Appendix A – Air Quality and Health Risk Assessment

RAMBOLL

ENVIRONMENT
& HEALTH

MEMO

Date: **February 2, 2026**

To: **Connor Tutino, Project Manager, David J Powers & Associates**

From: **Michael Keinath, PE**
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Subject: **CEQA AIR QUALITY AND HEALTH RISK ASSESSMENT FOR THE 500 EAST 4TH AVENUE (BLOCK 20) COMMERCIAL/RESIDENTIAL MIXED-USE PROJECT, SAN MATEO, CALIFORNIA**

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Ramboll conducted California Environmental Quality Act (CEQA) air quality and health risk analyses for the proposed mixed-use development at 500 E 4th Avenue in San Mateo, California (the "Project").

According to the Project sponsor, the Project would redevelop the site with a new six-story, approximately 234,925 square-foot mixed-use building with two levels of below grade parking in San Mateo. The building would be approximately 75 feet in height and would consist of approximately 99,025 square feet of office space, and approximately 72 multi-family residential units, consisting of 71,400 square feet. Surrounding land uses include proposed office and residential uses to the north along 4th avenue; a daycare, automobile service station, retail commercial, and residential uses to the east along S. Delaware Street; a lumber yard and residential uses to the south along E. 5th Avenue; and residences along S. Claremont Street to the west. The Project would include an emergency fire pump and 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 District (BAAD) CEQA Guidelines.[1] These guidelines present methods for evaluating compliance with CEQA as well as thresholds for determining significance. With respect to the Project, the BAAD thresholds of significance are as follows:

[1] BAAD. 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

BAAD 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 BAAD 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 BAAD and the land use sizes provided in **Table 1**, the proposed project is 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

Unmitigated and mitigated construction emissions are presented in **Table 2** and **Table 3**, respectively. As unmitigated health risk impacts are above thresholds, mitigation for construction equipment was developed to bring them below. The proposed mitigation measures are listed below.

- Off-Road equipment tiers: All construction equipment is assumed to use Tier 4 Final engines to reduce health risks on nearby sensitive receptors.
- Best management practices for fugitive dust: During Project construction, the Project sponsor shall comply with the BAAD'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.

Unmitigated and mitigated health risk impacts from the Project are shown in **Table 4** and **Table 5**, respectively. Health risk impacts on a cumulative basis are shown in **Table 6**. With the mitigation measures, the Project-level and cumulative air quality and health risk impacts from the Project are below the BAAD 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 2022.1.1.30 (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

[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.

(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 BAAD 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 7, 8,** and **9**. It was assumed that construction would start as early as 2026.[4] Under the unmitigated scenario, 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. Under the mitigated scenario, the Project construction is assumed to use construction equipment that meet emission standards associated with Tier 4 Final engines. Emissions from paving and architectural coating off-gassing were estimated using methodologies consistent with CalEEMod and are summarized in **Table 10** and **Table 11**, respectively**.**

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 list and usage hours were updated to reflect utilization of each equipment per phase as provided by the Project sponsor.
- The vendor and haul truck trips for all subphases were provided by the Project sponsor based on the demolition quantity and the amount of soil exported and imported during construction. These estimates are shown in **Table 9**.
- Under the mitigated scenario, all construction equipment were assumed to use Tier 4 Final diesel engines, and the construction site is assumed to be watered twice per day to reduce fugitive PM emissions.

LOCAL COMMUNITY RISK AND HAZARD IMPACTS

Local Carbon Monoxide (CO) Impacts

According to the BAAD 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, presented in **Appendix B**, the traffic volumes generated by the proposed project will be significantly less than 24,000 vehicles per hour. Thus, operational impacts from Project CO emissions would be less than significant.

[4] **Table 7** presents the construction schedule assumed for the analysis. A revised construction schedule provided by the Project Sponsor, which shifts construction activities by approximately one year, is included in **Appendix C**. Because the construction analysis evaluates conservative, worst-case assumptions for equipment, duration, and timing, and because emission factors are expected to decrease over time, the revised schedule would not result in increased emissions or health impacts compared to those analyzed herein.

Toxic Air Contaminant (TAC) and $PM_{2.5}$ 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[5] 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 12-17**.

Based on the construction schedule provided by the Project sponsor, the Project construction will be completed in one phase. All emissions from Project construction were summed by year and modeled on an annual basis. These unmitigated and mitigated modeled construction emission rates are shown in **Tables 18** and **19**, respectively.

TAC emissions from Project operation were estimated for the proposed emergency fire pump and emergency generator based on the horsepower and tier rating provided by the Project sponsor. The stack height, exhaust temperature, outlet diameter, and outlet velocity of the generators were provided by the Project Sponsor and default modelling parameters from the BAAD CEQA guidelines were used when information was not available. As recommended by the City of San Mateo, project emissions for the emergency fire pump and generator are based on the BAAD 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 fire pump and generator were estimated using ARB standards for diesel fire pump and generator engines.[7] Similar to construction TAC sources, PM_{10} exhaust emissions from the proposed fire pump and generator were conservatively calculated as DPM. The emission factors and modeled emission rates for the proposed emergency fire pump and emergency generator are summarized in **Table 20** and **21,** respectively.

Operational traffic can also contribute vehicular TAC emissions, predominantly from gasoline fueled engines, if the Project would substantially increase traffic volumes on nearby roadways. Based on BAAD's risk requirement, a major roadway with at least 10,000 average annual daily traffic (AADT) should be identified as mobile source. [8] However, since the Project is

[5] 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.

[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

[8] BAAD. 2022. CEQA Guidelines- Risk and Hazard Screening Analysis Process Flow Chart. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/tools/2020_02_20-screening-approach-flow-chart-pdf.pdf?la=en.

relatively small, it will generate less than 10,000 AADT distributed to nearby roadways. Therefore, operational on-road vehicles were not modeled as a TAC source.

Project-Level Health Risk Assessment

Ramboll analyzed Project construction-related and operational health risks by estimating ambient air concentrations of DPM and $PM_{2.5}$.

Air Dispersion Modeling

To estimate air concentrations of DPM and $PM_{2.5}$, Ramboll used AERMOD Version 22112, 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 22** and **Table 23**, 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 (04274) of the Building Profile Input Program, PRIME (BPIP PRIME). Point sources were used only to model the Project fire pump and generator, so building downwash was only evaluated in the Project operational fire pump and generator modeling.

The AERMOD input files are provided electronically as **Appendix D**. The source and building setup are shown in **Figure 1**. The modeled receptor grid is shown in **Figure 2**. As recommended in BAAD 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.[9] In accordance with OEHHA's revised HRA guidelines, the 2022 BAAD CEQA Guidelines has adopted an intake methodology that addresses children's greater sensitivity and health impacts from early exposure to carcinogenic compounds.[10] 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 BAAD CEQA Guidelines Appendix E. This analysis followed the recommended methodology from the 2022 BAAD CEQA Guidelines.

Ramboll conservatively evaluated Project impacts due to construction emissions using default exposure assumptions for a resident child from OEHHA unless otherwise noted. The resident child

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

[10] BAAD. 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.

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.[11] 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 24**.

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)

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 25**.

[11] 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=.

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

BAAD 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). Resident types are expected to be exposed 24 hours/day and 7 days/week; as a result, the MAF is 1. Operational sources could potentially operate at any time of day; as a result, the MAF is 1 for all receptors for operational sources. The MAF values are presented with exposure parameters in **Table 24**.

The potential for exposure to result in adverse chronic noncancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the noncancer chronic reference exposure level (cREL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the chronic HQs for all chemicals are summed, yielding a non-cancer chronic HI.

$$HI = \Sigma HQ_i = \Sigma(C_i / cREL_i)$$

Where:

HQ_i	=	Chronic hazard quotient for chemical i
HI	=	Hazard index
C_i	=	Annual average concentration of chemical i ($\mu g/m^3$)
$cREL_i$	=	Chronic noncancer reference exposure level for chemical i ($\mu g/m^3$)

As shown in **Table 4**, the unmitigated construction activities and operations would result in a maximum cancer risk of 103 in a million (threshold of 10) at the nearby Safari Kids daycare. However, Ramboll understands that it is unknown if the Safari Kids daycare will be occupied during construction of the Project. Therefore, the second highest cancer risk is shown in Table 4, which is an off-site residential receptor with a cancer risk of 13 in a million.[13] The unmitigated Project would also result in a maximum chronic HI of 0.032 (threshold of 1.0) and a maximum $PM_{2.5}$ concentration of 0.68 micrograms per cubic meter ($\mu g/m^3$) (threshold of 0.3 $\mu g/m^3$) at the maximally exposed individuals (MEIs). The unmitigated cancer risk and $PM_{2.5}$ would therefore exceed the BAAD's thresholds.

After applying assumptions associated with the proposed mitigation discussed above, mitigated health risk impacts were determined and are shown in **Table 5**. The mitigated construction activities would result in a maximum cancer risk of 9.2 in a million at the nearby daycare and the second highest impact is 1.9 in a million at a nearby offsite residential receptor.[13] The Project would also result in a

[13] Ramboll modeled an alternative scenario where the daycare facility would be occupied by workers. In that scenario, the cancer risk would be less than other nearby residential receptors.

non-cancer chronic HI of 0.0028 and a maximum $PM_{2.5}$ concentration 0.28 µg/m^3 at the Project's MEI for each health endpoint. As a result of the proposed mitigation, all health impacts would be below BAAD's thresholds of significance for health impacts. The locations of the MEIs are shown in **Figure 1**.

The Project's on on-site and off-site sensitive receptors are all below the BAAD thresholds of significance with the use of all Tier 4 Final diesel engines and dust control measures Thus, health risk impacts associated with the Project construction and operation are less than significant with mitigation. There may be other methods for reducing emissions below thresholds, but further analysis would be necessary to confirm they would meet the threshold.

Cumulative Health Risk Assessment

In accordance with BAAD 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 following as foreseeable future cumulative development projects to be included in the cumulative HRA:

- 435 East 3rd Avenue,
- 500 East 3rd Avenue,
- 222 East 4th Avenue,
- 616 B Street, and
- 477 9th Avenue .

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 BAAD 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 listed above. The BAAD provides tools with conservative estimates of impacts from many of these sources, including a stationary source tool and a mobile source screening tool for railways and major roadways.

The stationary source screening tool from the BAAD 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.

BAAD's mobile source screening tool is 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 screening tool includes impacts based on TACs including DPM for the year 2022 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

[14] The BAAD 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.

8,501 to 14,000 lbs), 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). Vehicle emission processes include running exhaust emitted from the tailpipe of vehicles, running losses when hot fuel vapors escape from the fuel system during operation, particulate matter from vehicle brakewear and tirewear, and re-entrained road dust from vehicles traveling along the road.

The railway screening tool includes impacts across the Bay Area trains used to]transport people along commuter/passenger rail lines, for goods movements at railyards in West Oakland and Richmond/North Richmond/San Pablo, and for freight movement along lines operated by the Burlington Northern Santa Fe Corporation (BNSF) and Union Pacific (UP) rail companies. Impacts are estimated based on the Spring 2025 arrival and departure schedules for commuter/passenger trains, the AB617 impact estimates from select railyards in West Oakland and Richmond-North Richmond-San Pablo, and 2024 fuel consumption rates for the freight lines operated by BSNF and UP rail companies.

The mobile screening tool 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 MEI.

Future Foreseeable Cumulative Development Sources

For the impacts from the operation of future foreseeable cumulative development projects, Ramboll utilized methodology consistent with CalEEMod to quantify all operational TAC emissions. Operational TAC emissions, including DPM and $PM_{2.5}$ emissions from emergency generators or fire pumps, are from the projects at 435 E 3rd Avenue, 500 E. 3rd Avenue, 222 East 4th Avenue, and 477 9th Avenue. The Project at 616 B Street does not have any operational sources and was therefore not included in the cumulative impact. Construction emissions from all projects listed above were not included in the cumulative impact sum because their construction schedules do not overlap with the construction of the Project.

Ramboll analyzed operation related health risks by estimating ambient air concentrations of DPM and $PM_{2.5}$ using consistent methodology used to estimate health risks for the Project. The health impacts from these future foreseeable development sources 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 6**. The combined impact from all the sources results in a maximum excess cancer risk of 66 in a million compared to a threshold of 100 in a million, a noncancer hazard index of 0.21 compared to a threshold of 10, and a PM2.5 concentration of 0.54 compared to a threshold of 0.80. Therefore, the Project's maximally exposed receptors are all below the BAAD thresholds of significance for cumulative health impacts with the use of all Tier 4 Final diesel engines and dust control measures. Thus, the cumulative health risk impacts associated with the Project are less than significant with mitigation

CLOSING

The analysis presented above represents emissions and health risk impacts from construction and operation of the proposed Project. On a project level, the Project does not exceed any BAAD CEQA significance thresholds, with the mitigation measures to control fugitive dust by watering the construction site two times per day and use an all Tier 4 diesel engine construction vehicle fleet. On a cumulative level, the combined impact from the project and nearby existing off-site sources and future foreseeable cumulative development projects do not exceed any BAAD CEQA threshold of significance.

Therefore, the Project does not result in any significant air quality of health risk impacts with the proposed mitigation.

Attachments:

Tables

Figures

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

Appendix B: Traffic Study

Appendix C: Revised Construction Schedule

Appendix D: AERMOD Input Files (provided Electronically)

TABLES

Table 1
Land Use Summary for Proposed Project
500 East 4th Avenue - Block 20
San Mateo, CA

Project Land Use Type[1]	CalEEMod® Land Use Type	CalEEMod® Land Use Subtype	Value	Units	Square Footage
Residential	Residential	Apartments Mid Rise	72	Dwelling Units	71,400
Residential and Office Parking Garage	Parking	Enclosed Parking Structure	64.5	1000sqft	64,500
Office Space	Commercial	General Office Building	99	1000sqft	99,025

Notes:

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

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

Table 2
Unmitigated Criteria Air Pollutants Emissions from Proposed Project Construction
500 East 4th Avenue - Block 20
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	2026	Off-Road Equipment	24	236	10	9.0
		Onroad Vehicles	0.88	20	0.18	0.17
Site Preparation	2026	Off-Road Equipment	33	353	15	14
		Onroad Vehicles	0.50	3.6	0.033	0.031
Grading	2026	Off-Road Equipment	47	485	19	18
		Onroad Vehicles	3.4	118	1.1	1.0
Building Construction	2026	Off-Road Equipment	52	464	13	12
		Onroad Vehicles	26	180	1.6	1.6
	2027	Off-Road Equipment	134	1,238	31	28
		Onroad Vehicles	69	473	4.3	4.1
Paving	2027	Off-Road Equipment	6.5	59	2.8	2.6
		Onroad Vehicles	0.47	4.7	0.044	0.042
		Paving	3.9	0	0	0
Architectural Coating	2027	Off-Road Equipment	2.0	14	0.33	0.30
		Onroad Vehicles	1.0	15	0.14	0.13
		Architectural Coating	2,072	0	0	0

Average Construction Emissions by day

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	0.72	7.1	0.23	0.21
2027	12	10	0.20	0.19
BAAD 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 BAAD Guidance for Assessing and Mitigating Air Quality Impacts.

Abbreviations:

BAAD - Bay Area Air 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
Mitigated Criteria Air Pollutants Emissions from Proposed Project Construction
500 East 4th Avenue - Block 20
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	2026	Off-Road Equipment	3.3	17	0.66	0.66
		Onroad Vehicles	0.88	20	0.18	0.17
Site Preparation	2026	Off-Road Equipment	4.4	23	0.87	0.87
		Onroad Vehicles	0.50	3.6	0.033	0.031
Grading	2026	Off-Road Equipment	8.2	43	1.6	1.6
		Onroad Vehicles	3.4	118	1.1	1.0
Building Construction	2026	Off-Road Equipment	10	162	1.6	1.6
		Onroad Vehicles	26	180	1.6	1.6
	2027	Off-Road Equipment	28	449	4.4	4.4
		Onroad Vehicles	69	473	4.3	4.1
Paving	2027	Off-Road Equipment	1.8	9.1	0.35	0.35
		Onroad Vehicles	0.47	4.7	0.044	0.042
		Paving	3.9	0	0	0
Architectural Coating	2027	Off-Road Equipment	0.20	1.1	0.041	0.041
		Onroad Vehicles	1.0	15	0.14	0.13
		Architectural Coating	2,072	0	0	0

Average Construction Emissions by day

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	0.22	2.2	0.029	0.029
2027	12	5.1	0.050	0.049
BAAD 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 BAAD Guidance for Assessing and Mitigating Air Quality Impacts.

Abbreviations:

BAAD - Bay Area Air 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 4
Unmitigated Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$
500 East 4th Avenue - Block 20
San Mateo, CA

Source Category	Project Construction + Operation				Project Operation		
	Excess Lifetime Cancer Risk[1,4]		Chronic HI[2,3]	$PM_{2.5}$ Concentration[3]	Excess Lifetime Cancer Risk[1]	Chronic HI[2,3]	$PM_{2.5}$ Concentration[3]
	in a million		unitless ratio	µg/m³	in a million	unitless ratio	µg/m³
Construction	103	13	0.032	0.68	--	--	--
Operation	0.030	0.494	--	--	1.1	3.6E-04	0.0018
Unmitigated Total	**103**	**13**	**0.032**	**0.68**	**1.1**	**3.6E-04**	**0.0018**
Significance Threshold	**10**	**10**	**1**	**0.30**	**10**	**1**	**0.30**
Exceeds thresholds?	**Yes**	**Yes**	**No**	**Yes**	**No**	**No**	**No**
Receptor Type	Daycare	Offsite Resident	Offsite Worker	Offsite Worker	Onsite Resident	Offsite Worker	Offsite Worker
Year	--	--	2026	2026	--	2027+	2027+
UTMx	560160	560080	560120	560120	560080	560100	560100
UTMy	4157860	4157820	4157840	4157840	4157860	4157820	4157820

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. PM2.5 concentration and Non-Cancer Hazard Index values represent annual values.
4. The cancer risk MEI is located at the Safari Kids daycare. However, Ramboll understands that it is unknown if the daycare would be operational during construction. Therefore, the second highest maximally exposed individual is presented, which occurs at a nearby offsite resident.

Abbreviations:

BAAD - Bay Area Air 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:

BAAD. 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 5
Mitigated Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$
500 East 4th Avenue - Block 20
San Mateo, CA

Source Category	Project Construction + Operation				Project Operation		
	Excess Lifetime Cancer Risk[1,4]		Chronic HI[2,3]	$PM_{2.5}$ Concentration[3]	Excess Lifetime Cancer Risk[1]	Chronic HI[2,3]	$PM_{2.5}$ Concentration[3]
	in a million		unitless ratio	µg/m³	in a million	unitless ratio	µg/m³
Construction	9.2	1.3	0.0028	0.22	--	--	--
Operation	0.030	0.57	--	--	1.1	3.6E-04	1.8E-03
Unmitigated Total	**9.2**	**1.9**	**0.0028**	**0.22**	**1.1**	**3.6E-04**	**1.8E-03**
Significance Threshold	**10**	**10**	**1**	**0.30**	**10**	**1**	**0.30**
Exceeds thresholds?	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Receptor Type	Daycare	Offsite Resident	Offsite Worker	Offsite Worker	Onsite Resident	Offsite Worker	Offsite Worker
Year	--	--	2027	2026	--	2027+	2027+
UTMx	560160	560060	560120	560120	560080	560100	560100
UTMy	4157860	4157840	4157840	4157840	4157860	4157820	4157820

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. PM2.5 concentration and Non-Cancer Hazard Index values represent annual values.
4. The cancer risk MEI is located at the Safari Kids daycare. However, Ramboll understands that it is unknown if the daycare would be operational during construction. Therefore, the second highest maximally exposed individual is presented, which occurs at a nearby offsite resident.

Abbreviations:

BAAD - Bay Area Air 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:

BAAD. 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 6
Construction and Operation Cumulative Risks and Hazards
500 East 4th Avenue - Block 20
San Mateo, CA

Source[1]	Daycare	Offsite Worker	Offsite Worker
	Construction + Operation	Construction + Operation	Construction+Operation
	Lifetime Excess Cancer Risk	Noncancer Chronic HI	$PM_{2.5}$ Concentration
	(in a million)		($\mu g/m^3$)
Stationary Sources[1]	39	0.17	3.0E-04
Roadways[2]	16	0.042	0.31
Railways[2]	0.65	2.41E-04	2.15E-03
Foreseeable Future Stationary Sources[3]	1.0	0.00087	0.0037
Project mitigated Construction + Operations	9.2	0.0028	0.22
Total	**66**	**0.21**	**0.54**
Theshold	**100**	**10**	**0.80**
Exceeds Threshold?	**NO**	**NO**	**NO**
Year	--	2027	2026
UTMx	560160	560120	560120
UTMy	4157860	4157840	4157840

Notes:

1. Health impacts from Stationary Sources estimated using BAAD Stationary Source Screening Analysis Tool. Risk values listed are maximum values, not expected values. Results have been adjusted by the BAAD-recommended distance multiplier, where relevant.

2. Cancer risk, chronic HI, and PM2.5 concentration values were determined using BAAD 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 at 435 East 3rd Avenue, 500 E. 3rd Avenue, 222 East 4th Avenue, 616 B Street, and 477 9th Avenue. Risk values from operations only were summed since the construction schedules do not overlap with the Block 20 construction schedule.

Abbreviations:

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

References:

Bay Area Air District (BAAD). 2025. Stationary Sources Screening Map. August. Available at: https://experience.arcgis.com/experience/89ba715c4dc7427f85e2d2fc5b8175ff/page/Stationary-Source-Screening-Tool?draft=true

Bay Area Air District (BAAD). 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 District (BAAD). 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 District (BAAD). 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 District (BAAD). 2025. CEQA Rail Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Cancer-Risk/6eut-z6mm

Bay Area Air District (BAAD). 2025. CEQA Rail Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Bay Area Air District (BAAD). 2025. CEQA Rail Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Table 7
Construction Phasing Schedule
500 East 4th Avenue - Block 20
San Mateo, CA

Phase[1]	Start Date	End Date	Number of Work Days	Days per Week
Demolition	6/1/2026	6/28/2026	20	5
Site Preparation	7/1/2026	7/21/2026	15	5
Grading	7/22/2026	10/10/2026	58	5
Building Construction	10/11/2026	8/17/2027	222	5
Paving	8/18/2027	9/2/2027	12	5
Architectural Coating	9/3/2027	9/18/2027	11	5

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

Table 8
Construction Equipment
500 East 4th Avenue - Block 20
San Mateo, CA

Phase	Equipment[1]	CalEEMod® Equipment[2]	Fuel[3]	Number[1]	Horsepower[1]	Daily Usage[4] (hours/day)	Utilization[5]	Unmitigated Engine Tier[6]	Mitigated Engine Tier[7]
Demolition	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	81	8	50%	No Specific Tier	Tier 4 Final
	Rubber Tired Dozers	Rubber Tired Dozers	Diesel	2	247	8	50%	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	158	8	50%	No Specific Tier	Tier 4 Final
Site Preparation	Rubber Tired Dozers	Rubber Tired Dozers	Diesel	3	247	8	75%	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	4	97	8	75%	No Specific Tier	Tier 4 Final
Grading	Graders	Graders	Diesel	1	187	8	75%	No Specific Tier	Tier 4 Final
	Rubber Tired Dozers	Rubber Tired Dozers	Diesel	1	247	8	50%	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	3	97	8	50%	No Specific Tier	Tier 4 Final
Building Construction	Cranes	Cranes	Diesel	1	231	7	1.54%	No Specific Tier	Tier 4 Final
	Forklifts	Forklifts	Diesel	3	89	8	25%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	84	8	75%	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	3	97	7	50%	No Specific Tier	Tier 4 Final
	Welders	Welders	Diesel	3	46	8	75%	No Specific Tier	Tier 4 Final
Paving	Pavers	Pavers	Diesel	1	130	8	75%	No Specific Tier	Tier 4 Final
	Paving Equipment	Paving Equipment	Diesel	2	132	8	80%	No Specific Tier	Tier 4 Final
	Rollers	Rollers	Diesel	2	80	8	80%	No Specific Tier	Tier 4 Final
Architectural Coating	Air Compressors	Air Compressors	Diesel	1	78	6	75%	No Specific Tier	Tier 4 Final

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, consistent with the City of San Mateo guidelines.
5. Utilization is calculated based on the total usage days for the equipment divided by the total days in the phase.
6. Unmitigated equipment tier is based on a fleetwide average from CalEEMod® 2022.1.
7. Mitigated equipment are assumed to meet Tier 4 Final emission standards, according to the Project Sponsor.

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 9
Construction Trips
500 East 4th Avenue - Block 20
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[1] (one-way trips/phase)	Trip Lengths[1] (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker	Vendor	Hauling	Worker	Vendor	Hauling
Demolition	2026	20	10	5	120	10.8	7.3	20	2,160	730	2,400
Site Preparation	2026	15	10	5	0	10.8	7.3	20	1,620	548	0
Grading	2026	58	10	5	820	10.8	7.3	20	6,264	2,117	16,400
Building Construction	2026	59	135	62	27	10.8	7.3	20	86,022	26,703	0,532
	2027	163	135	62	73	10.8	7.3	20	237,654	73,774	1,468
Paving	2027	12	12	4	20	10.8	7.3	20	1,555	350	400
Architectural Coating	2027	11	25	10	80	10.8	7.3	20	2,970	0,803	1,600

EMFAC Data

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Mateo County Calendar Years 2026-2027 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 daily 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 10
Estimated Emissions from Construction Paving Off-Gassing
500 East 4th Avenue - Block 20
San Mateo, CA

Phase	Year	Asphalt-Paved Area (sqft)	Asphalt-Paved Area (acre)	Asphalt Paving Off-Gassing ROG Emission Factor (lb/acre)[1]	Asphalt Paving Off-Gassing ROG Emissions (lb)
Paving	2027	64,500	1.48	2.62	3.9

Notes:

1. Based on CalEEMod defaults, assumes 100% asphalt paving for the entire parking lot.
2. Emission factor from CalEEMod User's Guide, Appendix C.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
lb - pound
ROG - reactive organic gas
sqft - square foot

References:

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

Table 11
Estimated Emissions from Construction Architectural Coating Off-Gassing
500 East 4th Avenue - Block 20
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%	--
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%	--
VOC Content	Indoor Paint VOC Content	100	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/yr)
Architectural Coating	Apartments Mid Rise	2027	71,400	192,780	144,585	48,195	--	1,006
	Enclosed Parking Structure	2027	64,500	3,225	2,903	323	3,870	34
	General Office Building	2027	99,025	198,050	148,538	49,513	--	1,033
Total VOC Emissions by Year							**2,027**	**2,072**

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
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 12
Emission Factors for Entrained Roadway Dust
500 East 4th Avenue - Block 20
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	
$PM_{2.5}$ (lb/VMT)	3.3E-04
sL = roadway silt loading [grams per square meter - g/m^2]	0.50
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	
$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

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 is assumed 0.5 g/m3 according to BAAD CEQA Guidelines. The number of wet days is obtained from BAAD guidelines for San Mateo county. Other parameters (average weight of vehicles, size multipliers) are from ARB 2021. PM2.5 is assumed to be 15% of PM10 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
BAAD - Bay Area Air District

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

BAAD. 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

Table 13
Emissions Calculations for Entrained Road Dust
500 East 4th Avenue - Block 20
San Mateo, CA

Entrained Road Dust Emission Factors

PM_{10} Emission Factor [lb/VMT]	2.8E-03
$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

Phase	Year	Construction Days	Total VMT (miles)	Total Emissions (lb) Fugitive $PM_{2.5}$
Demolition	2026	20	5,290	2.2
Site Preparation	2026	15	2,168	0.91
Grading	2026	58	24,781	10
Building Construction	2026	59	113,257	48
	2027	163	312,896	131
Paving	2027	12	2,306	0.97
Architectural Coating	2027	11	5,373	2.3

Abbreviations:

lb - pound

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

VMT - vehicle miles travelled

Table 14
Fugitive Dust Emissions from Building Demolition Waste
500 East 4th Avenue - Block 20
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	ft^2	ton	lb/ton	lb/ton	ton/yr	ton/yr
Demolition	2026	20	1,500	89	4.5E-04	0.0031	1.6E-04	1.0E-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 controlled 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 15
Fugitive Dust Emissions from Off-Road Grading Activity
500 East 4th Avenue - Block 20
San Mateo, CA

Construction Phase	Year	Equipment	CalEEMod Grading rate[1,2]	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	1.7E-03	6.5E-04
Grading	2025	Rubber Tired Dozers	0.50	0.34	0.17	1.7E-03	6.5E-04
Grading	2025	Tractors/Loaders/Backhoes	0.50	0.34	0.17	1.7E-03	6.5E-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 controlled 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
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 16
Fugitive Dust Emissions from Truck Loading Activity
500 East 4th Avenue - Block 20
San Mateo, CA

Construction Phase	Year	Number of Days	Haul Trips	Total Material Loaded[1]	Unmitigated Emissions[3]	Mitigated Emissions[3,4]
					$PM_{2.5}$	$PM_{2.5}$
		days	# trips	ton	ton/yr	ton/yr
Demolition	2026	20	120	89	1.6E-06	6.3E-07
Grading	2026	58	820	24,714	4.5E-04	1.7E-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 *= $k_{PM2.5}$, 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 controlled 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 17
Fugitive Dust Emissions from Off-Road Bulldozing Activity
500 East 4th Avenue - Block 20
San Mateo, CA

Construction Phase[1]	Equipment	Year	Quantity	Utilization %	Avg. Usage Hours per Day	Emission Factor[2]	Unmitigated Emissions[3]	Mitigated Emission[3,4]
						$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$
				%	hr/day	lb/hr	ton/yr	ton/yr
Site Preparation	Rubber Tired Dozers	2026	3	75%	8	0.41	0.056	0.022

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 = $F_{PM2.5}$, 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 12 hours per day, consistent with the modeled hours from 7 AM - 7 PM.
4. Fugitive PM emissions will be controlled 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 18
Modeled Unmitigated Emission Rates from Proposed Project Construction Sources
500 East 4th Avenue - Block 20
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	2026	2.8E-04	2.6E-04	0.0019	2.6E-07	2.6E-07	4.6E-06
Site Preparation	2026	4.3E-04	4.0E-04	0.0032	7.4E-08	8.0E-08	2.4E-06
Grading	2026	5.5E-04	3.9E-04	3.1E-04	1.4E-06	1.3E-06	1.9E-05
Building Construction	2026	3.8E-04	3.5E-04	0	3.6E-06	4.0E-06	1.2E-04
	2027	0.0009	0.0008	0	9.6E-06	1.0E-05	3.4E-04
Paving	2027	8.0E-05	7.3E-05	0	7.1E-08	7.6E-08	2.2E-06
Architectural Coating	2026	0.0E+00	0.0E+00	0	0.0E+00	0.0E+00	0.0E+00

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 0.83 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 19
Modeled Mitigated Emission Rates from Proposed Project Construction Sources
500 East 4th Avenue - Block 20
San Mateo, CA

Mitigated 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	2026	1.9E-05	1.9E-05	7.4E-04	2.6E-07	2.6E-07	4.6E-06
Site Preparation	2026	2.5E-05	2.5E-05	0.0013	7.4E-08	8.0E-08	2.4E-06
Grading	2026	4.7E-05	4.8E-05	1.2E-04	1.4E-06	1.3E-06	1.9E-05
Building Construction	2026	4.7E-05	4.8E-05	0	3.6E-06	4.0E-06	1.2E-04
	2027	1.3E-04	1.3E-04	0	9.6E-06	1.0E-05	3.4E-04
Paving	2027	1.0E-05	1.0E-05	0	7.1E-08	7.6E-08	2.2E-06
Architectural Coating	2026	1.2E-06	1.2E-06	0	2.1E-07	2.1E-07	5.0E-06

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 0.82 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 20
Estimated Emissions from Emergency Fire Pump Operation
500 East 4th Avenue - Block 20
San Mateo, CA

Emission Factors for Diesel Fire Pump

Engine Type	Engine Tier	Engine Size Range (hp)		Engine Emission Factors1 (g/bhp-hr)	
		Minimum	Maximum	DPM	$PM_{2.5}$
Fire Pump	Tier 3	25	50	0.45	0.45

Fire Pump Information[2]

Scenario	Engine Type	Fuel Type	Size	Size	Load Factor	Annual Operation[3]
			kW	hp		hr/yr
Project Operation	Fire Pump	Diesel	26	35	0.73	50

Fire Pump Emissions

Scenario	Engine Type	Size (hp)	Quantity	Annual Emissions g/s	
				DPM	$PM_{2.5}$
Project Operation	Fire Pump	35	1	1.8E-05	1.8E-05

Notes:

1. Engine emission factors for PM10 and PM2.5 (assumed all engines are diesel fueled and that all PM10 is diesel particulate matter) are based on CalEEMod defaults.
2. Number and fuel-type of fire pump engine was provided by the Project Applicant. The size of the engine was assumed to be 35 horse-power based on similar nearby projects.
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:

CalEEMod® - CALifornia Emissions Estimator MODel®
g/bhp-hr - grams per brake horsepower hour
hp - horsepower
kW - kilowatt
NOx - oxides of nitrogen
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
g - gram
s - second

References:

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

Table 21
Estimated Emissions from Emergency Generator Operation
500 East 4th Avenue - Block 20
San Mateo, CA

Emission Factors for Diesel Fire Pump

Engine Type	Engine Tier	Engine Size Range (hp)		Engine Emission Factors1 (g/bhp-hr)	
		Minimum	Maximum	DPM	$PM_{2.5}$
Emergency Generator	Tier 2	530	589	0.15	0.15

Fire Pump Information[2]

Scenario	Engine Type	Fuel Type	Size	Size	Load Factor	Annual Operation[3]
			kW	hp		hr/yr
Project Operation	Emergency Generator	Diesel	400	589	0.73	50

Fire Pump Emissions

Scenario	Engine Type	Size (hp)	Quantity	Annual Emissions g/s	
				DPM	$PM_{2.5}$
Project Operation	Emergency Generator	589	1	1.0E-04	1.0E-04

Notes:

1. Engine emission factors for PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled and that all PM10 is diesel particulate matter) are based on CalEEMod defaults.
2. The number, fuel type, and specifications of the emergency generator engine 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:

CalEEMod® - CALifornia Emissions Estimator MODel®
g/bhp-hr - grams per brake horsepower hour
hp - horsepower
kW - kilowatt
NOx - oxides of nitrogen
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
g - gram
s - second

References:

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

Table 22
Construction Modeling Parameters
500 East 4th Avenue - Block 20
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	3,445	5	1.2
Construction Equipment - Fugitive Dust	Area[2]	1	3,445	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	3.2	10
		S. Claremont St	6.8	19	3.4	3.2	8.8
		E. 4th Ave	6.8	20	3.4	3.2	9.3
		E. 5th Ave	6.8	18	3.4	3.2	8.4
		S. Delaware	6.8	22	3.4	3.2	10

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 BAAD 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 BAAD CEQA Guidelines calculates the release height for haul trucks as 0.5 times the top of the plume. According to 2022 BAAD 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
BAAD - Bay Area Air District
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

BAAD. 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 23
Stationary Sources Modeling Parameters
500 East 4th Avenue - Block 20
San Mateo, CA

Source	Source Type	Number of Sources	Release Height[2,3]	Exit Temperature[2,3]	Exit Diameter[2,3]	Exit Velocity[2,3]
			(m)	(K)	(m)	(m/s)
Fire Pump[1]	Point	1	28.2	1060.2	0.08	49.5
Generator[1]	Point	1	28.2	719.9	0.18	16.8

Notes:

1. One fire pump and one generator (rated 35 and 589 horsepower respectively) would be located at the proposed building.
2. Fire pump was modeled using default parameters from the BAAD's 2022 CEQA guidelines and guidance from the project sponsor.
3. The generator was modeled based on information from the engine specification sheet, guidance from the project sponsor and where information was not available, default parameters from the BAAD's 2022 CEQA guidelines.
4. Annual emissions of DPM and PM2.5 were based on 50 hours of non-emergency operation, as shown in Table 20.

Abbreviations:

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

References:

Bay Area Air District (BAAD). 2023. Air Quality Guidelines Appendix E: Recommended Methods for Screening and Modeling Local Risks and Hazards. Available online 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 24
Construction and Operational Exposure Parameters
500 East 4th Avenue - Block 20
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]
Resident	Construction	2026	3rd Trimester	361	0.43	1.0	350	10	25,500	1	0.021
			Age 0-<2	1,090	0.57	1.0		10		1	0.086
		2027	Age 0-<2	1,090	1	1.0		10		1	0.11
	Operation	2027	Age 0-<2	1,090	0.28	1.0		10		1	0.042
		2027+	Age 0-<2	1,090	0.43	1.0		10		1	0.064
			Age 2-<16	572	14	1.0		3		1	0.33
			Age >16	261	13.57	0.73		1		1	0.035
School	Construction	2026	Age 2-<16	520	1	--	250	3		4.2	0.064
		2027	Age 2-<16	520	1	--		3		4.2	0.064
	Operation	2027	Age 2-<16	520	0.28	--		3		1	0.0043
		2027+	Age 2-<16	520	4	--		3		1	0.061
Daycare	Construction	2026	Age 0-<2	1,090	1	--	350	10		4.2	0.63
		2027	Age 2-<16	520	1	--		3		4.2	0.090
	Operation	2027	Age 2-<16	520	0.28	--	250	3		1	0.0043
		2027+	Age 2-<16	520	4	--		3		1	0.061
Pre K-8th	Construction	2026	Age 2-<16	520	1	--	250	3		4.2	0.064
		2027	Age 2-<16	520	1	--		3		4.2	0.064
	Operation	2027	Age 2-<16	520	0.28	--		3		1	0.0043
		2027+	Age 2-<16	520	10	--		3		1	0.15
Offsite Worker	Construction	2026	Age 16-70	230	1	--	250	1		4.2	9.5E-03
		2027	Age 16-70	230	1	--		1		4.2	9.5E-03
	Operation	2027	Age 16-70	230	0.28	--		1		1	6.4E-04
		2027+	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]
Offsite Resident	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 BAAD 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 begining 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 K-8th receptor is assumed to be exposed during age 2-14. For the operation-only scenario, exposure begins at the start of operations.
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 BAAD (BAAD 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 BAAD (2022).
4. Exposure frequency is consistent with 2022 BAAD 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 BAAD 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 BAAD 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 BAAD 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
BAAD - Bay Area Air 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

BAAD. 2022. 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 25
Toxicity Values
500 East 4th Avenue - Block 20
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:

California Air Resources Board (ARB)/ California Office of Environmental Health Hazard Assessment (OEHHA). 2023. Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. Updated on: May 1, 2023. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/toxics/healthval/contable05012023.pdf

Table 26
Health Risk Impacts from Stationary Sources for Cumulative Analysis
500 East 4th Avenue - Block 20
San Mateo, CA

Location of MEIR	BAAQMD Facility Number[1]	Facility Name[1]	Facility Address	Source type (used for distance multiplier)[1]	Location[1,2]		Health Risk Screening Values Adjusted by BAAD Screening Tool[3]		
							Daycare	Offsite Worker	Offsite Worker
					Latitude	Longitude	Lifetime Excess Cancer Risk (in a million)	Noncancer Chronic HI	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Off-Site	110792	Gas and Shop	609 E 4th Ave	Gasoline Stations	37.566756	-122.31903	16	0.070	0
	112267	Third Street Shell	611 E 3rd Ave	Gasoline Stations	37.567493	-122.3201	14	0.060	0
	112491	San Mateo Gas Co	706 E 4th Ave	Gasoline Stations	37.56695	-122.31807	8.3	0.036	0
	200272	All Car Auto Painting & Body Repair	817 S CLAREMONT ST	Repair and Maintenance	37.563378	-122.31689	0	1.3E-04	0
	15342	Eurocraft Auto Body LLC	649 S Claremont St	Auto Body Coating Operation	37.564	-122.318	0	1.6E-04	0
	20478	Gramercy on the Park Condos	555 Laurel Avenue	Generators	37.564	-122.321	0.23	6.0E-05	3.0E-04

Notes:

1. Facility information are provided by the BAAD.
2. Locations are approximate for preliminary assessment of risk.
3. Health impacts estimated using BAAD Stationary Source Screening Analysis Tool. Risk values listed are maximum values, not expected values. Results have been adjusted by the BAAD-recommended distance multiplier, where relevant.

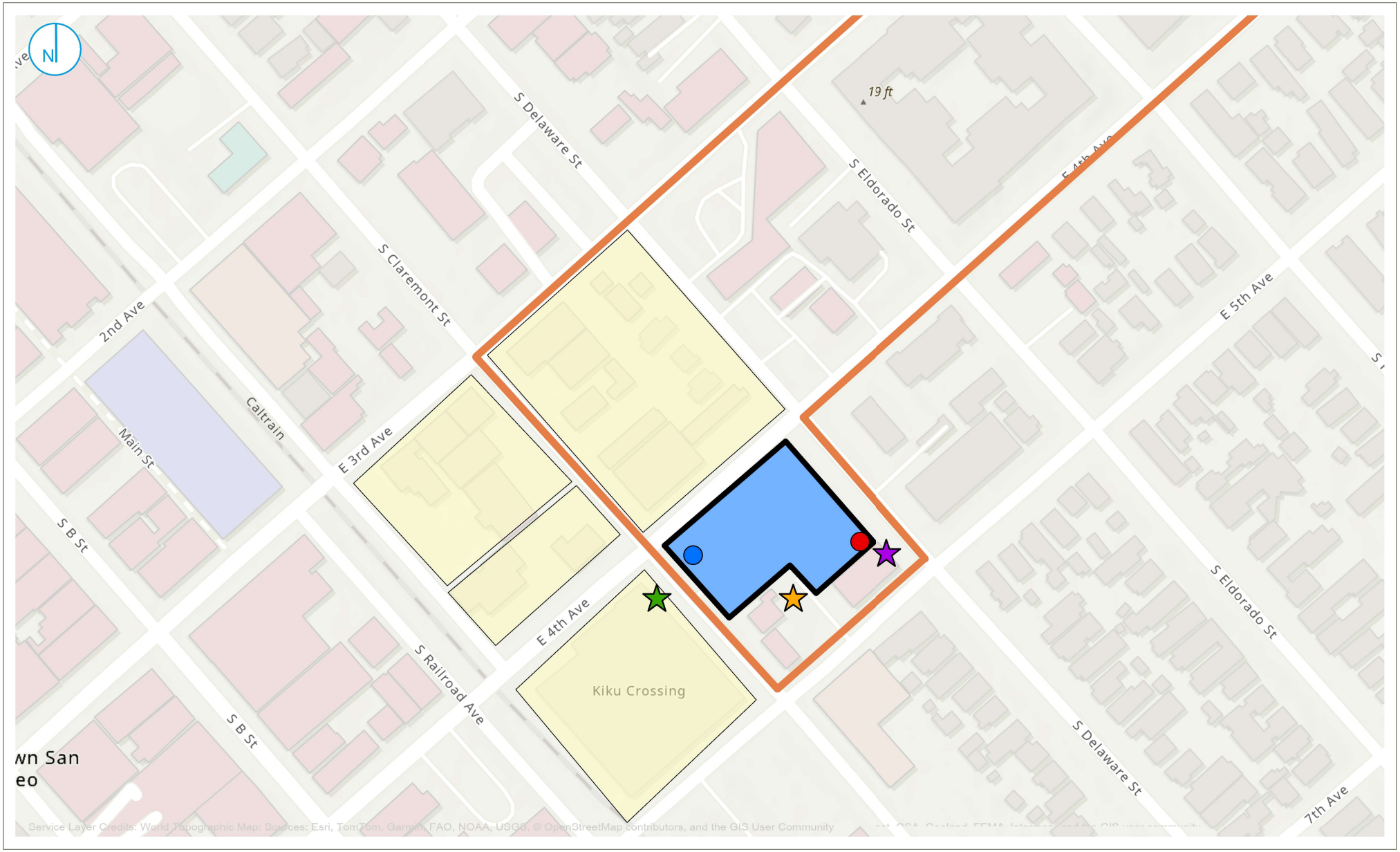
Abbreviations:

µg - microgram
BAAD - Bay Area Air District
ft - feet
HI - hazard index
m - meter
m^3 - cubic meter
MEIR - maximum exposed individual receptor
$PM_{2.5}$ - fine particulate matter

References:

Bay Area Air District (BAAD). 2025. Stationary Sources Screening Map. August. Available at: https://experience.arcgis.com/experience/89ba715c4dc7427f85e2d2fc5b8175ff/page/Stationary-Source-Screening-Tool?draft=true

FIGURES



Fire Pump
Generator
Project Site
Nearby Buildings
Hauling Route

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

0 500 1,000 Feet

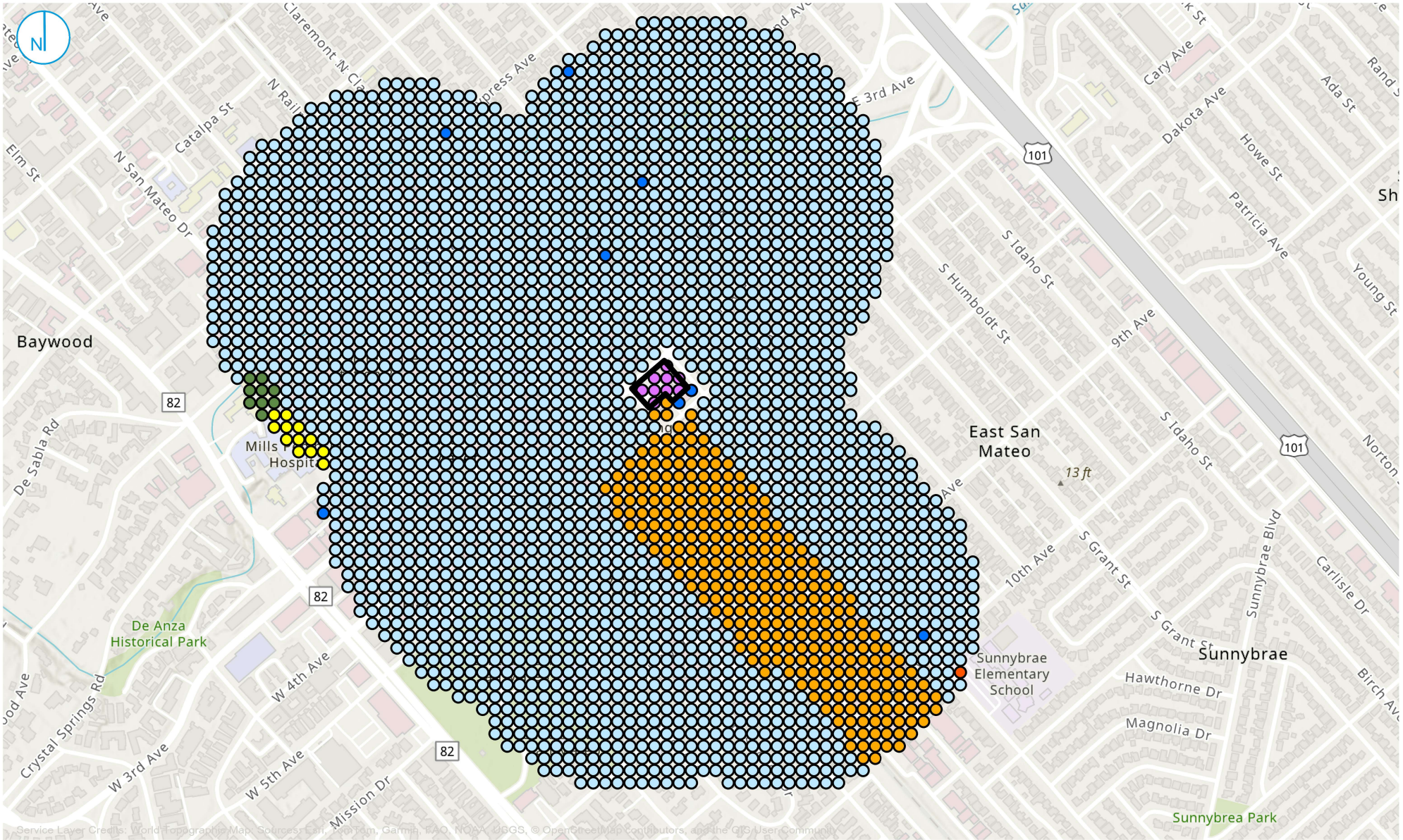
MODELED SOURCES, VICINITY AND MAXIMALLY EXPOSED INDIVIDUALS

Block 20
500 E 4th Avenue
San Mateo, CA

FIGURE 01

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL



Project Site

RecType

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

PROJECT SITE AND MODELED RECEPTORS

Block 20
500 E 4th Avenue
San Mateo, CA

FIGURE 02

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.

RAMBOLL

0 2,500 5,000 Feet

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	72.0	☐
Parking	Enclosed Parking Structure	Spaces	161.0	☐
Commercial	General Office Building	KSF	99.0	☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
				☐
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

Block 20
Fehr & Peers

Existing Counts		AM												PM										
Int #	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	3rd/Claremont	8	78	4	8	84	35	14	55	21	59	418	37	9	68	10	13	96	41	28	121	27	24	376	34
2	3rd/S Delaware	20	208	0	0	386	17	16	0	68	219	460	135	25	258	0	0	476	19	20	0	102	231	417	119
3	4th/Claremont	6	86	32	44	65	13	14	329	4	6	90	11	8	66	43	82	88	31	9	589	9	4	80	5
4	4th/Delaware	18	204	90	298	309	85	20	363	15	0	0	0	19	245	141	377	356	96	29	650	18	0	0	0
5	5th/Claremont	15	84	18	8	64	7	17	154	20	62	128	15	13	65	40	17	66	12	29	258	15	45	153	25
6	5th/Delaware	17	234	10	9	217	98	41	118	20	12	98	33	19	315	17	11	272	89	63	204	36	13	98	34
Opening Year		AM												PM										
Int #	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	3rd/Claremont	11	88	11	8	87	35	14	54	47	108	393	34	22	63	10	13	110	41	21	101	15	16	382	37
2	3rd/S Delaware	24	201	0	0	393	14	12	0	63	246	515	135	27	260	0	0	481	16	24	0	113	249	400	119
3	4th/Claremont	6	97	47	44	120	20	29	324	4	6	82	10	9	56	78	68	91	34	3	557	9	8	97	6
4	4th/Delaware	19	206	94	287	336	79	20	388	26	0	0	0	17	260	160	373	383	94	27	679	16	0	0	0
5	5th/Claremont	33	80	18	9	83	52	25	168	30	62	138	21	25	64	40	14	56	36	51	288	35	41	148	23
6	5th/Delaware	17	234	10	10	211	97	41	119	21	12	98	33	19	315	17	11	272	89	66	207	39	13	98	34
Opening Year + Project		AM												PM										
Int #	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	3rd/Claremont	11	89	11	8	91	35	14	54	47	144	393	34	22	65	10	13	110	41	18	101	15	16	382	37
2	3rd/S Delaware	24	201	0	0	394	14	12	0	63	258	551	135	27	261	0	0	481	16	24	-3	113	249	400	119
3	4th/Claremont	9	98	52	44	160	20	29	324	4	6	82	10	25	58	110	68	88	34	3	556	9	8	97	6
4	4th/Delaware	19	206	94	287	336	92	20	393	26	0	0	0	17	260	160	373	383	94	27	710	16	0	0	0
5	5th/Claremont	33	83	18	10	84	55	25	168	30	62	138	21	25	64	40	16	58	52	49	288	35	41	148	23
6	5th/Delaware	20	234	10	10	211	97	41	119	21	12	98	33	19	315	17	11	272	89	66	207	39	13	98	34
Cumulative		AM												PM										
1	3rd/Claremont	20	99	20	10	96	50	30	100	50	114	450	50	30	88	10	20	130	60	73	270	100	30	440	50
2	3rd/S Delaware	30	220	0	0	399	50	20	0	100	378	524	140	40	269	0	0	500	50	120	3	170	250	440	120
3	4th/Claremont	7	109	55	60	120	20	30	430	10	10	220	20	14	78	78	110	123	40	10	681	10	20	130	10
4	4th/Delaware	80	240	100	340	340	177	20	465	30	0	0	0	80	260	160	380	420	110	40	759	50	0	0	0
5	5th/Claremont	16	89	24	0	53	6	25	206	23	87	261	24	21	88	39	9	80	-5	50	352	25	34	293	24
6	5th/Delaware	17	320	10	20	230	100	50	120	40	20	310	70	20	320	70	20	320	150	70	300	40	20	260	130
Cumulative + Project		AM												PM										
1	3rd/Claremont	20	100	20	10	100	50	30	100	50	150	450	50	30	90	10	20	130	60	70	270	100	30	440	50
2	3rd/S Delaware	30	220	0	0	400	50	20	0	100	390	560	140	40	270	0	0	500	50	120	0	170	250	440	120
3	4th/Claremont	10	110	60	60	160	20	30	430	10	10	220	20	30	80	110	110	120	40	10	680	10	20	130	10
4	4th/Delaware	80	240	100	340	340	190	20	470	30	0	0	0	80	260	160	380	420	110	40	790	50	0	0	0
5	5th/Claremont	16	92	24	1	54	9	25	206	23	87	261	24	21	88	39	11	82	11	48	352	25	34	293	24
6	5th/Delaware	20	320	10	20	230	100	50	120	40	20	310	70	20	320	70	20	320	150	70	300	40	20	260	130

APPENDIX C
REVISED CONSTRUCTION SCHEDULE

Appendix C
Revised Construction Phasing Schedule
500 East 4th Avenue - Block 20
San Mateo, CA

Phase[1]	Start Date	End Date	Number of Work Days	Days per Week
Demolition	6/1/2027	6/28/2027	20	5
Site Preparation	7/1/2027	7/21/2027	15	5
Grading	7/22/2027	10/10/2027	58	5
Building Construction	10/11/2027	8/17/2028	222	5
Paving	8/18/2028	9/2/2028	12	5
Architectural Coating	9/3/2028	9/18/2028	11	5

Notes:

1. This table presents a revised construction schedule provided by the Project Sponsor after completion of the impact analysis. Construction emissions and health impacts were evaluated based on the conservative construction schedule presented in Table 7. The revised schedule would not be expected to result in greater impacts.

APPENDIX D
AERMOD INPUT FILES (PROVIDED ELECTRONICALLY)