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& HEALTH

MEMO

Date: **July 14, 2023**

To: **Natalie Noyes, Senior Project Manager, David J Powers & Associates**

From: **Michael Keinath**
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Subject: **CEQA AIR QUALITY AND HEALTH RISK ASSESSMENT FOR 477 9TH AVENUE MIXED-USE PROJECT, SAN MATEO, CALIFORNIA**

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Ramboll Americas Engineering Solutions, Inc. (Ramboll) conducted California Environmental Quality Act (CEQA) air quality and health risk analyses for the proposed 477 9th Avenue Mixed-Use Project in San Mateo, California (the "Project").

According to the Project sponsor, the Project would redevelop the site with a new five-story, approximately 209,204 square-foot mixed-use building with two levels of above-ground parking. The building would consist of approximately 27,100 square feet of office space and 120 rental dwelling units of residential space on the third through the fifth floors. Directly adjacent to the building in the north, east, and south directions are commercial buildings; Caltrain tracks lie to the west of the project site, with commercial buildings just beyond the tracks. The Project would include an emergency generator during operation.

The proposed land uses at the Project site are listed in **Table 1**.

CEQA THRESHOLDS OF SIGNIFICANCE

The City of San Mateo is the lead agency responsible for Project approval. Per City of San Mateo requirements, Ramboll evaluated the Project in accordance with the current Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines, which were updated in April 2023.[1] These guidelines present methods for evaluating compliance with CEQA as well as thresholds for determining significance. With respect to the Project, the BAAQMD thresholds of significance are as follows:

[1] BAAQMD. 2023. California Environmental Quality Act (CEQA) Air Quality Guidelines. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

BAAQMD CEQA Thresholds of Significance	
Criteria Air Pollutants (and Precursors)	**Construction-Related Average Daily Emissions (lbs/day)**
ROG	54
NO_X	54
PM_{10}	82 (exhaust only)
$PM_{2.5}$	54 (exhaust only)
$PM_{10}/PM_{2.5}$ (fugitive dust)	Best Management Practices
CO (local concentration)	None
Health Risks	**Construction- and Operation-Related Risks and Hazards for New Sources and Receptors**
Individual Project	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >10.0 in a million Increased non-cancer risk of > 1.0 HI (chronic or acute) Ambient $PM_{2.5}$ increase: > 0.3 µg/m^3 annual average Zone of Influence: 1,000-foot radius from fence line of source or receptor
Cumulative Threshold	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >100 in a million (from all local sources) Increased non-cancer risk of >10 HI (from all local sources) (chronic) Ambient $PM_{2.5}$ increase: > 0.8 µg/m^3 annual average (from all local sources) Zone of Influence: 1,000-foot radius from fence line of source or receptor
Odors	None

Abbreviations:
CO = Carbon Monoxide
Lbs = pounds
MT of CO_2e/yr = metric tons of carbon dioxide equivalent per year
MT CO_2e/SP/yr = metric tons carbon dioxide equivalent per service population per year
NOx = oxides of nitrogen
$PM_{2.5}$ = Particulate Matter less than 2.5 microns
PM_{10} = Particulate Matter less than 2.5 microns
ROG = Reactive Organic Gas
µg/m^3 = micrograms per cubic meter.

Since the City of San Mateo has separately arranged for a GHG analysis, this Technical Memorandum only evaluates construction Criteria Air Pollutants (CAP) emissions and health effects of toxic air contaminant (TAC) emissions emitted during Project construction and operation, including a

cumulative assessment from all sources within the zone of influence. The memorandum also includes the health effects of the Project's emergency generator, in combination with off-site sources, on future on-site residents of the proposed Project.

The 2022 BAAQMD CEQA Guidelines Appendices provide an Excel-based tool that generates a conservative indication of whether implementing a proposed mixed land use project could result in potentially significant criteria air pollutants and precursors impacts. Using the "Mixed Land Use Screening Tool for Criteria Pollutants and Precursors" provided by BAAQMD and the land use sizes provided in **Table 1**, the proposed project was found to be below operational criteria pollutant screening levels, shown in **Appendix A**. As a result, an operational CAP assessment is not included in this memorandum.

SUMMARY OF RESULTS

Construction emissions are presented in **Table 2**. As shown in the table, CAP emissions for construction are below the BAAQMD thresholds of significance. Health risk impacts from the Project are shown in **Table 3**. Health risk impacts on a cumulative basis are shown in **Table 4**. Health risk impacts are also below the BAAQMD thresholds of significance.

DATA SOURCES AND EMISSIONS METHODOLOGIES

The following sections describe the input data and methodologies used in the construction and operational emissions analysis. Detailed information for each section can be found in the referenced tables and appendices.

Construction CAP Emissions Estimation

Ramboll utilized methodology consistent with the California Emission Estimator Model version 2022.1 (CalEEMod®)[2] to quantify all construction CAP emissions. CalEEMod is a statewide program designed to calculate both CAP and GHG emissions for development projects in California. CalEEMod provides a simple platform to calculate both construction emissions and operational emissions from a land use project. It calculates both the daily maximum and annual average for CAPs as well as total or annual GHG emissions.

CalEEMod utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available. CalEEMod uses sources such as the US Environmental Protection Agency (USEPA) AP-42 emission factors,[3] California Air Resources Board's (CARB) on-road and off-road equipment emission models such as the EMission FACtor model (EMFAC) and the Emissions Inventory Program model (OFFROAD), and studies commissioned by California agencies such as the California Energy Commission (CEC) and CalRecycle.

Construction emissions from the Project include both on-site, off-road heavy equipment as well as off-site, on-road vehicle travel. As described below, Ramboll updated several default assumptions to Project-specific information to generate emission estimates with CalEEMod, for consistency with BAAQMD and California Air Pollution Control Officer Association (CAPCOA) methods. Where project-specific data were not available, Ramboll used CalEEMod defaults for the land uses shown in **Table 1**. The construction phasing, equipment, and trip rate assumptions are shown in **Tables 5, 6**, and **7**. It

[2] California Air Pollution Control Officers Association (CAPCOA). 2022. California Emissions Estimator Model. Available at: http://www.CalEEMod.com/.

[3] The USEPA maintains a compilation of Air pollutant Emission Factors and process information for several air pollution source categories. The data is based on source test data, material balance studies, and engineering estimates. Available at: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

was assumed that construction would start as early as 2024. Project construction is assumed to use statewide fleet-average tier diesel engines for all equipment. Construction equipment during a given construction year in the OFFROAD model is a mix of Tier 1, 2, 3, Tier 4 Interim and Tier 4 Final engines based on statewide equipment inventory for that given year. This assumes that the Project would use construction equipment as available and not specify a particular engine Tier level. Emissions from architectural coating were also estimated using methodologies consistent with CalEEMod and summarized in **Table 8**. No asphalt paving is expected during construction.

Updates to CalEEMod® Default Assumptions

In preparing Project construction emissions, several updates were made to modify the CalEEMod® default factors and assumptions. These include the following areas:

- Off-road equipment hours were updated to reflect utilization of each equipment per phase as provided by the Project sponsor.
- Haul truck trips for demolition were calculated by CalEEMod based on the amount of demolition required for construction. The haul truck trips for grading were estimated by the Project sponsor based on soil exported and imported during construction. These estimates are shown in **Table 7**.

LOCAL COMMUNITY RISK AND HAZARD IMPACTS

Local Carbon Monoxide (CO) Impacts

According to the 2022 BAAQMD CEQA Guidelines, the Project would result in less-than-significant localized CO concentrations if it meets the following criteria:

1. Is consistent with county and local congestion management plans, and
2. Does not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour.

Based on the traffic volume data provided by the Project sponsor (see **Appendix B**), the project would generate less vehicle trips per hour during morning and evening rush hours compared to the existing land uses on the project site. Thus, operational impacts from Project CO emissions would be less than significant.

Toxic Air Contaminant (TAC) Emissions

The TAC emissions associated with the Project construction were calculated with the following assumptions and exceptions:

1. Diesel Particulate Matter (DPM): DPM emissions were used to evaluate the cancer risk and non-cancer chronic HI from Project construction. In this analysis, both on-site (i.e., construction equipment) and local off-site (i.e., construction mobile sources) particulate matter less than 10 microns (PM_{10}) exhaust emissions[4] were calculated as DPM and modeled within the Project boundary (as discussed in the next section). This analysis also conservatively assumed the small fraction of non-diesel PM_{10} (i.e., PM_{10} emissions from gasoline fueled passenger vehicles) was DPM, which has greater human health impacts.
2. $PM_{2.5}$: Exhaust and fugitive particulate matter less 2.5 microns ($PM_{2.5}$) emissions were used to evaluate the $PM_{2.5}$ concentration due to the Project construction. Fugitive PM emissions were calculated using CalEEMod methodologies as shown in **Tables 9-15**. The modeled emissions were calculated using the same conservative assumptions as the DPM calculation.

[4] Local off-site (mobile source) emissions were conservatively calculated by including CalEEMod® on-road emissions for the entire default trip length in the screening model.

Total modeled emissions are presented in **Table 16** as total PM_{10} and $PM_{2.5}$ from construction.

TAC emissions from Project operation were estimated for the proposed emergency generator based on the horsepower and tier rating provided by the Project sponsor. Default exhaust temperature, outlet size and outlet velocity were collected from the 2012 BAAQMD technical memorandum for the San Francisco Community Reduction Plan.[5] As recommended by the City of San Mateo, project emissions for the emergency generators are based on the BAAQMD rule limiting the hours of non-emergency operation for emergency standby diesel engines to a maximum of 50 hours per year of testing and maintenance, which is consistent with the maximum allowed testing time from the Airborne Toxic Control Measure for Stationary Compression Ignition Engines.[6] Annual emissions of PM_{10} and $PM_{2.5}$ from the proposed generator were estimated using ARB standards for diesel generator engines.[7] Similar to construction TAC sources, PM_{10} exhaust emissions from the proposed generator were conservatively calculated as DPM. Modelling parameters for the proposed emergency generator are summarized in **Table 17**.

Health Risk Assessment

Ramboll analyzed Project construction-related and operational health risks by estimating ambient air concentrations of DPM and $PM_{2.5}$. To estimate air concentrations of DPM and $PM_{2.5}$, Ramboll used AERMOD, a steady-state Gaussian plume model developed by USEPA for regulatory applications. AERMOD requires emission source locations and release parameters, receptor locations, and processed meteorological data. The construction and operational source parameters are shown in **Table 18** and **Table 19**, respectively. Ramboll used five years of meteorological data from the San Francisco International Airport, which was the nearest dataset available to the Project.

Turbulent eddies can form on the downwind side of buildings and may cause a plume from a stack or point source located near the building to be drawn towards the ground to a greater degree than if the building were not present. This is referred to as the "building downwash" effect. The effect can increase the resulting ground-level pollutant concentrations downwind of a building. AERMOD takes this effect into account for sources modeled as point sources. The dimensions and locations of the Project and the commercial buildings adjacent to the Project site were included, as shown in **Figure 1**, to allow AERMOD to incorporate algorithms to evaluate the downwash effect on dispersion of point sources. Building heights were obtained from the plans of the proposed Project and the adjacent buildings. The direction-specific building downwash dimensions were determined by the latest version (04274) of the Building Profile Input Program, PRIME (BPIP PRIME). Point sources were used only to model the Project generator, so building downwash was only evaluated in the Project operational generator modeling.

The AERMOD input files are provided electronically as **Appendix C**. The source and building setup are shown in **Figure 1**. The receptor grid is shown in **Figure 2**. Receptor heights at different floors were considered for the future on-site receptors on the Project site, while all other receptors are at ground-level.

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[5] BAAQMD. 2012. San Francisco Community Risk Reduction Plan (SFCRRP). December. Available at: https://www.gsweventcenter.com/Appeal_Response_References/2012_1201_BAAQMD.pdf.

[6] California Air Resources Board (CARB). 2011. Final Regulations Order: Amendments to the Airborne Toxic Control Measure for Stationary Compression Ignition Engines. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/finalreg2011.pdf.

[7] California Air Resources Board (CARB). Non-road Diesel Engine Certification Tier Chart. Available at: https://ww2.arb.ca.gov/resources/documents/non-road-diesel-engine-certification-tier-chart

Modeled Emissions

Based on the construction schedule provided by the Project sponsor, the Project will be completed in one phase. All emissions from Project construction were summed by year and modeled on an annual basis for off-site receptors. These modeled emission rates are shown in **Table 16**. Operational modeled emission rates are shown in **Table 19**.

Exposure Parameters and Cancer Risk Calculation

In February 2015, Office of Environmental Health Hazard Assessment (OEHHA) released the updated Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, which combines information from previously-released and adopted technical support documents to delineate OEHHA's revised risk assessment methodologies based on current science.[8] In accordance with OEHHA's revised HRA guidelines, the 2022 BAAQMD CEQA Guidelines has adopted an intake methodology that addresses children's greater sensitivity and health impacts from early exposure to carcinogenic compounds.[9] The updated calculation procedures include the use of age-specific weighting factors, breathing rates, fraction of time at home, and reduced exposure durations, as shown in the 2022 BAAQMD CEQA Guidelines Appendix E. This analysis followed the recommended methodology from the 2022 BAAQMD CEQA Guidelines.

Ramboll conservatively evaluated Project impacts due to construction emissions using default exposure assumptions for a resident child from OEHHA unless otherwise noted.[10] The resident child scenario assumes a much higher daily breathing rate and age-sensitivity factor (ASF)[11] than other sensitive receptor populations and therefore is the most conservative scenario to evaluate for this analysis. For the construction and operation exposure scenario, off-site residential receptors exposed to the entire construction period and 30 years of Project operation were evaluated to determine the maximum health impacts of the Project; for the operation-only scenario, the Project residential receptors were assumed to be exposed at the start of Project operation for 30 years. Other sensitive receptor locations were identified using a report from Environmental Data Resources (EDR). The EDR report identified daycares, childcares, and elementary schools in Project vicinity. Exposure periods for each of the non-residential sensitive land uses are assumed to be the same as the age range accepted at the location. The exposure parameters used to estimate excess lifetime cancer risks for the nearby sensitive receptors are presented in **Tables 20**.

The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IF_{inh} = \frac{DBR * FAH * EF * ED * CF * ASF * FY}{AT}$$

Where:

IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)

DBR = Daily Breathing Rate (L/kg-day)

FAH = Fraction of Time at Home (unitless)

[8] OEHHA. 2015. Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

[9] BAAQMD. 2023. California Environmental Quality Act (CEQA) Air Quality Guidelines. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.

[10] OEHHA. 2015. Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

[11] *Ibid.*

EF = Exposure Frequency (days/year)

ED = Exposure Duration (years)

AT = Averaging Time (days)

CF = Conversion Factor, 0.001 (m^3/L)

ASF = Age Sensitivity Factor (unitless)

FY = Fraction of Year, to correct annualization of partial year emissions

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the OEHHA Hot Spots guidance.[12]

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. This HRA evaluated theoretical exposures to TACs for two categories of potential adverse health effects, cancer and non-cancer endpoints. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

Excess lifetime cancer risk and chronic hazard quotient (HQs) calculations for Project construction and operation utilized the toxicity values for DPM. Toxicity values for DPM are as presented in **Table 21**.

Cancer risk and chronic HI were calculated from ambient annual concentrations using intake factors, cancer potency factors, and chronic reference exposure levels calculated consistent with the 2015 OEHHA Hot Spots Guidance[13] and 2020 BAAQMD guidance.[14]

As shown in **Table 3**, construction activities and operation would result in a maximum cancer risk of 8.2 in a million (threshold of 10), a maximum non-cancer hazard index of 0.011 (threshold of 1.0), and maximum $PM_{2.5}$ concentration of 0.25 micrograms per cubic meter (µg/m^3) (threshold of 0.3 µg/m^3) at the maximally exposed individual (MEI) for each impact type. As shown in **Table 3**, Project operation would result in a maximum cancer risk of 9.4 in 1 million, a non-cancer hazard index of 0.0028, and maximum $PM_{2.5}$ concentration 0.014 µg/m^3 at the Project's MEI for each impact type.

The Project's health risks on on-site and off-site sensitive receptors are all below the BAAQMD thresholds of significance; thus, health risk impacts associated with construction and operation of the Project are less than significant. The location of the off-site and on-site MEIs are shown in **Figure 2**.

Cumulative Health Risk Assessment

In accordance with BAAQMD CEQA guidelines, Ramboll conducted a cumulative HRA for both off-site sensitive receptors and new on-site sensitive receptors created by the Project. The cumulative assessment tabulates the impact of Project-related risks plus existing off-site sources (stationary and mobile) and future foreseeable cumulative development projects at the off-site MEI location for cancer risk, located on a residential receptor, and off-site MEI location for chronic health impacts and $PM_{2.5}$

[12] Cal/EPA. 2003. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August.

[13] OEHHA. 2015. Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

[14] BAAQMD, 2020. Health Risk Assessment Modeling Protocol. December.

concentration[15], located on a worker receptor. The cumulative assessment for on-site receptors is determined at the location of the maximum risk from the proposed emergency generator. The evaluation requires the identification of any existing stationary and mobile sources within 1,000 feet of the Project boundary and any future foreseeable cumulative development projects identified by the City of San Mateo. For this project the City of San Mateo identified the future mixed land use development to be located at 616 South B Street as the only foreseeable future cumulative development projects to be included in the cumulative HRA. In addition to the evaluation of each single source, the combined health risk from all TAC and $PM_{2.5}$ sources are evaluated.

Sources evaluated in the cumulative health risk assessment include any BAAQMD permitted stationary sources, other major source of emissions within the zone of influence such as railways and roadways, and construction impacts from the future development project at 616 South B Street (operational impacts are not expected for this project). The BAAQMD provides tools with conservative estimates of impacts from many of these sources, including a stationary source tool and raster files for railways and major roadways.

The stationary source screening tool from the BAAQMD provides generalized risk estimates and estimated $PM_{2.5}$ concentrations for the existing stationary sources, which represents a screening-level analysis based on the size and type of activity that occurs on site. BAAQMD's raster files are intended to assist project sponsors in conducting cumulative cancer risk and hazard analyses from roadway sources (freeways and surface streets) and rail sources (rail lines and selected railyards). The roadway raster file includes impacts based on 2019 data for the entire Bay Area from three vehicle classes: (1) non-trucks (passenger cars, light duty trucks, buses, motorcycles, and motor homes), (2) Truck 1 (light heavy-duty trucks weighing 8,501 to 14,000lbs), and (3) Truck 2 (medium heavy-duty weighing 14,001 to 33,000 lbs and heavy heavy-duty trucks weighing 33,000 lbs and above). The railway raster file includes impacts across the Bay Area from diesel locomotives used to transport freight along Class I rail lines, to transport people along commuter/passenger rail lines, and for goods movements at railyards in West Oakland and Richmond/North Richmond/San Pablo. Impacts are estimated based on arrival/departure schedules for commuter/passenger trains from the Fall of 2021 and 2020 fuel consumption rates for the freight lines operated by the Burlington Northern Santa Fe Corporation (BNSF) and Union Pacific (UP) rail companies. The raster files and stationary source screening tools were used to estimate the health impacts from roadways, railways, and stationary sources and combined with the impacts from all other sources at the construction off-site MEI and on-site cumulative MEI.

For the impacts from the construction of future foreseeable cumulative development project located 616 South B St, Ramboll utilized methodology consistent with CalEEMod to quantify all construction TAC emissions. Construction TAC emissions from the project at 616 South B St. include DPM and $PM_{2.5}$ emissions from both on-site, off-road heavy equipment and off-site, on-road vehicle travel. Ramboll analyzed construction related health risks for 616 South B St by estimating ambient air concentrations of DPM and $PM_{2.5}$ using methodology consistent with the methodology used to estimate health risks for the Project. The health impacts from construction of the project at 616 South B St were combined with the impacts from all other sources at the construction off-site MEIs and operational off-site and on-site MEI.

Details of each source included in the cumulative analysis are presented in **Table 4**. The combined impact from all the sources results in a maximum excess cancer risk of 86 in a million compared to a

[15] The BAAQMD tools for cumulative health risk assessments use the most conservative exposure parameters, which assumes residential exposure for 30 years. Using these tools conservatively estimates the impacts at maximally exposed worker receptors.

threshold of 100 in 1 million. This risk would occur at the on-site MEI. The combined non-cancer hazard index at all sensitive receptors are less than 0.1 (threshold of 10). The maximum combined $PM_{2.5}$ concentrations is 0.69 µg/m^3 compared to a threshold of 0.8 µg/m^3 and is expected to occur at the off-site MEI. Therefore, the Project would not result in a cumulatively considerable contribution to the significant impact.

CLOSING

The analysis presented above represents emissions and health risk impacts from construction of the proposed Project. The Project does not exceed any BAAQMD CEQA significance thresholds without the need for mitigation.

Attachments:

Tables

Figures

Appendix A: Mixed Land Use Screening Tool for Criteria Pollutants and Precursors

Appendix B: Traffic Study

Appendix C: AERMOD Input Files (provided Electronically)

TABLES

Table 1
Land Use Summary for Proposed Project
477 9th Avenue Mixed-Use Project
San Mateo, CA

Project Land Use Type[1]	CalEEMod® Land Use Type	CalEEMod® Land Use Subtype	Value	Units	Square Footage
Residential Space	Residential	Apartments Mid Rise	120	Dwelling Units	120,208
Office Space	Commercial	General Office Building	27	1000sqft	27,076
Parking Garage	Parking	Enclosed Parking with Elevator	166	Spaces	61,920

Notes:

1. Project land use type and square footage provided by the Project Applicant.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

Table 2
Criteria Air Pollutants Emissions from Proposed Project Construction
477 9th Avenue Mixed-Use Project
San Mateo, CA

Summary of Construction Emissions by Source

Phase	Year	Source	CAP Emissions[1]			
			ROG	NOx	PM_{10}	$PM_{2.5}$
			lb/yr			
Demolition	2024	Off-Road Equipment	23	232	10	9.4
		Onroad Vehicles	1.9	36	0.31	0.30
Site Preparation	2024	Off-Road Equipment	16	173	7.2	6.6
		Onroad Vehicles	0.32	0.24	0.0041	0.0038
Grading/Excavation	2024	Off-Road Equipment	39	417	17	16
		Onroad Vehicles	2.4	82	0.70	0.67
Trenching/Foundation	2024	Off-Road Equipment	8.5	80	3.6	3.4
		Onroad Vehicles	1.1	0.84	0.014	0.013
Building - Exterior	2024	Off-Road Equipment	7.7	72	3.1	2.8
		Onroad Vehicles	19	75	0.75	0.70
	2025	Off-Road Equipment	18	171	6.9	6.3
		Onroad Vehicles	45	185	1.8	1.7
Building - Interior/Architectural Coating	2024	Off-Road Equipment	1.7	11	0.39	0.35
		Onroad Vehicles	1.0	0.73	0.012	0.011
		Architectural Coating	115	0	0	0
	2025	Off-Road Equipment	25	175	5.4	5.0
		Onroad Vehicles	15	11	0.19	0.18
		Architectural Coating	1,892	0	0	0
Paving	2025	Off-Road Equipment	3.4	31	1.4	1.2
		Onroad Vehicles	1.2	3.1	0.035	0.033

Average Construction Emissions by day

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2024	0.90	4.5	0.17	0.15
2025	11	3.1	0.084	0.078
BAAQMD Thresholds[2]	54	54	82	54
Exceeds Thresholds?	**No**	**No**	**No**	**No**

Notes:

1. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks.

2. Thresholds are from BAAQMD Guidance for Assessing and Mitigating Air Quality Impacts.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

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Table 3
Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$
477 9th Avenue Mixed-Use Project
San Mateo, CA

Source Category	Project Construction + Operation			Project Operation		
	Offsite Resident	Offsite Worker	Offsite Worker	Offsite Resident	Offsite Worker	Offsite Worker
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration[3]	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration[3]
	in a million	unitless ratio	µg/m³	in a million	unitless ratio	µg/m³
Construction	2.4	0.011	0.25	0	0	0
Emergency Generator	5.8	0	0	9.4	0.0028	0.014
Unmitigated Total	**8.2**	**0.011**	**0.25**	**9.4**	**0.0028**	**0.014**
Significance Threshold	**10**	**1**	**0.30**	**10**	**1**	**0.30**
Exceeds thresholds?	**No**	**No**	**No**	**No**	**No**	**No**
Year	--	2024	2024	--	All	All
UTMx	560,400	560,340	560,240	560,400	560,340	560,340
UTMy	4,157,560	4,157,480	4,157,520	4,157,560	4,157,580	4,157,580

Note:

1. Excess lifetime cancer risks were estimated using the following equation:

   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$

   Where:

   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m³
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m³/kg-day)
   CPF_i = Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$
   ASF = Age Sensitivity Factor (unitless)

2. Chronic HI for each receptor was estimated using the following equation:

   $HI_{inh} = \Sigma C_i / cREL$

   Where:

   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m³)
   cREL = Chronic Reference Exposure Level (ug/m³)

3. $PM_{2.5}$ concentration conservatively excludes watering for construction fugitive dust mitigation. As a result, $PM_{2.5}$ concentrations are expected to be lower than reported.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
HI - Hazard Index
m³ - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment
PM - particulate matter
µg - microgram
UTMx, UTMy - Universal Transverse Mercator coordinates

Reference:

BAAQMD. 2023. California Environmental Quality Act Air Quality Guidelines. Available at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 4
Construction and Operation Cumulative Risks and Hazards
477 9th Avenue Mixed-Use Project
San Mateo, CA

Source[1]	Offsite Resident Operations Only Lifetime Excess Cancer Risk (in a million)	Offsite Worker Construction + Operation Noncancer Chronic HI	Offsite Worker Construction+Operation $PM_{2.5}$ Concentration ($\mu g/m^3$)
Stationary Sources	0.038	1.7E-03	4.8E-05
Roadways[1]	18	0.045	0.25
Railways[1]	58	0.027	0.19
Foreseeable Future Stationary Sources[2]	0.24	5.2E-04	0.0053
Project Construction + Operations/Operations Only[3]	9.4	0.011	0.25
Total	**86**	**0.084**	**0.69**
Exceeds Threshold?	**NO**	**NO**	**NO**
Year	--	2024	2024
UTMx	560,400	560,340	560,240
UTMy	4,157,560	4,157,480	4,157,520
Theshold	**100**	**10**	**0.80**

Notes:

1. Cancer risk, chronic HI, and $PM_{2.5}$ concentration values were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located on the identified sensitive receptors.
2. Foreseeable future stationary sources for this project include the mixed-use development project located at 616 South B. Street.
3. The maximum cancer impacts is from the Project Operation scenario. The maximum chronic HI and $PM_{2.5}$ concentration is from the Project Construction + Operations scenario.

Abbreviations:

µg - microgram
HI - hazard index
m^3 - cubic meter
$PM_{2.5}$ - fine particulate matter

References:

Bay Area Air Quality Management District (BAAQMD). 2020. Permitted Sources Risk and Hazards Map. June. Available at: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Cancer-Risk/kz4a-ueki

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Chronic-Hazard/sfnx-xg6j

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-PM2-5/r9gy-qwxe

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Cancer-Risk/6eut-z6mm

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Table 5
Construction Phasing Schedule
477 9th Avenue Mixed-Use Project
San Mateo, CA

Phase[1]	Start Date	End Date	Number of Work Days	Days per Week
Demolition	1/1/2024	2/1/2024	28	6
Site Preparation	2/2/2024	2/15/2024	12	6
Grading/Excavation	2/16/2024	3/16/2024	26	6
Trenching/Foundation	3/17/2024	6/18/2024	67	6
Building - Exterior	11/8/2024	5/18/2025	156	6
Building - Interior/Architectural Coating	12/18/2024	8/18/2025	209	6
Paving	8/18/2025	9/18/2025	28	6

Notes:
1. Construction schedule was provided by the Project Applicant.

Table 6
Construction Equipment
477 9th Avenue Mixed-Use Project
San Mateo, CA

Phase	Equipment[1]	CalEEMod® Equipment[2]	Fuel[3]	Number[1]	Horsepower[1]	Daily Usage[4] (hours/day)	Utilization[5]	Tier[6]
Demolition	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	81	7.5	18%	No Specific Tier
	Excavators	Excavators	Diesel	1	158	7.5	89%	No Specific Tier
	Rubber-Tired Dozers	Rubber-Tired Dozers	Diesel	1	247	7.5	54%	No Specific Tier
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	3	97	7.5	36%	No Specific Tier
Site Preparation	Graders	Graders	Diesel	1	187	7.5	100%	No Specific Tier
	Rubber-Tired Dozers	Rubber-Tired Dozers	Diesel	1	247	7.5	100%	No Specific Tier
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	7.5	100%	No Specific Tier
Grading/Excavation	Excavators	Excavators	Diesel	1	158	7.5	12%	No Specific Tier
	Graders	Graders	Diesel	1	187	7.5	96%	No Specific Tier
	Rubber-Tired Dozers	Rubber-Tired Dozers	Diesel	1	247	7.5	96%	No Specific Tier
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	81	8	19%	No Specific Tier
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	97	7.5	96%	No Specific Tier
Trenching/Foundation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	7.5	67%	No Specific Tier
	Excavators	Excavators	Diesel	1	158	8	22%	No Specific Tier
Building - Exterior	Cranes	Cranes	Diesel	1	231	7.5	19%	No Specific Tier
	Forklifts	Forklifts	Diesel	1	89	7.5	29%	No Specific Tier
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	7.5	29%	No Specific Tier
	Welders	Welders	Diesel	3	46	7.5	10%	No Specific Tier
Building - Interior/Architectural Coating	Air Compressors	Air Compressors	Diesel	1	78	7.5	38%	No Specific Tier
Paving	Cement and Mortar Mixers	Cement and Mortar Mixers	Diesel	1	9	7.5	71%	No Specific Tier
	Pavers	Pavers	Diesel	1	130	7.5	11%	No Specific Tier
	Paving Equipment	Paving Equipment	Diesel	1	132	7.5	11%	No Specific Tier
	Rollers	Rollers	Diesel	1	80	7.5	11%	No Specific Tier
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	7.5	36%	No Specific Tier

Notes:

1. Equipment list was provided by the Project Applicant.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
3. All equipment is conservatively assumed to be diesel-fueled.
4. Construction activities are assumed to occur during 7AM to 7PM each weekday, and 9AM-5PM on Saturday, consistent with San Mateo County guidelines.
5. Utilization is calculated based on the total usage days for the equipment divided by the total days in the phase.
6. Equipment tier is based on a fleetwide average from CalEEMod® 2022.1.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 7
Construction Trips
477 9th Avenue Mixed-Use Project
San Mateo, CA

Phase	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[2] (one-way trips/phase)	Trip Lengths[1] (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker	Vendor	Hauling	Worker	Vendor	Hauling
Demolition	2024	28	15	0	255	11.7	8.4	20	4,914	0	5,100
Site Preparation	2024	12	8	0	0	11.7	8.4	20	1,123	0	0
Grading/Excavation	2024	26	15	0	588	11.7	8.4	20	4,563	0	11,750
Trenching/Foundation	2024	67	5	0	0	11.7	8.4	20	3,920	0	0
Building - Exterior	2024	43	121	27	39	11.7	8.4	20	61,283	9,818	777
	2025	113	121	27	101	11.7	8.4	20	159,566	25,563	2,023
Building - Interior/Architectural Coating	2024	12	24	0	0	11.7	8.4	20	3,370	0	0
	2025	197	24	0	0	11.7	8.4	20	55,318	0	0
Paving	2025	28	13	0	18	11.7	8.4	20	4,259	0	350

EMFAC Data[8]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Mateo County Calendar Years 2024-2025 Annual Season Aggregated Model Year EMFAC2021	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Worker and vendor daily trip rates are consistent with CalEEMod® defaults. Trip lengths are based on CalEEMod® Appendix G defaults for San Mateo County.
2. Hauling trip rates are calculated based on the demolition square footage and the import and export quantities provided by the Project Applicant. Demolition square footage was converted to cubic yards of waste material using CalEEMod® methodology which states that 1 sqft of building is equivalent to 10 cubic feet of building volume and 1 cubic foot of building volume is equivalent to 0.25 cubic feet of waste. Building waste, import and export quantities are converted from tons or cubic yards to corresponding one-way trips per phase by assuming 0.5 tons per cubic yard and 16 cubic yards per truck, are consistent with CalEEMod® User's Guide Appendix C.

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
LDA - light-duty automobiles
LDT - light-duty trucks
HHDT - heavy-heavy duty trucks
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/
California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 8
Estimated Emissions from Construction Architectural Coating Off-Gassing
477 9th Avenue Mixed-Use Project
San Mateo, CA

Inputs[1,2]

Parameter		Input	Units
Residential Surface Area to Floor Area Ratio		2.7	--
Non-Residential Surface Area to Floor Area Ratio		2.0	
Painted Area in Parking Structures		6%	--
Application Rate		100%	--
Reapplication Rate		10%	--
Fraction of Surface Area (Non-Parking)	Interior Surfaces	75%	--
	Exterior Shell	25%	--
Fraction of Surface Area (Parking)	Interior Surfaces	90%	--
	Exterior Shell	10%	--
Total surface for painting by acreage (in square feet) for parking lot		5%	--
Indoor Paint VOC Content (Unmitigated)		100	g/L
Indoor Paint VOC Content (Mitigated)		10	g/L
Exterior Paint VOC Content		150	g/L
Parking VOC Content		100	g/L

Emissions

Phase	Land Use Type	Year	Square Footage[2] (square feet)	Building Surface Area Painted[2] (square feet)	Interior Area Painted[3] (square feet)	Exterior Area Painted[3] (square feet)	Parking Area for Stripes and Symbols (square feet)	Architectural Coating VOC emissions (lb)
Building - Interior/Architectural Coating	Apartments Mid Rise	2024	120,208	324,562	243,421	81,140	--	97
		2025						1,596
	General Office Building	2024	27,076	54,152	40,614	13,538	--	16
		2025						266
	Enclosed Parking with Elevator	2024	61,920	3,096	2,786	310	3,715	2
		2025						30
							Total VOC Emissions by Year	**2024**	**115**
								2025	**1,892**

Notes:

[1] Inputs and assumptions are consistent with CalEEMod® 2022.1 for BAAQMD. Indoor and outdoor paint VOC content parameters were obtained from CalEEMod Appendix G Table G-17 Architectural Coating Emissions Factors by Air District.

[2] Building type square footage is based on information provided by the Project Sponsor. Non-residential square footage is assumed to be 2.0 times the square footage, and parking square footage is assumed to be 0.05 times the lot acreage (converted to square feet), consistent with CalEEMod® Appendix C. For parking acreage, it was conservatively assumed to be the total acreage in each phase.

[3] For commercial and recreational land use types: calculated based on CalEEMod® assumption that 1 gallon of paint covers 180 square feet and that building area is assumed to be 75% indoors and 25% outdoors. For parking land use types: calculated based on CalEEMod® assumption that 1 gallon of paint covers 180 square feet and that building area is assumed to be 90% indoors and 10% outdoors.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - Emission Factor
g - grams
L - liter
lb - pound
VOC - Volatile Organic Compound

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

RAMBOLL

Table 9
Silt Loading Emission Factors
477 9th Avenue Mixed-Use Project
San Mateo, CA

Entrained Roadway Dust Constants for San Mateo County		
Roadway Category	**Silt Loading[1] (g/m^2)**	**Travel Fraction[1]**
Freeway	0.015	63%
Major	0.032	27%
Collector	0.032	5%
Local	0.32	5%
Weighted Silt Loading Factor	0.036	100%

Notes:

1. Travel fraction by roadway category and silt loading are from the ARB's Entrained Road Travel Emission Inventory Source Methodology, Tables 2 and 4, respectively.

Abbreviations:

ARB - [California] Air Resources Board

g - gram

m^2 - meter squared

References:

California Air Resources Board. 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

Table 10
Emission Factors for Entrained Roadway Dust
477 9th Avenue Mixed-Use Project
San Mateo, CA

Road Dust Equation[1]

E [lb/VMT] = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

Parameters	Value
E = annual average emission factor in the same units as k	[calculated]
k = particle size multiplier for particle size range	
PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	3.3E-04
sL = roadway silt loading [grams per square meter - g/m^2]	0.036
W = average weight of vehicles traveling the road [tons]	2.4
P = number of "wet" days in county with at least 0.1 in of precipitation during the annual averaging period	32
N = number of days in the averaging period	365

Entrained Road Dust Emission Factors	
PM_{10} Emission Factor [lb/VMT]	2.5E-04
$PM_{2.5}$ Emission Factor [lb/VMT]	3.8E-05

Notes:

1. Road dust equation and parameters are from the California Air Resources Board's (ARB) 2021 Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust. The silt loading emission factor assumes San Mateo county default roadway fractions and silt loading levels from ARB 2021. The number of "wet" days for San Mateo county is from CalEEMod® Appendix G Table 2. Other parameters (average weight of vehicles, size multipliers) are from ARB 2021. $PM_{2.5}$ is assumed to be 15% of PM_{10} based on paved road dust sampling in California (ARB Speciation Profile #471), which is a more representative fraction than provided in the older AP-42 fugitive dust methodology as discussed in ARB 2021 (page 10).

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
g - gram
lb - pound
m^2 - meter squared
$PM_{2.5}$ - particulate matter less than 2.5 microns
PM_{10} - particulate matter less than 10 microns
VMT - vehicle miles traveled

References:

California Air Resources Board. 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 11
Emissions Calculations for Entrained Road Dust
477 9th Avenue Mixed-Use Project
San Mateo, CA

Entrained Road Dust Emission Factors

$PM_{2.5}$ Emission Factor [lb/VMT]	3.8E-05

Phase	Year	Construction Days	Total VMT (miles)	Total Emissions (lb) Fugitive $PM_{2.5}$
Demolition	2024	28	10,014	0.38
Site Preparation	2024	12	1,123	0.043
Grading/Excavation	2024	26	16,313	0.62
Trenching/Foundation	2024	67	3,920	0.15
Building - Exterior	2024	43	71,877	2.7
	2025	113	187,153	7.1
Building - Interior/Architectural Coating	2024	12	3,370	0.13
	2025	197	55,318	2.1
Paving	2025	28	4,609	0.18

Abbreviations:

lb - pound

$PM_{2.5}$ - particulate matter less than 2.5 microns

VMT - vehicle miles travelled

Table 12
Fugitive Dust Emissions from Building Demolition Waste
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction Phase	Year	Number of Days	Building Waste[1]	Emission Factor - Mechanical or Explosive Dismemberment[2]	Emission Factor - Debris Loading[3]	Uncontrolled Emissions[4]
				$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
		days	ton	lb/ton	lb/ton	ton/yr
Demolition	2024	28	1,014	4.5E-04	0.0031	1.8E-03

Notes:

1. Demolition building square footage was provided by the Project Applicant. Building waste in ton was converted from square footage using the CalEEMod default conversion 0.046 ton/ft^2.
2. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C Mechanical or Explosive Dismemberment, which is based of AP 42 Section 13.2.4.3 for batch drop operations. The equation is:
   $EF = k*(0.0032)*(U/5)^{1.3}/(M/2)^{1.4}$ (lb/ton of debris)
   - 0.053 = k, PM2.5 particle size multiplier (dimensionless)
   - 10.51 = U, mean wind speed (mph)
   - 2 = M, material moisture content (%)
3. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C Debris Loading, which is based of AP 42 Section 13.2. The equation is:
   $EF = k*EF_{L\text{-}TSP}$
   - 0.053 = k, $PM_{2.5}$ particle size multiplier (dimensionless)
   - 0.058 = $EF_{L\text{-}TSP}$, lb/ton
4. The mass emissions shown below are converted from ton per year to gram per second for the health risk assessment. The conversion is based on 365 days per year and 12 hours per day, consistent with the modeled hours from 7 AM - 7 PM.

Abbreviations:

CalEEMod - California Emissions Estimator Model
cy - cubic yard(s)
EF - emission factor
lb - pound(s)
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter.
VMT - vehicle miles traveled
yr - year(s)

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 13
Fugitive Dust Emissions from Off-Road Grading Activity
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction Phase	Year	Equipment	Maximum Area Disturbed[1]	Grading VMT[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Uncontrolled Emissions[4] $PM_{2.5}$
			acre/day	mile/day	lb/VMT	ton/yr
Site Preparation	2024	Graders	0.50	0.34	0.17	3.4E-04
Grading/Excavation	2024	Graders	0.48	0.33	0.17	7.2E-04

Notes:

1. Maximum graded area calculated following guidance in the CalEEMod® User's Guide, Appendix C.
2. Based on CalEEMod® default daily acres graded by equipment type, below.

Equipment	Acres Graded per 8 Hour Day
Crawler Tractors	0.5
Graders	0.5
Rubber Tired Dozers	0.5
Scrapers	1

3. VMT per day calculated following guidance in the CalEEMod® User's Guide, Appendix C, which is based on AP-42, Section 11.9 for grading equipment. The equation is:
   $VMT = A_S/W_b$ x (43,560 sqft/acre)/(5,280 ft/mile), where:
   A_S = A_S, acres graded per day (varies by sub-activity); in this case using maximum estimated disturbed acres/day
   12 = W_b, blade width of grading equipment (CalEEMod® default) in ft
3. Emission factors calculated following guidance in the CalEEMod® User's Guide, Appendix C, which is based on AP-42, Section 11.9 for grading equipment. The equations are:
   $EF_{PM2.5} = 0.04 \times (S)^{2.5} \times F_{PM2.5}$ where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   0.031 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)
4. The mass emissions shown below are converted from ton per year to gram per second for the health risk assessment. The conversion is based on 365 days per year and 12 hours per day, consistent with the modeled hours from 7 AM - 7 PM.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
ft - feet
lb - pound(s)
mph - miles per hour
$PM_{2.5}$ - particulate matter less than 2.5 microns
VMT - vehicle miles traveled
yr - year

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 14
Fugitive Dust Emissions from Truck Loading Activity
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction Phase	Year	Number of Days	Haul Trips	Total Material Loaded[1]	Uncontrolled Emission Factor[2]	Uncontrolled Emissions[3]
					$PM_{2.5}$	$PM_{2.5}$
		days	# trips	ton	lb/ton	ton/yr
Demolition	2024	28	255	1,014	3.6E-05	1.8E-05
Grading/Excavation	2024	26	588	5,942		1.1E-04

Notes:

1. Total materials loaded for demolition phases were the building waste converted from square feet to tons assuming an average soil density of 1.5 grams per cubic centimeter. Total material loaded for other phases was calculated using the total material exported provided by Project Sponsor and subtracted the total material loaded for demolition.
2. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:

   EF *= k x (0.0032) x $(U/5)^{1.3}$ / $(M/2)^{1.4}$, where the following default values are used:

   0.053 *= kPM2.5, PM2.5 particle size multiplier

   4.7 *= mean wind speed (U), meters per second

   10.5 *= mean wind speed (U), miles per hour

   12 *= material moisture content (M), %
3. The mass emissions shown below are converted from ton per year to gram per second for the health risk assessment. The conversion is based on 365 days per year and 13 hours per day, consistent with the modeled hours from 7 AM - 8 PM.

Abbreviations:

CalEEMod - California Emissions Estimator Model

EF - emission factor

lbs - pounds

$PM_{2.5}$ - particulate matter less than 2.5 microns

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 15
Fugitive Dust Emissions from Off-Road Bulldozing Activity
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction Phase[1]	Equipment	Year	Quantity	Utilization %	Avg. Usage Hours per Day	Emission Factor[2]	Uncontrolled Emissions[3]
						$PM_{2.5}$	$PM_{2.5}$
				%	hr/day	lb/hr	ton/yr
Site Preparation	Rubber-Tired Dozers	2024	1	100%	7.5	0.41	0.019
Grading/Excavation	Rubber-Tired Dozers	2024	1	96%	7.5		0.039

Notes:

1. Fugitive dust emission factors from site preparation, and grading. The fugitive dust loading/unloading emission factors for paving are assumed to be negligible due to high moisture content of the material.
2. Emission factor for bulldozing calculated following guidance in the CalEEMod® User's Guide, Appendix C, which is based on AP-42, Section 11.9. The equation is:
   $EF_{PM2.5}= C_{TSP}*s^(1.2)/M^(1.3) * F_{PM2.5}$

   1 = C_{PM15}
   5.7 = C_{TSP}
   7.90 = M % (Material moisture content)
   6.90 = s%, material silt content
   0.105 = $FPM_{2.5}$,scaling factor
3. The mass emissions shown below are converted from ton per year to gram per second for the health risk assessment. The conversion is based on 365 days per year and 13 hours per day, consistent with the modeled hours from 7 AM - 8 PM.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lb - pound
$PM_{2.5}$ - particulate matter less than 2.5 microns
yr - year

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 16
Modeled Emission Rates from Proposed Project Construction Sources
477 9th Avenue Mixed-Use Project
San Mateo, CA

Unmitigated Emissions Rates

Phase	Year	Construction Emissions Rates[1,2]					
		Offroad			Onroad		
		DPM	$PM_{2.5}$		DPM	$PM_{2.5}$	
			Exhaust	Fugitive		Exhaust	Fugitive
		g/s					
Demolition	2024	3.0E-04	2.7E-04	1.0E-04	5.8E-07	6.0E-07	2.1E-06
Site Preparation	2024	2.1E-04	1.9E-04	0.0011	0	1.1E-08	1.8E-07
Grading/Excavation	2024	5.0E-04	4.6E-04	0.0023	1.3E-06	1.3E-06	3.6E-06
Trenching/Foundation	2024	1.0E-04	9.7E-05	0	0	3.9E-08	6.4E-07
Building - Exterior	2024	8.9E-05	8.2E-05	0	2.3E-06	2.8E-06	1.5E-05
	2025	2.0E-04	1.8E-04	0	5.6E-06	6.8E-06	3.9E-05
Building - Interior/Architectural Coating	2024	1.1E-05	1.0E-05	0	0	3.4E-08	5.5E-07
	2025	1.6E-04	1.4E-04	0	0	5.2E-07	9.0E-06
Paving	2025	3.9E-05	3.6E-05	0	3.9E-08	7.8E-08	7.8E-07

Notes:

1. Construction TAC emissions were estimated from on-site off-road and on-road emissions, where all PM_{10} tailpipe emissions from diesel fueled vehicles and equipment are assumed to be DPM (although a portion of this is likely not from diesel sources). On-road emissions from worker, hauling and vendor vehicles were estimated using a modeled trip length of 1.37 miles.
2. The modeled emission rates in g/s are calculated assuming a construction schedule between 7 am - 7 pm (12 hours).

Abbreviations:

DPM - diesel particulate matter

$PM_{2.5}$ - particulate matter less than 2.5 microns

g/s - grams/second

Table 17
Estimated Emissions from Emergency Generator Operation
477 9th Avenue Mixed-Use Project
San Mateo, CA

Emergency Engine Emission Factors for Diesel Engines

Fuel	Engine Tier	Engine Size Range (hp)		Engine Emission Factors[1] (g/bhp-hr)				
		Minimum	Maximum	ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Diesel	Tier 2	600	750	0.26	4.6	0.15	0.15	523

Emergency Engine Information[2]

Scenario	Engine Type	Engine Control	Number of Engines	Load Factor	Size	Size	Fuel Type	Annual Operation[3]
					kW	hp		hr/yr
Project Operation	Generator	Tier 2	1	0.73	559	750	Diesel	50

Emergency Engine Emissions

Scenario	Engine Type	Size (hp)	Quantity	Annual Emissions (ton/yr)				(MT/yr)
				ROG	NO_x	PM_{10}	$PM_{2.5}$	CO_2e
Project Operation	Generator	750	1	0.0077	0.14	0.0045	0.0045	16
			Total Emissions	**0.0077**	**0.14**	**0.0045**	**0.0045**	**16**

Notes:

1. Engine emission factors for PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled and that all PM_{10} is diesel particulate matter) based on ARB standards for diesel generator engines. Emission factors for ROG were converted from NMHC values provided in the Tier standards using EPA hydrocarbon conversion factors. When an emission factor was specified as a combined NMHC+NOx factor, the NMHC/NOx ratio of 5%/95% were taken from BAAQMD guidance. The emission factors for CO_2e are based on diesel emergency generator CO_2, CH_4, and N_2O emission factors from CalEEMod® User's Guide Appendix G, Table G-40, along with a GWP of 25 for CH_4 and 298 for N_2O.
2. Number, size, and fuel of emergency engines were provided by the Project Applicant.
3. Per guidance from the City of San Mateo, operational hours include operation for routine maintenance and testing which was conservatively assumed to be 50 hours per year, the maximum allowable by the Airborne Toxics Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR 93115).

Abbreviations:

ARB - [California] Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel®
CH_4 - methane
CO_2e - carbon dioxide equivalent
EPA - US Environmental Protection Agency
g/bhp-hr - grams per brake horsepower hour
GWP - global warming potential
hp - horsepower
kW - kilowatt
MT - metric ton
N_2O - nitrous oxide
NMHC - non-methanic hydrocarbons
NOx - oxides of nitrogen
PM - particulate matter
PM_{10} - PM less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - PM less than 2.5 microns in aerodynamic diameter
ROG - reactive organic gases
yr - year
hr - hour

References:

BAAQMD. 2004. CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC + NOx. Available at: https://www.baaqmd.gov/~/media/files/engineering/policy_and_procedures/engines/emissionfactorsfordieselengines.pdf

BAAQMD. 2022. Bay Area Air Quality Management District California Environmental Quality Act Air Quality Guidelines. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-5-project-air-quality-impacts_final-pdf.pdf?la=en

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

California Air Resources Board. Non-road Diesel Engine Certification Tier Chart. Available online at: https://ww2.arb.ca.gov/resources/documents/non-road-diesel-engine-certification-tier-chart

USEPA. 2010. Conversion Factors for Hydrocarbon Emission Components, NR-002d. EPA-420-R-10-015. July. Available online at: https://nepis.epa.gov/Exe/ZyPDF.cgi/P10081RP.PDF?Dockey=P10081RP.PDF

Table 18
Construction Modeling Parameters
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction Area Sources

Source[1]	Source Type	Number of Sources	Area Source Dimension (m^2)	Release Height[2] (m)	Initial Vertical Dimension[3] (m)
Construction Equipment - Exhaust	Area[2]	1	6,321	5	1.2
Construction Equipment - Fugitive Dust	Area[2]	1	6,321	0	1

Construction Volume Sources

Source[1]	Source Type	Leg	Top of Plume[4] (m)	Width of Plume[4] (m)	Release Height[4] (m)	Initial Vertical Dimension[4] (m)	Initial Lateral Dimension[4] (m)
On-Road Haul Trucks	Volume	E. 3rd Ave	6.8	21	3.4	3.16	9.8
		S. Claremont St	6.8	19	3.4	3.16	8.8
		E. 4th Ave	6.8	20	3.4	3.16	9.3

Notes:

1. Modeled emission rates for emission sources are 1 gram/second to generate unit dispersion factors. The complete AERMOD input file can be found in Appendix C.
2. Exhaust area source release height is assumed to be 5 meters and fugitive area source release height is assumed to be 0 meters, consistent with SCAQMD LST Guidance.
3. Consistent with USEPA's AERMOD guidance, the initial vertical dimension of the modeled construction equipment exhaust area sources is the release height divided by 4.3. Fugitive emissions from construction equipment were modeled with an initial vertical dimension of 1, consistent with SCAQMD LST Guidance.
4. Consistent with 2022 BAAQMD CEQA Guidelines, the top of the plume was calculated as 1.7*the vehicle height, which was assumed to be 4 meters, and the width of the plume was calculated as the width of the roadway + 6 meters. 2022 BAAQMD CEQA Guidelines calculates the release height for haul trucks as 0.5 times the top of the plume. According to 2022 BAAQMD CEQA Guidelines, the initial vertical dimension can be calculated as the top of the plume divided by 2.15 and the initial lateral dimension can be calculated as the width of the plume divided by 2.15. 2.15 is derived from the standard deviation of the estimated Gaussian normally distributed plume concentration which is 4.3. Since these volume sources are adjacent to one another, the plume expansion happens in only one direction (i.e., 4.3/2 = 2.15).

Abbreviations:

m - meter
m^2 - square meter
AERMOD - Atmospheric Dispersion Modeling
SCAQMD - South Coast Air Quality Management District
LST - Localized Significance Thresholds
USEPA - United States Environmental Protection Agency

References:

SCAQMD. 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2

BAAQMD. 2023. Bay Area Air Quality Management District California Environmental Quality Act Air Quality Guidelines. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-5-project-air-quality-impacts_final-pdf.pdf?la=en

USEPA. 2022. User's Guide for the AMS/EPA Regulatory Model (AERMOD). U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

Table 19
Emergency Generator Modeling Parameters
477 9th Avenue Mixed-Use Project
San Mateo, CA

Source	Source Type	Number of Sources	Release Height[2]	Exit Temperature[2]	Exit Diameter[2]	Exit Velocity[2]	Annual Average Emission Rate[3]
			(m)	(K)	(m)	(m/s)	(g/s)
Generators[1]	Point	1	3.66	739.8	0.183	45.30	1.30E-04

Notes:

1. One generator rated 750 horsepower would be located at the proposed building.
2. Stack parameters are based on generator defaults from the 2012 BAAQMD technical memorandum for the San Francisco Community Reduction Plan.
3. Annual emissions of DPM and $PM_{2.5}$ were based on 50 hours of non-emergency operation, as shown in Table 17.

Abbreviations:

DPM - diesel particulate matter
g/s - grams per second
K - Kelvin
m - meter
m/s - meters per second
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter

References:

BAAQMD. 2012. San Francisco Community Risk Reduction Plan (SFCRRP). December. Available at: https://www.gsweventcenter.com/Appeal_Response_References/2012_1201_BAAQMD.pdf.

Table 20
Construction and Operational Exposure Parameters
477 9th Avenue Mixed-Use Project
San Mateo, CA

Construction + Operation Scenario

Receptor Type	Project Phase	Year	Receptor Age Group	Exposure Parameters							
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Age Sensitivity Factor[5]	Averaging Time (AT)[6]	Modeling Adjustment Factor[7]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Construction	2024	3rd Trimester	361	0.25	1.0	350	10	25,500	1	0.012
		2024	Age 0-<2	1,090	0.75	1.0		10		1	0.11
		2025	Age 0-<2	1,090	0.72	1.0		10		1	0.11
	Operation	2025	Age 0-<2	1,090	0.28	1.0		10		1	0.043
		2026+	Age 0-<2	1,090	0.25	1.0		10		1	0.037
			Age 2-<16	572	14	1.0		3		1	0.33
			Age 16-30	261	14	0.73		1		1	0.037
School	Construction	2024	Age 2-<16	520	1	--	250	3		4.2	0.064
		2025	Age 2-<16	520	0.72	--		3		4.2	0.046
	Operation	2025	Age 2-<16	520	0.28	--		3		1	0.0044
		2026+	Age 2-<16	520	4	--		3		1	0.061
Daycare	Construction	2024	Age 0-<2	1,090	1	--	350	10		4.2	0.628
		2025	Age 0-<2	1,090	0.72	--		10		4.2	0.449
	Operation	2025	Age 0-<2	1,090	0.28	--		10		1	0.043
		2026+	Age 2-<16	520	4	--	250	3		1	0.061
Pre K-8th	Construction	2024	Age 2-<16	520	1.00	--	250	3		4.2	0.064
		2025	Age 2-<16	520	0.72	--		3		4.2	0.046
	Operation	2025	Age 2-<16	520	0.28	--		3		1	0.0044
		2026+	Age 2-<16	520	10	--		3		1	0.15
Worker	Construction	2024	Age 16-70	230	1	--	250	1		4.2	0.0095
		2025	Age 16-70	230	0.72	--		1		4.2	0.0068
	Operation	2025	Age 16-70	230	0.28	--		1		1	6.4E-04
		2026+	Age 16-70	230	23	--		1		1	0.052

Operation Only Scenario

Receptor Type	Project Phase	Year	Receptor Age Group	Exposure Parameters							
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Age Sensitivity Factor[5]	Averaging Time (AT)	Modeling Adjustment Factor[6]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Operation	All	3rd Trimester	361	0.25	1.0	350	10	25,500	1	0.012
			Age 0-<2	1,090	2.00	1.0		10		1	0.30
			Age 2-<16	572	14	1.0		3		1	0.33
			Age 16-30	261	14	0.73		1		1	0.037
School	Operation	All	Age 2-<16	520	6	--	250	3		1	0.092
Daycare	Operation	All	Age 0-<2	1,090	2	--	350	10		1	0.30
	Operation	All	Age 2-<16	520	4	--	250	3		1	0.061
Pre K-8th	Operation	All	Age 2-<16	520	12	--	250	3		1	0.18
Worker	Operation	All	Age 16-70	230	25	--	250	1		1	0.056

Notes:

1. Daily breathing rates by receptor type and age bin are consistent with Table 34 of Appendix E of the 2022 BAAQMD CEQA Guidelines.
2. Annual exposure duration represents one full year. The exposure duration for all years is 1, as the health risk assessment is based on annual emissions. For the construction and operation scenario, residential receptors are assumed to begin the third trimester at the beginning of construction and continue exposure for 30 years after birth; School (elementary) receptor is assumed to be exposed during age 5-11; Daycare receptor is assumed to be exposed during age 0-6. Pre-school receptor is assumed to be exposed during age 2-14. For the operation-only scenario, exposure begins at the start of operations.

Table 20
Construction and Operational Exposure Parameters
477 9th Avenue Mixed-Use Project
San Mateo, CA

3. Fraction of time spent at home is conservatively assumed to be 1 (i.e., 24 hours/day) for age groups from the third trimester to less than 16 years old based on the recommendation from BAAQMD (BAAQMD 2022) and OEHHA (OEHHA 2015). The fraction of time at home for adults age 16-30 reflects default OEHHA guidance (OEHHA 2015) as recommended by BAAQMD (2022).

4. Exposure frequency is consistent with 2022 BAAQMD CEQA Guidelines and was determined as follows:

Residents: reflects default residential exposure frequency from Cal/EPA

Daycare/School/Pre K-8th: reflects default residential exposure frequency for 0-2 age bin, consistent with 2022 BAAQMD CEQA Guidelines, and default worker exposure frequency for 2-16 age bin, assuming a child is at the daycare/school when the parents are at work.

Worker: reflects default worker exposure frequency, consistent with 2022 BAAQMD CEQA Guidelines.

5. Age Sensitive Factors account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA Technical Support Document and current OEHHA guidance. This is consistent with the 2022 BAAQMD CEQA Guidelines.

6. Modeling adjustment factors are calculated based on the methodology from OEHHA's Guidance Manual for Preparation of Health Risk Assessments (2015). For construction, the MAF for the school, daycare and pre-school receptors are calculated to adjust from 24 hours/day to 8 hours/day and from 7 days/week to 5 days/week ([24 hours/8 hours] * [7 days/5 days] = 4.20); Resident types are expected to be exposed 24 hours/day and 7 days/week; as a result, the MAF is 1. Operational sources are expected 24 hours/day and 7 days/week; as a result, the MAF is 1 for all receptors.

Calculation:

IF_{inh} = DBR * FAH * EF * ED * CF / AT

CF = 0.001 (m^3/L)

$MAF=H_{Resident}/H_{Source}*D_{Resident}/D_{Source}*DF$

$DF=H_{Coin}/H_{Worker}*D_{Coin}/D_{Worker}$

Abbreviations:

AT - averaging time

BAAQMD - Bay Area Air Quality Management District

DBR - daily breathing rate

ED - exposure duration

EF - exposure frequency

FAH - fraction of time at home

$H_{Resident}$ - Hours per day of residential exposure (24 hours)

$D_{Resident}$ - Number of days per week that the resident is exposed (7 days)

DF - Discount Factor

H_{Coin} - Hour per day that the receptor's schedule coincides with when the source is emitting(hours)

D_{Worker} - Number of days that the receptor is at the site per week (days)

IF_{inh} - intake factor

kg - kilogram

L - liter

m^3 - cubic meter

OEHHA - Office of Environmental Health Hazard Assessment

MAF_{cancer} - Modeling Adjustment Factor for cancer risk

H_{Source} - Number of hours per day that the source operates (hours)

D_{Source} - Number of days per year that the source operates (days)

H_{Worker} - Hours that the receptor is at the site per day (hours)

D_{Coin} - Number of days per week that receptor's schedule coincides with when the source isemitting (days)

References:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. Available at https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf

BAAQMD. 2023. Air Quality Guidelines Appendix E: Recommended Methods For Screening and Modeling Local Risks and Hazards. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?la=en

Table 21
Toxicity Values
477 9th Avenue Mixed-Use Project
San Mateo, CA

Chemical[1]	Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$	Chronic REL ($\mu g/m^3$)
Diesel PM	1.1	5.0

Notes:

1. Chemicals presented in this table reflect air toxic contaminants in the proposed fuel types that are expected from off-road equipment and on-road truck trips and the generator operation.

Abbreviations:

$\mu g/m^3$ - micrograms per cubic meter

ARB - [California] Air Resources Board

Cal/EPA - California Environmental Protection Agency

$(mg/kg\text{-}day)^{-1}$ - per milligram per kilogram-day

OEHHA - Office of Environmental Health Hazard Assessment

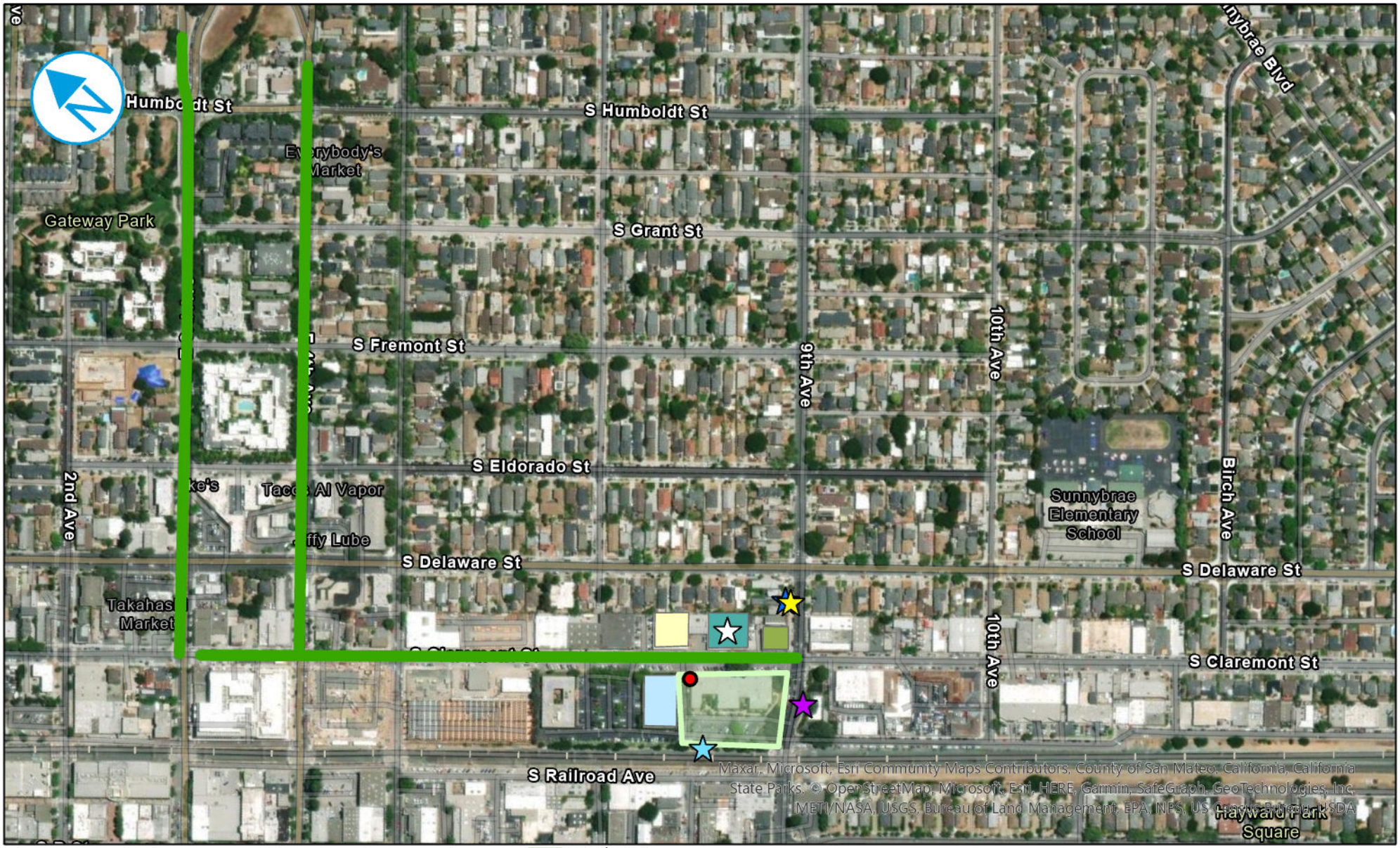
PM - particulate matter

REL - reference exposure level

Reference:

Cal/EPA. 2015. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. May 13.

FIGURES



Operation-Only Scenario

- MEI (Cancer, Offsite Resident)
- MEI (Chronic HI and PM2.5, Offsite Worker)

Construction and Operation Scenario

- MEI (Cancer, Offsite Resident)
- MEI (Chronic HI, Offsite Worker)
- MEI (PM2.5, Offsite Worker)

- Roadways
- Construction Area Source
- Building 1
- Building 2
- Building 3
- Building 4
- Generator

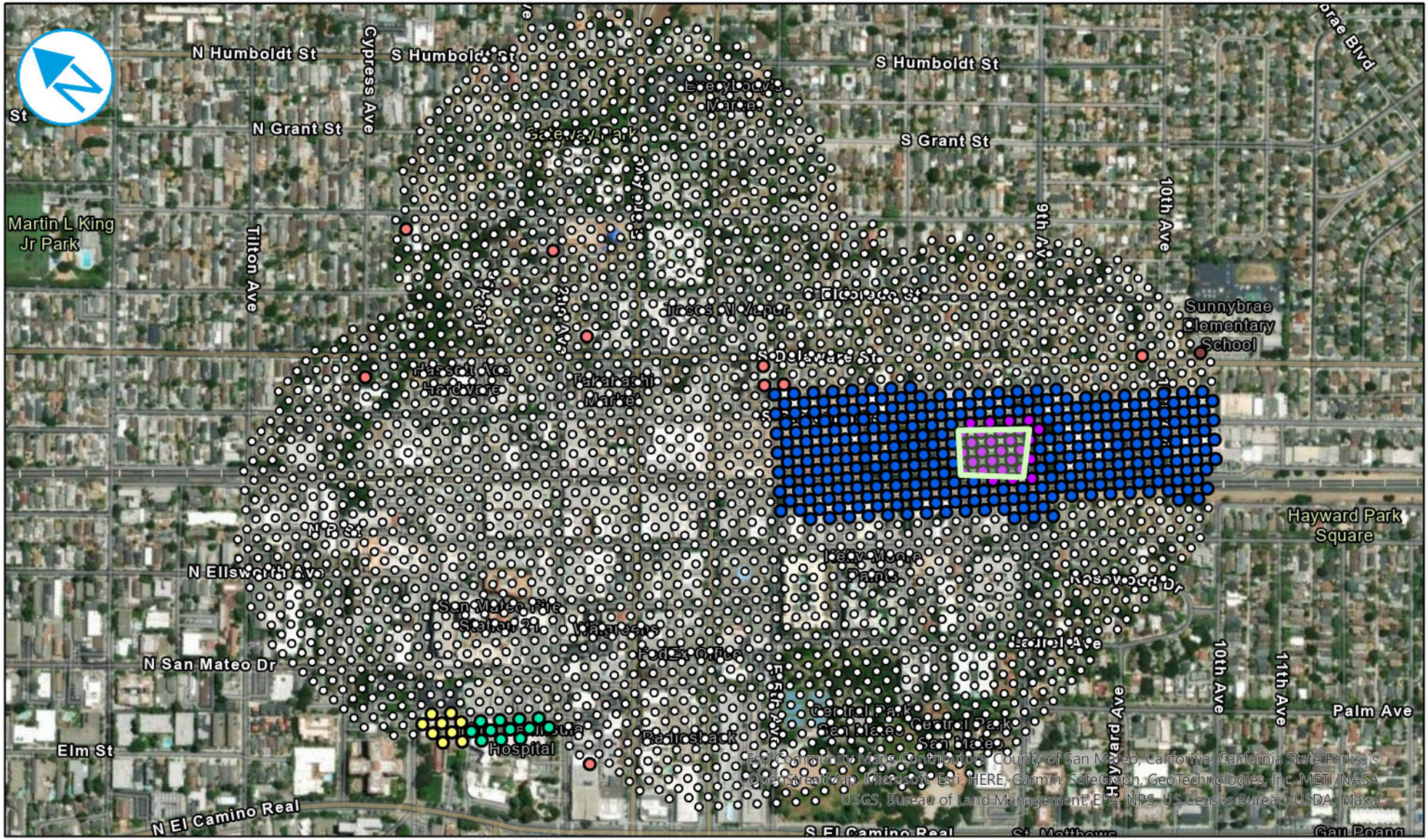
MODELLED SOURCES, VICINITY AND MAXIMALLY EXPOSED INDIVIDUAL RECEPTORS

477 9th Avenue
San Mateo, California

FIGURE 01

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL



Receptor Type

- Daycare
- Hospital
- Offsite Resident
- Offsite Worker
- Onsite Resident, Onsite Worker
- Pre K-8th
- School
- Project Site

0 0.07 0.15 Miles

PROJECT SITE AND MODELLED RECEPTORS

FIGURE 02

477 9th Avenue
San Mateo, California

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL

APPENDIX A
MIXED LAND USE SCREENING TOOL FOR CRITERIA POLLUTANTS AND PRECURSORS

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Multi-land Use Screening Tool Overview

This screening tool helps to determine whether the daily construction or operational emissions associated with a proposed land use development project with multiple land use types would exceed BAAQMD's average daily thresholds.

Instructions

Use the drop-down menus to select the land use category and land use type for each type of land use included in the project. Enter the proposed size of each land use based on the default units that are autopopulated in column D.

The tool will estimate whether the project may exceed the construction thresholds, operational thresholds, or both, and whether further analysis is needed before making a significance determination. This tool will not work for projects which have construction-related activities overlapping with operational activities, and vice versa.

Construction and Operation Screening Tool				
Land Use Category	**Land Use Type**	**Unit**	**Project Land Use Size**	**Has Overlapping Construction Phases?**
Residential	Apartments Mid Rise	DU	120.0	☐
Commercial	General Office Building	KSF	27.0	☐
Parking	Enclosed Parking w/ Elevato	Spaces	166.0	☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
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				☐
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				☐
				☐
				☐
				☐
				☐
Exceeds Construction Threshold?			NO	
Exceeds Operational Threshold?			NO	
BAAQMD's Recommendation			Further Analysis Not Required	

Developed by

ASCENT ENVIRONMENTAL

Last updated: 5/6/2022

APPENDIX B
TRAFFIC STUDY

Table 6: Project Vehicle Trip Generation

Land Use	ITE LU Code	Quantity	Units[1]	Daily	AM			PM		
				Total	In	Out	Total	In	Out	Total
Proposed project										
Multifamily Low-Rise	220	120	DU	845	14	46	60	45	27	72
General Office Building	710	28	KSF	304	38	5	43	7	33	40
Reductions compared to isolated suburban land uses[2]										
Internal Capture				-40	-3	-3	-6	-2	-2	-4
External Walk, Bike, and Transit				-409	-17	-17	-34	-16	-20	-36
Proposed Project Subtotal				**700**	**32**	**31**	**63**	**34**	**38**	**72**
Existing Uses										
General Office Building	710	22	KSF	238	29	4	33	5	27	32
Reductions compared to isolated suburban land uses[2]										
Internal Capture				0	0	0	0	0	0	0
External Walk, Bike, and Transit				-27	-4	0	-4	0	-3	-3
Existing Uses Subtotal				**211**	**25**	**4**	**29**	**5**	**24**	**29**
Net new trips (Proposed project minus existing)				**489**	**7**	**27**	**34**	**29**	**14**	**43**

Notes: Assumes 100% of existing uses were occupied

1. DU=dwelling unit; KSF=1,000 square feet
2. Based on MXD trip generation methodology which accounts for built environment factors not accounted in the ITE Trip Generation Manual such as diversity of land uses, design of the pedestrian and bicycle environment, site demographics, and accessibility of transit, among other factors. Internal trip reductions account for trips made between land uses on the site.

Sources: Fehr & Peers; ITE *Trip Generation Manual*, 11th Edition, 2023

APPENDIX C
AERMOD INPUT FILES (PROVIDED ELECTRONICALLY)