WINCHESTER RANCH AIR QUALITY & GREENHOUSE GAS ASSESSMENT

San José, California

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Introduction

The purpose of this report is to address air quality impacts and compute greenhouse gas (GHG) emissions associated with the Winchester Ranch residential project located at 500 Charles Cali Drive in San José. The air quality impacts and GHG emissions would be associated with demolition of the existing uses at the site, construction of the new buildings and infrastructure, and operation of the project. Air pollutant and GHG emissions associated with construction and operation of the project were predicted using models. In addition, the potential construction health risk impact to nearby sensitive receptors and the impact of existing toxic air contaminant (TAC) sources affecting the proposed residences were evaluated. This analysis addresses those issues following the guidance provided by the Bay Area Air Quality Management District (BAAQMD).

Project Description

The proposed Planned Development zoning district would allow for the development of up to 688 residential units at approximately 44 du/ac. The rezoning includes an approximately 2.0-acre park. Of the 688 residential units, 368 units would be located on the eastern portion of the project site within a five-story multi-family residential building above two levels of an above-ground parking garage. The building would be a total of seven stories in height (approximately 79.5 feet tall facing Interstate 280 and 74 feet tall facing Winchester Mystery House). The remaining 320 units would be located on the western portion of the site and would consist of 90 four-story row townhouses, 158 four-story condominiums, and 72 flats. The proposed residential units within the western portion of the property would have a maximum height of 51 feet to the roof. The proposed buildings on-site would be set back approximately 33 feet from the adjacent single-family residences and 42 feet from the Winchester Mystery House.

This project would be built in two phases. Phase 1 construct the entire podium apartments structure, 72 of the four-story flats, and 33 of the four-story row homes for a total of 473 dwelling units. The parking garage under the podium apartments would also be built during this phase. During Phase 2, the remaining portion of the western portion would be built. The remaining 57 four-story row homes and all 158 four-story condos would be constructed. From this point on, the project will be distinguished by its phases (i.e. Phase 1 or Phase 2) when appropriate.

Setting

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

<u>Air Pollutants of Concern</u>

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

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

Toxic Air Contaminants

TACs are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs. The most recent Office of Environmental Health Hazard Assessment (OEHHA) risk assessment guidelines were published in February of 2015.[1] See *Attachment 1* for a detailed description of the community risk modeling methodology used in this assessment.

Regulatory Agencies

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California Environmental Protection Agency [EPA]) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.

[1] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, and elementary schools. For cancer risk assessments, children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Residential locations are assumed to include infants and small children. The closest sensitive receptors to the project site are single-family homes adjacent to the western and northern project site boundaries. There are additional residences to the south, east, and west of the project site.

Regulatory Setting

Federal Regulations

The United States Environmental Protection Agency (EPA) sets nationwide emission standards for mobile sources, which include on-road (highway) motor vehicles such trucks, buses, and automobiles, and non-road (off-road) vehicles and equipment used in construction, agricultural, industrial, and mining activities (such as bulldozers and loaders). The EPA also sets nationwide fuel standards. California also has the ability to set motor vehicle emission standards and standards for fuel used in California, as long as they are the same or more stringent than the federal standards.

The EPA has established a number of emission standards for on- and non-road heavy-duty diesel engines used in trucks and other equipment. This was done in part because diesel engines are a significant source of NO_X and particulate matter (PM_{10} and $PM_{2.5}$) and because the EPA has identified DPM as a probable carcinogen. Implementation of the heavy-duty diesel on-road vehicle standards and the non-road diesel engine standards are estimated to reduce particulate matter and NO_X emissions from diesel engines up to 95 percent in 2030 when the heavy-duty vehicle fleet is completely replaced with newer heavy-duty vehicles that comply with these emission standards.[2]

In concert with the diesel engine emission standards, the EPA has also substantially reduced the amount of sulfur allowed in diesel fuels. The sulfur contained in diesel fuel is a substantial contributor to the formation of particulate matter in diesel-fueled engine exhaust. The current standards reduced the amount of sulfur allowed by 97 percent for highway diesel fuel (from 500 parts per million by weight [ppmw] to 15 ppmw), and by 99 percent for off-highway diesel fuel (from about 3,000 ppmw to 15 ppmw). The low sulfur highway fuel (15 ppmw sulfur), also called ultra-low sulfur diesel (ULSD), is currently required for use by all vehicles in the U.S.

[2] USEPA, 2000. *Regulatory Announcement, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. EPA420-F-00-057. December.

All of the above federal diesel engine and diesel fuel requirements have been adopted by California, in some cases with modifications making the requirements more stringent or the implementation dates sooner.

State Regulations

To address the issue of diesel emissions in the state, CARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.[3] In addition to requiring more stringent emission standards for new on-road and off-road mobile sources and stationary diesel-fueled engines to reduce particulate matter emissions by 90 percent, a significant component of the plan involves application of emission control strategies to existing diesel vehicles and equipment. Many of the measures of the Diesel Risk Reduction Plan have been approved and adopted, including the federal on-road and non-road diesel engine emission standards for new engines, as well as adoption of regulations for low sulfur fuel in California.

CARB has adopted and implemented a number of regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy duty diesel trucks that represent the bulk of DPM emissions from California highways. CARB regulations require on-road diesel trucks to be retrofitted with particulate matter controls or replaced to meet 2010 or later engine standards that have much lower DPM and $PM_{2.5}$ emissions. This regulation will substantially reduce these emissions between 2013 and 2023. While new trucks and buses will meet strict federal standards, this measure is intended to accelerate the rate at which the fleet either turns over so there are more cleaner vehicles on the road or is retrofitted to meet similar standards. With this regulation, older, more polluting trucks would be removed from the roads sooner.

CARB has also adopted and implemented regulations to reduce DPM and NO_X emissions from in-use (existing) and new off-road heavy-duty diesel vehicles (e.g., loaders, tractors, bulldozers, backhoes, off-highway trucks, etc.). The regulations apply to diesel-powered off-road vehicles with engines 25 horsepower (hp) or greater. The regulations are intended to reduce particulate matter and NO_X exhaust emissions by requiring owners to turn over their fleet (replace older equipment with newer equipment) or retrofit existing equipment in order to achieve specified fleet-averaged emission rates. Implementation of this regulation, in conjunction with stringent federal off-road equipment engine emission limits for new vehicles, will significantly reduce emissions of DPM and NO_X.

Bay Area Air Quality Management District (BAAQMD)

BAAQMD has jurisdiction over an approximately 5,600-square mile area, commonly referred to as the San Francisco Bay Area (Bay Area). The District's boundary encompasses the nine San Francisco Bay Area counties, including Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County, and southern Sonoma County.

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[3] California Air Resources Board, 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October.

BAAQMD is the lead agency in developing plans to address attainment and maintenance of the National Ambient Air Quality Standards and California Ambient Air Quality Standards. The District also has permit authority over most types of stationary equipment utilized for the proposed project. The BAAQMD is responsible for permitting and inspection of stationary sources; enforcement of regulations, including setting fees, levying fines, and enforcement actions; and ensuring that public nuisances are minimized.

The BAAQMD California Environmental Quality Act (*CEQA) Air Quality Guidelines*[4] were prepared to assist in the evaluation of air quality impacts of projects and plans proposed within the Bay Area. The guidelines provide recommended procedures for evaluating potential air impacts during the environmental review process consistent with CEQA requirements including thresholds of significance, mitigation measures, and background air quality information. They also include assessment methodologies for air toxics, odors, and greenhouse gas emissions.

San José Envision 2040 General Plan

The San José Envision 2040 General Plan includes goals, policies, and actions to reduce exposure of the City's sensitive population to exposure of air pollution and toxic air contaminants or TACs. The following goals, policies, and actions are applicable to the proposed project:

Applicable Goals – Air Pollutant Emission Reduction

Goal MS-10 Minimize air pollutant emissions from new and existing development.

Applicable Policies – Air Pollutant Emission Reduction

MS-10.1 Assess projected air emissions from new development in conformance with the Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines and relative to state and federal standards. Identify and implement feasible air emission reduction measures.

MS-10.2 Consider the cumulative air quality impacts from proposed developments for proposed land use designation changes and new development, consistent with the region's Clean Air Plan and State law.

Applicable Goals – Toxic Air Contaminants

Goal MS-11 Minimize exposure of people to air pollution and toxic air contaminants such as ozone, carbon monoxide, lead, and particulate matter.

Applicable Policies – Toxic Air Contaminants

MS-11.1 Require completion of air quality modeling for sensitive land uses such as new residential developments that are located near sources of pollution such as freeways and industrial uses. Require new residential development projects and projects categorized as sensitive receptors to incorporate effective mitigation into project designs or be located an adequate distance from sources of toxic air contaminants (TACs) to avoid significant risks to health and safety.

[4] Bay Area Air Quality Management District, 2017. *CEQA Air Quality Guidelines*. May.

MS-11.2 For projects that emit toxic air contaminants, require project proponents to prepare health risk assessments in accordance with BAAQMD-recommended procedures as part of environmental review and employ effective mitigation to reduce possible health risks to a less than significant level. Alternatively, require new projects (such as, but not limited to, industrial, manufacturing, and processing facilities) that are sources of TACs to be located an adequate distance from residential areas and other sensitive receptors.

MS-11.4 Encourage the installation of appropriate air filtration at existing schools, residences, and other sensitive receptor uses adversely affected by pollution sources.

Actions – Toxic Air Contaminants

MS-11.7 Consult with BAAQMD to identify stationary and mobile TAC sources and determine the need for and requirements of a health risk assessment for proposed developments.

Applicable Goals – Construction Air Emissions

Goal MS-13 Minimize air pollutant emissions during demolition and construction activities

Applicable Policies – Construction Air Emissions

MS-13.1 Include dust, particulate matter, and construction equipment exhaust control measures as conditions of approval for subdivision maps, site development and planned development permits, grading permits, and demolition permits. At minimum, conditions shall conform to construction mitigation measures recommended in the current BAAQMD CEQA Guidelines for the relevant project size and type.

Applicable Actions – Construction Air Emissions

MS-13.4 Adopt and periodically update dust, particulate, and exhaust control standard measures for demolition and grading activities to include on project plans as conditions of approval based upon construction mitigation measures in the BAAQMD CEQA Guidelines.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA and these significance thresholds were contained in the District’s 2011 *CEQA Air Quality Guidelines*. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA. The thresholds were challenged through a series of court challenges and were mostly upheld. BAAQMD updated the *CEQA Air Quality Guidelines* in 2017 to include the latest significance thresholds that were used in this analysis are summarized in Table 1.

Table 1. Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average 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
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	**Single Sources Within 1,000-foot Zone of Influence**	**Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)**	
Excess Cancer Risk	>10 per one million	>100 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual $PM_{2.5}$	>0.3 µg/m^3	>0.8 µg/m^3	
Greenhouse Gas Emissions			
Land Use Projects – direct and indirect emissions		Compliance with a Qualified GHG Reduction Strategy OR 1,100 metric tons annually or 4.6 metric tons per capita (for 2020) and adjusted to 2.6 metric tons per capita (for 2030)*	
Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less. GHG = greenhouse gases. *BAAQMD does not have a recommended post-2020 GHG threshold.			

IMPACTS AND MITIGATION MEASURES

Impact 1: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable State or federal ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NO_X), PM_{10}, and $PM_{2.5}$ and apply to both construction period and operational period impacts.

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD *CEQA Air Quality Guidelines* consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

The California Emissions Estimator Model (CalEEMod) Version 2016.3.2 was used to estimate emissions from construction and operation of the project assuming full build-out conditions. The project land use types and size, and anticipated construction schedule were input to CalEEMod. The model output from CalEEMod is included as *Attachment 2*.

<u>Construction Period Emissions</u>

CalEEMod provided annual emissions for construction. CalEEMod provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling, and vendor traffic. A construction build-out scenario, including equipment list and schedule, was based on applicant provided information. The proposed project land uses and project information were input into CalEEMod in two modeling scenarios:

Phase 1 (Eastern Section)

- 368 dwelling units entered as "Mid-Rise Apartments",
- 105 dwelling units entered as "Condo/Townhouse High Rise",[5]
- 530 spaces and 200,000 square feet (sf) entered as "Enclosed Parking with Elevator",
- 81,250 sf of building demolition,
- 2,783 cubic yards (cy) of soil hauled during site preparation,
- 100,188 cy of soil hauled during grading/excavation,
- 2,000 cement truck round trips,
- 100 cy of asphalt hauled during paving &
- Cranes and generators used during building construction would be electrified
- Note that the default building square footage was used for the apartments and condominiums since the amount of residential square footage for each land uses was not differentiated and instead given as a total.

Phase 2 (Western Section)

- 215 dwelling units entered as "Condo/Townhouse High Rise",
- 2 acres entered as "City Park",
- 90,000 sf of building demolition,
- 6,000 cy of soil hauled during grading/excavation,
- 500 cement truck round trips &
- 1,000 cy of asphalt hauled during paving

For both phases, the construction schedule was based on the start dates given for each phase and the number of work days given per phase with one exception during Phase 2. The Phase 2 exterior and interior construction total work days did not match the given calendar date range; therefore, the calendar dates for these phases were used instead. Construction was assumed to begin November 2020 and last till December 2024. The entire construction period from 2020 to 2024 was estimated to take approximately 1,087 workdays.

Average daily emissions were computed for each building by dividing the total construction emissions by the number of construction days. Table 2 shows average daily construction emissions of ROG, NO_X, PM_{10} exhaust, and $PM_{2.5}$ exhaust during construction of the project. As indicated in Table 2, predicted the construction period emissions would not exceed the BAAQMD thresholds for criteria air pollutants.

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[5] CalEEMod defines a high rise condo/townhouse as "ownership units that have three or more levels".

Table 2. Construction Period Emissions

Scenario	ROG	NOx	PM_{10} Exhaust	$PM_{2.5}$ Exhaust
Phase 1: Eastern Site (2020-2022) Construction Emissions (tons)	4.8	13.4	0.49	0.46
Phase 2: Western Site (2022-2024) Construction Emissions (tons)	3.1	5.6	0.22	0.21
Total Construction Tons	7.9	19.0	0.7	0.7
Combined Average daily emissions (pounds per day)[1]	14.5 lbs./day	34.9 lbs./day	1.3 lbs./day	1.2 lbs./day
BAAQMD Thresholds (pounds per day)	*54* lbs./day	*54* lbs./day	*82* lbs./day	*54* lbs./day
Exceed Threshold?	No	No	No	No
Notes: [1]Assumes 1,087 workdays total for entire construction period (2020-2024). For Phase 1, emissions are based on mitigated construction to capture the use of electrified cranes and generators				

However, construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be *less-than-significant* if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

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

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

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

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

9. Implement exhaust control measures outlined in *Mitigation Measure AQ-2* that require use of diesel-powered equipment that meets U.S. EPA Tier 4 emission standards or electrically powered equipment.

Effectiveness of Mitigation Measure AQ-1

The measures above are consistent with BAAQMD-recommended basic control measures for reducing fugitive particulate matter that are contained in the BAAQMD CEQA Air Quality Guidelines.

<u>Operational Period Emissions</u>

Operational air emissions from the project would be generated primarily from autos driven by future residents and employees of the apartment building. Evaporative emissions from architectural coatings and maintenance products (classified as consumer products) are typical emissions from these types of uses. CalEEMod was also used to estimate emissions from operation of the proposed project assuming full build-out.

Model Year

Emissions associated with vehicle travel depend on the year of analysis because emission control technology requirements are phased-in over time. Therefore, the earlier the year analyzed in the model, the higher the emission rates utilized by CalEEMod. This analysis assumed that the project would be fully-built out and operating in the year 2025.

Trip Generation Rates

CalEEMod allows the user to enter specific vehicle trip generation rates, which were input to the model using the daily trip generation rate provided in the project trip generation table. For each land use type, the daily trips forecasted (with trip reductions applied) was divided by the quantity of that land use to identify the weekday daily trip rate. The Saturday and Sunday trip rates were assumed to be the weekday rate adjusted by multiplying the ratio of the CalEEMod default rates for those days. The traffic consultant provided project trip generation estimates for low-rise multifamily housing (i.e. the 320 four-story condominiums/townhomes) and for mid-rise multifamily housing (i.e. the 368 podium apartment units).[6] The following reductions were applied to the number of trips: *location-based reduction* and *VMT reduction*. The weekday trip rates used for the four-story condominiums was 5.79, which changed the Saturday trip rate to 5.97 and the Sunday trip rate to 4.75. For the podium apartments, the weekday trip rate used was 4.30, which changed the Saturday trip rate to 4.13 and the Sunday trip rate to 3.79. Note that a trip rate was not applied to the proposed park. Due to the park's small acreage, it was assumed that it would not produce any trips and mostly be utilized by locals already living in the area.

Energy

CalEEMod defaults for energy use were used, which include the 2016 Title 24 Building Standards. Indirect emissions from electricity were computed in CalEEMod. The model has a default rate of 641.3 pounds of CO_2 per megawatt of electricity produced, which is based on PG&E's 2008 emissions rate. The rate was adjusted to account for PG&E's projected 2020 CO_2 intensity rate. This 2020 rate is based, in part, on the requirement of a renewable energy portfolio standard of 33 percent by the year 2020. The derived 2020 rate for PG&E was estimated at 290 pounds of CO_2 per megawatt of electricity delivered.[7] Energy usage associated with new State Title 24 building code requirements that would require more efficient homes and provisions for solar power generation were not included in the emissions calculations. New homes are anticipated to have up to 50-percent lower electricity consumption[8].

Other Inputs

Wood-burning stoves and fireplaces are not allowed in new developments in the Bay Area; however, it was assumed that residential units could contain gas-powered fireplaces. Default model assumptions for emissions associated with solid waste generation and water/wastewater use were applied to the project. Water/wastewater use were changed to 100% aerobic conditions to represent wastewater treatment plant conditions.

Existing Uses

The existing land use on the project site include 111 dwelling units entered as "Mobile Home Park" on a 15.69-acre site. A CalEEMod model for the existing land use was run for year 2025.

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[6] Hexagon Transportation Consultants, Inc. 2019. *Winchester Ranch Residential Development Transportation Analysis*. June 14.
[7] Pacific Gas & Electric, 2015. *Greenhouse Gas Emission Factors: Guidance for PG&E Customers*. November.
[8] CEC 2018. See https://www.energy.ca.gov/title24/2019standards/documents/2018_Title_24_2019_Building_Standards_FAQ.pdf, accessed 10/19/2018

Project Operational Emissions

As shown in Table 3, operational emissions would not exceed the BAAQMD significance thresholds. This would be considered a *less-than-significant* impact.

Table 3. Operational Period Emissions

Scenario	ROG	NOx	PM_{10}	$PM_{2.5}$
2025 Project Operational Emissions (*tons*) [1]	4.0	2.9	3.0	0.8
2025 Existing Use Emissions (*tons*)	0.7	0.4	0.3	0.1
Net Annual Emissions (*tons*) for 2025	3.3	2.5	2.6	0.7
BAAQMD Thresholds (tons /year)	***10 tons***	***10 tons***	***15 tons***	***10 tons***
Exceed Threshold?	*No*	*No*	*No*	*No*
2025 Project Operational Emissions (*lbs/day*)	18.1	13.6	14.4	4.1
BAAQMD Thresholds (lbs/day)	***54* lbs.**	***54* lbs.**	***82* lbs.**	***54* lbs.**
Exceed Threshold?	*No*	*No*	*No*	*No*

Notes: [1] Assumes both sites are operational, [2]Assumes 365-day operation.

Impact 2: Expose sensitive receptors to substantial pollutant concentrations?

Project impacts related to increased community risk can occur either by introducing a new sensitive receptor, such as a residential use, in proximity to an existing source of TACs or by introducing a new source of TACs with the potential to adversely affect existing sensitive receptors in the project vicinity. The project would introduce new residents that are sensitive receptors. In addition, temporary project construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors. Community risk impacts are addressed by increased predicting lifetime cancer risk, the increase in annual $PM_{2.5}$ concentrations, and computing the Hazard Index (HI) for non-cancer health risks. The methodology for computing community risks impacts is contained in *Attachment 1*.

Construction Community Health Risk Impacts

Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. These exhaust air pollutant emissions would not be considered to contribute substantially to existing or projected air quality violations. Construction exhaust emissions may still pose health risks for sensitive receptors such as surrounding residents. The primary community risk impact issue associated with construction emissions are cancer risk and exposure to $PM_{2.5}$. Diesel exhaust poses both a potential health and nuisance impact to nearby receptors. A health risk assessment of the project construction activities was conducted that evaluated potential health effects to nearby sensitive receptors from construction emissions of DPM and $PM_{2.5}$.[9] This assessment included dispersion modeling to predict the offsite and onsite

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

concentrations resulting from project construction, so that lifetime cancer risks and non-cancer health effects could be evaluated.

Construction Emissions

Construction period emissions were computed using CalEEMod along with projected construction activity, as described above. The CalEEMod model provided total annual $PM_{2.5}$ exhaust emissions (assumed to be DPM) for the off-road construction equipment used for construction of the project and for the exhaust emissions from on-road vehicles (haul trucks, vendor trucks, and worker vehicles). DPM emissions from the entire project over the 2020-2024 construction period would be 0.7875 (1575 pounds). A trip length of one mile was used to represent vehicle travel while at or near the construction sites. For modeling purposes, it was assumed that these emissions from on-road vehicles would occur at the construction sites. Fugitive dust $PM_{2.5}$ emissions were also computed and included in this analysis. The model predicts emissions of 0.6907 tons (1381 pounds) of fugitive $PM_{2.5}$ from the entire construction period.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict concentrations of DPM and $PM_{2.5}$ at sensitive receptors (residences and school children) in the vicinity of the project construction area. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[10] For each of the construction sites modeled, the modeling utilized two area sources to represent the on-site construction emissions, one for exhaust emissions and one for fugitive dust emissions. To represent the construction equipment exhaust emissions, an emission release height of 6 meters (19.7 feet) was used for the area sources. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive $PM_{2.5}$ emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area sources. Emissions from the construction equipment and on-road vehicle travel were distributed throughout the modeled area sources. Construction emissions were modeled as occurring daily between 7 a.m. to 5 p.m. for Phase 1 (Eastern Portion) and between 8 a.m. to 5 p.m. Phase 2 (Western Portion) based on information from the project applicant.

The modeling used a 5-year meteorological data set (2006-2010) from the San José Airport prepared for use with the AERMOD model by the BAAQMD. Annual DPM and $PM_{2.5}$ concentrations from construction activities at each project site during the 2019-2022 period were calculated using the model. DPM and $PM_{2.5}$ concentrations were calculated at nearby sensitive receptor locations. A receptor height of 1.5 meters (4.9 feet) was used to represent the breathing height of nearby residences in single-family homes.

The maximum-modeled annual DPM and $PM_{2.5}$ concentrations, which includes both the DPM and fugitive $PM_{2.5}$ concentrations, were identified at nearby sensitive receptors as shown in

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

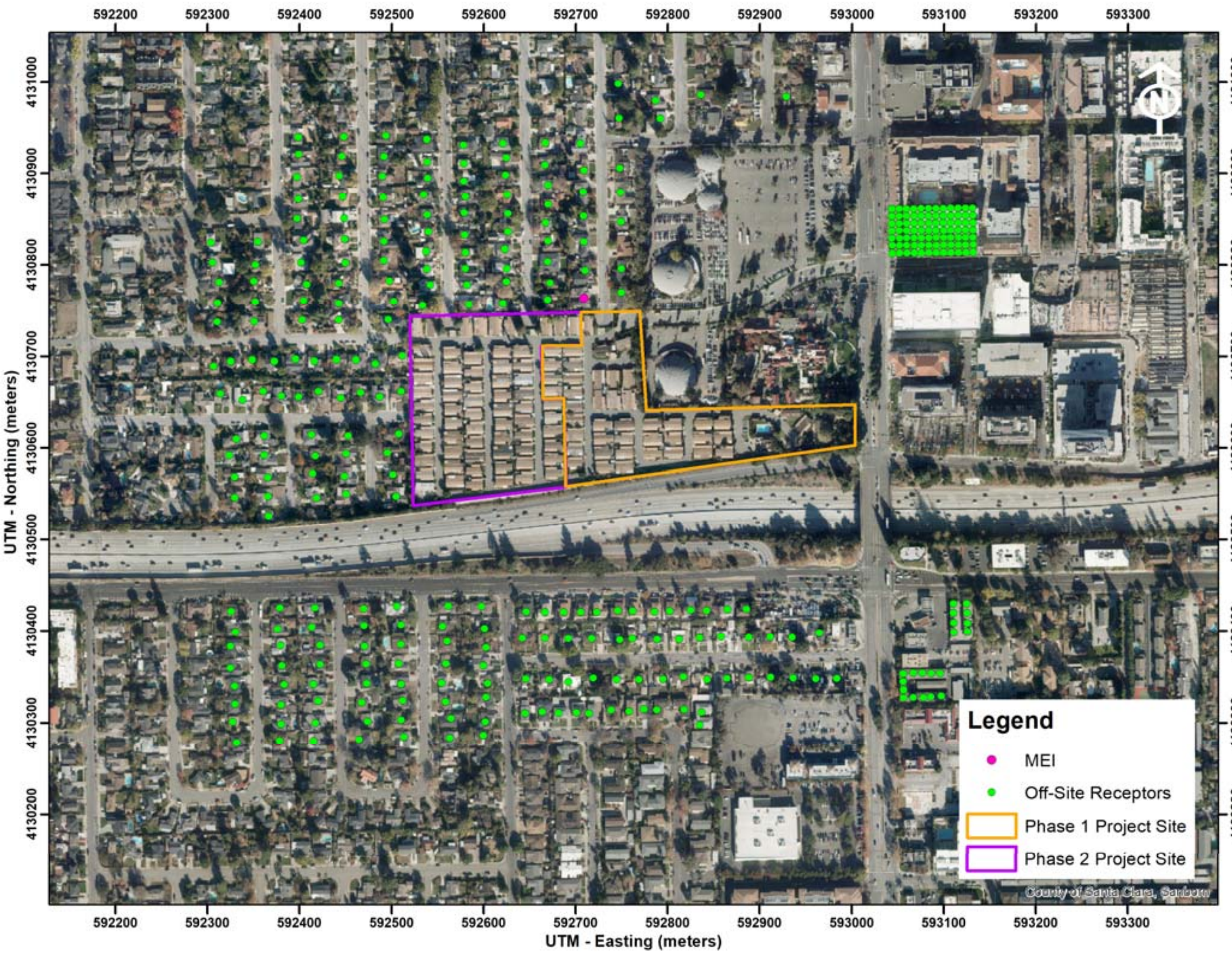
Figure 1 for the maximally exposed individuals (MEIs). Using the maximum annual modeled DPM concentrations, the maximum increased cancer risks were calculated using BAAQMD recommended methods and exposure parameters described in *Attachment 1*. Non-cancer health hazards and maximum $PM_{2.5}$ concentrations were also calculated and identified.

Results of this assessment indicate that the maximum excess residential cancer risks would be greater than the BAAQMD significance threshold of 10 in one million and the maximum $PM_{2.5}$ concentrations would exceed the BAAQMD significance threshold of 0.3 µg/m^3. *Implementation of Mitigation Measures AQ-2 would reduce this impact to a level of less-than-significant*. Table 4 summarizes the maximum cancer risks, $PM_{2.5}$ concentrations, and health hazard indexes for project related construction activities affecting the residential MEI. *Attachment 3* to this report includes the emission calculations used for the construction area source modeling and the cancer risk calculations.

Table 4. Construction Risk Impacts at the Offsite Residential MEI

Source	Cancer Risk (per million)	Annual $PM_{2.5}$ (µg/m^3)	Hazard Index
Project Construction			
Unmitigated	**55.2 (infant)**	**0.95**	0.05
Mitigated	2.8 (infant)	0.18	<0.01
BAAQMD Single-Source Threshold	***>10.0***	***>0.3***	***>0.1***
Significant?			
Unmitigated	***Yes***	***Yes***	*No*
Mitigated	*No*	*No*	*No*

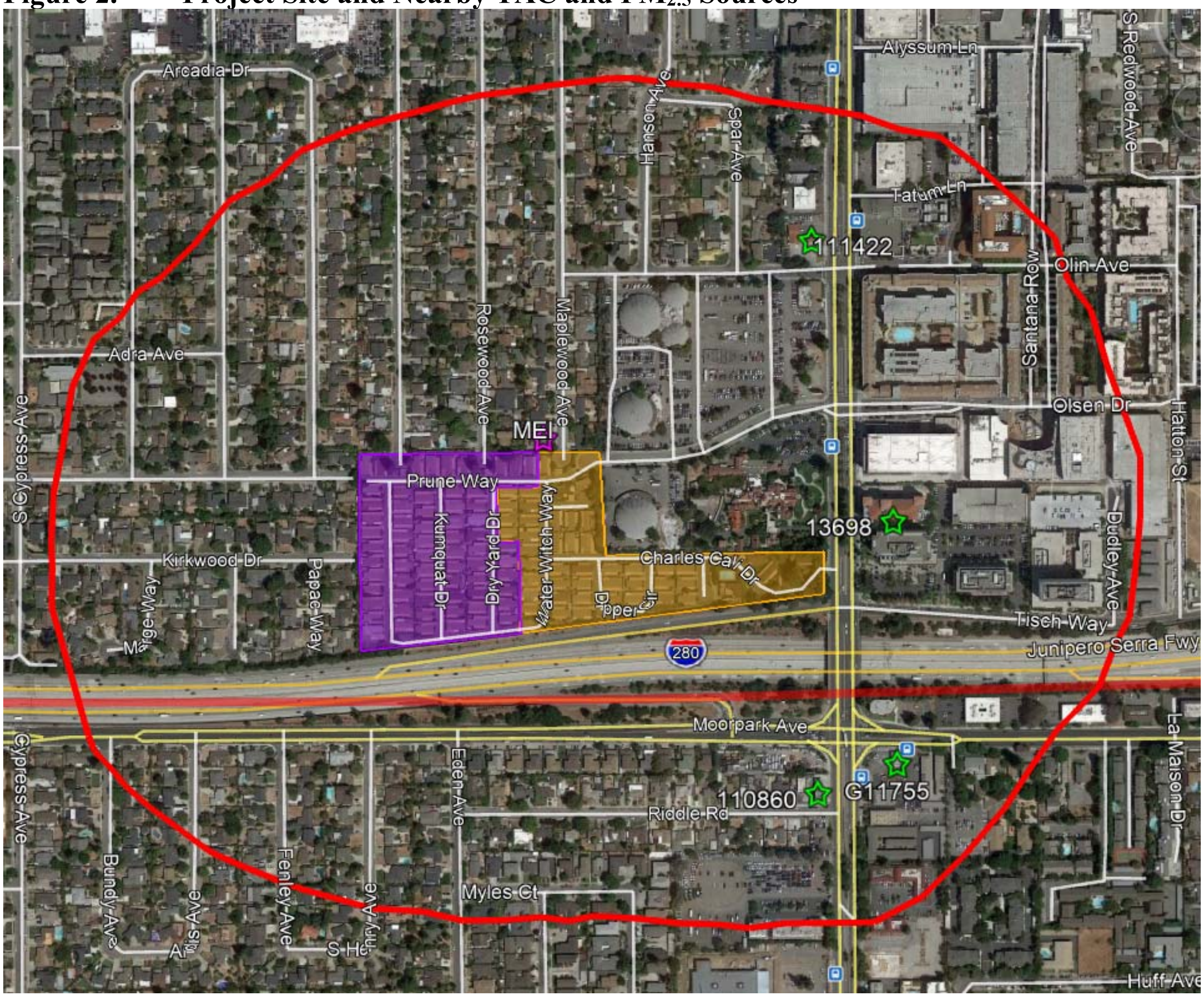
Figure 1. Project Construction Sites, Locations of Off-Site Sensitive Receptors, and Locations of Maximum Cancer Risk and $PM_{2.5}$ Impacts



Combined Impact of All TAC Sources on the Off-Site MEI

Community health risk assessments typically look at all substantial sources of TACs that can affect sensitive receptors that are located within 1,000 feet of a project site. These sources can include freeways or highways, busy surface streets, and stationary sources identified by BAAQMD. Traffic on high volume roadways is a source of TAC emissions that may adversely affect sensitive receptors in close proximity to the roadway. A review of the project area indicates that traffic on Interstate 280, Winchester Boulevard, and Moorpark Avenue would exceed 10,000 vehicles per day. Other nearby streets are assumed to have less than 10,000 vehicles per day. A review of BAAQMD's stationary source Google Earth map tool identified four sources with the potential to affect the project site. Figure 2 shows the sources affecting the project site. Details of the modeling and community risk calculations are included in *Attachment 4*.

Figure 2. Project Site and Nearby TAC and $PM_{2.5}$ Sources



Highways – Interstate 280

BAAQMD provides a Google Earth *Highway Screening Analysis Tool* that can be used to identify screening level impacts from State highways. Interstate 280 (i.e. Link 306, 6 fet) risk impacts were screened using the BAAQMD *Highway Screening Analysis Tool*. The lifetime cancer risk, annual $PM_{2.5}$ exposure and non-cancer hazard index corresponding to the distance between the project and the site was used. The data were based on the MEI being approximately 660 feet north of the highway. Cancer risk levels were adjusted for exposure duration, age, and new exposure guidance provided by OEHHA, as described in *Attachment 1*.

Local Roadways – Winchester Boulevard and Moorpark Avenue

For local roadways, BAAQMD has provided the *Roadway Screening Analysis Calculator* to assess whether roadways with traffic volumes of over 10,000 vehicles per day may have a potentially significant effect on a proposed project. Two adjustments were made to the cancer risk predictions made by this calculator: (1) adjustment for latest vehicle emissions rates predicted using EMFAC2014 and (2) adjustment of cancer risk to reflect new Office of Environmental Health Hazard Assessment (OEHHA) guidance (see *Attachment 1*).

The calculator uses EMFAC2011 emission rates for the year 2014. However, a new version of the emissions factor model, EMFAC2014 is available. This version predicts lower emission rates. An adjustment factor of 0.5 was developed by comparing emission rates of total organic gases (TOG) for running exhaust and running losses developed using EMFAC2011 for year 2014 and those from EMFAC2014 for 2018. The predicted cancer risk was then adjusted using a factor of 1.3744 to account for new OEHHA guidance. This factor was provided by BAAQMD for use with their CEQA screening tools that are used to predict cancer risk.

The two following roadways were identified as having over 10,000 vehicles per day: Winchester Boulevard and Moorpark Avenue. The average daily traffic (ADT) on Winchester Boulevard was estimated to be 30,155 vehicles and the ADT on Moorpark Avenue was estimated to be 25,055 vehicles. This estimate was based on the peak-hour traffic volumes included in the project's traffic analysis for background plus project conditions.[11] The AM and PM peak-hour volumes were averaged and then multiplied by 10 to estimate the ADT.

The BAAQMD *Roadway Screening Analysis Calculator* for Santa Clara County was used for both roadways. Winchester Boulevard was identified as a north-west directional roadway with the project sensitive receptors west of the roadway Moorpark Avenue was identified as an east-west directional roadway with the project sensitive receptors north of the roadway Estimated risk values for both roadways are listed in Table 5. Note that BAAQMD has found that non-cancer hazards from all local roadways would be well below the BAAQMD thresholds. Chronic or acute HI for the roadway would be below 0.03.

[11] Correspondence with Fiona Phung, David J. Powers. 14 June 2019.

Stationary Sources

Permitted stationary sources of air pollution near the project site were identified using BAAQMD's *Stationary Source Risk & Hazard Analysis Tool*. This mapping tool uses Google Earth and identified the location of four stationary sources and their estimated risk and hazard impacts. A Stationary Source Information Form (SSIF) containing the identified sources was prepared and submitted to BAAQMD. They provided updated risk levels, emissions and adjustments to account for new OEHHA guidance.[12] The risk values were then adjusted with the appropriate distance multiplier values provided by BAAQMD or the emissions information was used in refined modeling.

Five stationary sources were identified (Plants #13698, #111422, #110860, #G11755, and #20550). However, only four of the identified sources were active with Plant #20550 being shut down. The emissions data for the remaining four these stationary sources were provided by BAAQMD and adjusted for distance based on BAAQMD's *Distance Adjustment Multiplier Tool for Diesel Internal Combustion Engines* or *Distance Adjustment Multiplier Tool for Gasoline Dispensing Facilities* when appropriate. Concentration levels and community risk impacts from these sources upon the project are reported in Table 5.

Summary of Construction Impacts

Table 5 reports both the project and cumulative community risk impacts. The project would have a *significant* impact with respect to community risk caused by project construction activities, since the maximum cancer risk is above the single-source thresholds of 10.0 per million for cancer risk. As shown in Table 5, the combined annual cancer risk and Hazard risk values, which includes unmitigated and mitigated, would not exceed the cumulative threshold. However, the unmitigated $PM_{2.5}$ concentration does exceed the cumulative threshold. With MM-AQ-2, this level will be reduced to a level of *less-than*-significant. *Attachment 4* includes the construction emission calculations and source information used in the modeling and the cancer risk calculations.

[12] Correspondence with Areana Flores, BAAQMD, October 1, 2018.

Table 5. Impacts from Combined Sources at Off-site MEI

Source	Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	Hazard Index
Project Construction Unmitigated Mitigated	 **55.2 (infant)** 2.8 (infant)	 **0.95** 0.18	 0.05 <0.01
Interstate 280 with MEI 660 feet north	23.5	0.14	0.02
Winchester Boulevard (north-south) with MEI 110 feet west 30,155 ADT	5.9	0.17	<0.03
Moorpark Avenue (East-West) at with MEI 980 feet north 26,428 ADT	1.3	0.04	<0.01
Plant #13698 (Diesel Generator) at 1,000 feet	0.1	<0.01	<0.01
Plant #111422 (Gas Station) at 1,000 feet	0.2	-	<0.01
Plant #110860 (Gas Station) at 1,000 feet	0.2	-	<0.01
Plant #G11755 (Gas Station) at 1,000 feet	0.3	-	<0.01
Cumulative Total Unmitigated Mitigated	 86.7 34.3	 **1.31** 0.54	 <0.15 <0.11
BAAQMD Cumulative Source Threshold	***>100***	***>0.8***	***>10.0***
Significant? *Unmitigated* *Mitigated*	 *No* *No*	 ***Yes*** *No*	 *No* *No*

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

The project shall develop a plan demonstrating that the off-road equipment used onsite to construct the project would achieve a fleet-wide average 85-percent reduction in DPM exhaust emissions or greater. One feasible plan to achieve this reduction would include the following:

1. All diesel-powered off-road equipment, larger than 25 horsepower, operating on the site for more than two days continuously shall, at a minimum, meet U.S. EPA particulate matter emissions standards for Tier 4 interim engines. Where Tier 4 equipment is not feasible, then equipment that meets U.S. EPA emission standards for Tier 3 engines and include particulate matter emissions control equivalent to CARB Level 3 verifiable diesel emission control devices that altogether achieve a 85 percent reduction in particulate matter exhaust shall be used. Alternatively, equipment that is electrically powered or uses non-diesel fuels would meet this requirement.

2. Per the construction information provided by the project applicant, cranes using during construction must be electrified and temporary line power must be available to minimize use of portable diesel-powered equipment.

Effectiveness of Mitigation Measure AQ-2

Project construction activities were analyzed with the assumption of Tier 4 interim equipment usage. With the implementation of this mitigation, the computed maximum increased lifetime residential cancer risk from construction, assuming infant exposure, would be 2.8 in one million or less, the maximum annual $PM_{2.5}$ concentration would be 0.18 $\mu g/m^3$, and the Hazard Index would be <0.01. As a result, impacts would be reduced to *less-than-significant* with respect to community risk caused by construction activities.

Operational Community Risk Impacts at Project Site

Additionally, a health risk assessment was completed to analyze the impact existing TAC sources would have on the new proposed sensitive receptors that that project would introduce. The same TAC sources identified above were used in this HRA assessment.[13] All results are listed in Table 6.

Highways – Interstate 280

A refined analysis of the impacts of TACs and $PM_{2.5}$ to new sensitive receptors is necessary to evaluate potential cancer risks and $PM_{2.5}$ concentrations from Interstate 280 (I-280). A review of the traffic information reported by the California Department of Transportation (Caltrans) indicates that I-280 traffic includes 195,000 annual average vehicles per day that are about 3.1 percent trucks, of which 1.6 percent are considered diesel heavy duty trucks.[14]

Traffic Emissions Modeling

This analysis involved the development of DPM, organic TACs, and $PM_{2.5}$ emissions for traffic on I-280 using the CARB EMFAC2014 emission factor model and the traffic mix developed from Caltrans data. DPM emissions are projected to decrease in the future and are reflected in the EMFAC2014 emissions data.

Residential occupation of the project was assumed to begin in 2022 or thereafter.[15] In order to estimate TAC and $PM_{2.5}$ emissions over the 30-year exposure period used for calculating increased cancer risks to new residents from traffic on I-280, the EMFAC2014 model was used to develop vehicle emission factors for the year 2022 using the calculated mix of cars and trucks on I-280. Year 2022 emissions were conservatively assumed as being representative of future conditions over the time period that cancer risks are evaluated (30 years), since, as discussed above, overall vehicle emissions, and in particular diesel truck emissions will decrease in the future. Default EMFAC2014 vehicle model fleet age distributions for Santa Clara County were assumed. Average daily traffic volumes truck percentages were based on Caltrans data for I-280 for 2016. Traffic volumes were assumed to increase 1 percent per year. Average hourly traffic

[13] We note that to the extent this analysis considers *existing* air quality issues in relation to the impact on *future residents* of the Project, it does so for informational purposes only pursuant to the judicial decisions in *CBIA v. BAAQMD* (2015) 62 Cal.4th 369, 386 and *Ballona Wetlands Land Trust v. City of Los Angeles* (2011) 201 Cal.App.4th 455, 473

[14] Caltrans. 2017. *2016 Annual Average Daily Truck Traffic on the California State Highway System*

[15] This analysis was done prior to the update to the project and site plan. However, the on-site receptors would be located in the same areas as in the prior site plan. Therefore, the results and mitigation remain true.

distributions for Santa Clara County roadways were developed using the EMFAC model,[16] which were then applied to the average daily traffic volumes to obtain estimated hourly traffic volumes and emissions for I-280.

Emissions of total organic gases (TOG) were also calculated for 2022 using the EMFAC2014 model. These TOG emissions were then used in modeling the organic TACs (i.e., TACs associated with motor vehicle from TOG exhaust emissions and evaporative TOG emissions). TOG emissions from exhaust and for running evaporative loses from gasoline vehicles were calculated using EMFAC2014 default model values for Santa Clara County along with the traffic volumes and vehicle mixes for the highway.

For all hours of the day, other than during peak a.m. and p.m. periods, an average speed of 65 mph was assumed for all vehicles other than trucks which were assumed to travel at a speed of 60 mph. Based on traffic data from the Santa Clara Valley Transportation Authority's 2016 Monitoring and Conformance Report, traffic speeds during the peak a.m. and p.m. periods were identified.[17] For a 2-hour period during the peak a.m. period, the free-flow average speed was used for eastbound traffic and an average travel speed of 15 mph was used for westbound traffic. For the peak p.m. period, an average travel speed of 15 mph was used for eastbound traffic and an average travel speed of 15 mph was used for westbound traffic.

Dispersion Modeling

Dispersion modeling of TAC and $PM_{2.5}$ emissions was conducted using the U.S. EPA AERMOD model, which is recommended by the BAAQMD for this type of analysis. East- and west-bound traffic on I-280 within about 1,000 feet of the project site was evaluated with the model. The modeling used a five-year data set (2006-2010) of hourly meteorological data from the San Jose Airport prepared by the BAAQMD for use with the AERMOD model. Other inputs to the model included road geometry and elevations, hourly traffic emissions, and receptor locations and elevations.

The modeling used receptors placed in the proposed new residential areas with 15 meter (49 feet) spacing. Receptor heights of 1.5 meters (4.9 feet), 4.5 meters (14.8 feet), and 7.6 meters (24.9 feet) were used to represent the breathing heights of residents on the first, second, and third floor levels, respectively. Figure 3 shows the roadway links and on-site receptor locations used in the modeling.

Computed Cancer and Non-Cancer Health Impacts

The maximum increased lifetime cancer risk and annual $PM_{2.5}$ concentrations for new residents at the project site are shown in Table 6 and were computed using modeled TAC and $PM_{2.5}$ concentrations and the BAAQMD recommended methods and exposure parameters described in *Attachment 1*. The maximum impacts occurred at the first-floor residential level. The maximum

[16] The Burden output from EMFAC2007, CARB's previous version of the EMFAC model, was used for this since the current web-based version of EMFAC2011 does not include Burden type output with hour by hour traffic volume information.
[17] Santa Clara Valley Transportation Authority. *2016 CMP Monitoring and Conformance Report 2017.*

cancer risk and $PM_{2.5}$ concentration are above their respective BAAQMD significance thresholds (i.e., cancer risk > 10.0 per million and annual $PM_{2.5}$ concentrations > 0.3 $\mu g/m^3$). The maximum non-cancer health impact (hazard index) is below its BAAQMD significance threshold. The locations where the maximum TAC and $PM_{2.5}$ impacts from I-280 occurred are shown in Figure 3. Figure 4 shows the computed lifetime cancer risk as residential locations across the site. Modeled cancer risks range from 12.0 in one million to a 3.0 per million. Figure 5 shows the annual $PM_{2.5}$ concentrations across the site, which range from 1.38 to 0.31 $\mu g/m^3$. Results are listed in Table 6. The modeling results and health risk calculations for the receptor with the maximum cancer risk from I-280 traffic are also provided in *Attachment 4*.

Local Roadways – Winchester Boulevard and Moorpark Avenue

The roadway analysis was done in the same manner for the new project sensitive receptors as described above for the construction MEI. The project sensitive receptors would be 130 feet away from the roadway approximately 260 feet north of Moorpark Avenue and 110 feet west of Winchester Boulevard. The results are listed in Table 6.

Stationary Sources

The stationary source analysis was done in the same manner as described above for the MEI. Results are listed in Table 6.

Project Construction

During construction of the project, there will be on-site sensitive receptors who previously lived in the existing mobile homes. These receptors would be located on the western portion of the project while Phase 1 is on-going. Once complete, these receptors will then occupy the new multi-family residential units on the eastern portion of the project while the Phase 2 takes place.

The construction emissions were modeled with AERMOD using the same inputs as described in the dispersion modeling section for the off-site MEI. A receptor height of 1.5 meters (4.9 feet) was used to represent the breathing height of nearby residences in single-family homes. For each phase, the health risks were calculated separately with the assumption that there would be third trimester and infant exposure during each phase. The health risk calculations follow the guidelines detailed in *Attachment 1* and the calculations themselves are in *Attachment 3*.

Figure 3. Project Site, On-Site Sensitive Receptors, Roadway Segments Modeled and Receptor with Maximum TAC Impacts

Figure 4. Increased Cancer Risks (per million) in Future Project Residential Areas

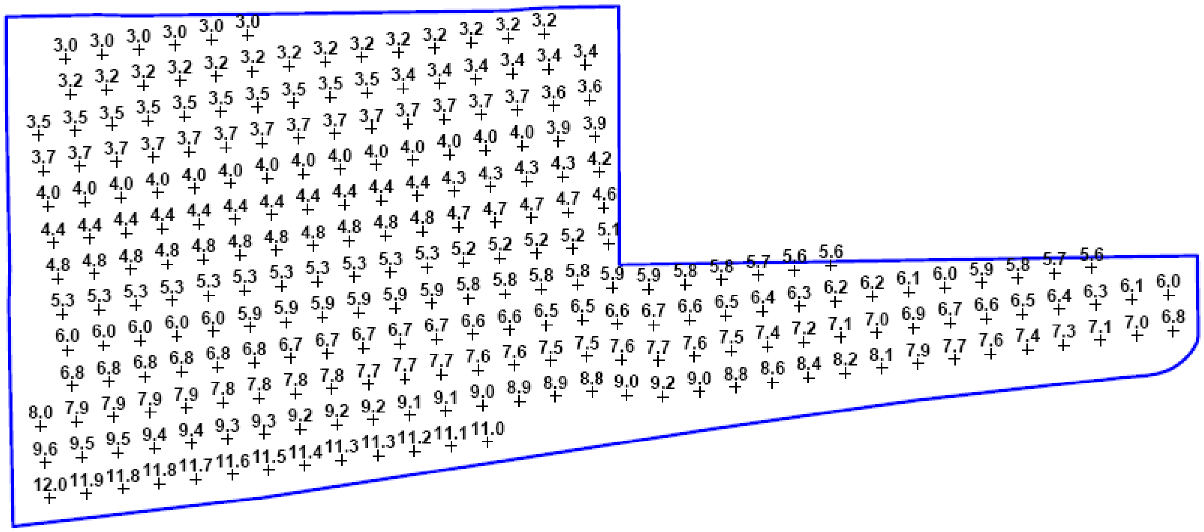
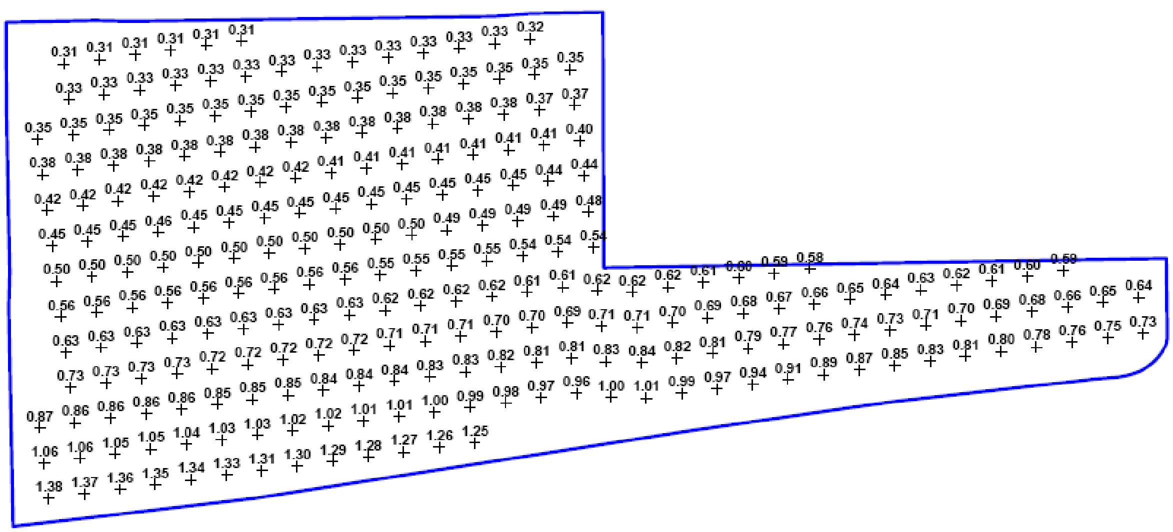


Figure 5. $PM_{2.5}$ Concentrations ($\mu g/m^3$) in Future Project Residential Areas



Cumulative Community Health Risk at Project Site

Community risk impacts from combined sources upon the project site are reported in Table 6. As shown, the annual cancer risk for I-280 would exceed the cancer single-source threshold of 10 per million, and the annual $PM_{2.5}$ concentrations would exceed both the single-source threshold (due to I-280) and cumulative threshold for $PM_{2.5}$. The project construction from both Phase 1 and 2 would also exceed the single-source threshold for cancer. Phase 1 also exceeds the single source threshold for $PM_{2.5}$. However, with *MM AQ-2* the construction risks impacts would be reduced to a level below the single-source thresholds. For I-280, recommended measures to reduce the cancer risk and annual $PM_{2.5}$ concentration are discussed below. The cumulative total for $PM_{2.5}$ would still exceed the BAAQMD cumulative threshold of 0.8 μg/m^3 even with these measures.

Table 6. Impacts from Combined TAC Sources at Project Site

Source	Maximum Cancer Risk (per million)	Maximum Annual $PM_{2.5}$ (μg/m^3)	Maximum Hazard Index
Phase 1 Construction			
Unmitigated	**66.2 (infant)**	**1.44**	0.06
Mitigated	3.4 (infant)	0.29	<0.01
Phase 2 Construction			
Unmitigated	**45.1 (infant)**	0.16	0.03
Mitigated	3.5 (infant)	0.03	<0.01
Interstate 280, ADT 195,000			
Unmitigated	**12.0**	**1.38**	<0.01
Mitigated	5.8	0.29	N/A
Winchester Boulevard (north-south) at 120 feet west 30,155 ADT	5.7	0.17	<0.03
Moorpark Avenue (East-West) at 300 feet north 25,055 ADT	3.0	0.08	<0.03
Plant #13698 (Diesel Generator) at 260 feet	0.4	<0.01	<0.01
Plant #111422 (Gas Station) at 1,000 feet	0.2	-	<0.01
Plant #110860 (Gas Station) at 700 feet	0.3	-	<0.01
Plant #G11755 (Gas Station) at 690 feet	0.6	-	<0.01
BAAQMD Single-Source Threshold	***>10.0***	***>0.3***	***>1.0***
Significant?			
Unmitigated	***Yes***	***Yes***	*No*
Mitigated	*No*	*No*	*No*
Cumulative Total			
Unmitigated	133.5	**3.24**	0.20
Mitigated	22.9	**0.87**	0.13
BAAQMD Cumulative Source Threshold	***>100***	***>0.8***	***>10.0***
Exceeds?			
Unmitigated	*No*	***Yes***	*No*
Mitigated	*No*	***Yes***	*N/A*

Recommended AQ Measure: **Include high-efficiency particulate filtration systems in residential ventilation systems.**

The significant exposure for new project receptors is judged by two effects: (1) increased cancer risk, and (2) annual $PM_{2.5}$ concentration. Cancer risk and exposure to annual $PM_{2.5}$ concentrations from I-280 are significant. Cancer risk is mostly the result of exposure to diesel particulate matter, although, gasoline vehicle exhaust contributes to this effect. Annual $PM_{2.5}$ concentrations are based on the exposure to $PM_{2.5}$ resulting from emissions attributable to truck and auto exhaust, the wearing of brakes and tires and re-entrainment of roadway dust from vehicles traveling over pavement. The modeled $PM_{2.5}$ exposure to future residents drives the mitigation plan. Reducing particulate matter exposure would reduce both annual $PM_{2.5}$ exposures and cancer risk.

The project shall include the following measures to minimize long-term annual $PM_{2.5}$ exposure for new project occupants:

1. Install air filtration in residential buildings. Air filtration devices shall be rated MERV16 or higher for portions of the site that have annual $PM_{2.5}$ exposure above 1.15 $\mu g/m^3$ (see Figure 4, as this included the homes closest to I-280) and MERV13 or higher for all other portions of the site. To ensure adequate health protection to sensitive receptors (i.e., residents), this ventilation system, whether mechanical or passive, all fresh air circulated into the dwelling units shall be filtered.

2. As part of implementing this measure, an ongoing maintenance plan for the buildings' heating, ventilation, and air conditioning (HVAC) air filtration system shall be required.

3. Ensure that the use agreement and other property documents: (1) require cleaning, maintenance, and monitoring of the affected buildings for air flow leaks, (2) include assurance that new owners or tenants are provided information on the ventilation system, and (3) include provisions that fees associated with owning or leasing a unit(s) in the building include funds for cleaning, maintenance, monitoring, and replacements of the filters, as needed.

Effectiveness: A properly installed and operated ventilation system with MERV16 filters should achieve reductions of at least 90 percent and a system with MERV13 would achieve an 80-percent reduction[18]. Increased cancer risk and $PM_{2.5}$ exposures for MERV16 filtration cases were calculated assuming a combination of outdoor and indoor exposure. For use of MERV16 or MERV13 filtration systems, without the additional use of sealed, inoperable widows and no balconies, an outdoor exposure of three hours to ambient $PM_{2.5}$ concentrations and 21 hours of indoor exposure to filtered air was assumed. In this case, the effective control efficiency using a MERV16 filtration system is about 79 percent and MERV13 is about 70 percent for $PM_{2.5}$ exposure. This would reduce the maximum cancer risk to 5.8 in one million and the maximum annual $PM_{2.5}$ concentration to 0.29 $\mu g/m^3$.

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[18] Bay Area Air Quality Management District (2016). Appendix B: Best Practices to Reduce Exposure to Local Air Pollution, *Planning Healthy Places A Guidebook for Addressing Local Sources of Air Pollutants in Community Planning* (p. 38). http://www.baaqmd.gov/~/media/files/planning-and-research/planning-healthy-places/php_may20_2016-pdf.pdf?la=en

Greenhouse Gas Emissions

<u>Setting</u>

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

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

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

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

<u>Recent Regulatory Actions</u>

Assembly Bill 32 (AB 32), California Global Warming Solutions Act (2006)

AB 32, the Global Warming Solutions Act of 2006, codified the State's GHG emissions target by directing CARB to reduce the State's global warming emissions to 1990 levels by 2020. AB 32 was signed and passed into law by Governor Schwarzenegger on September 27, 2006. Since that time, the CARB, CEC, California Public Utilities Commission (CPUC), and Building

Standards Commission have all been developing regulations that will help meet the goals of AB 32 and Executive Order S-3-05.

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

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

Senate Bill 375, California's Regional Transportation and Land Use Planning Efforts (2008)

California enacted legislation (SB 375) to expand the efforts of AB 32 by controlling indirect GHG emissions caused by urban sprawl. SB 375 provides incentives for local governments and applicants to implement new conscientiously planned growth patterns. This includes incentives for creating attractive, walkable, and sustainable communities and revitalizing existing communities. The legislation also allows applicants to bypass certain environmental reviews under CEQA if they build projects consistent with the new sustainable community strategies. Development of more alternative transportation options that would reduce vehicle trips and miles traveled, along with traffic congestion, would be encouraged. SB 375 enhances CARB's ability to reach the AB 32 goals by directing the agency in developing regional GHG emission reduction targets to be achieved from the transportation sector for 2020 and 2035. CARB works with the metropolitan planning organizations (e.g. Association of Bay Area Governments [ABAG] and Metropolitan Transportation Commission [MTC]) to align their regional transportation, housing, and land use plans to reduce vehicle miles traveled and demonstrate the region's ability to attain its GHG reduction targets. A similar process is used to reduce transportation emissions of ozone precursor pollutants in the Bay Area.

SB 350 Renewable Portfolio Standards

In September 2015, the California Legislature passed SB 350, which increases the states Renewables Portfolio Standard (RPS) for content of electrical generation from the 33 percent target for 2020 to a 50 percent renewables target by 2030.

Executive Order EO-B-30-15 (2015) and SB 32 GHG Reduction Targets

In April 2015, Governor Brown signed Executive Order which extended the goals of AB 32, setting a greenhouse gas emissions target at 40 percent of 1990 levels by 2030. On September 8, 2016, Governor Brown signed SB 32, which legislatively established the GHG reduction target of 40 percent of 1990 levels by 2030. In November 2017, CARB issued *California's 2017 Climate Change Scoping Plan*. While the State is on track to exceed the AB 32 scoping plan 2020 targets, this plan is an update to reflect the enacted SB 32 reduction target.

SB 32 was passed in 2016, which codified a 2030 GHG emissions reduction target of 40 percent below 1990 levels. CARB is currently working on a second update to the Scoping Plan to reflect the 2030 target set by Executive Order B-30-15 and codified by SB 32. The proposed Scoping Plan Update was published on January 20, 2017 as directed by SB 32 companion legislation AB 197. The mid-term 2030 target is considered critical by CARB on the path to obtaining an even deeper GHG emissions target of 80 percent below 1990 levels by 2050, as directed in Executive Order S-3-05. The Scoping Plan outlines the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure, providing a blueprint to continue driving down GHG emissions and obtain the statewide goals.

The new Scoping Plan establishes a strategy that will reduce GHG emissions in California to meet the 2030 target (note that the AB 32 Scoping Plan only addressed 2020 targets and a long-term goal). Key features of this plan are:

- Cap and Trade program places a firm limit on 80 percent of the State's emissions;
- Achieving a 50-percent Renewable Portfolio Standard by 2030 (currently at about 29 percent statewide);
- Increase energy efficiency in existing buildings;
- Develop fuels with an 18-percent reduction in carbon intensity;
- Develop more high-density, transit-oriented housing;
- Develop walkable and bikable communities;
- Greatly increase the number of electric vehicles on the road and reduce oil demand in half;
- Increase zero-emissions transit so that 100 percent of new buses are zero emissions;
- Reduce freight-related emissions by transitioning to zero emissions where feasible and near-zero emissions with renewable fuels everywhere else; and
- Reduce "super pollutants" by reducing methane and hydrofluorocarbons or HFCs by 40 percent.

In the updated Scoping Plan, CARB recommends statewide targets of no more than 6 metric tons CO_2e per capita (statewide) by 2030 and no more than 2 metric tons CO_2e per capita by 2050. The statewide per capita targets account for all emissions sectors in the State, statewide population forecasts, and the statewide reductions necessary to achieve the 2030 statewide target under SB 32 and the longer-term State emissions reduction goal of 80 percent below 1990 levels by 2050.

Significance Thresholds

The BAAQMD's CEQA Air Quality Guidelines recommended a GHG threshold of 1,100 metric tons or 4.6 metric tons (MT) per capita. These thresholds were developed based on meeting the 2020 GHG targets set in the scoping plan that addressed AB 32. Development of the project would occur beyond 2020, so a threshold that addresses a future target is appropriate. Although BAAQMD has not published a quantified threshold for 2030 yet, this assessment uses a "Substantial Progress" efficiency metric of 2.6 MT CO_2e/year/service population and a bright-line threshold of 660 MT CO_{2e}/year based on the GHG reduction goals of EO B-30-15. The service population metric of 2.6 is calculated for 2030 based on the 1990 inventory and the projected 2030 statewide population and employment levels[19]. The 2030 bright-line threshold is a 40 percent reduction of the 2020 1,100 MT CO_{2e}/year threshold.

CalEEMod Modeling

CalEEMod was used to predict GHG emissions from operation of the site assuming full build-out of the project. The project land use types and size and other project-specific information were input to the model, as described above within the operational period emissions. CalEEMod output is included in *Attachment 2*.

Service Population Emissions

The project service population efficiency rate is based on the number of future residents. For this project, the number of future residents was estimated by multiplying the total number of units (i.e. 688 dwelling units) by the persons per household rate for San Jose found in the California Department of Finance Population and Housing Estimate report.[20] Using the 3.20 persons per household 2019 estimate for San José, the number of future residents is estimated to be 2,202.

Construction Emissions

GHG emissions associated with construction were computed to be 2,459 MT of CO_2e for the total construction period of about 3 years. These are the emissions from on-site operation of construction equipment, vendor and hauling truck trips, and worker trips. Neither the City nor BAAQMD have an adopted threshold of significance for construction-related GHG emissions, though BAAQMD recommends quantifying emissions and disclosing that GHG emissions would occur during construction. BAAQMD also encourages the incorporation of best management practices to reduce GHG emissions during construction where feasible and applicable.

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[19] Association of Environmental Professionals, 2016. *Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California*. April.
[20] State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State — January 1, 2011-2019*. Sacramento, California, May 2019.

Operational Emissions

The CalEEMod model, along with the project vehicle trip generation rates, was used to estimate daily emissions associated with operation of the fully-developed site under the proposed project. As shown in Table 7, annual net emissions resulting from operation of the proposed project are predicted to be 3,207 MT of CO_2e for the year 2025 and 2,961 MT of CO_{2e} for the year 2030. In 2025, the service population emissions would 1.7 MT CO_2e/year/service population. The 2030 service population emissions would be 1.5 MT CO_2e/year/service population. The per capita emissions for both 2025 and 2030 would not exceed the "Substantial Progress" efficiency metric of 2.6 MT CO_2e/year/service population. As a result, GHG impacts would be *less-than-significant*.

Table 7. Annual Project GHG Emissions (CO_2e) in Metric Tons

Source Category	Existing Project Site in 2023	Proposed Project in 2025[1]	Existing Project Site in 2030	Proposed Project in 2030
Area	5	36	6	36
Energy Consumption	180	872	180	872
Mobile	285	2,593	253	2,296
Solid Waste Generation	26	159	25	159
Water	12	74	12	74
Total (MT of CO_{2e})	508	3,734	476	3,437
Net Emissions		3,207		2,961
Service Population Emissions (MT CO2e/year/service population)		1.7		1.5
Significance Threshold		***2.6 in 2030***		
Significant?		No		*No*

Supporting Documentation

Attachment 1 is the methodology used to compute community risk impacts, including the methods to compute lifetime cancer risk from exposure to project emissions.

Attachment 2 includes the CalEEMod output for project construction and operational criteria air pollutant and GHG emissions. The operational output for existing uses is also included in this attachment. Also included are any modeling assumptions.

Attachment 3 includes the emissions and health risk calculations for construction activities. AERMOD dispersion modeling files for this assessment, which are quite voluminous, are available upon request and would be provided in digital format.

Attachment 4 includes the screening community risk calculations from sources affecting the project and MEI. This includes the emission and health risk assessment calculations for I-280 traffic

Attachment 1: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[21] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[22] This HRA used the 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[23] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency and duration of exposure. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD for residential exposures, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. For children at schools and daycare facilities, BAAQMD recommends using the 95th percentile breathing rates. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of

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[21] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

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

[23] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. December 2016.

30 years for sources with long-term emissions (e.g., roadways). For workers, assumed to be adults, a 25-year exposure period is recommended by the BAAQMD.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

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

Cancer Risk (per million) = *CPF x Inhalation Dose x ASF x ED/AT x FAH x* 10^6

Where:

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

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

Where:

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

The health risk parameters used in this evaluation are summarized as follows:

Parameter	***Exposure Type →***	**Infant**		**Child**		**Adult**
	Age Range →	**3rd Trimester**	**0<2**	**2 < 9**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day) 80th Percentile Rate		273	758	631	572	261
Daily Breathing Rate (L/kg-day) 95th Percentile Rate		361	1,090	861	745	335
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual $PM_{2.5}$ Concentrations

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

Attachment 2: CalEEMod Modeling Output

Attachment 3: Construction Health Risk Calculations

Winchester Ranch, San Jose, CA

DPM Emissions and Modeling Emission Rates - Without Mitigation

Construction Year	Construction Area	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Eastern Portion (P1)	0.0479	P1_DPM	95.8	0.02625	3.31E-03	29,766	1.11E-07
2021	Eastern Portion (P1)	0.3640	P1_DPM	728.0	0.19945	2.51E-02	29,766	8.44E-07
2022	Eastern Portion (P1)	0.1585	P1_DPM	317.0	0.08685	1.09E-02	29,766	3.68E-07
	Western Portion (P2)	0.0590	P2_DPM	118.0	0.03592	4.53E-03	32,350	1.40E-07
		0.2175		435.0	0.12277	1.55E-02	62,116	
2023	Western Portion (P2)	0.0860	P2_DPM	172.0	0.05236	6.60E-03	32,350	2.04E-07
2024	Western Portion (P2)	0.0721	P2_DPM	144.2	0.04390	5.53E-03	32,350	1.71E-07
Total		***0.7875***		***1575.00***	***0.4447***	***0.0560***		

Construction Hours Phase 1
hr/day = 10 (7am - 5pm)
days/yr = 365
hours/year = 3650

Construction Hours Phase 2
hr/day = 9 (8am - 5pm)
days/yr = 365
hours/year = 3285

PM2.5 Fugitive Dust Emissions for Modeling - Without Mitigation

Construction Year	Construction Area	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Eastern Portion (P1)	P1_FUG	0.0063	12.5	0.00344	4.33E-04	29,766	1.45E-08
2021	Eastern Portion (P1)	P1_FUG	0.5755	1151.0	0.31534	3.97E-02	29,766	1.33E-06
2022	Eastern Portion (P1)	P1_FUG	0.0096	19.2	0.00526	6.63E-04	29,766	2.23E-08
	Western Portion (P2)	P2_FUG	0.0891	178.2	0.05425	6.84E-03	32,350	2.11E-07
			0.0987	197.4	5.95E-02	7.50E-03	62,116	
2023	Western Portion (P2)	P2_FUG	0.0057	11.3	0.00345	4.35E-04	32,350	1.34E-08
2024	Western Portion (P2)	P2_FUG	0.0046	9.1	0.00277	3.49E-04	32,350	1.08E-08
Total			***0.6907***	***1381.3800***	***0.3845***	***0.0484***		

Operation Hours
hr/day = 10 (7am - 4pm)
days/yr = 365
hours/year = 3650

Construction Hours Phase 2
hr/day = 9
days/yr = 365
hours/year = 3285

DPM Emissions and Modeling Emission Rates - With Mitigation

Construction Year	Construction Area	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Eastern Portion (P1)	0.0017	P1_DPM	3.4	0.00094	1.19E-04	29,766	3.99E-09
2021	Eastern Portion (P1)	0.0187	P1_DPM	37.4	0.01025	1.29E-03	29,766	4.34E-08
2022	Eastern Portion (P1)	0.0093	P1_DPM	18.5	0.00507	6.39E-04	29,766	2.15E-08
	Western Portion (P2)	0.0039	P2_DPM	7.8	0.00238	3.00E-04	32,350	9.27E-09
		0.0132		26.3	0.00745	9.39E-04	62,116	
2023	Western Portion (P2)	0.0065	P2_DPM	13.0	0.00396	4.99E-04	32,350	1.54E-08
2024	Western Portion (P2)	0.0059	P2_DPM	11.7	0.00357	4.50E-04	32,350	1.39E-08
Total		***0.0460***		***91.9000***	***0.0262***	***0.0033***		

Construction Hours Phase 1			*Construction Hours Phase 2*		
hr/day =	10	(7am - 5pm)	hr/day =	9	(8am - 5pm)
days/yr =	365		days/yr =	365	
hours/year =	3650		hours/year =	3285	

PM2.5 Fugitive Dust Emissions for Modeling - With Mitigation

Construction Year	Construction Area	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Eastern Portion (P1)	P1_FUG	0.0016	3.1	0.00086	1.08E-04	29,766	3.64E-09
2021	Eastern Portion (P1)	P1_FUG	0.1400	280.0	0.07671	9.67E-03	29,766	3.25E-07
2022	Eastern Portion (P1)	P1_FUG	0.0096	19.2	0.00526	6.63E-04	29,766	2.23E-08
	Western Portion (P2)	P2_FUG	0.0211	42.2	0.01285	1.62E-03	32,350	5.00E-08
			0.0307	61.4	1.81E-02	2.28E-03	62,116	
2023	Western Portion (P2)	P2_FUG	0.0057	11.3	0.00345	4.35E-04	32,350	1.34E-08
2024	Western Portion (P2)	P2_FUG	0.0046	9.1	0.00277	3.49E-04	32,350	1.08E-08
Total			***0.1825***	***364.9800***	***0.1019***	***0.0128***		

Operation Hours			*Construction Hours Phase 2*	
hr/day =	10	(7am - 4pm)	hr/day =	9
days/yr =	365		days/yr =	365
hours/year =	3650		hours/year =	3285

Winchester Ranch, San Jose, CA - Summary of Health Impacts

Maximum Impacts at Construction MEI Location

Emissions Year	Maximum Concentrations Exhaust PM10/DPM (µg/m^3)	Fugitive PM2.5 (µg/m^3)	Cancer Risk (per million) Child	Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration (µg/m^3)
2020	0.0357	0.0000	0.5	-	0.007	0.00
2021	0.0357	0.0074	5.9	0.10	0.007	0.04
2022	0.2715	0.6757	44.6	0.78	0.054	0.95
2023	0.1306	0.0360	3.7	0.37	0.026	0.17
2024	0.0178	0.0016	0.5	0.05	0.004	0.02
Maximum	0.2715	0.6757	-	-	**0.054**	**0.95**
Total	-	-	**55.2**	**1.3**	-	-

Maximum Impacts at Construction MEI Location - Mitigated

Emissions Year	Maximum Concentrations Exhaust PM10/DPM (µg/m^3)	Fugitive PM2.5 (µg/m^3)	Cancer Risk (per million) Child	Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration (µg/m^3)
2020	0.0013	0.0000	0.0	0.00	0.000	0.00
2021	0.0013	0.0019	0.2	0.00	0.000	0.00
2022	0.0140	0.1651	2.3	0.04	0.003	0.18
2023	0.0077	0.0172	0.2	0.02	0.002	0.02
2024	0.0014	0.0016	0.0	0.00	0.000	0.00
Maximum	0.0140	0.1651	-	-	**0.003**	**0.18**
Total	-	-	**2.8**	**0.1**	-	-

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction - Unmitigated
Impacts at Off-Site Receptors-1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
	Exposure				Age	Cancer	Modeled		Age	Cancer	Maximum	
Exposure	Duration		DPM Conc (ug/m3)		Sensitivity	Risk	DPM Conc (ug/m3)		Sensitivity	Risk	Fugitive	Total
Year	(years)	Age	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	PM2.5	PM2.5
0	0.25	-0.25 - 0*	2020	0.0357	10	0.49	2020	0.0357	1	-		
1	1	0 - 1	2020	0.0357	10	5.86	2020	0.0357	1	0.10	0.007	0.043
2	1	1 - 2	2021	0.2715	10	44.59	2021	0.2715	1	0.78	0.676	0.947
3	1	2 - 3	2022	0.1306	3	3.73	2022	0.1306	1	0.37	0.0360	0.167
4	1	3 - 4	2023	0.0178	3	0.51	2023	0.0178	1	0.05	0.0016	0.019
5	1	4 - 5	2024	0.0150	3	0.43	2024	0.0150	1	0.04	0.0013	0.016
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00		
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00	**0.68**	**0.95**
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**55.6**				**1.4**		

* Third trimester of pregnancy

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction - With Mitigation
Impacts at Off-Site Receptors- 1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information: DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Infant/Child Cancer Risk (per million)	Adult - Exposure Information: Modeled DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Adult Cancer Risk (per million)	Fugitive PM2.5	Total PM2.5
0	0.25	-0.25 - 0*	2020	0.0013	10	0.02	2020	0.0013	1	0.00		
1	1	0 - 1	2020	0.0013	10	0.21	2020	0.0013	1	0.00	0.0019	0.003
2	1	1 - 2	2021	0.0140	10	2.29	2021	0.0140	1	0.04	0.1651	0.179
3	1	2 - 3	2022	0.0077	3	0.22	2022	0.0077	1	0.02	0.0172	0.025
4	1	3 - 4	2023	0.0014	3	0.04	2023	0.0014	1	0.00	0.0016	0.003
5	1	4 - 5	2024	0.0012	3	0.03	2024	0.0012	1	0.00	0.0013	0.002
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00		
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00		
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00		
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00		
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00		
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00		
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00		
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00		
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00		
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00		
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00		
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00		
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00		
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00		
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00		
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00		
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00		
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00		
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00		
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00		
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00		
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00		
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00		
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00		
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00		
Total Increased Cancer Risk						**2.81**				**0.1**		

* Third trimester of pregnancy

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction of Phase 1 - Unmitigated
Impacts at On-site Receptors-1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult
	Exposure				Age	Cancer	Modeled		Age	Cancer
Exposure	Duration		DPM Conc (ug/m3)		Sensitivity	Risk	DPM Conc (ug/m3)		Sensitivity	Risk
Year	(years)	Age	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)
0	0.25	-0.25 - 0*	2020	0.0418	10	0.57	2020	0.0418	1	-
1	1	0 - 1	2020	0.0418	10	6.87	2020	0.0418	1	0.12
2	1	1 - 2	2021	0.3180	10	52.22	2021	0.3180	1	0.91
3	1	2 - 3	2022	0.2280	3	6.50	2022	0.2280	1	0.65
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00
Total Increased Cancer Risk						**66.2**				**1.7**

* Third trimester of pregnancy

Hazard Index	Maximum Fugitive PM2.5	Total PM2.5
0.008	0.012	0.054
0.064	1.125	1.443
0.046	0.3624	0.590
0.06	**1.12**	**1.44**

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction of Phase 1 - Mitigated
Impacts at On-site Receptors-1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult	Maximum		
	Exposure				Age	Cancer	Modeled		Age	Cancer			
Exposure	Duration		DPM Conc (ug/m3)		Sensitivity	Risk	DPM Conc (ug/m3)		Sensitivity	Risk	Hazard	Fugitive	Total
Year	(years)	Age	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	Index	PM2.5	PM2.5
0	0.25	-0.25 - 0*	2020	0.0015	10	0.02	2020	0.0015	1	-			
1	1	0 - 1	2020	0.0015	10	0.25	2020	0.0015	1	0.00	0.000	0.003	0.005
2	1	1 - 2	2021	0.0164	10	2.69	2021	0.0164	1	0.05	0.003	0.275	0.291
3	1	2 - 3	2022	0.0140	3	0.40	2022	0.0140	1	0.04	0.003	0.1003	0.114
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00	**0.00**	**0.27**	**0.29**
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00			
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00			
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00			
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00			
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00			
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00			
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00			
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00			
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00			
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00			
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00			
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00			
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00			
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00			
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00			
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00			
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00			
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00			
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00			
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00			
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00			
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00			
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00			
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00			
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00			
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00			
Total Increased Cancer Risk						**3.4**				**0.1**			

* Third trimester of pregnancy

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction of Phase 2 - Unmitigated
Impacts at On-site Receptors-1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Informatio: DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Infant/Child Cancer Risk (per million)	Adult - Exposure Information: Modeled DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Adult Cancer Risk (per million)
0	0.25	-0.25 - 0*	2023	0.1431	10	1.95	2023	0.1431	1	-
1	1	0 - 1	2023	0.1431	10	23.50	2023	0.1431	1	0.41
2	1	1 - 2	2024	0.1199	10	19.70	2024	0.1199	1	0.34
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00
Total Increased Cancer Risk						**45.1**				**0.8**

* Third trimester of pregnancy

Maximum		
Hazard Index	Fugitive PM2.5	Total PM2.5
0.029	0.015	0.159
0.024	0.012	0.132
0.03	**0.02**	**0.16**

Winchester Ranch, San Jose, CA
Maximum DPM Cancer Risk Calculations From Construction of Phase 2 - Mitigated
Impacts at On-site Receptors-1.5 meter

Cancer Risk Calculation Method

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

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

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

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

Values

	Infant/Child				Adult
Age -->	3rd Trimester	0 - 2	2 - 9	2 - 16	16 - 30
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

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

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Infant/Child Cancer Risk (per million)	Adult - Exposure Information Modeled DPM Conc (ug/m3) Year	Annual	Age Sensitivity Factor	Adult Cancer Risk (per million)
0	0.25	-0.25 - 0*	2023	0.0108	10	0.15	2023	0.0108	1	-
1	1	0 - 1	2023	0.0108	10	1.77	2023	0.0108	1	0.03
2	1	1 - 2	2024	0.0098	10	1.60	2024	0.0098	1	0.03
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00
Total Increased Cancer Risk						**3.5**				**0.1**

* Third trimester of pregnancy

Maximum Hazard Index	Maximum Fugitive PM2.5	Maximum Total PM2.5
0.002	0.015	0.026
0.002	0.012	0.022
0.00	**0.02**	**0.03**

Attachment 4: Screening Community Risk Calculations & I-280 Traffic Calculations

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	Santa Clara	
Roadway Direction	East-West	
Side of the Roadway	North	
Distance from Roadway	980	feet
Annual Average Daily Traffic (ADT)	25,055	

Results

Santa Clara County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.035 (µg/m^3)

Cancer Risk

1.91 (per million)

Moorpark Ave, MEI

Background Plus Project Conditions
Data for Santa Clara County based on meteorological data collected from San Jose Airport in 1997

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

1.31

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

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~~ Cal3qhcr 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.

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	Santa Clara	
Roadway Direction	East-West	
Side of the Roadway	North	
Distance from Roadway	300	feet
Annual Average Daily Traffic (ADT)	25,055	

Results

Santa Clara County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.082 (µg/m^3)

Cancer Risk

4.33 (per million)

Moorpark Ave, Project

Background Plus Project Conditions
Data for Santa Clara County based on meteorological data collected from San Jose Airport in 1997

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

2.98

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

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~~ Cal3qhcr 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.

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	Santa Clara	
Roadway Direction	East-West	
Side of the Roadway	North	
Distance from Roadway	300	feet
Annual Average Daily Traffic (ADT)	25,055	

Results

Santa Clara County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.082 (μg/m³)

Cancer Risk

4.33 (per million)

Moorpark Ave, Project

Background Plus Project Conditions
Data for Santa Clara County based on meteorological data collected from San Jose Airport in 1997

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

2.98

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

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~~ Cal3qhcr 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.

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	Santa Clara	
Roadway Direction	North-South	
Side of the Roadway	West	
Distance from Roadway	120	feet
Annual Average Daily Traffic (ADT)	30,155	

Results

Santa Clara County

NORTH-SOUTH DIRECTIONAL ROADWAY

PM2.5 annual average

0.165 (μg/m³)

Cancer Risk

8.22 (per million)

Winchester Blvd, MEI

Background Plus Project Conditions
Data for Santa Clara County based on meteorological data collected from San Jose Airport in 1997

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

5.65

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

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~~ Cal3qhcr 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.

I-280 Traffic Emissions and Health Risk Calculations

Winchester Ranch, San Jose, CA
I-280
DPM Modeling - Roadway Links, Traffic Volumes, and DPM Emissions
Year = 2022

Road Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	Diesel ADT	Average Speed (mph)
EB I-280	Eastbound I-280	E	4	1137	68	20.6	3.4	2,546	variable
WB I-280	Westbound I-280	W	4	1134	68	20.6	3.4	2,546	variable

2022 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - EB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	2.58%	66	0.0095	9	7.59%	193	0.0086	17	7.04%	179	0.0176
2	1.58%	40	0.0098	10	4.95%	126	0.0094	18	5.39%	137	0.0182
3	1.66%	42	0.0100	11	4.30%	109	0.0094	19	4.79%	122	0.0082
4	2.35%	60	0.0092	12	7.92%	202	0.0086	20	0.63%	16	0.0098
5	1.44%	37	0.0095	13	7.53%	192	0.0086	21	2.01%	51	0.0094
6	2.38%	61	0.0092	14	7.44%	189	0.0086	22	2.84%	72	0.0093
7	4.30%	109	0.0092	15	6.76%	172	0.0085	23	1.63%	42	0.0095
8	6.45%	164	0.0085	16	5.86%	149	0.0084	24	0.58%	15	0.0096
								Total		2,546	

2022 Hourly Diesel Traffic Volumes Per Direction and DPM Emissions - WB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	2.58%	66	0.0095	9	7.59%	193	0.0181	17	7.04%	179	0.0092
2	1.58%	40	0.0098	10	4.95%	126	0.0094	18	5.39%	137	0.0086
3	1.66%	42	0.0100	11	4.30%	109	0.0094	19	4.79%	122	0.0082
4	2.35%	60	0.0092	12	7.92%	202	0.0086	20	0.63%	16	0.0098
5	1.44%	37	0.0095	13	7.53%	192	0.0086	21	2.01%	51	0.0094
6	2.38%	61	0.0092	14	7.44%	189	0.0086	22	2.84%	72	0.0093
7	4.30%	109	0.0092	15	6.76%	172	0.0085	23	1.63%	42	0.0095
8	6.45%	164	0.0174	16	5.86%	149	0.0084	24	0.58%	15	0.0096
								Total		2,546	

Winchester Ranch, San Jose, CA
I-280
PM2.5 & TOG Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2022

Group Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	ADT	Average Speed (mph)
EB I-280	Eastbound I-280	E	4	1137	68	20.6	1.3	103,350	variable
WB I-280	Westbound I-280	W	4	1134	68	20.6	1.3	103,350	variable

2022 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - EB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.10%	1134	0.0211	9	7.08%	7316	0.0200	17	7.38%	7626	0.0231
2	0.37%	379	0.0220	10	4.28%	4428	0.0205	18	8.27%	8547	0.0229
3	0.30%	309	0.0225	11	4.61%	4760	0.0202	19	5.79%	5981	0.0195
4	0.20%	209	0.0294	12	5.85%	6050	0.0201	20	4.36%	4503	0.0195
5	0.45%	470	0.0217	13	6.17%	6379	0.0199	21	3.28%	3395	0.0198
6	0.83%	863	0.0223	14	6.03%	6236	0.0199	22	3.31%	3424	0.0200
7	3.78%	3909	0.0203	15	7.08%	7313	0.0198	23	2.47%	2554	0.0198
8	7.90%	8160	0.0196	16	7.21%	7455	0.0196	24	1.89%	1951	0.0195
								Total		103,350	

2022 Hourly Traffic Volumes Per Direction and PM2.5 Emissions - WB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.10%	1134	0.0211	9	7.08%	7316	0.0234	17	7.38%	7626	0.0195
2	0.37%	379	0.0220	10	4.28%	4428	0.0205	18	8.27%	8547	0.0193
3	0.30%	309	0.0225	11	4.61%	4760	0.0202	19	5.79%	5981	0.0195
4	0.20%	209	0.0294	12	5.85%	6050	0.0201	20	4.36%	4503	0.0195
5	0.45%	470	0.0217	13	6.17%	6379	0.0199	21	3.28%	3395	0.0198
6	0.83%	863	0.0223	14	6.03%	6236	0.0199	22	3.31%	3424	0.0200
7	3.78%	3909	0.0203	15	7.08%	7313	0.0198	23	2.47%	2554	0.0198
8	7.90%	8160	0.0230	16	7.21%	7455	0.0196	24	1.89%	1951	0.0195
								Total		103,350	

Winchester Ranch, San Jose, CA
I-280
Entrained PM2.5 Road Dust Modeling - Roadway Links, Traffic Volumes, and PM2.5 Emissions
Year = 2022

Group Link	Description	Direction	No. Lanes	Link Length (m)	Link Width (ft)	Link Width (m)	Release Height (m)	ADT	Average Speed (mph)
EB I-280	Eastbound I-280	E	4	1137	68	20.6	1.3	103,350	variable
WB I-280	Westbound I-280	W	4	1134	68	20.6	1.3	103,350	variable

2022 Hourly Traffic Volumes Per Direction and Road Dust PM2.5 Emissions - EB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.10%	1134	0.0100	9	7.08%	7316	0.0100	17	7.38%	7626	0.0100
2	0.37%	379	0.0100	10	4.28%	4428	0.0100	18	8.27%	8547	0.0100
3	0.30%	309	0.0100	11	4.61%	4760	0.0100	19	5.79%	5981	0.0100
4	0.20%	209	0.0100	12	5.85%	6050	0.0100	20	4.36%	4503	0.0100
5	0.45%	470	0.0100	13	6.17%	6379	0.0100	21	3.28%	3395	0.0100
6	0.83%	863	0.0100	14	6.03%	6236	0.0100	22	3.31%	3424	0.0100
7	3.78%	3909	0.0100	15	7.08%	7313	0.0100	23	2.47%	2554	0.0100
8	7.90%	8160	0.0100	16	7.21%	7455	0.0100	24	1.89%	1951	0.0100
								Total		103,350	

2022 Hourly Traffic Volumes Per Direction and Road Dust PM2.5 Emissions - WB I-280

Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile	Hour	% Per Hour	VPH	g/mile
1	1.10%	1134	0.0100	9	7.08%	7316	0.0100	17	7.38%	7626	0.0100
2	0.37%	379	0.0100	10	4.28%	4428	0.0100	18	8.27%	8547	0.0100
3	0.30%	309	0.0100	11	4.61%	4760	0.0100	19	5.79%	5981	0.0100
4	0.20%	209	0.0100	12	5.85%	6050	0.0100	20	4.36%	4503	0.0100
5	0.45%	470	0.0100	13	6.17%	6379	0.0100	21	3.28%	3395	0.0100
6	0.83%	863	0.0100	14	6.03%	6236	0.0100	22	3.31%	3424	0.0100
7	3.78%	3909	0.0100	15	7.08%	7313	0.0100	23	2.47%	2554	0.0100
8	7.90%	8160	0.0100	16	7.21%	7455	0.0100	24	1.89%	1951	0.0100
								Total		103,350	

Winchester Ranch, San Jose, CA
I-280 Traffic Data and PM2.5 & TOG Emission Factors - 63 mph

Analysis Year = ***2022***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2016 Caltrans Number Vehicles (veh/day)	2022 Number Vehicles (veh/day)	2022 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	137,142	145,371	1.14%	1,657	65	0.0076	0.0192	0.0015	0.0131	0.041
LDT	51,813	54,922	0.18%	101	65	0.0113	0.0192	0.0015	0.0200	0.086
MDT	2,896	3,069	10.36%	318	60	0.0111	0.0226	0.0019	0.0319	0.179
HDT	3,149	3,338	90.33%	3,015	60	0.0092	0.0579	0.0082	0.0687	0.093
Total	195,000	206,700	-	5,091	62.5	-	-		-	-
Mix Avg Emission Factor						**0.00881**	**0.01991**	**0.00160**	**0.01531**	**0.05526**
Increase From 2016		1.06								
Vehicles/Direction		103,350		2,546						
Avg Vehicles/Hour/Direction		**4,306**		**106**						

Traffic Data Year = ***2016***

Caltrans Truck AADT		Total	Truck by Axle			
	Total	Truck	2	3	4	5
I-280 B San Jose, Jct Rtes 17/880	195,000	6,045	2,896	1,052	290	1,807
			47.90%	17.40%	4.80%	29.89%
Percent of Total Vehicles		3.10%	1.48%	0.54%	0.15%	0.93%

Traffic Increase per Year (%) = ***1.00%***

Winchester Ranch, San Jose, CA
I-280 Traffic Data and PM2.5 & TOG Emission Factors - 50 mph

Analysis Year = ***2022***

						Emission Factors				
						Diesel	All Vehicles		Gas Vehicles	
Vehicle Type	2016 Caltrans Number Vehicles (veh/day)	2022 Number Vehicles (veh/day)	2022 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Vehicles DPM (g/VMT)	Total PM2.5 (g/VMT)	Exhaust PM2.5 (g/VMT)	Exhaust TOG (g/VMT)	Running TOG (g/VMT)
LDA	137,142	145,371	1.14%	1,657	50	0.0065	0.0190	0.0012	0.0107	0.041
LDT	51,813	54,921	0.18%	101	50	0.0095	0.0190	0.0012	0.0165	0.086
MDT	2,896	3,069	10.36%	318	50	0.0137	0.0248	0.0041	0.0323	0.179
HDT	3,149	3,338	90.33%	3,015	50	0.0115	0.0603	0.0106	0.0787	0.093
Total	194,999	206,699	-	5,091	50	-	-		-	-
Mix Avg Emission Factor						**0.00995**	**0.01971**	**0.00141**	**0.01268**	**0.05526**
Increase From 2016		1.06								
Vehicles/Direction		103,350		2,546						
Avg Vehicles/Hour/Direction		**4,306**		**106**						

Traffic Data Year = ***2016***

Caltrans Truck AADT		Total*	Truck by Axle			
	Total	Truck	2	3	4	5
I-280 B San Jose, Jct Rtes 17/880	195,000	6,045	2,896	1,052	290	1,807
			47.90%	17.40%	4.80%	29.89%
Percent of Total Vehicles		3.10%	1.48%	0.54%	0.15%	0.93%

Traffic Increase per Year (%) = ***1.00%***

Winchester Ranch, San Jose, CA
I-280 Traffic Data and PM2.5 & TOG Emission Factors - 15 mph

Analysis Year = ***2022***

Vehicle Type	2016 Caltrans Number Vehicles (veh/day)	2022 Number Vehicles (veh/day)	2022 Percent Diesel	Number Diesel Vehicles (veh/day)	Vehicle Speed (mph)	Emission Factors: Diesel Vehicles DPM (g/VMT)	All Vehicles: Total PM2.5 (g/VMT)	All Vehicles: Exhaust PM2.5 (g/VMT)	Gas Vehicles: Exhaust TOG (g/VMT)	Gas Vehicles: Running TOG (g/VMT)
LDA	137,142	145,371	1.14%	1,657	15	0.0157	0.0224	0.0046	0.0412	0.041
LDT	51,813	54,922	0.18%	101	15	0.0232	0.0224	0.0047	0.0624	0.086
MDT	2,896	3,069	10.36%	318	15	0.0343	0.0375	0.0168	0.1347	0.179
HDT	3,149	3,338	90.33%	3,015	15	0.0183	0.0657	0.0160	0.2388	0.093
Total	195,000	206,700	-	5,091	15	-	-	-	-	-
Mix Avg Emission Factor						**0.01856**	**0.02331**	**0.00500**	**0.04858**	**0.05526**
Increase From 2016		1.06								
Vehicles/Direction		103,350		2,546						
Avg Vehicles/Hour/Direction		**4,306**		**106**						

Traffic Data Year = ***2016***

Caltrans Truck AADT	Total	Total Truck	Truck by Axle: 2	3	4	5
I-280 B San Jose, Jct Rtes 17/880	195,000	6,045	2,896	1,052	290	1,807
			47.90%	17.40%	4.80%	29.89%
Percent of Total Vehicles		3.10%	1.48%	0.54%	0.15%	0.93%

Traffic Increase per Year (%) = ***1.00%***

Winchester Ranch, San Jose, CA
I-280 Traffic Data and Entrained PM2.5 Road Dust Emission Factors

$E_{2.5} = [k(sL)^{0.91} \times (W)^{1.02} \times (1-P/4N) \times 453.59$

where:

$E_{2.5}$ = $PM_{2.5}$ emission factor (g/VMT)

k = particle size multiplier (g/VMT) [$k_{PM2.5} = k_{PM10} \times (0.0686/0.4572) = 1.0 \times 0.15 = 0.15$ g/VM

sL = roadway specific silt loading (g/m^2)

W = average weight of vehicles on road (Bay Area default = 2.4 tons)[a]

P = number of days with at least 0.01 inch of precipitation in the annual averaging period

N = number of days in the annual averaging period (default = 365)

Notes: [a] CARB 2014, Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust (Revised and updated, April 2014)

Road Type	Silt Loading (g/m^2)	Average Weight (tons)	County	No. Days ppt > 0.01"	$PM_{2.5}$ Emission Factor (g/VMT)
Freeway	0.02	2.4	Santa Clara	64	0.00996

SFBAAB[a]

Road Type	Silt Loading (g/m^2)
Collector	0.032
Freeway	0.02
Local	0.32
Major	0.032

SFBAAB[a]

County	>0.01 inch precipitation
Alameda	61
Contra Costa	60
Marin	66
Napa	68
San Francisco	67
San Mateo	60
Santa Clara	64
Solano	54
Sonoma	69

Winchester Ranch, San Jose, CA - I-280 - TACs & PM2.5
AERMOD Risk Modeling Parameters and Maximum Concentrations
On-Site Residential Receptors (1.5 meter receptor heights)

Emissions Year	2022
Receptor Information	
Number of Receptors	248
Receptor Height =	1.5 meters above ground level
Receptor distances =	15 meter grid in planned residential areas
Meteorological Conditions	
BAAQMD San Jose Airport Met Data	2006-2010
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

MEI Maximum Concentrations

Meteorological	Concentration (µg/m^3)		
Data Years	DPM	Exhaust TOG	Evaporative TOG
2006 - 2010	0.01055	0.8197	2.5522

Meteorological	PM2.5 Concentrations (µg/m^3)		
Data Years	Total PM2.5	Road Dust PM2.5	Vehicle PM2.5
2006 - 2010	1.3811	0.4497	0.93147

Winchester Ranch, San Jose, CA - I-280 Maximum Cancer Risks
On-Site Residential Receptors (1.5 meter receptor heights)
30-Year Residential Exposure

Cancer Risk Calculation Method

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

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

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

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

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00
Vehicle TOG Exhaust	6.28E-03
Vehicle TOG Evaporative	3.70E-04

	Infant/Child			Adult
Age -->	3rd Trimester	0 - <2	2 - <16	16 - 30
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates

Road Traffic Cancer Risk by Year - Maximum Impact Receptor Location

				Maximum - Exposure Information				Cancer Risk (per million)			
		Exposure		Age	Annual TAC Conc (ug/m3)						
Exposure		Duration		Sensitivity		Exhaust	Evaporative		Exhaust	Evaporative	
Year	Year	(years)	Age	Factor	DPM	TOG	TOG	DPM	TOG	TOG	Total
0	2029	0.25	-0.25 - 0*	10	0.0106	0.8197	2.5522	0.143	0.064	0.012	0.22
1	2029	1	1	10	0.0106	0.8197	2.5522	1.73	0.769	0.141	2.64
2	2030	1	2	10	0.0106	0.8197	2.5522	1.73	0.769	0.141	2.64
3	2031	1	3	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
4	2032	1	4	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
5	2033	1	5	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
6	2034	1	6	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
7	2035	1	7	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
8	2036	1	8	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
9	2037	1	9	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
10	2038	1	10	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
11	2039	1	11	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
12	2040	1	12	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
13	2041	1	13	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
14	2042	1	14	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
15	2043	1	15	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
16	2044	1	16	3	0.0106	0.8197	2.5522	0.27	0.121	0.022	0.42
17	2045	1	17	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
18	2046	1	18	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
19	2047	1	19	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
20	2048	1	20	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
21	2049	1	21	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
22	2050	1	22	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
23	2051	1	23	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
24	2052	1	24	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
25	2053	1	25	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
26	2054	1	26	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
27	2055	1	27	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
28	2056	1	28	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
29	2057	1	29	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
30	2058	1	30	1	0.0106	0.8197	2.5522	0.03	0.013	0.002	0.046
Total Increased Cancer Risk			**Total**					7.85	3.484	0.640	**12.0**

* Third trimester of pregnancy

Winchester Ranch, San Jose, CA - I-280 - TACs & PM2.5
AERMOD Risk Modeling Parameters and Maximum Concentrations
On-Site Residential Receptors (1.5 meter receptor heights)
With Mitigation - MERV16 Filtration

Emissions Year	2022
Receptor Information	
Number of Receptors	248
Receptor Height =	1.5 meters above ground level
Receptor distances =	15 meter grid in planned residential areas
Meteorological Conditions	
BAAQMD San Jose Airport Met Data	2006-2010
Land Use Classification	urban
Wind speed =	variable
Wind direction =	variable

MEI Maximum Concentrations

Meteorological Data Years	Concentration (μg/m^3)		
	DPM	Exhaust TOG	Evaporative TOG
2006 - 2010	0.00224	0.8197	2.5522

Meteorological Data Years	PM2.5 Concentrations (μg/m^3)		
	Total PM2.5	Road Dust PM2.5	Vehicle PM2.5
2006 - 2010	0.2935	0.0956	0.1979

Winchester Ranch, San Jose, CA - I-280 Maximum Cancer Risks
On-Site Residential Receptors (1.5 meter receptor heights)
30-Year Residential Exposure
With Mitigation - MERV16 Filtration

Cancer Risk Calculation Method

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

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

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

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

Values

Cancer Potency Factors $(mg/kg\text{-}day)^{-1}$

TAC	CPF
DPM	1.10E+00
Vehicle TOG Exhaust	6.28E-03
Vehicle TOG Evaporative	3.70E-04

	Infant/Child			Adult
Age -->	3rd Trimester	0 - <2	2 - <16	16 - 30
Parameter				
ASF	10	10	3	1
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
ED =	0.25	2	14	14
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates

Road Traffic Cancer Risk by Year - Maximum Impact Receptor Location

				Maximum - Exposure Information				Cancer Risk (per million)			
		Exposure		Age	Annual TAC Conc (ug/m3)						
Exposure		Duration		Sensitivity		Exhaust	Evaporative		Exhaust	Evaporative	
Year	Year	(years)	Age	Factor	DPM	TOG	TOG	DPM	TOG	TOG	Total
0	2029	0.25	-0.25 - 0*	10	0.0022	0.8197	2.5522	0.030	0.064	0.012	0.11
1	2029	1	1	10	0.0022	0.8197	2.5522	0.37	0.769	0.141	1.28
2	2030	1	2	10	0.0022	0.8197	2.5522	0.37	0.769	0.141	1.28
3	2031	1	3	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
4	2032	1	4	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
5	2033	1	5	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
6	2034	1	6	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
7	2035	1	7	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
8	2036	1	8	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
9	2037	1	9	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
10	2038	1	10	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
11	2039	1	11	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
12	2040	1	12	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
13	2041	1	13	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
14	2042	1	14	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
15	2043	1	15	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
16	2044	1	16	3	0.0022	0.8197	2.5522	0.06	0.121	0.022	0.20
17	2045	1	17	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
18	2046	1	18	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
19	2047	1	19	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
20	2048	1	20	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
21	2049	1	21	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
22	2050	1	22	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
23	2051	1	23	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
24	2052	1	24	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
25	2053	1	25	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
26	2054	1	26	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
27	2055	1	27	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
28	2056	1	28	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
29	2057	1	29	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
30	2058	1	30	1	0.0022	0.8197	2.5522	0.01	0.013	0.002	0.022
Total Increased Cancer Risk			**Total**					1.67	3.484	0.640	**5.8**

* Third trimester of pregnancy