RAMBOLL

ENVIRONMENT & HEALTH

MEMO

Date: **November 3, 2023**

To: **Maria Kisyova, Project Manager, David J Powers & Associates**

From: **Michael Keinath**
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Subject: **CEQA AIR QUALITY AND HEALTH RISK ASSESSMENT FOR THE 31-57 SOUTH B ST COMMERCIAL/OFFICE 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 mixed-use development at 57 South B Street in San Mateo, California (the "Project").

According to the Project sponsor, the Project would redevelop the site with a new four-story, approximately 41,190 square-foot mixed-use building on a 0.32-acre site in San Mateo. The building would consist of approximately 5,302 square feet of restaurant on the ground floor and 35,888 square feet of office space on floors one through four. 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 fire pump 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, but are designated as the "2022 Guidelines." [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. 2022 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 Hazard Index (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 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. The health risk impacts from the Project are shown in **Table 3**. Health risk impacts on a cumulative basis are shown in **Table 4**. Fugitive dust emissions during construction are controlled with the implementation of best management practices, designed to mitigate the $PM_{2.5}$ concentration from the project, as listed below:

- Best management practices for fugitive dust: During Project construction, the Project sponsor shall comply with the BAAQMD's current basic control measures for reducing construction emissions of fugitive PM_{10} and $PM_{2.5}$. The fugitive PM emissions are assumed to be mitigated by watering the construction site two times per day, using CalEEMod® default reduction percentages for the specified control measures.

With the mitigation measure, the air quality and health risk impacts from the Project are 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)

[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.

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 5-7**. It was assumed that construction would start as early as 2025. Ramboll assumes statewide fleet-average tier diesel engines for the construction equipment when no tier data is provided. 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. ROG emissions from asphalt paving, if any, are negligible as the Project would not construct any parking lots or other asphalt surfaces.

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.
- The haul truck trips for demolition, site preparation, and grading were provided by the Project sponsor based on the amount of demolition required and the amount of 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 8-14**. The modeled emissions were calculated using the same conservative assumptions as the DPM calculation.

The modeled emissions rates of DPM and $PM_{2.5}$ from construction are presented in **Table 15.**

TAC emissions from Project operation were estimated for the proposed emergency fire pump based on the horsepower and tier rating provided by the Project sponsor. The default stack height, exhaust temperature, outlet diameter, and outlet velocity of the generators were collected from the 2022 BAAQMD CEQA Guidelines and assumed for the fire pump. As recommended by the City of San Mateo, project emissions for the emergency fire pump 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.[5] Annual emissions of PM_{10} and $PM_{2.5}$ from the proposed fire pump were estimated using ARB standards for diesel fire pump engines.[6] Similar to construction TAC sources, PM_{10} exhaust emissions from the proposed fire pump were conservatively calculated as DPM. The emission factors and modeled emission rates for the proposed emergency fire pump are summarized in **Table 16**.

Project-Level 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 17** and **Table 18**, respectively. Ramboll used five years of meteorological data from the San Francisco International Airport, which was the available dataset nearest 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

[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.

[5] 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.

[6] 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

(04274) of the Building Profile Input Program, PRIME (BPIP PRIME). Point sources were used only to model the Project fire pump, so building downwash was only evaluated in the Project operational fire pump modeling.

The AERMOD input files are provided electronically as **Appendix C**. The source and building setup are shown in **Figure 1**. The modeled receptor grid is shown in **Figure 2**. As recommended in 2022 BAAQMD CEQA Guidelines, receptor heights were modeled at 1.5 meters to represent breathing zone of an adult.

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.[7] 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.[8] 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.[9] The resident child scenario assumes a much higher daily breathing rate and age-sensitivity factor (ASF) 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. The locations for sensitive receptor including daycares, childcares and elementary schools were identified using a report from Environmental Data Resources (EDR). Worker receptor's locations were identified using the City of San Mateo Zoning Map.[10] 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 **Table 19**.

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:

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

[8] BAAQMD. 2023. 2022 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.

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

[10] City of San Mateo. 2022. City of San Mateo Zoning Map. Available online at: https://www.cityofsanmateo.org/DocumentCenter/View/66332/CDD-Planning---Zoning?bidId=.

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

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

FAH = Fraction of Time at Home (unitless)

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.[11]

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 20**.

BAAQMD recommends applying an adjustment factor to the annual average concentration modeled assuming continuous emissions (i.e., 24 hours per day, seven days per week), when the actual emissions are less than 24 hours per day and exposures are concurrent with activities occurring as part of the Project. For construction activities, emissions only impact receptors during certain hours of the day when activities are occurring. However, the TAC concentrations modeled during those hours are annualized assuming 24 hour per day in the modeling outputs. Thus, a modeling adjustment factor (MAF) is recommended to be applied to the annual average concentration used in the evaluation to account for an emissions schedule that is not occurring 24 hours per day, seven days per week if the exposure takes place preferentially during hours during which work, school or recreational activities are occurring. Thus, a MAF of 4.2 was applied to all receptor types except for residents to adjust from 24 hours per day to 8 hours per day and from 7 days a week to 5 days week ([24 hours/ 8 hours] * [7 days/ 5 days] = 4.2). The MAF values are presented with exposure parameters in **Table 19**.

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[12] and 2022 BAAQMD guidance.[13]

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

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

[13] BAAQMD. 2023. 2022 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

As shown in **Table 3**, the construction activities and operations would result in a maximum cancer risk of 0.50 in a million (below the threshold of 10) and a maximum chronic HI of 0.0021 (below the threshold of 1.0) at the maximally exposed individuals (MEIs). The unmitigated maximum $PM_{2.5}$ concentration is 0.48 micrograms per cubic meter (µg/m^3), exceeding the BAAQMD's threshold of 0.3 µg/m^3. However, by implementing the BAAQMD's standard construction mitigation measure of watering the construction site twice a day, the mitigated maximum $PM_{2.5}$ concentration would be reduced to 0.19 µg/m^3 at the MEI.

With the proposed mitigation, the Project's health risks on off-site 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 locations of the off-site MEIs are shown in **Figure 1**.

Cumulative Health Risk Assessment

In accordance with BAAQMD CEQA Guidelines, Ramboll conducted a cumulative HRA for off-site sensitive receptors. 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 $PM_{2.5}$ concentration,[14] located on a worker receptor. 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 435 East 3rd Avenue and 500 E. 3rd Avenue (Block 21) as the future foreseeable 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.

Stationary Sources, Railway, and Roadway Sources

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 projects at 435 East 3rd Avenue and 500 E. 3rd Avenue (Block 21). 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 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.

[14] 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.

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.

Future Foreseeable Cumulative Development Sources

For the impacts from the construction and operation of future foreseeable cumulative development projects located at 435 East 3rd Avenue and 500 E. 3rd Avenue (Block 21), Ramboll utilized methodology consistent with CalEEMod to quantify all construction and operational TAC emissions. Construction TAC emissions from the projects at 435 East 3rd Avenue and 500 E. 3rd Avenue (Block 21) include DPM and $PM_{2.5}$ emissions from both on-site, off-road heavy equipment and off-site, on-road vehicle travel. Operational TAC emissions, including DPM and $PM_{2.5}$ emissions from the emergency generator, are only from the project at 500 E. 3rd Avenue (Block 21). Ramboll analyzed construction and operation related health risks for 435 East 3rd Avenue and 500 E. 3rd Avenue (Block 21) 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 435 East 3rd Avenue and from construction and operation of the project at 500 E. 3rd Avenue (Block 21) were combined with the impacts from all other sources at the construction and operational off-site MEIs.

Summary of Cumulative Analysis

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 139 in a million compared to a threshold of 100 in a million. However, the primary contributor to the cumulative cancer risk at the off-site MEI is the nearby Caltrain operation, located about 40 feet from the off-site MEI, accounting for approximately 116 in a million (83%). The railway sources caused the exceedance of the cumulative cancer risk over the cumulative threshold of 100 in a million. The BAAQMD raster provides generalized risk estimates and estimated cancer risks for railway sources, which represents a screening-level analysis based on the train schedules and fuel consumption rates. Therefore, the identified concentrations and risks are conservative. If this railway source were not operational, there would be no cumulative impact associated with the Project and the rest of the cumulative sources. Further, the Project's contribution from construction activities would be temporary and are below the single source (Project level) thresholds. Therefore, the Project would not result in a cumulatively considerable contribution to the significant impact.

The combined chronic HI at all sensitive receptors is 0.12 (threshold of 10). The maximum combined $PM_{2.5}$ concentrations is 0.7 $\mu g/m^3$ compared to a threshold of 0.8 $\mu g/m^3$ and is expected to occur at the off-site MEI.

CLOSING

The analysis presented above represents emissions and health risk impacts from construction and operation of the proposed Project. The Project does not exceed any BAAQMD CEQA significance thresholds, with the mitigation measure to control fugitive dust by watering the construction site two times per day.

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
31-57 South B Street
San Mateo, CA

Project Land Use Type[1]	CalEEMod® Land Use Type	CalEEMod® Land Use Subtype	Value	Units	Square Footage
Office	Commercial	General Office Building	35.9	1000sqft	35,888
Restaurant	Recreational	High Turnover (Sit-Down Restaurant)	5.3	1000sqft	5,302

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
31-57 South B Street
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	2025	Off-Road Equipment	4.8	25	1.0	1.0
		Onroad Vehicles	1.6	27	0.24	0.23
Site Preparation	2025	Off-Road Equipment	0.32	1.6	0.063	0.063
		Onroad Vehicles	0.37	4.2	0.038	0.036
Grading	2025	Off-Road Equipment	1.3	6.7	0.26	0.26
		Onroad Vehicles	1.1	46	0.41	0.39
Building Construction	2025	Off-Road Equipment	6.7	48	1.8	1.7
		Onroad Vehicles	8.0	5.8	0.10	0.10
	2026	Off-Road Equipment	17	125	4.3	4.0
		Onroad Vehicles	20	14	0.26	0.24
Paving	2026	Off-Road Equipment	2.3	20	0.79	0.73
		Onroad Vehicles	0.58	0.41	0.0077	0.0071

Average Construction Emissions by day

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2025	0.18	1.3	0.030	0.028
2026	0.23	0.90	0.030	0.028
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/

Table 3
Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$
31-57 South B Street
San Mateo, CA

Source Category	Project Construction + Operation				Project Operation		
	Offsite Resident	Offsite Worker	Offsite Worker	Offsite Worker	Offsite Resident	Offsite Worker	Offsite Worker
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	Unmitigated $PM_{2.5}$ Concentration	Mitigated $PM_{2.5}$ Concentration[3]	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	unitless	$\mu g/m^3$	$\mu g/m^3$	in a million	unitless	$\mu g/m^3$
Construction	0.27	0.0021	0.48	0.19	--	--	--
Fire Pump	0.22	8.8E-05	--	--	0.31	2.9E-04	0.0015
Project Impact	**0.50**	**0.0021**	**0.48**	**0.19**	**0.31**	**2.9E-04**	**0.0015**
Significance Threshold	**10**	**1.0**	**0.30**	**0.30**	**10**	**1.0**	**0.30**
Exceeds thresholds?	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**
Year	--	2026	2025	2025	--	All	All
UTMx	559740	559740	559680	559680	559740	559740	559740
UTMy	4158100	4158020	4158060	4158060	4158100	4158060	4158060

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/m^3
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m^3/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/m^3)
   cREL = Chronic Reference Exposure Level (ug/m^3)

3. The mitigated scenario includes watering the construction site twice a day to control fugitive dust.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
HI - Hazard Index
m^3 - 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
31-57 South B Street
San Mateo, CA

Source[1]	Offsite Resident Construction + Operation 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[1]	15	0.046	0.20
Roadways[2]	7.6	0.049	0.23
Railways[2]	116	0.019	0.079
Future Foreseeable Cumulative Development Sources[3]	0.13	1.6E-04	2.4E-04
Mitigated Project Construction + Operations	0.50	0.0021	0.19
Total	**139**	**0.12**	**0.70**
Exceeds Threshold?	**YES**	**NO**	**NO**
Year	--	2026	2025
UTMx	559740	559740	559680
UTMy	4158100	4158020	4158060
Theshold	**100**	**10**	**0.80**

Notes:

1. Health impacts from Stationary Sources estimated using BAAQMD Stationary Source Screening Analysis Tool. Risk values listed are maximum values, not expected values. Results have been adjusted by the BAAQMD-recommended distance multiplier, where relevant.
2. 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.
3. Future foreseeable cumulative development sources for this project include the mixed-use development projects located at 435 East 3rd Avenue and Block 21 (500 E. 3rd Avenue).

Abbreviations:

µg - microgram
m^3 - cubic meter
HI - hazard index
$PM_{2.5}$ - 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
31-57 South B Street
San Mateo, CA

Phase[1]	Start Date	End Date	Number of Work Days	Days per Week
Demolition	7/1/2025	8/26/2025	40	5
Site Preparation	8/27/2025	9/10/2025	10	5
Grading	9/11/2025	10/2/2025	15	5
Building Construction	10/3/2025	8/28/2026	235	6
Paving	8/7/2026	9/4/2026	20	5

Notes:

1. Construction schedule was provided by the Project Applicant.

Table 6
Construction Equipment
31-57 South B Street
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	Rubber Tired Dozers	Rubber Tired Dozers	Diesel	1	247	8	100%	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	8	100%	Tier 4 Final
Site Preparation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	8	100%	Tier 4 Final
Grading	Graders	Graders	Diesel	1	158	8	100%	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	87	8	100%	Tier 4 Final
Building Construction	Cranes	Cranes	Diesel	1	231	8	50%	Tier 4 Final
	Forklifts	Forklifts	Diesel	1	89	4	50%	No Specific Tier
	Welders	Welders	Diesel	2	46	8	15%	No Specific Tier
Paving	Pavers	Pavers	Diesel	1	130	8	25%	Tier 4 Final
	Paving Equipment	Paving Equipment	Diesel	1	132	8	25%	No Specific Tier
	Rollers	Rollers	Diesel	1	80	8	25%	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	97	8	50%	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 was provided by the Project Applicant; otherwise, it was assumed to be at full capacity.
6. The statewide fleet-average tier diesel engines from CalEEMod® 2022.1 are assumed if project-specific equipment tier data is unavailable.

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
31-57 South B Street
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	2025	40	10	0	200	11.7	8.4	20	4,680	0	4,000
Site Preparation	2025	10	10	0	30	11.7	8.4	20	1,170	0	600
Grading	2025	15	10	0	350	11.7	8.4	20	1,755	0	7,000
Building Construction	2025	64	40	0	0	11.7	8.4	20	29,952	0	0
	2026	171	40	0	0	11.7	8.4	20	80,028	0	0
Paving	2026	20	10	0	0	11.7	8.4	20	2,340	0	0

EMFAC Data[8]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Mateo County Calendar Years 2025-2026 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, vendor, and hauling trip rates are provided by the Project Applicant. Trip lengths are based on CalEEMod® Appendix G defaults for San Mateo County.

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
Silt Loading Emission Factors
31-57 South B Street
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 9
Emission Factors for Entrained Roadway Dust
31-57 South B Street
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 10
Emissions Calculations for Entrained Road Dust
31-57 South B Street
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/yr)
				Fugitive $PM_{2.5}$
Demolition	2025	40	8,680	0.33
Site Preparation	2025	10	1,770	0.067
Grading	2025	15	8,755	0.33
Building Construction	2025	64	29,952	1.1
	2026	171	80,028	3.0
Paving	2026	20	2,340	0.089

Abbreviations:

lb - pound

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

VMT - vehicle miles travelled

Table 11
Fugitive Dust Emissions from Building Demolition Waste
31-57 South B Street
San Mateo, CA

Construction Phase	Year	Number of Days	Building Waste[1]	Emission Factor - Mechanical or Explosive Dismemberment[2]	Emission Factor - Debris Loading[3]	Unmitigated Emissions[4]	Mitigated Emissions[5]
				$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
		days	ton	lb/ton	lb/ton	ton/yr	ton/yr
Demolition	2025	40	429	4.5E-04	0.0031	7.6E-04	4.8E-04

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.
5. Fugitive PM emissions will be mitigated by watering the construction site two times per day, which is estimated to reduce emissions by 36% per CalEEMod® recommendation.

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 12
Fugitive Dust Emissions from Off-Road Grading Activity
31-57 South B Street
San Mateo, CA

Construction Phase	Year	Equipment	Maximum Area Disturbed[1]	Grading VMT[2]	Unmitigated $PM_{2.5}$ Emission Factor[3]	Unmitigated Emissions[4]	Mitigated Emissions[4,5]
						$PM_{2.5}$	$PM_{2.5}$
			acre/day	mile/day	lb/VMT	ton/yr	ton/yr
Grading	2025	Graders	0.50	0.34	0.17	4.3E-04	1.7E-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:
   $VMT = A_S/W_b \times (43{,}560\ sqft/acre)/(5{,}280\ ft/mile)$, 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.
5. Fugitive PM emissions will be mitigated by watering the construction site two times per day, which is estimated to reduce emissions by 61% per CalEEMod® recommendation.

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 13
Fugitive Dust Emissions from Truck Loading Activity
31-57 South B Street
San Mateo, CA

Construction Phase	Year	Number of Days	Haul Trips	Total Material Loaded[1]	Unmitigated Emission Factor[2]	Unmitigated Emissions[3]	Mitigated Emissions[3,4]
					$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
		days	# trips	ton	lb/ton	ton/yr	ton/yr
Demolition	2025	40	200	429	3.6E-05	7.8E-06	3.0E-06
Grading	2025	15	350	2,212		4.0E-05	1.6E-05

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 provided by Project Sponsor.

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:

   $EF = k \times (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$, 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 12 hours per day, consistent with the modeled hours from 7 AM - 7 PM.
4. Fugitive PM emissions will be mitigated by watering the construction site two times per day, which is estimated to reduce emissions by 61% per CalEEMod® recommendation.

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 14
Fugitive Dust Emissions from Off-Road Bulldozing Activity
31-57 South B Street
San Mateo, CA

Construction Phase	Equipment	Year	Quantity	Utilization %	Avg. Usage Hours per Day	Emission Factor[1]	Unmitigated Emissions[2]	Mitigated Emission[3]
						$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
				%	hr/day	lb/hr	ton/yr	ton/yr
Demolition	Rubber Tired Dozers	2025	1	100%	8	0.41	0.066	0.026

Notes:

1. 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

2. 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.

3. Fugitive PM emissions will be mitigated by watering the construction site two times per day, which is estimated to reduce emissions by 61% per CalEEMod® recommendation.

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 15
Modeled Emission Rates from Proposed Project Construction Sources
31-57 South B Street
San Mateo, CA

Emissions Rates

Phase	Year	Construction Emissions Rates[1,2]						
		Offroad				Onroad		
		DPM	$PM_{2.5}$			DPM	$PM_{2.5}$	
			Exhaust	Fugitive (Unmitigated)	Fugitive (Mitigated)[3]		Exhaust	Fugitive
		g/s						
Demolition	2025	2.7E-05	2.7E-05	4.3E-05	2.8E-05	9.1E-08	9.6E-08	1.7E-07
Site Preparation	2025	1.8E-06	1.8E-06	--	--	1.4E-08	1.5E-08	2.9E-08
Grading	2025	7.4E-06	7.5E-06	2.5E-05	9.6E-06	1.6E-07	1.6E-07	2.5E-07
Building Construction	2025	5.3E-05	5.0E-05	--	--	--	5.8E-08	2.1E-07
	2026	1.2E-04	1.2E-04	--	--	--	1.5E-07	5.7E-07
Paving	2026	2.3E-05	2.1E-05	--	--	--	4.3E-09	1.7E-08

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 0.28 miles.
2. The modeled emission rates in g/s are calculated assuming a construction schedule between 7 am - 7 pm (12 hours).
3. The mitigated scenario includes the fugitive dust mitigation measure of watering the construction site two times per day.

Abbreviations:

DPM - diesel particulate matter
$PM_{2.5}$ - particulate matter less than 2.5 microns
g/s - grams/second

Table 16
Estimated Emissions from Fire Pump Operation
31-57 South B Street
San Mateo, CA

Fire Pump Emission Factors

Engine Type	Fuel	Engine Size Range (hp)		Engine Emission Factors[1] (g/bhp-hr)	
		Minimum	Maximum	DPM	$PM_{2.5}$
Fire Pump	Diesel	11	25	0.60	0.60

Fire Pump Information[2]

Scenario	Engine Type	Number of Engines	Load Factor	Size	Size	Fuel Type	Annual Operation[3]
				kW	hp		hr/yr
Project Operation	Fire Pump	1	0.73	15	20	Diesel	50

Fire Pump Emissions

Scenario	Engine Type	Size (hp)	Quantity	Annual Emissions g/s	
				DPM	$PM_{2.5}$
Project Operation	Fire Pump	20	1	2.8E-05	2.8E-05

Notes:

1. Engine emission factors for the diesel fire pump were based on CalEEMod® User's Guide Appendix G, Table G-40.
2. Number, size, and fuel of the fire pump engine was 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®
g/bhp-hr - grams per brake horsepower hour
hp - horsepower
hr - hour
kW - kilowatt
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
yr - year

References:

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

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

Table 17
Construction Modeling Parameters
31-57 South B Street
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	1,332	5.0	1.2
Construction Equipment - Fugitive Dust	Area[2]	1	1,332	0	1.0

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	1st Ave	6.8	19	3.4	3.2	8.8
		S. Delaware St.	6.8	20	3.4	3.2	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 18
Fire Pump Modeling Parameters
31-57 South B Street
San Mateo, CA

Source	Source Type	Number of Sources	Release Height[2]	Exit Temperature[2]	Exit Diameter[2]	Exit Velocity[2]
			(m)	(K)	(m)	(m/s)
Fire Pump[1]	Point	1	3.66	740	0.183	45

Notes:

1. One fire pump rated 20 horsepower would be located at the proposed building.
2. Stack parameters are based on generator defaults from the 2022 BAAQMD CEQA Guidelines.

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. 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

Table 19
Construction and Operational Exposure Parameters
31-57 South B Street
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)	Modeling Adjustment Factor[6]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Construction	2025	3rd Trimester	361	0.50	1.0	350	10	25,500	1	0.025
		2025	Age 0-<2	1,090	0.50	1.0		10		1	0.075
		2026	Age 0-<2	1,090	0.68	1.0		10		1	0.10
	Operation	2026	Age 0-<2	1,090	0.32	1.0		10		1	0.048
		2027+	Age 0-<2	1,090	0.75	1.0		10		1	0.11
			Age 2-<16	572	14	1.0		3		1	0.33
			Age 16-30	261	14	0.73		1		1	0.037
School	Construction	2025	Age 2-<16	520	1.0	--	250	3		4.2	0.064
		2026	Age 2-<16	520	0.68	--		3		4.2	0.043
	Operation	2026	Age 2-<16	520	0.32	--		3		1	0.0049
		2027+	Age 2-<16	520	4.5	--		3		1	0.069
Daycare	Construction	2025	Age 0-<2	1,090	1.0	--	350	10		4.2	0.63
		2026	Age 0-<2	1,090	0.68	--		10		4.2	0.43
	Operation	2026	Age 0-<2	1,090	0.32	--		10		1	0.048
		2027+	Age 2-<16	520	4.5	--	250	3		1	0.069
Pre K-8th	Construction	2025	Age 2-<16	520	1.0	--	250	3		4.2	0.064
		2026	Age 2-<16	520	0.68	--		3		4.2	0.043
	Operation	2026	Age 2-<16	520	0.32	--		3		1	0.0049
		2027+	Age 2-<16	520	10	--		3		1	0.16
Worker	Construction	2025	Age 16-70	230	1.0	--	250	1		4.2	0.0095
		2026	Age 16-70	230	0.68	--		1		4.2	0.0064
	Operation	2026	Age 16-70	230	0.32	--		1		1	7.3E-04
		2027+	Age 16-70	230	23	--		1		1	0.053

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	2.0	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
			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 19
Construction and Operational Exposure Parameters
31-57 South B Street
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 20
Toxicity Values
31-57 South B Street
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 fire pump 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

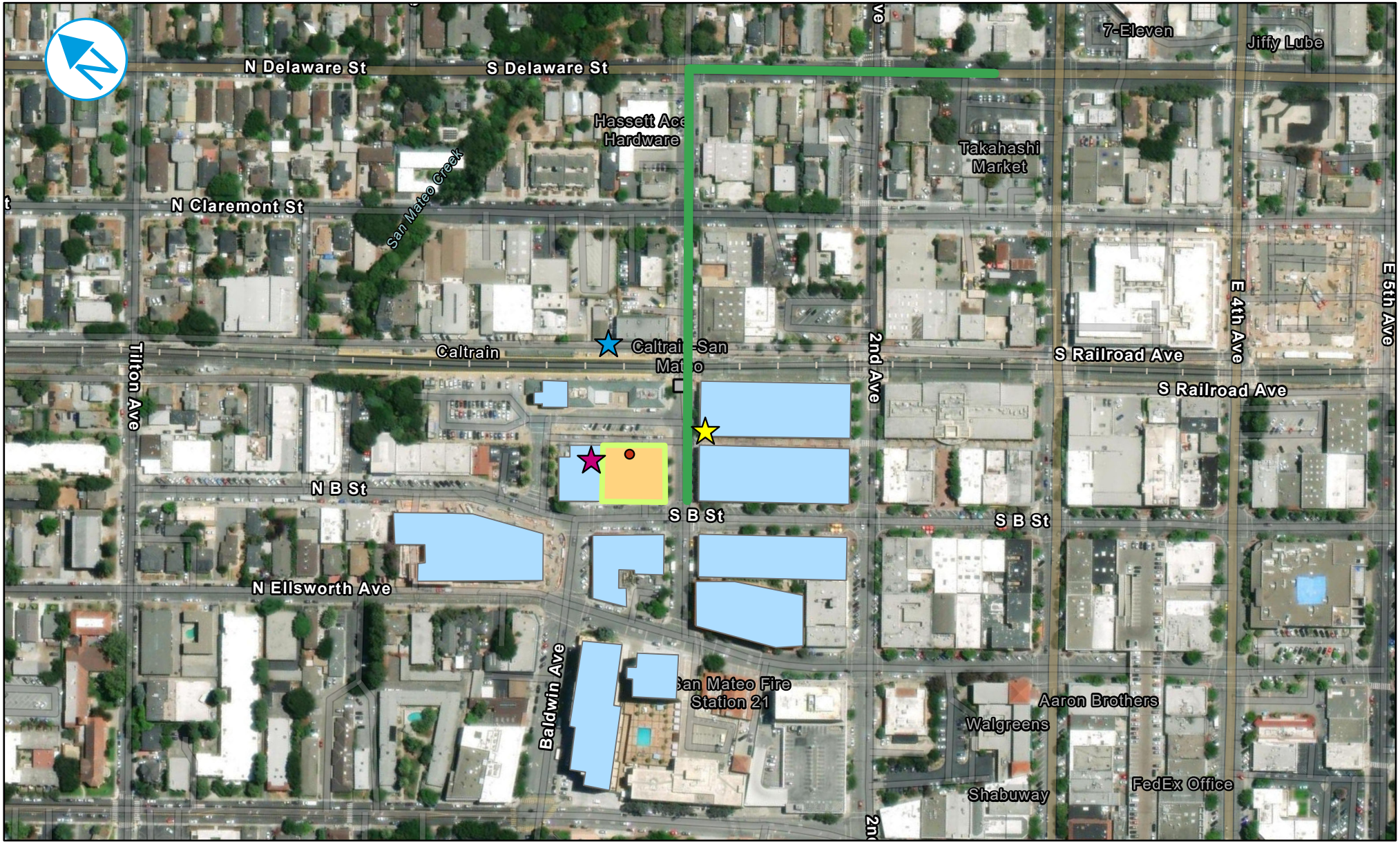
Reference:

Cal/EPA. 2023. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. October 6.

FIGURES

DRAFT

PROJECT: 1690031998 | DATED: 10/23/2023 | DESIGNER: ANSHI



Haul Routes
Construction Area Source
FirePump
Offsite Building
Onsite Building

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

0 1,000 Feet

MODELED SOURCES, VICINITY, AND MAXIMALLY EXPOSED INDIVIDUAL RECEPTORS

31-57 South B Street
San Mateo, California

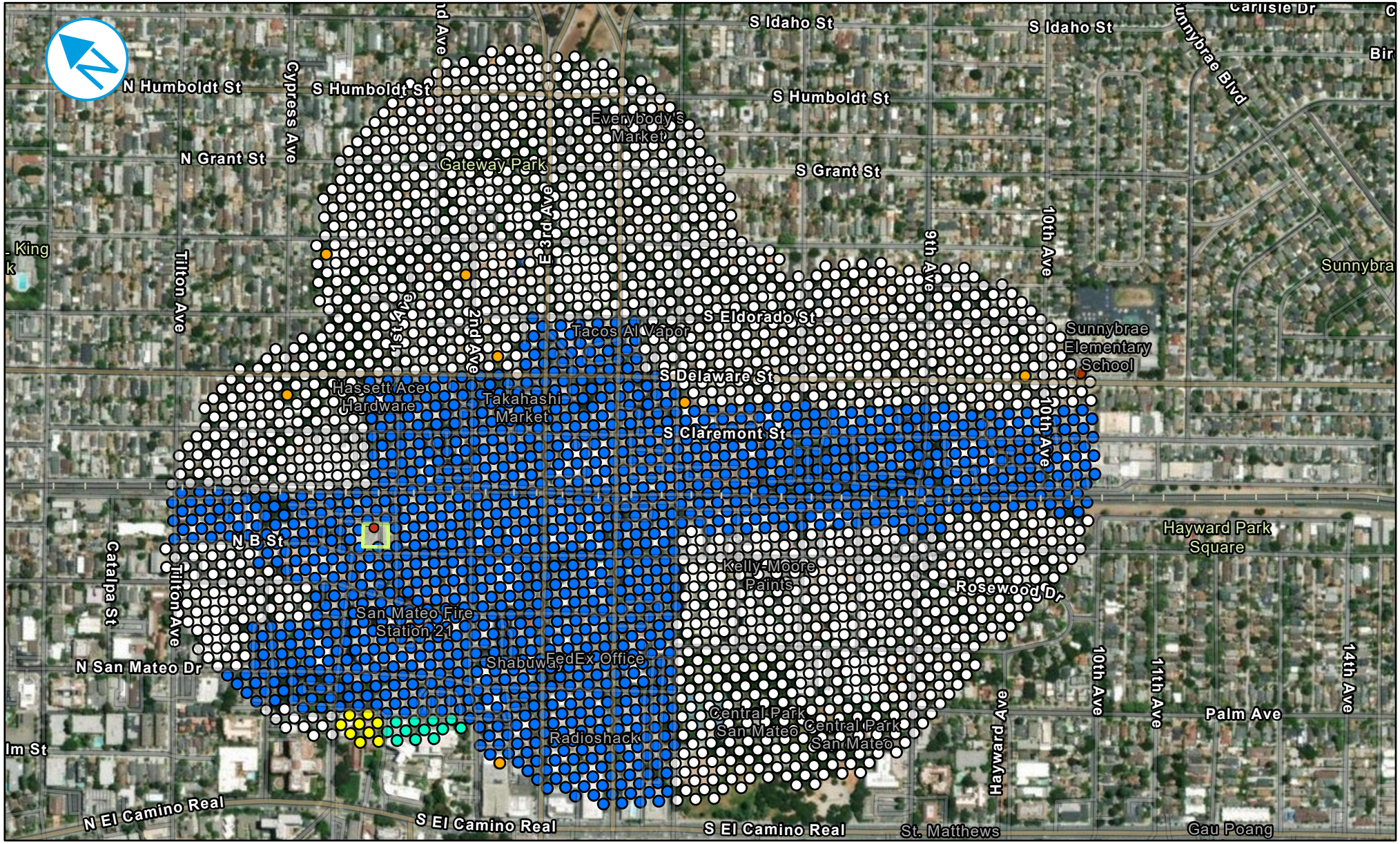
FIGURE 01

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

DRAFT

PROJECT: 1690031998 | DATED: 11/1/2023 | DESIGNER: LLI



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

0 2,000 Feet

PROJECT SITE AND MODELED RECEPTORS

31-57 South B Street
San Mateo, California

FIGURE 02

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, 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?**
Commercial	General Office Building	KSF	35.9	☐
Recreational	High Turnover (Sit Down Restaurant)	KSF	5.3	☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
Exceeds Construction Threshold?			**NO**	
Exceeds Operational Threshold?			**NO**	
BAAQMD's Recommendation			**Further Analysis Not Required**	

Developed by

ASCENT ENVIRONMENTAL

Last updated: 5/6/2022

RAMBOLL

APPENDIX B
TRAFFIC STUDY

31-57 South B Street Trip Generation

Land Use	ITE LU Code	Quantity	Units	Daily	AM			PM		
				Total	In	Out	Total	In	Out	Total
Proposed Project										
General Office Building	710	33.5	KSF	363	45	6	51	8	40	48
Strip Retail Plaza (<40k Sq Ft)	822	5	KSF	272	7	5	12	17	17	33
Reductions										
Internal Capture				-2	-2	0	-2	0	0	0
External Walk, Bike, and Transit				-159	-14	-3	-17	-6	-14	-20
Proposed Project Subtotal				**474**	**36**	**8**	**44**	**19**	**43**	**61**
Existing Uses										
Strip Retail Plaza (<40k Sq Ft)	822	1.8	KSF	98	2	2	4	6	6	12
Reductions										
External Walk, Bike, and Transit				-12	0	0	0	-1	0	-1
Existing Uses Subtotal				**86**	**2**	**2**	**4**	**5**	**6**	**11**
Net new trips (Proposed project minus existing)				**388**	**34**	**6**	**40**	**14**	**37**	**50**

APPENDIX C
AERMOD INPUT FILES (PROVIDED ELECTRONICALLY)