategy to protect public health and protect the climate. To protect public health, the plan describes how BAAQMD will continue making progress toward attaining all state and federal air quality standards and eliminating health risk disparities from exposure to air pollution among Bay Area communities. The 2017 Clean Air Plan includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful, such as particulate matter, ozone, and TACs; and to decrease emissions of CO2 by reducing fossil fuel combustion. The 2017 Clean Air Plan represents the Bay Area's most recent assessment of the region's strategy to attain the state and national ozone and $PM_{2.5}$ standards.

The 2017 Clean Air Plan's control measures for construction equipment, on-road trucks, and marine vessels are to reduce emissions by:

- Providing cash incentives to retrofit diesel engines with diesel particulate matter filters or upgrade to Tier 4 engines
- Working with CARB and the California Energy Commission to develop more fuel-efficient, off-road engines and drive trains
- Working with local communities, contractors, and developers to encourage the use of renewable alternative fuels in applicable equipment.

CEQA Air Quality Guidelines

BAAQMD has also developed California Environmental Quality Act (CEQA) Air Quality Guidelines that establish thresholds of significance for evaluating new projects and plans and provide guidance for evaluating air quality impacts of projects and plans (BAAQMD 2023). The CEQA Air Quality Guidelines are non-binding recommendations but provide procedures and thresholds of significance for evaluating potential construction-related impacts during the environmental review process consistent with CEQA requirements.

BAAQMD has developed best management practices for construction-related fugitive dust and GHG emissions. For a project to have a less-than-significant criteria air pollutant impact related to construction-related fugitive dust emissions, it must implement the basic best management practices listed in Table 5-2 of the CEQA Guidelines, shown in inset figure 1 below (BAAQMD 2023). BAAQMD also encourages projects to incorporate the best management practices for reducing GHG emissions listed in Table 6-1 of the CEQA Air Quality Guidelines (BAAQMD 2023).

BMP ID	Basic Best Management Practice
B-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.
B-2	All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
B-3	All visible mud or dirt trackout 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.
B-4	All vehicle speeds on unpaved roads shall be limited to 15 mph.
B-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.
B-6	All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
B-7	All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
B-8	Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.
B-9	Publicly visible signs shall be posted with the telephone number and name of the 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 General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.

Inset Figure 1. BAAQMD Basic Best Management Practices for Construction-Related Fugitive Dust Emissions.

2.5.2 Local Air Quality Plans

Sonoma County Regional Climate Action Plan

The County of Sonoma adopted a Climate Action Plan (CAP) in 2016 to address climate change and reduce the community's GHG emissions at the local level (RCPA 2016). The City of Cotati participated in the countywide CAP. The Sonoma County communities identified a regional

GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 22 local GHG reduction measures.

The County conducted a baseline emission study in 2010 and created a forecasted inventory for years 2015, 2020, 2040, and 2050. Results were reported in the 2016 CAP. The forecasted 2020 GHG emission totals for Sonoma County and the City of Cotati were 4,343,000 metric tons CO_{2eq} and 61,350 metric tons CO_{2eq}, respectively. The majority of GHG emissions in Cotati are from fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes and businesses in Cotati.

City of Cotati General Plan

In March 2015, the City Council for Cotati adopted the Cotati General Plan (De Novo Planning Group 2015). The plan outlines several objectives related to air quality impacts including a requirement for all construction projects and ground disturbing activities to implement BAAQMD dust control and abatement measures.

3 PROJECT AIR QUALITY IMPACT ANALYSIS

This section analyzes Project-specific estimated emissions and air quality and GHG impacts.

3.1 THRESHOLDS OF SIGNIFICANCE

Construction activities associated with the project would result in temporary increases in air pollutant emissions. These emissions would be generated primarily from construction equipment exhaust, and construction worker and other construction-related vehicle trips (e.g., materials transport) to and from the construction area. These activities would result in emissions of ozone precursors (reactive organic gases [ROGs] and NO_x), and particulate matter from fugitive dust emissions, including road dust, from on-road vehicles and, off-road construction equipment. Operational emissions are anticipated to occur continuously after the project is built and include stationary sources, both permitted and non-permitted, and mobile sources, such as vehicles and other equipment (BAAQMD 2023).

BAAQMD has identified CEQA thresholds of significance for exhaust emissions from construction and operational related activities. Table 3-1 lists the project level thresholds of significance for daily and annual criteria air pollutant emissions (BAAQMD 2023). While there is no quantitative threshold identified for PM_{10}/$PM_{2.5}$ (fugitive dust), BAAQMD recommends implementation of all feasible fugitive dust management practices for construction.

Table 3-1. Criteria Air Pollutant Thresholds of Significance

Criteria Air Pollutants and Precursors	Construction-Related Average Daily Emissions (pounds/day)	Operational-Related Average Daily Emissions (pounds/day)	Operational-Related Maximum Annual Emissions (tons/year)
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (exhaust)	82	15
$PM_{2.5}$	54 (exhaust)	54	10
PM_{10}/$PM_{2.5}$ (fugitive dust)	Best Management Practices	None	None
Local CO	None	9.0 ppm (8-hour average) 20.0 ppm (1-hour average)	

Source: BAAQMD (2023)

BAAQMD project level thresholds of significance for GHG emissions identifies two approaches for project to make a less-than-significant contribution of GHG emissions. A project can meet identified design elements required of new land use projects and/or demonstrate consistency with a local GHG reduction strategy that is consistent with state guidance (CEQA Air Quality Guidelines Section 15183.5[b]) (BAAQMD 2023).

3.2 METHOD USED IN ANALYSIS

Construction emissions of ozone precursors ROG and NOx, and PM_{10} and $PM_{2.5}$ were estimated for the whole of the project-related activities, and those for operational activities were based on updated information obtained from the developer (Pink Viking, LLC). The California Emissions Estimate Model (CalEEMod), an air quality modeling program that estimates air pollutant emissions in tons per year (CAPCOA 2022), was used to estimate both types of emissions. No mitigation measures were modeled to offset emissions.

3.2.1 Construction Emissions

Construction is anticipated to occur over three years from 2024 to 2026. Construction-related activities that would results in emissions include:

- Demolition of all existing structures (which consists of 3 single family homes and garages);
- Site preparation and grading activities (including up to 30,500 CY of net cut material to be exported); and
- Simultaneous occurrence of two construction phases (e.g., building construction and paving would occur simultaneously).

Project-specific inputs to CalEEMod include land use types; size in acres and square feet; start and end dates of construction phases; heavy-duty equipment types and operating hours; volumes of import and export materials; and haul, material, and worker trips. There are no stationary emission sources anticipated during construction (i.e., back-up generators).

The assumptions used in this analysis are based on planning-level information; actual equipment types and numbers, worker trips, and other aspects of construction would be determined by the contractor. The assumptions and resulting emission estimates provided herein are likely conservative (i.e., overestimates). A summary of project-specific inputs used in the CalEEMod construction module is provided in Attachment A.

3.2.2 Operations Emissions

Operational activities would begin in 2027 and would not overlap with construction-related activities. The project size is below the applicable operational screening level size of 421,000 ft^2 (9.66 acres) for Residential Single-Family Housing shown in Table 4-1 of the 2022 BAAQMD CEQA Guidelines. Operational activities would not include stationary engines or industrial sources subject to BAAQMD rules and regulations.

CalEEMod provided default values were used for estimating operational emissions from the project. Default values for vehicle trips per day and vehicle miles traveled were compared to a traffic study prepared for the project. The traffic study estimated approximately 302 trips/day while CalEEMod estimated 330 trips per day (Transpedia Consulting Engineers 2022). Vehicle miles traveled values from the traffic study were also found to be comparable to CalEEMod default values. Overall, CalEEMod default values were determined to be more conservative and were therefore used in the analysis.

3.3 ESTIMATED CRITERIA POLLUTANT EMISSIONS

The CalEEMod results summary report is provided in Attachment B, and the results are summarized in Table 3-2, which summarizes the average daily emissions for construction- and operations-related activities, and Table 3-3 which summarizes annual emissions.

Table 3-2. Estimated Average Daily Criteria Pollutant Project Emissions

	Average Daily Emissions (pounds/day)						
Phase/Year	ROG	NO_x	PM_{10} Exhaust	$PM_{2.5}$ Exhaust	PM_{10} Dust	$PM_{2.5}$ Dust	CO
Construction							
2024	0.53	4.88	0.19	0.17	0.56	0.07	4.19
2025	0.58	5.40	0.17	0.16	0.71	0.13	5.66
2026	0.30	2.08	0.07	0.07	0.16	0.04	3.15
Operations							
2027	2.97	1.59	0.05	0.05	1.97	0.50	10.2
Threshold of Significance	54	54	82	54	--	--	--
Exceedance of Threshold?	No	No	No	No	NA	NA	NA

Notes:
- - = No average daily emission threshold
NA = Not applicable

Table 3-3. Estimated Annual Criteria Pollutant Project Emissions

	Annual Emissions (ton/year)						
Phase/Year	ROG	NO_x	PM_{10} Exhaust	$PM_{2.5}$ Exhaust	PM_{10} Dust	$PM_{2.5}$ Dust	CO
Construction							
2024	0.10	0.89	0.03	0.03	0.10	0.01	0.77
2025	0.10	0.99	0.03	0.03	0.13	0.02	1.03
2026	0.06	0.38	0.01	0.01	0.03	0.01	0.57
Operations							
2027	0.54	0.29	0.01	0.01	0.35	0.09	1.86
Threshold of Significance	10*	10*	15*	10*	--	--	--
Exceedance of Threshold?	No	No	No	No	NA	NA	NA

Notes:
* Threshold of significance is for operational emissions.
- - = No average daily emission threshold
NA = Not applicable

The estimated emissions of ozone precursors ROG and NOx and particulate matter PM_{10} and $PM_{2.5}$ are well below the average daily and maximum annual thresholds of significance for emissions.

3.4 GREENHOUSE GAS EMISSIONS

Project-level thresholds of significance for climate impacts (e.g. GHG emissions) were adopted by the BAAQMD in 2022. The developer (Pink Viking, LLC) provided details of project design elements for buildings and transportation. All homes included in the project will be equipped with solar and battery backups and will be built to latest green building standards including "low-e" windows and heavy insulation. Per State CEQA Guidelines Section 15183.5(a), the project will not result in wasteful energy use. However, the current project plans do not eliminate natural gas appliances or plumbing (a final design has not been determined at this time).

The project design elements for transportation requirements meet the State CEQA Guidelines in Section 15183.5(a). All homes will have a dedicated electric vehicle (EV) circuit and the project will achieve compliance with off-street EV requirements. The project traffic impact analysis determined the project to achieve greater than a 15% reduction in VMT below the existing VMT per capita (Transpedia Consulting Engineers 2022).

The Sonoma County Regional Climate Action Plan does not establish a level below which the contribution to GHG emissions from project activities would not be cumulatively considerable, per State CEQA Guidelines Section 15183.5(b), and therefore does not qualify as local GHG reduction strategy. For comparison purposes, Sonoma County's 2020 forecasted community-wide GHG emissions (projected from the 2010 baseline inventory) were estimated at 4,343,000 metric tons CO_{2eq} (RCPA 2016). The City of Cotati's forecasted 2020 community-wide GHG emissions (projected from the 2010 baseline inventory) were estimated at 61,350 metric tons CO_{2eq} (RCPA 2016). Project GHG emissions estimated from CalEEMod, as shown in Table 3-4, were compared to both the City and County projected emissions.

Table 3-4. Project GHG Emissions

	Estimated GHG Emissions Summary		
Phase/Year	Project GHG CO_2eq (metric tons/year	% of 2020 Sonoma County Projected GHG Emissions	% of 2020 City of Cotati Projected GHG Emissions
Construction			
2024	228	0.005	0.372
2025	381	0.009	0.621
2026	137	0.003	0.223
Operations			
2027	459	0.011	0.748

Project operations-related emissions would account for only 0.01 percent of Sonoma County's 2020 projected community-wide GHG emissions and 0.75 percent of the City of Cotati's San 2020 projected community-wide GHG emissions. The GHG emissions resulting from construction activities and operations represent a small contribution to the community-wide emissions. In addition, the Project's construction-related GHG emissions would be temporary. The project incorporates most of the project-level thresholds of significance for climate impacts and therefore would make a less-than-significant contribution to GHG emissions.

3.5 SUMMARY

The construction activities at the project site would use on-road vehicles and off-road construction equipment, and equipment that would comply with current BAAQMD and state/local plans and regulations. Construction activities associated with the project would be short term and temporary. The estimated emissions of ozone precursors ROG and NO_x and particulate matter PM_{10} and $PM_{2.5}$ (Table 3-2 and 3-3) are below the threshold of significance for construction-related emissions. The project meets the operational screening criteria outlined by BAAQMD which would result in a less-than-significant impact related to criteria air pollutants and precursors. Furthermore, the current project design meets the most of the minimum elements for climate impact thresholds of significance and therefore would make a less-than-significant contribution to GHG emissions.

The thresholds of significance developed by BAAQMD represent the levels at which a project's individual emissions of criteria air pollutants (or precursors) for which the SF Air Basin is in nonattainment would result in a cumulatively considerable contribution. For these reasons, activities at the project site would not conflict with or obstruct implementation of any applicable air quality plan.

4 HEALTH RISK IMPACT ANALYSIS

The SF Air Basin is designated as a nonattainment area for state and national ambient air quality criteria for ozone and $PM_{2.5}$. Pollutants including criteria and noncriteria pollutants and TACs contribute to the overall health risks to local communities. Emissions from project activities also contribute to the health risks. If emissions from the project are significant, that is exceeding the thresholds of significance, it could result in adverse air quality impacts.

A health risk analysis was completed to evaluate impacts to local communities and sensitive receptors.

4.1 SENSITIVE RECEPTORS

Children, the elderly, and people with respiratory or cardiovascular diseases can be sensitive to air pollution. Examples of sensitive receptors include schools, daycare facilities, hospitals, nursing homes, and residences. As described in Section 1, the project site is bounded by single-family residential development adjacent to the project site (along Clothier Lane), and further to the north and east as well as rural residential to the west and the south. There are no schools, daycare centers, or nursing homes located within a 0.25 mile radius of the project. The closest school is the Cotati-Rohnert Park Co-op Nursery School (a preschool) which is over 0.5 miles from the project site. There are no hospitals within a mile of the project site. No other sensitive receptors are located in close proximity to the project boundary. As a residential land use development project, the proposed single-family residential units would be considered sensitive receptors once occupied.

Potential impacts to sensitive receptors outside the project boundary, including residents adjacent to the project site, could occur mainly during construction activities which are anticipated to start in 2024 and be completed in 2027. As shown in Tables 3-2 and 3-3, emissions generated from construction and operational activities are less than the screening criteria for criteria pollutants, including the initial phases of the project, when emissions are expected to be the highest. Further analysis of potential impacts from emissions is provided below and shows less than significant impacts for sensitive receptors.

4.2 HEALTH RISK ANALYSIS

For the health risk analysis, the BAAQMD recommends a tiered approach where the project's impacts and the combined cumulative impacts from surrounding sources and the project are compared with appropriate thresholds of significance. If thresholds of significance are exceeded, then it would trigger the next tier of evaluation (i.e., refinement of analysis).

Thresholds of significance were developed to "ensure no individual project (or source) creates a significant adverse impact and that no sensitive receptor endures a significant adverse impact from any individual project" (BAAQMD 2022).

The project level thresholds of significance for local risks and hazards are based on:

- Increased cancer risk greater than 10 in a million
- Increased hazard greater than 1 (chronic or acute)
- Increased $PM_{2.5}$ greater than 0.3 µg /m^3 annual average.

The cumulative thresholds of significance for local risks and hazards are based on:

- Cancer risk greater than 100 in a million (from all local sources)
- Hazard greater than 10 (chronic from all local sources)
- $PM_{2.5}$ greater than 0.8 µg /m^3 annual average (from all local sources).

The sections below present the risk analyses.

4.2.1 Construction Impacts

The emissions from project specific construction and operations are well below the project level thresholds of significance, see Table 4-1 below. The project's incremental contribution to risk and hazard is not significant, and thus, cumulative impacts are not considerable. Cancer risks were predicted for this project area using the maximum modeled annual diesel particulate matter (DPM) concentrations. Following the BAAQMD guidance (2011), DPM emissions as annual exhaust $PM_{2.5}$ emissions were modeled using CalEEMod provided in Attachment B and summarized in Tables 3-2 and 3-3. Concentrations of exhaust $PM_{2.5}$ in air were estimated using EPA's SCREEN3 dispersion model[2], recommended by the BAAQMD for a Tier 1 screening analysis.

To represent the construction equipment exhaust emissions, an emission release height of 5 meters was assumed for the source area, reflecting the equipment exhaust pipes plume rise (AQMD 2008). The source area was assumed to be the total project area (7.1 acres [292 meters x 99 meters]) as demolition/construction activities are planned for the entire parcel (Section 1.2). The $PM_{2.5}$ air concentrations were calculated for nearby sensitive receptors at a height of 1.5 meters, representative of an average breathing zone for all receptors (BAAQMD 2023; Appendix E). Although receptors like infants maybe closer to the ground, they are not exposed (e.g., outdoors) for significant amounts of time. Adult receptors are likely more the maximally exposed individual (MEI). A map showing MEI locations is provided in Figure 3.

[2] https://www.epa.gov/scram/air-quality-dispersion-modeling-alternative-models#isc3

In the first year of construction, the 1-hour $PM_{2.5}$ air concentration for the MEI, assumed to be immediately adjacent to the project site (10 meters from the project boundary), was modeled to be 0.9 µg/m^3 using SCREEN3 and scaled to an annual concentration of 0.07 µg/m^3. A scaling factor of 0.08 was used to estimate annual concentrations (EPA 1992). The maximum annual air concentration was estimated to be 0.12 µg/m^3at 176 meters from the project boundary. The same $PM_{2.5}$ air concentrations were modeled for the second year of construction. For the final year of construction, the annual $PM_{2.5}$ air concentration immediately adjacent to the project site was modeled to be 0.02 µg/m^3 and the maximum annual air concentration was modeled to be 0.04 µg/m^3 at 176 meters from the project boundary. These concentrations are below the local and cumulative risk/hazard thresholds as summarized below in Table 4-1; SCREEN3 Outputs are included in Attachment C.

Table 4-1. Local and Cumulative Risk/Hazards of Annual $PM_{2.5}$ Emissions

Construction Year	Modeled $PM_{2.5}$ Air Concentration - Adjacent to Site	Modeled $PM_{2.5}$ Air Concentration - Maximum Exposure
	Local Risk/Hazard Threshold = 0.3 µg/m^3 Cumulative Risk/Hazard Threshold = 0.8 µg/m^3	
2024	0.07	0.12
2025	0.07	0.12
2026	0.02	0.04

Cancer Risk

The modeled air concentrations adjacent to the project site were used to calculate inhalation doses for the child and adult in accordance with the BAAQMD guidance (2011) and using the most current exposure assumptions from the Office of Environmental Health Hazard Assessment guidance (OEHHA 2015).

$$\text{Dose-air} = C_{air} \times \{BR/BW\} \times A \times EF \times 10^{-6}$$

Where:

Dose-air = dose through inhalation (mg/kg-day)
C_{air} = air concentration from air dispersion model (µg/m^3)
BR/BW = daily breathing rate normalized to body weight (210 L/kg body weight-day for an adult; 535 L/kg body weight-day for a young child [2-5 years old]; and 658 L/kg body weight-day for an infant [0-2 years old])
EF = exposure frequency (350 days/365 days in a year for a resident) = 0.96
A = inhalation absorption factor (unitless); assumed to be 1
10^{-6} = micrograms to milligrams conversion, liters to cubic meters conversion factor

Cancer risks were then estimated as follows.

$$RISK_{inh\text{-}res} = DOSE_{air} \times CPF \times ASF \times ED/AT \times FAH$$

Where:

$RISK_{inh\text{-}res}$ = residential inhalation cancer risk
Dose-air = dose through inhalation (mg/kg-day)
CPF = cancer Potency Factor (mg/kg-day^{-1})
ASF = age sensitivity factor for a specified age group (unitless); 1 for adult, 3 for young child, and 10 for infant
ED = exposure duration in years for specified age group
AT = averaging time for lifetime cancer risk (70 years)
FAH = fraction of time spent at home (unitless); 0.73 for adult, 0.72 for young child, and 0.85 for infant

For receptors adjacent to the project site (10 meters) and the maximum exposed receptors (176 meters from the project site, based on SCREEN3 output; see Attachment C), cancer risks based on modeled annual $PM_{2.5}$ air concentrations from the project are at or below the local and cumulative risk thresholds as summarized in Table 4-2.

Table 4-2. Local and Cumulative Cancer Risk During Construction

Receptor	Local Risk Threshold = 10 in a million Cumulative Risk Threshold = 100 in a million	
	Adjacent to Site	Maximum
Adult	0.4 in a million	0.6 in a million
Young Child	3 in a million	5 in a million
Infant	10 in a million	10 in a million

Noncancer Hazard

The potential for noncancer hazards were estimated using the following:

$$HQ = C_{air}/REL$$

Where:

HQ = hazard quotient (unitless)
C_{air} = air concentration from air dispersion model (μg/m^3)
REL = reference exposure level (5 μg/m^3 for $PM_{2.5}$)

For receptors adjacent to the project site (10 meters) and the maximum exposed receptors (176 meters from the project site, based on SCREEN3 output; see Attachment C), noncancer hazards based on modeled annual $PM_{2.5}$ air concentrations from the project are at or below the local and cumulative hazard thresholds as summarized in Table 4-3.

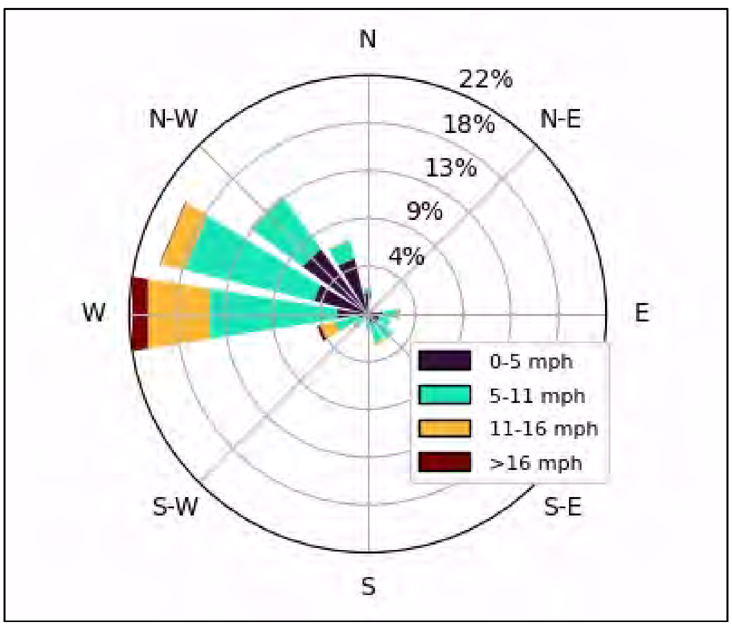
Table 4-3. Local and Cumulative Noncancer Hazards During Construction

Receptor	Local Hazard Threshold = 1 Cumulative Hazard Threshold = 10	
	Adjacent to Site	Maximum
Adult	0.01	0.02
Young Child	0.01	0.02
Infant	0.01	0.02

Local Risk and Hazard Results

For receptors adjacent to the project site, cancer risks based on annual $PM_{2.5}$ air concentrations from the project are estimated to be at or below the local risk threshold of 10 in a million (Table 4-2). The modeled air concentrations are below the REL of 5 µg/m^3 for $PM_{2.5}$, and therefore, estimated noncancer hazards for infant, young child, and adult are also below the local hazard threshold of 1 (Table 4-3). The risk and hazard calculations are included in Attachment C.

The closest preschool is over 0.5 miles (800 meters) northwest and downwind of the project site. The annual $PM_{2.5}$ air concentration at that distance is modeled to be 0.02 µg/m^3 and estimated risks would be well below the thresholds. Based on wind speed data from the closest station located at the Petaluma Municipal Airport, the wind blows 22% from the west 18% from the northwest, and less than 4% from the east and southeast (Inset Figure 2).



Inset Figure 2. Wind rose for Petaluma Municipal Airport wind speed October 2011 to September 2023 (NCEI 2023).

Given the estimated air concentrations of $PM_{2.5}$ from the project are below the thresholds, additional tier of evaluations are not warranted.

4.2.2 Operational Impacts

Community health risk assessments typically look at all substantial sources of TACs located within 1,000 feet of project sites. These sources include freeways or State highways, busy surface streets, and stationary sources identified by BAAQMD. A review of the Project indicates that traffic on Old Redwood Highway is the only source of TAC emissions near the project site.

Old Redwood Highway has an average daily trip volume of 12,500 vehicles per day (Winzler and Kelly 2005). Using the BAAQMD Roadway Screening Analysis Table for Sonoma County for north-south directional roadways and at a distance of approximately 50 feet and traffic volume of 12,500, the estimated $PM_{2.5}$ concentration would be 0.18 µg/m^3. At this concentration, the estimated cancer risk would be 7.2 in one million or less, which is below the BAAQMD community risk significance threshold of 10 in one million and the estimated hazard index would be well under 1 as summarized in Table 4-4 (calculations are in Attachment C).

Table 4-4. Estimated Cancer Risk and Hazard from Operational Impacts

	Estimated $PM_{2.5}$ Air Concentration	Community Risk	Hazard Index
Project Impact	0.18 µg/m^3	7.2 in a million	0.04
Threshold	0.3 µg/m^3	10 in a million	1.0
Exceedance of Threshold?	No	No	No

This project is not a significant source of operation-related TAC emissions and would not contribute to any significant adverse risk to onsite sensitive receptors.

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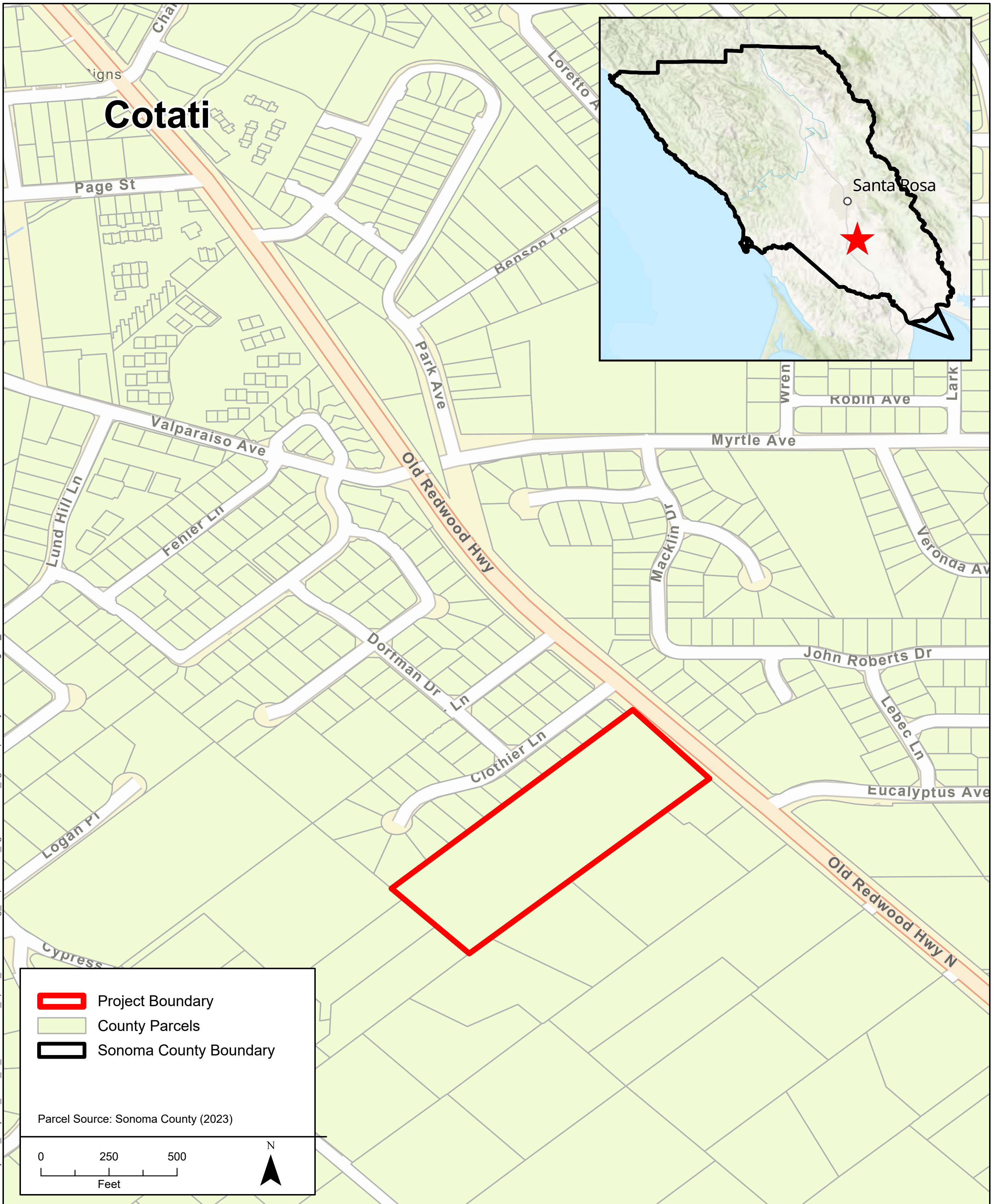

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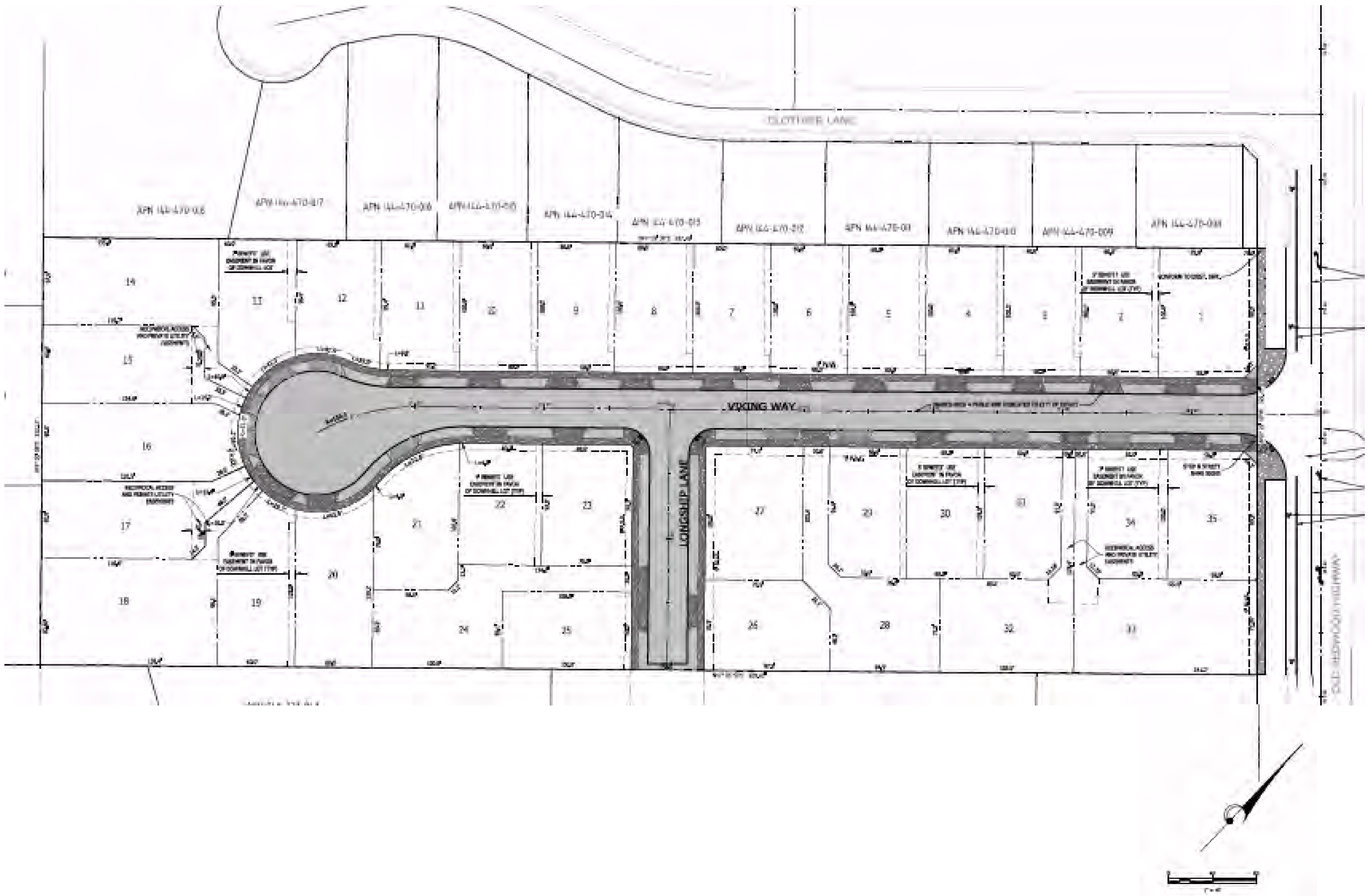
Figure 1.
Project Location



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Source: T.D.G. Consulting Civil Engineers, Inc. 2023. Flahavan Estates Tentative Map. August.

Figure 2.
Site Plan

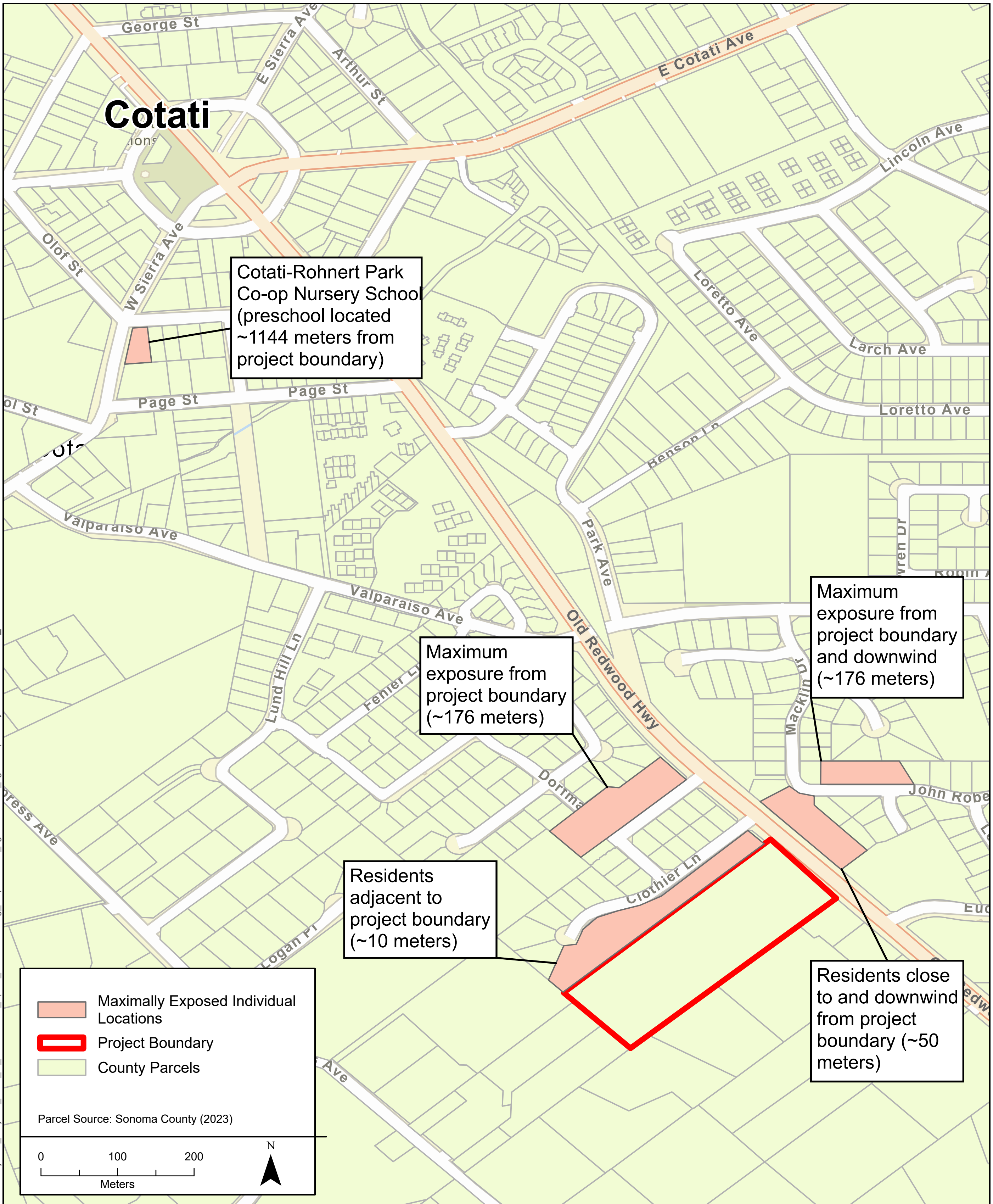

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Figure 3.
Maximally Exposed Individual Locations

Attachment A

Project Input Values for CalEEMod Construction Module

Project Input Values for CalEEMod Construction Module

	Schedule					Workers		Equipment			Trips			
Phase	Start Date	End Date	Total Days	Work Days/ Week	Total Work Days	Workers Onsite per Day	One-Way Worker Trips/Day	Equipment Type	Quantity	Operating Hours/Day	Total Vendor Trips	Vendor One-Way Trips/Day	Total Haul Trips	Haul One-Way Trips/Day
Demolition	8/1/2024	8/15/2024	14	5	11	8	16	Tractors/Loader/Backhoes	1	2	0	0	22	4
								Excavators	1	7				
								Scrapers	2	7				
								Dumper/Tender	1	3				
Site Preparation	8/15/2024	2/1/2025	170	5	122	8	16	Tractors/Loader/Backhoes	1	2	0	0	0	0
								Excavator	1	7				
								Scrapers	2	7				
Grading	2/1/2025	4/1/2025	59	5	42	8	16	Tractors/Loader/Backhoes	1	2	84	4	3,822*	91*
								Excavator	1	7				
								Scrapers	2	7				
								Off-Highway Truck	1	4				
Building Construction	4/1/2025	10/1/2026	548	5	393	17	34	Forklift	1	4	393	2	0	0
								Tractors/Loader/Backhoes	1	3				
								Off-Highway Truck	1	4				
								Other construction equipment	1	7				
Paving	9/15/2026	10/1/2026	16	5	13	0	0	Paver	1	7	0	0	0	0
								Paving Equipment	1	7				
								Rollers	1	7				

*Haul trips calculated by CalEEMod based on project material export volume.

Attachment B

CalEEMod Results Summary Report

Flahavan Estates Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Flahavan Estates
Construction Start Date	8/1/2024
Operational Year	2027
Lead Agency	—
Land Use Scale	Plan/community
Analysis Level for Defaults	County
Windspeed (m/s)	2.20
Precipitation (days)	4.80
Location	8841 Old Redwood Hwy, Cotati, CA 94931, USA
County	Sonoma-San Francisco
City	Cotati
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	974
EDFZ	2
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.19

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

Single Family Housing	35.0	Dwelling Unit	7.10	63,000	70,000	—	90.0	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Unmit.	3.10	28.8	24.6	1.09	3.99	1.00	0.77	11,931
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Unmit.	2.98	34.6	28.2	1.02	5.68	0.94	0.94	15,113
Average Daily (Max)	—	—	—	—	—	—	—	—
Unmit.	0.58	5.40	5.66	0.19	0.71	0.17	0.13	2,301
Annual (Max)	—	—	—	—	—	—	—	—
Unmit.	0.10	0.99	1.03	0.03	0.13	0.03	0.02	381
Exceeds (Daily Max)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	82.0	—	54.0	—	—
Unmit.	No	No	—	No	—	No	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	82.0	—	54.0	—	—
Unmit.	No	No	—	No	—	No	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—
2024	3.10	28.8	24.6	1.09	2.55	1.00	0.34	7,827
2025	1.95	24.1	20.9	0.64	3.99	0.60	0.77	11,931
2026	0.88	6.77	10.1	0.27	0.30	0.25	0.07	2,179
Daily - Winter (Max)	—	—	—	—	—	—	—	—
2024	1.80	16.6	14.3	0.63	1.99	0.58	0.23	4,731
2025	2.98	34.6	28.2	1.02	5.68	0.94	0.94	15,113
2026	0.88	6.80	9.97	0.27	0.30	0.25	0.07	2,159
Average Daily	—	—	—	—	—	—	—	—
2024	0.53	4.88	4.19	0.19	0.56	0.17	0.07	1,380
2025	0.58	5.40	5.66	0.17	0.71	0.16	0.13	2,301
2026	0.30	2.08	3.15	0.07	0.16	0.07	0.04	827
Annual	—	—	—	—	—	—	—	—
2024	0.10	0.89	0.77	0.03	0.10	0.03	0.01	228
2025	0.10	0.99	1.03	0.03	0.13	0.03	0.02	381
2026	0.06	0.38	0.57	0.01	0.03	0.01	0.01	137

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Unmit.	3.16	1.52	12.0	0.05	1.97	0.05	0.50	2,928
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Unmit.	2.92	1.67	9.79	0.05	1.97	0.05	0.50	2,808
Average Daily (Max)	—	—	—	—	—	—	—	—

Unmit.	2.97	1.59	10.2	0.05	1.92	0.05	0.49	2,775
Annual (Max)	—	—	—	—	—	—	—	—
Unmit.	0.54	0.29	1.86	0.01	0.35	0.01	0.09	459

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Mobile	1.37	1.17	9.88	0.02	1.97	0.02	0.50	2,309
Area	1.77	0.02	1.99	< 0.005	—	< 0.005	—	5.33
Energy	0.02	0.33	0.14	0.03	—	0.03	—	563
Water	—	—	—	—	—	—	—	13.4
Waste	—	—	—	—	—	—	—	35.8
Refrig.	—	—	—	—	—	—	—	0.45
Total	3.16	1.52	12.0	0.05	1.97	0.05	0.50	2,928
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Mobile	1.31	1.34	9.65	0.02	1.97	0.02	0.50	2,195
Area	1.59	0.00	0.00	0.00	—	0.00	—	0.00
Energy	0.02	0.33	0.14	0.03	—	0.03	—	563
Water	—	—	—	—	—	—	—	13.4
Waste	—	—	—	—	—	—	—	35.8
Refrig.	—	—	—	—	—	—	—	0.45
Total	2.92	1.67	9.79	0.05	1.97	0.05	0.50	2,808
Average Daily	—	—	—	—	—	—	—	—
Mobile	1.27	1.24	9.04	0.02	1.92	0.02	0.49	2,159
Area	1.68	0.01	0.98	< 0.005	—	< 0.005	—	2.63
Energy	0.02	0.33	0.14	0.03	—	0.03	—	563

Water	—	—	—	—	—	—	—	13.4
Waste	—	—	—	—	—	—	—	35.8
Refrig.	—	—	—	—	—	—	—	0.45
Total	2.97	1.59	10.2	0.05	1.92	0.05	0.49	2,775
Annual	—	—	—	—	—	—	—	—
Mobile	0.23	0.23	1.65	< 0.005	0.35	< 0.005	0.09	357
Area	0.31	< 0.005	0.18	< 0.005	—	< 0.005	—	0.43
Energy	< 0.005	0.06	0.03	< 0.005	—	< 0.005	—	93.2
Water	—	—	—	—	—	—	—	2.21
Waste	—	—	—	—	—	—	—	5.93
Refrig.	—	—	—	—	—	—	—	0.07
Total	0.54	0.29	1.86	0.01	0.35	0.01	0.09	459

3. Construction Emissions Details

3.1. Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.21	11.7	9.23	0.45	—	0.41	—	2,614
Demolition	—	—	—	—	0.36	—	0.05	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.35	0.28	0.01	—	0.01	—	78.8
Demolition	—	—	—	—	0.01	—	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.05	< 0.005	—	< 0.005	—	13.0
Demolition	—	—	—	—	< 0.005	—	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.05	0.84	0.00	0.13	0.00	0.03	145
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.44	0.17	< 0.005	0.07	< 0.005	0.02	326
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	< 0.005	0.00	< 0.005	4.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	9.82
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	< 0.005	0.00	< 0.005	0.68
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.63

3.3. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	16.5	13.6	0.63	—	0.58	—	4,597

Dust From Material Movement	—	—	—	—	1.86	—	0.20	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.74	16.5	13.6	0.63	—	0.58	—	4,597
Dust From Material Movement	—	—	—	—	1.86	—	0.20	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.47	4.50	3.69	0.17	—	0.16	—	1,251
Dust From Material Movement	—	—	—	—	0.50	—	0.05	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.82	0.67	0.03	—	0.03	—	207
Dust From Material Movement	—	—	—	—	0.09	—	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.05	0.84	0.00	0.13	0.00	0.03	145
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.74	0.00	0.13	0.00	0.03	134
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.20	0.00	0.04	0.00	0.01	36.9

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.01	0.00	< 0.005	6.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Site Preparation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.57	13.9	12.7	0.53	—	0.49	—	4,597
Dust From Material Movement	—	—	—	—	1.86	—	0.20	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10	0.87	0.80	0.03	—	0.03	—	288
Dust From Material Movement	—	—	—	—	0.12	—	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.16	0.15	0.01	—	0.01	—	47.7
Dust From Material Movement	—	—	—	—	0.02	—	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.69	0.00	0.13	0.00	0.03	132
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.01	0.00	< 0.005	8.33
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	< 0.005	0.00	< 0.005	1.38
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Grading (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.15	10.4	10.3	0.40	—	0.37	—	2,885
Dust From Material Movement	—	—	—	—	1.89	—	0.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	1.15	10.4	10.3	0.40	—	0.37	—	2,885
Dust From Material Movement	—	—	—	—	1.89	—	0.21	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	1.20	1.18	0.05	—	0.04	—	332
Dust From Material Movement	—	—	—	—	0.22	—	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.22	0.22	0.01	—	0.01	—	55.0
Dust From Material Movement	—	—	—	—	0.04	—	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.07	0.05	0.78	0.00	0.13	0.00	0.03	142
Vendor	< 0.005	0.15	0.06	< 0.005	0.03	< 0.005	0.01	116
Hauling	0.13	9.51	3.74	0.08	1.64	0.08	0.46	7,265
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.06	0.06	0.69	0.00	0.13	0.00	0.03	132
Vendor	< 0.005	0.16	0.06	< 0.005	0.03	< 0.005	0.01	116
Hauling	0.12	10.0	3.77	0.08	1.64	0.08	0.46	7,252
Average Daily	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.02	0.00	< 0.005	15.3
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	< 0.005	< 0.005	13.3
Hauling	0.01	1.14	0.43	0.01	0.19	0.01	0.05	835
Annual	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	< 0.005	0.00	< 0.005	2.53
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.21
Hauling	< 0.005	0.21	0.08	< 0.005	0.03	< 0.005	0.01	138

3.9. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.46	3.83	4.33	0.16	—	0.14	—	1,163
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.46	3.83	4.33	0.16	—	0.14	—	1,163
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.25	2.06	2.33	0.08	—	0.08	—	626
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.38	0.43	0.02	—	0.01	—	104
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.14	0.10	1.66	0.00	0.28	0.00	0.07	301
Vendor	< 0.005	0.07	0.03	< 0.005	0.01	< 0.005	< 0.005	58.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.14	1.47	0.00	0.28	0.00	0.07	280
Vendor	< 0.005	0.08	0.03	< 0.005	0.01	< 0.005	< 0.005	58.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.07	0.07	0.77	0.00	0.15	0.00	0.04	152

Vendor	< 0.005	0.04	0.02	< 0.005	0.01	< 0.005	< 0.005	31.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.14	0.00	0.03	0.00	0.01	25.2
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.17
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	3.49	4.21	0.13	—	0.12	—	1,164
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.42	3.49	4.21	0.13	—	0.12	—	1,164
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	1.87	2.26	0.07	—	0.06	—	624
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.34	0.41	0.01	—	0.01	—	103
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.09	1.56	0.00	0.28	0.00	0.07	295
Vendor	< 0.005	0.07	0.03	< 0.005	0.01	< 0.005	< 0.005	57.1

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.13	0.13	1.38	0.00	0.28	0.00	0.07	275
Vendor	< 0.005	0.07	0.03	< 0.005	0.01	< 0.005	< 0.005	57.0
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.07	0.06	0.72	0.00	0.15	0.00	0.04	149
Vendor	< 0.005	0.04	0.02	< 0.005	0.01	< 0.005	< 0.005	30.6
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.13	0.00	0.03	0.00	0.01	24.6
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.06
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Onsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	3.11	4.35	0.14	—	0.13	—	663
Paving	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	3.11	4.35	0.14	—	0.13	—	663
Paving	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.11	0.15	< 0.005	—	< 0.005	—	23.6
Paving	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.03	< 0.005	—	< 0.005	—	3.91
Paving	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Single Family Housing	1.37	1.17	9.88	0.02	1.97	0.02	0.50	2,309
Total	1.37	1.17	9.88	0.02	1.97	0.02	0.50	2,309
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Single Family Housing	1.31	1.34	9.65	0.02	1.97	0.02	0.50	2,195
Total	1.31	1.34	9.65	0.02	1.97	0.02	0.50	2,195
Annual	—	—	—	—	—	—	—	—
Single Family Housing	0.23	0.23	1.65	< 0.005	0.35	< 0.005	0.09	357
Total	0.23	0.23	1.65	< 0.005	0.35	< 0.005	0.09	357

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	139
Total	—	—	—	—	—	—	—	139
Daily, Winter (Max)	—	—	—	—	—	—	—	—

Single Family Housing	—	—	—	—	—	—	—	139
Total	—	—	—	—	—	—	—	139
Annual	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	23.0
Total	—	—	—	—	—	—	—	23.0

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Single Family Housing	0.02	0.33	0.14	0.03	—	0.03	—	424
Total	0.02	0.33	0.14	0.03	—	0.03	—	424
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Single Family Housing	0.02	0.33	0.14	0.03	—	0.03	—	424
Total	0.02	0.33	0.14	0.03	—	0.03	—	424
Annual	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.06	0.03	< 0.005	—	< 0.005	—	70.3
Total	< 0.005	0.06	0.03	< 0.005	—	< 0.005	—	70.3

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	—	0.00	—	0.00
Consumer Products	1.35	—	—	—	—	—	—	—
Architectural Coatings	0.24	—	—	—	—	—	—	—
Landscape Equipment	0.17	0.02	1.99	< 0.005	—	< 0.005	—	5.33
Total	1.77	0.02	1.99	< 0.005	—	< 0.005	—	5.33
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	—	0.00	—	0.00
Consumer Products	1.35	—	—	—	—	—	—	—
Architectural Coatings	0.24	—	—	—	—	—	—	—
Total	1.59	0.00	0.00	0.00	—	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	—	0.00	—	0.00
Consumer Products	0.25	—	—	—	—	—	—	—
Architectural Coatings	0.04	—	—	—	—	—	—	—
Landscape Equipment	0.02	< 0.005	0.18	< 0.005	—	< 0.005	—	0.43
Total	0.31	< 0.005	0.18	< 0.005	—	< 0.005	—	0.43

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—

Single Family Housing	—	—	—	—	—	—	—	13.4
Total	—	—	—	—	—	—	—	13.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	13.4
Total	—	—	—	—	—	—	—	13.4
Annual	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	2.21
Total	—	—	—	—	—	—	—	2.21

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	35.8
Total	—	—	—	—	—	—	—	35.8
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	35.8
Total	—	—	—	—	—	—	—	35.8
Annual	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	5.93
Total	—	—	—	—	—	—	—	5.93

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	0.45
Total	—	—	—	—	—	—	—	0.45
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	0.45
Total	—	—	—	—	—	—	—	0.45
Annual	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	0.07
Total	—	—	—	—	—	—	—	0.07

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	PM10E	PM10D	PM2.5E	PM2.5D	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—

Sequestered	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	8/1/2024	8/15/2024	5.00	11.0	—

Site Preparation	Site Preparation	8/15/2024	2/1/2025	5.00	122	—
Grading	Grading	2/1/2025	4/1/2025	5.00	42.0	—
Building Construction	Building Construction	4/1/2025	10/1/2026	5.00	393	—
Paving	Paving	9/15/2026	10/1/2026	5.00	13.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Tractors/Loaders/Backhoes	Diesel	Average	1.00	2.00	33.0	0.73
Demolition	Excavators	Diesel	Average	1.00	7.00	36.0	0.38
Demolition	Scrapers	Diesel	Average	2.00	7.00	367	0.40
Demolition	Dumpers/Tenders	Diesel	Average	1.00	3.00	16.0	0.38
Site Preparation	Excavators	Diesel	Average	1.00	7.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	2.00	84.0	0.37
Site Preparation	Scrapers	Diesel	Average	2.00	7.00	423	0.48
Grading	Excavators	Diesel	Average	1.00	7.00	36.0	0.38
Grading	Off-Highway Trucks	Diesel	Average	1.00	4.00	148	0.41
Grading	Scrapers	Diesel	Average	2.00	7.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	1.00	2.00	84.0	0.37
Building Construction	Other Construction Equipment	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	1.00	4.00	82.0	0.20
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	3.00	84.0	0.37
Building Construction	Off-Highway Trucks	Diesel	Average	1.00	4.00	46.0	0.45

Paving	Pavers	Diesel	Average	1.00	7.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	7.00	89.0	0.36
Paving	Rollers	Diesel	Average	1.00	7.00	36.0	0.38

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	16.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	0.00	8.40	HHDT,MHDT
Demolition	Hauling	4.00	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	16.0	11.7	LDA,LDT1,LDT2
Site Preparation	Vendor	0.00	8.40	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	16.0	11.7	LDA,LDT1,LDT2
Grading	Vendor	4.00	8.40	HHDT,MHDT
Grading	Hauling	90.8	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	34.0	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	2.00	8.40	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT

Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	0.00	11.7	LDA,LDT1,LDT2
Paving	Vendor	0.00	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	4,000	—
Site Preparation	0.00	0.00	7.32	0.00	—
Grading	0.00	30,500	7.32	0.00	—
Paving	0.00	0.00	0.00	0.00	0.39

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Single Family Housing	0.39	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	204	0.03	< 0.005
2025	0.00	204	0.03	< 0.005
2026	0.00	204	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	330	334	299	119,154	2,732	2,761	2,474	985,177

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Single Family Housing	—
Wood Fireplaces	0
Gas Fireplaces	0

Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	35
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
127575	42,525	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Single Family Housing	246,002	204	0.0330	0.0040	1,320,554

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	1,128,288	766,421

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	19.0	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	11.1	annual days of extreme heat
Extreme Precipitation	11.6	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	9.76	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A

Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract

Exposure Indicators	—
AQ-Ozone	6.38
AQ-PM	10.1
AQ-DPM	68.9
Drinking Water	24.4
Lead Risk Housing	23.9
Pesticides	42.6
Toxic Releases	6.04
Traffic	70.2
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	40.8
Haz Waste Facilities/Generators	16.6
Impaired Water Bodies	77.3
Solid Waste	63.7
Sensitive Population	—
Asthma	34.5
Cardio-vascular	17.7
Low Birth Weights	5.34
Socioeconomic Factor Indicators	—
Education	45.6
Housing	13.9
Linguistic	45.4
Poverty	45.1
Unemployment	23.8

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	52.58565379
Employed	82.34312845
Median HI	44.33465931
Education	—
Bachelor's or higher	58.10342615
High school enrollment	100
Preschool enrollment	16.42499679
Transportation	—
Auto Access	74.57975106
Active commuting	38.52175029
Social	—
2-parent households	78.63467214
Voting	90.94058771
Neighborhood	—
Alcohol availability	35.41639933
Park access	42.89747209
Retail density	21.22417554
Supermarket access	43.17977672
Tree canopy	87.47593995
Housing	—
Homeownership	54.95957911
Housing habitability	61.50391377
Low-inc homeowner severe housing cost burden	61.70922623
Low-inc renter severe housing cost burden	37.17438727
Uncrowded housing	50.16040036

Health Outcomes	—
Insured adults	67.86860003
Arthritis	0.0
Asthma ER Admissions	50.5
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	18.8
Cognitively Disabled	50.3
Physically Disabled	88.8
Heart Attack ER Admissions	73.5
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	60.3
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0

Children	84.9
Elderly	59.3
English Speaking	74.3
Foreign-born	22.7
Outdoor Workers	47.6
Climate Change Adaptive Capacity	—
Impervious Surface Cover	78.2
Traffic Density	76.7
Traffic Access	23.0
Other Indices	—
Hardship	41.3
Other Decision Support	—
2016 Voting	93.1

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	17.0
Healthy Places Index Score for Project Location (b)	66.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Project-specific inputs.
Construction: Construction Phases	Project-specific inputs.
Construction: Off-Road Equipment	Project-specific inputs.
Construction: Trips and VMT	Project-specific inputs.
Operations: Hearths	Project-specific inputs.
Construction: Dust From Material Movement	Project-specific inputs

Attachment C

Health Risk Analysis

09/25/23
11:38:24

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 13043 ***

C:\Lakes\Screen View\Examples\Example4.scr

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	0.825000E-07
SOURCE HEIGHT (M)	=	5.0000
LENGTH OF LARGER SIDE (M)	=	292.0000
LENGTH OF SMALLER SIDE (M)	=	99.0000
RECEPTOR HEIGHT (M)	=	1.5000
URBAN/RURAL OPTION	=	URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = 0.000 M**4/S**3; MOM. FLUX = 0.000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	0.8969	5	1.0	1.0	10000.0	5.00	10.
100.	1.285	5	1.0	1.0	10000.0	5.00	0.
200.	1.370	5	1.0	1.0	10000.0	5.00	13.
300.	0.8902	5	1.0	1.0	10000.0	5.00	0.
400.	0.6109	5	1.0	1.0	10000.0	5.00	0.
500.	0.4426	5	1.0	1.0	10000.0	5.00	0.
600.	0.3367	5	1.0	1.0	10000.0	5.00	0.
700.	0.2663	5	1.0	1.0	10000.0	5.00	0.
800.	0.2174	5	1.0	1.0	10000.0	5.00	0.
900.	0.1819	5	1.0	1.0	10000.0	5.00	0.
1000.	0.1552	5	1.0	1.0	10000.0	5.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 10. M:

176.	1.457	5	1.0	1.0	10000.0	5.00	17.

****

*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	0.8969	5	1.0	1.0	10000.0	5.00	10.
50.	1.087	5	1.0	1.0	10000.0	5.00	5.
100.	1.285	5	1.0	1.0	10000.0	5.00	0.
500.	0.4426	5	1.0	1.0	10000.0	5.00	0.
1000.	0.1552	5	1.0	1.0	10000.0	5.00	0.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1.457	176.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

09/25/23
13:47:16

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 13043 ***

C:\Lakes\Screen View\Examples\Example4.scr

SIMPLE TERRAIN INPUTS:

```
   SOURCE TYPE                  =         AREA
   EMISSION RATE (G/(S-M**2))   =     0.275000E-07
   SOURCE HEIGHT (M)            =       5.0000
   LENGTH OF LARGER SIDE (M)    =     292.0000
   LENGTH OF SMALLER SIDE (M)   =      99.0000
   RECEPTOR HEIGHT (M)          =       1.5000
   URBAN/RURAL OPTION           =        URBAN
```

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = 0.000 M**4/S**3; MOM. FLUX = 0.000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	0.2990	5	1.0	1.0	10000.0	5.00	10.
100.	0.4282	5	1.0	1.0	10000.0	5.00	0.
200.	0.4567	5	1.0	1.0	10000.0	5.00	13.
300.	0.2967	5	1.0	1.0	10000.0	5.00	0.
400.	0.2036	5	1.0	1.0	10000.0	5.00	0.
500.	0.1475	5	1.0	1.0	10000.0	5.00	0.
600.	0.1122	5	1.0	1.0	10000.0	5.00	0.
700.	0.8877E-01	5	1.0	1.0	10000.0	5.00	0.
800.	0.7246E-01	5	1.0	1.0	10000.0	5.00	0.
900.	0.6062E-01	5	1.0	1.0	10000.0	5.00	0.
1000.	0.5175E-01	5	1.0	1.0	10000.0	5.00	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 10. M:

176.	0.4856	5	1.0	1.0	10000.0	5.00	17.

****

*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
10.	0.2990	5	1.0	1.0	10000.0	5.00	10.
50.	0.3623	5	1.0	1.0	10000.0	5.00	5.
100.	0.4282	5	1.0	1.0	10000.0	5.00	0.
500.	0.1475	5	1.0	1.0	10000.0	5.00	0.
1000.	0.5175E-01	5	1.0	1.0	10000.0	5.00	0.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	0.4856	176.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

FLAHAVAN ESTATES HEALTH RISK ANALYSIS - ADJACENT TO THE SITE

According to OEHHA Tox Database:

https://oehha.ca.gov/chemicals/diesel-exhaust-particulate

Inhalation Slope Factor (CPF) = 1.1E+00 $(mg/kg\text{-}day)^{-1}$

REL = 5.0E+00 ug/m^3

Inhalation Dose = C_{air} x BR x A x EF x 10^{-6}

Inhalation Cancer Risk = Inhalation dose x CPF x ASF x ED/AT x FAH

Resident Exposure Factors

Exposure duration (ED) from 2024-2025 =	2	yrs
Exposure duration (ED) in 2026 =	1	yr
Exposure frequency (EF), assumes 350 days =	0.96	unitless
Mean breathing rate (BR) infant 0-2 yrs =	658	L/kg BW-day
Mean breathing rate (BR) young child 2-5 yrs =	535	L/kg BW-day
Mean breathing rate (BR) adult x ≥ 16 yrs =	210	L/kg BW-day
Inhalation Absorption Factor (A) =	1	unitless
Age sensitivity factor (ASF) 3rd trimester, infant 0-2 yrs =	10	unitless
Age sensitivity factor (ASF) young child 2-5 yrs =	3	unitless
Age sensitivity factor (ASF) adult x ≥ 16 yrs =	1	unitless
Averaging Time (AT) =	70	yrs
Fraction of time spent at home (FAH) 3rd trimester, infant 0-2 yrs =	0.85	unitless
Fraction of time spent at home (FAH) young child 2-5 yrs =	0.72	unitless
Fraction of time spent at home (FAH) adult x ≥ 16 yrs =	0.73	unitless

Air Concentration

Annual Average Air Concentration (C_{air}) 2024, 2025 =	0.072	ug/m^3
Annual Average Air Concentration (C_{air}) 2026 =	0.024	ug/m^3

INFANT CANCER RISK (2024 and 2025)			YOUNG CHILD CANCER RISK (2026)			INFANT/YOUNG CHILD TOTAL CANCER RISK (2024-2026)		
Inhalation Dose - Infant 0-2 yrs =	4.5E-05	mg/kg/day	Inhalation Dose - Young Child 2-3 yrs =	1.5E-05	mg/kg/day			
Inhalation Cancer Risk - Infant 0-2 yrs =	1E-05	unitless	Inhalation Cancer Risk - Young Child 2-3 yrs =	2E-06	unitless	Total Cancer Risk - Infant, Young Child 0-3 yrs =	1E-05	unitless
YOUNG CHILD CANCER RISK (2024 and 2025)			**YOUNG CHILD CANCER RISK (2026)**			**YOUNG CHILD TOTAL CANCER RISK (2024-2026)**		
Inhalation Dose - Young Child 2-4 yrs =	3.7E-05	mg/kg/day	Inhalation Dose - Young Child 4-5 yrs =	1.2E-05	mg/kg/day			
Inhalation Cancer Risk - Young Child 2-4 yrs =	2E-06	unitless	Inhalation Cancer Risk - Young Child 4-5 yrs =	4E-07	unitless	Total Cancer Risk - Young Child 2-5 yrs =	3E-06	unitless
ADULT CANCER RISK (2024 and 2025)			**ADULT CANCER RISK (2026)**			**ADULT TOTAL CANCER RISK (2024-2026)**		
Inhalation Dose - Adult x ≥ 16 yrs =	1.4E-05	mg/kg-day	Inhalation Dose - Adult x ≥ 16 yrs =	4.8E-06	mg/kg-day			
Inhalation Cancer Risk - Adult x ≥ 16 yrs =	3E-07	unitless	Inhalation Cancer Risk - Adult x ≥ 16 yrs =	6E-08	unitless	Total Cancer Risk - Adult x ≥ 16 yrs =	4E-07	unitless
NONCANCER HAZARD (2024 and 2025)			**NONCANCER HAZARD (2026)**			**MAXIMUM NONCANCER HAZARD (2024-2026)**		
Noncancer =	0.01	unitless	Noncancer =	0.005	unitless	Maximum Noncancer Result =	0.01	unitless

Note: Emissions of PM2.5 are estimated to be the same for 2024 and 2025 (0.03 tons/year); emissions for 2026 is reduced to 0.01 tons/year (see Table 3-3). Risks and hazards estimated accordingly.
Air concentrations modeled using SCREEN3.

FLAHAVAN ESTATES HEALTH RISK ANALYSIS - MAXIMUM EXPOSURE

According to OEHHA Tox Database:

https://oehha.ca.gov/chemicals/diesel-exhaust-particulate

Inhalation Slope Factor (CPF) =	1.1E+00	$(mg/kg\text{-}day)^{-1}$
REL =	5.0E+00	ug/m^3

Inhalation Dose = C_{air} x BR x A x EF x 10^{-6}

Inhalation Cancer Risk = Inhalation dose x CPF x ASF x ED/AT x FAH

Resident Exposure Factors

Exposure duration (ED) from 2024-2025 =	2	yrs
Exposure duration (ED) in 2026 =	1	yr
Exposure frequency (EF), assumes 350 days =	0.96	unitless
Mean breathing rate (BR) infant 0-2 yrs =	658	L/kg BW-day
Mean breathing rate (BR) young child 2-5 yrs =	535	L/kg BW-day
Mean breathing rate (BR) adult x ≥ 16 yrs =	210	L/kg BW-day
Inhalation Absorption Factor (A) =	1	unitless
Age sensitivity factor (ASF) 3rd trimester, infant 0-2 yrs =	10	unitless
Age sensitivity factor (ASF) young child 2-5 yrs =	3	unitless
Age sensitivity factor (ASF) adult x ≥ 16 yrs =	1	unitless
Averaging Time (AT) =	70	yrs
Fraction of time spent at home (FAH) 3rd trimester, infant 0-2 yrs =	0.85	unitless
Fraction of time spent at home (FAH) young child 2-5 yrs =	0.72	unitless
Fraction of time spent at home (FAH) adult x ≥ 16 yrs =	0.73	unitless

Air Concentration

Annual Average Air Concentration (C_{air}) 2024, 2025 =	0.117	ug/m^3
Annual Average Air Concentration (C_{air}) 2026 =	0.039	ug/m^3

INFANT CANCER RISK (2024 and 2025)

Inhalation Dose - Infant 0-2 yrs =	7.4E-05	mg/kg/day
Inhalation Cancer Risk - Infant 0-2 yrs =	2E-05	unitless

YOUNG CHILD CANCER RISK (2026)

Inhalation Dose - Young Child 2-3 yrs =	2.5E-05	mg/kg/day
Inhalation Cancer Risk - Young Child 2-3 yrs =	3E-06	unitless

INFANT/YOUNG CHILD TOTAL CANCER RISK (2024-2026)

Total Cancer Risk - Infant, Young Child 0-3 yrs =	2E-05	unitless

YOUNG CHILD CANCER RISK (2024 and 2025)

Inhalation Dose - Young Child 2-4 yrs =	6.0E-05	mg/kg/day
Inhalation Cancer Risk - Young Child 2-4 yrs =	4E-06	unitless

YOUNG CHILD CANCER RISK (2026)

Inhalation Dose - Young Child 4-5 yrs =	2.0E-05	mg/kg/day
Inhalation Cancer Risk - Young Child 4-5 yrs =	7E-07	unitless

YOUNG CHILD TOTAL CANCER RISK (2024-2026)

Total Cancer Risk - Young Child 2-5 yrs =	5E-06	unitless

ADULT CANCER RISK (2024 and 2025)

Inhalation Dose - Adult x ≥ 16 yrs =	2.3E-05	mg/kg-day
Inhalation Cancer Risk - Adult x ≥ 16 yrs =	5E-07	unitless

ADULT CANCER RISK (2026)

Inhalation Dose - Adult x ≥ 16 yrs =	7.8E-06	mg/kg-day
Inhalation Cancer Risk - Adult x ≥ 16 yrs =	9E-08	unitless

ADULT TOTAL CANCER RISK (2024-2026)

Total Cancer Risk - Adult x ≥ 16 yrs =	6E-07	unitless

NONCANCER HAZARD (2024 and 2025)

Noncancer =	0.02	unitless

NONCANCER HAZARD (2026)

Noncancer =	0.01	unitless

MAXIMUM NONCANCER HAZARD (2024-2026)

Maximum Noncancer Result =	0.02	unitless

Note: Emissions of PM2.5 are estimated to be the same for 2024 and 2025 (0.03 tons/year); emissions for 2026 is reduced to 0.01 tons/year (see Table 3-3). Risks and hazards estimated accordingly.
Air concentrations modeled using SCREEN3.

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

- County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.
- Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.
- Side of the Roadway: Identify on which side of the roadway the project is located.
- Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.
- Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Sonoma	
Roadway Direction	North-South	
Side of the Roadway	East	
Distance from Roadway	50	feet
Annual Average Daily Traffic (ADT)	12,500	

Results

Sonoma County

NORTH-SOUTH DIRECTIONAL ROADWAY

PM2.5 annual average

0.184 (μg/m^3)

Cancer Risk

7.18 (per million)

Data for Sonoma County based on meteorological data collected from Santa Rosa in 2005

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using CALINE4 air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.