APPENDIX A

Air Quality Assessment

RAMBOLL

ENVIRONMENT
& HEALTH

MEMO

Date: **August 28, 2020**

To: **Mike Campbell, Project Manager, David J Powers & Associates**

From: **Michael Keinath**
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Subject: **DRAFT CEQA AIR QUALITY AND HEALTH RISK ASSESSMENT FOR THE PENINSULA HEIGHTS TOWNHOUSES PROJECT, SAN MATEO, CALIFORNIA**

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Ramboll US Corporation (Ramboll) conducted California Environmental Quality Act (CEQA) air quality and health risk analyses for the proposed Peninsula Heights Townhouses residential development on Campus Drive in San Mateo, California (the "Project").

According to the Project sponsor, the Project is a replacement of underutilized office park space with medium density residential units and open space. The proposed Project includes the demolition of six existing commercial buildings on the 26-acre site and the construction of 291 residential units within 31 three to four story buildings. Parking will consist of grade-level garages in each residential unit as well as grade-level parking throughout the site. Nearby uses to the site include residential uses to the north; commercial uses and residential uses to the east; commercial uses, including lab space, as well as California State Route 92 to the west; and residential and commercial uses to the south. The site would include over six acres of public and private parkland. According to the Project sponsor, the proposed Project will not include any major sources of air emissions besides typical residential uses.

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

CEQA THRESHOLDS OF SIGNIFICANCE

The City of San Mateo is the lead agency responsible for Project approval. Per City of San Mateo requirements, Ramboll evaluated the Project in accordance with the current Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines, which were updated in May 2017.[1] These guidelines present methods for evaluating compliance with CEQA as well as thresholds for determining significance. With respect to the Project, the BAAQMD thresholds of significance are as follows:

[1] BAAQMD. 2017. California Environmental Quality Act (CEQA) Air Quality Guidelines. May. Available online at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

BAAQMD CEQA Thresholds of Significance	
Criteria Air Pollutants (and Precursors)	**Construction-Related Average Daily Emissions (lbs/day)**
ROGs	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
Risks and Hazards for New Sources and Receptors (Individual Project)	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >10.0 in a million Increased non-cancer risk of > 1.0 HI (chronic or acute) Ambient $PM_{2.5}$ increase: > 0.3 µg/m^3 annual average Zone of Influence: 1,000-foot radius from fence line of source or receptor
Risks and Hazards for New Sources and Receptors (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 TACs emitted during construction, including a cumulative assessment from all sources within the zone of influence. The memorandum also includes the health effects of offsite sources on future onsite residents of the proposed Project. An operational HRA of the Project's impacts on surrounding properties is assumed to

not be required as the Project is smaller than operational CAP screening levels (451 dwelling units) and is therefore not included in this analysis.

SUMMARY OF RESULTS

Construction emissions are presented in **Table 5**. As shown in the table, CAP emissions for construction are below the BAAQMD thresholds of significance. Health risk impacts from the Project and on a cumulative basis are shown in **Tables 10** through **12**, respectively. These are also below the BAAQMD thresholds of significance.

DATA SOURCES AND EMISSIONS METHODOLOGIES

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

Construction CAP Emissions Estimation

Ramboll utilized the California Emission Estimator Model version 2016.3.2 (CalEEMod®)[2] to quantify all construction CAP emissions. CalEEMod® is a statewide program designed to calculate both CAP and GHG emissions for development projects in California. CalEEMod® provides a simple platform to calculate both construction emissions and operational emissions from a land use project. It calculates both the daily maximum and annual average for CAPs as well as total or annual GHG emissions.

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

Construction emissions from the Project include both on-site, off-road heavy equipment as well as off-site, on-road vehicle travel. As described below, Ramboll updated several default assumptions to Project-specific information to generate emission estimates with CalEEMod®, for consistency with BAAQMD and California Air Pollution Control Officer Association (CAPCOA) methods. Where project-specific data were not available, Ramboll used CalEEMod® defaults for the land uses shown in **Table 1**. The construction phasing, equipment, and trip rate assumptions are shown in **Tables 2**, **3**, and **4**. An operational year of 2022 was assumed. The CalEEMod® output report is included as **Appendix A**.

Updates to CalEEMod® Default Assumptions

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

- Project construction is assumed to use fleet-average tier engines for all equipment.
- Off-road equipment hours were updated to reflect utilization of each equipment per phase as provided by the Project sponsor.
- Emission factors for on-road equipment were adjusted from CalEEMod® defaults to use values for San Mateo County in 2022 from the more recently approved ARB Emissions Factor model

[2] California Air Pollution Control Officers Association (CAPCOA). 2016. 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: http://epa.gov/ttnchie1/ap42/.

(EMFAC2017) with SAFE rule adjustment. On September 27, 2019, the USEPA and NHTSA published the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One.[4] The SAFE rule (Part One) went into effect in November 2019, and revoked California's authority to set its own GHG standards and set zero emission vehicle mandates in California. The SAFE rule freezes new zero emission vehicle (ZEV) sales at model year 2020 levels for year 2021 and beyond and will likely result in a lower number of future ZEVs and a corresponding greater number of future gasoline internal combustion engine vehicles. In response to the USEPA's adoption of the SAFE rule (Part One), CARB has issued guidance regarding the adjustment of vehicle emissions factors to account for the rule's implications on criteria air pollutants,[5] which was applied to this Project.

- Haul truck trips for demolition were calculated by CalEEMod® based on the amount of demolition required for construction. The haul truck trips for grading were estimated by the Project sponsor based on soil exported and imported during construction. These estimates are shown in **Table 4**.

LOCAL COMMUNITY RISK AND HAZARD IMPACTS

Local Carbon Monoxide (CO) Impacts

According to the 2017 BAAQMD CEQA Guidelines, the Project would result in less-than-significant localized CO concentrations if it meets the following criteria:

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

Based on the traffic volume data provided by the Project sponsor (see **Appendix B**), the maximum hourly intersection traffic volume for net new Project trips is a reduction of 22 vehicles per hour. Thus, operational impacts from Project CO emissions would be less than significant.

Toxic Air Contaminant (TAC) Emissions

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

1. Diesel Particulate Matter (DPM): DPM emissions were used to evaluate the cancer risk and non-cancer chronic HI from Project construction. In this analysis, both onsite (i.e., construction equipment) and local offsite (i.e., construction mobile sources) particulate matter less than 10 microns (PM_{10}) exhaust emissions[6] 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 particulate matter less 2.5 microns ($PM_{2.5}$) emissions were used to evaluate the $PM_{2.5}$ concentration due to the Project construction. The modeled emissions were calculated using the same conservative assumptions as the DPM calculation.

Total modeled emissions are presented in **Table 5** as total PM_{10} and $PM_{2.5}$ from construction.

[4] One National Program. (84 Fed. Reg. 51,310 (Sept. 27, 2019.) Available at: https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-one-national-program-federal-preemption-state. Accessed: August 2020.
[5] CARB. November 20, 2019. EMFAC Off-Model Adjustment Factors to Account for the SAFE Vehicle Rule Part One. Available at: https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_draft.pdf. Accessed: August 2020.
[6] Local offsite (mobile source) emissions were conservatively calculated by including CalEEMod® on-road emissions for the entire default trip length in the screening model.

TAC emissions from operation were not estimated. BAAQMD recommends analyzing TAC emissions from roadways with over 10,000 vehicles per day. As discussed above, per the traffic assessment conducted by Kittelson & Associates, Inc. (see **Appendix B**), the Project is expected to generate a net 268 daily trips. Therefore, the Project would not generate 10,000 vehicles per day, so TAC emissions from roadways is not needed. The Project also does not contain other significant sources of TAC emissions.

Construction Health Risk Assessment

Ramboll analyzed Project construction-related risks by estimating ambient air concentrations of DPM and $PM_{2.5}$. To estimate air concentrations of DPM and $PM_{2.5}$, Ramboll used AERMOD, a steady-state Gaussian plume model developed by USEPA for regulatory applications. AERMOD requires emission source locations and release parameters, receptor locations, and processed meteorological data. The construction source parameters are shown in **Table 6**. Ramboll used five years of meteorological data from the San Francisco International Airport, which was the nearest dataset available to the Project.

The AERMOD input files are provided electronically as **Appendix C**. The receptor and source setup are shown in **Figure 1**.

Modeled Emissions

Based on the construction schedule provided by the Project sponsor, the Project will be completed in one phase. Off-site residential receptors exposed to the entire construction period were evaluated to determine the maximum health impacts of construction. All emissions from construction were summed by year and modeled on an annual basis for off-site receptors. These modeled emission rates are shown in **Table 7**.

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 (OEHHA 2015), which combines information from previously-released and adopted technical support documents to delineate OEHHA's revised risk assessment methodologies based on current science. The BAAQMD has issued HRA Guidelines formally adopting the OEHHA 2015 Guidance Manual.[7] This analysis followed the recommended methodology from the 2015 OEHHA Hot Spots Guidance. Ramboll conservatively evaluated Project impacts due to construction emissions using default exposure assumptions for a resident child from OEHHA (2015) unless otherwise noted.[8] The resident child scenario assumes a much higher daily breathing rate and age-sensitivity factor (ASF)[9] than other sensitive receptor populations and therefore is the most conservative scenario to evaluate for this analysis. The exposure parameters used to estimate excess lifetime cancer risks for a resident child are presented in **Table 8**.

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

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

Where:

[7] BAAQMD. 2016. Proposed Health Risk Assessment Guidelines. Air Toxics NSR program. January. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2016/reg-2-5/hra-guidelines_clean_jan_2016-pdf.pdf?la=en

[8] BAAQMD. 2010. BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.

[9] Ibid.

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 (Cal/EPA 2003).

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 utilized the toxicity values for DPM. Toxicity values for DPM (Cal/EPA 2016) are as presented in **Table 9**.

Cancer risk and chronic HI were calculated from ambient annual concentrations using intake factors, cancer potency factors, and chronic reference exposure levels calculated consistent with the 2015 OEHHA Hot Spots Guidance[10] and 2010 BAAQMD guidance.[11]

As shown in **Table 10**, the maximum cancer risk from construction activities is calculated to be 4.9 in 1 million, compared to a threshold of 10 in 1 million. Construction activities would also result in a non-cancer hazard index of 0.006 (threshold of 1.0), and maximum $PM_{2.5}$ concentration of 0.029 micrograms per cubic meter (µg/m^3) (threshold of 0.3 µg/m^3). These results are all below the BAAQMD thresholds of significance; thus, health risk impacts associated with construction of the Project are less than significant. The location of the off-site Maximally Exposed Individual Resident (MEIR) is shown in **Figure 2**.

Cumulative Health Risk Assessment

In accordance with BAAQMD CEQA guidelines, Ramboll conducted a cumulative HRA for both offsite sensitive receptors and new onsite sensitive receptors created by the Project. The cumulative assessment tabulates the impact of Project-related construction risks plus existing offsite sources (stationary and mobile) at the MEIR location for construction. The cumulative assessment for onsite receptors is determined at the location of the maximum total risk from offsite sources. The evaluation

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

[11] BAAQMD. 2010. Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January

requires the identification of any stationary and mobile sources within 1,000 feet of the Project boundary. In addition to the evaluation of each single source, the combined health risk from all TAC and $PM_{2.5}$ sources are evaluated.

Sources evaluated in the cumulative health risk assessment include any BAAQMD permitted stationary source, roadways with over 10,000 vehicles per day, and any other major source of emissions within the zone of influence such as railways. The BAAQMD provides tools with conservative estimates of impacts from these sources, including a stationary source tool and raster files for railways major streets, and highways.

BAAQMD's highway raster file includes impacts from highways in the Bay Area while the major street raster file includes impacts from all roadways with daily traffic above 30,000 vehicles per day. BAAQMD previously had a roadway screening analysis calculator that could be used to calculate impacts of roadways between 10,000 and 30,000 vehicles per day, but BAAQMD has since removed this roadway screening analysis calculator from their website. There is currently no alternative BAAQMD tool available for quantifying these results. There are no roadways with daily traffic between 10,000 and 30,000 vehicles per day within 1,000 feet of the MEIRs so the impacts from non-major street, non-highway roadways were not calculated.

The raster files and stationary source screening tools were used to estimate the health impacts from all highways, major streets, railways, and stationary sources and combined with the impacts from all other sources at the construction offsite MEIR and on-site cumulative MEIR.

The combined impact from all the sources results in a cancer risk of 17 in 1 million at the on-site MEIR, and 17 in 1 million at the off-site MEIR, compared to a threshold of 100 in 1 million. The combined non-cancer hazard index at the on-site and off-site MEIRs are 0 and 0.006 (threshold of 10), respectively, and combined maximum $PM_{2.5}$ concentrations are 0.42 and 0.30 $\mu g/m^3$ (threshold of 0.8 $\mu g/m^3$). Details of each source included in the cumulative analysis are presented in **Tables 11 and 12**. These results are all below the BAAQMD cumulative thresholds of significance; thus, the cumulative health risk impacts associated with the Project are less than significant.

CLOSING

The analysis presented above represents emissions and health risk impacts from construction of the proposed Project. The Project does not exceed any BAAQMD CEQA significance thresholds, with the use of fleet-average tier construction equipment.

Attachments:

Tables

Figures

Appendix A: CalEEMod® Output Files

Appendix B: Project Description and Traffic Study

Appendix C: AERMOD Input Files (provided Electronically)

TABLES

Table 1
Project Land Uses
Peninsula Heights Townhouses
San Mateo, California

Scenario	Project Description Land Use Type	CalEEMod® Land Use Type	CalEEMod® Land Use Subtype	Unit Amount[1]	Size Metric	Square Footage	Acreage
Project[3]	Mid-density Residential	Residential	Condo/Townhouse	290	Dwelling Units	290,000	8.56
	Open Space	Recreation	City Park	6.49	Acres	282,704	6.49
	Uncovered Parking	Parking	Parking Lot	44	Spaces	17,600	0.40

Notes:

1. Project land uses obtained from pre-application package provided by Harvest Properties, Inc.
2. Uncovered parking calculated assuming 624 proposed on-site parking spaces and 580 covered parking stalls as provided by Harvest Properties, Inc. The remaining spaces were assumed to be uncovered.
3. This project assumes 221,385 square feet from underutilized office space will be demolished, based on existing buildings map plan provided by Harvest Properties, Inc.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

Table 2
Construction Phasing Schedule
Peninsula Heights Townhouses
San Mateo, California

Construction Activity	Construction[1]			
	Phase Start Date	Phase End Date	Number Work Days	Days per Week
Demolition	7/1/2021	7/28/2021	20	5
Site Preparation	7/29/2021	8/11/2021	10	5
Grading	8/12/2021	9/22/2021	30	5
Building Construction	9/23/2021	11/16/2022	300	5
Paving	11/17/2022	12/14/2022	20	5
Architectural Coating	12/15/2022	1/11/2023	20	5

Notes

1. The construction schedule is based on CalEEMod default phases and durations, with construction beginning in Q3 2021.

Table 3
Construction Equipment List
Peninsula Heights Townhouses
San Mateo, California

Construction Phase	CalEEMod® Equipment Type[1]	Fuel	Quantity[1]	HP[1]	Load Factor[1]	Hours per Day[1]	% Utilization[1]	Unmitigated Equipment Tier
Demolition	Concrete/Industrial Saws	Diesel	1	81	0.73	8	50%	Fleet Average Tier
	Excavators	Diesel	3	158	0.38	8	100%	Fleet Average Tier
	Rubber Tired Dozers	Diesel	2	247	0.4	8	100%	Fleet Average Tier
Site Preparation	Rubber Tired Dozers	Diesel	3	247	0.4	8	100%	Fleet Average Tier
	Tractors/Loaders/Backhoes	Diesel	4	97	0.37	8	100%	Fleet Average Tier
Grading	Excavators	Diesel	2	158	0.38	8	100%	Fleet Average Tier
	Graders	Diesel	1	187	0.41	8	100%	Fleet Average Tier
	Rubber Tired Dozers	Diesel	1	247	0.4	8	100%	Fleet Average Tier
	Scrapers	Diesel	2	367	0.48	8	100%	Fleet Average Tier
	Tractors/Loaders/Backhoes	Diesel	2	97	0.37	8	100%	Fleet Average Tier
Building Construction	Cranes	Diesel	1	231	0.29	7	15%	Fleet Average Tier
	Forklifts	Diesel	3	89	0.2	8	100%	Fleet Average Tier
	Generator Sets	Diesel	1	84	0.74	8	10%	Fleet Average Tier
	Tractors/Loaders/Backhoes	Diesel	3	97	0.37	7	25%	Fleet Average Tier
Paving	Pavers	Diesel	2	130	0.42	8	75%	Fleet Average Tier
	Paving Equipment	Diesel	2	132	0.36	8	100%	Fleet Average Tier
	Rollers	Diesel	2	80	0.38	8	75%	Fleet Average Tier
Architectural Coating	Air Compressors	Diesel	1	78	0.48	6	100%	Fleet Average Tier

Notes

1. Equipment type, quantity, horsepower, and load factors are based on CalEEMod default assumptions. The percent utilization was provided by the Project Sponsor.

Abbreviations:

HP - horsepower
CalEEMod® - California Emissions Estimator Model®

Table 4
Construction Trip Rates
Peninsula Heights Townhouses
San Mateo, California

Demolition Quantities[1]	
Phase	**Existing Building Area (Square Feet)**
Demolition	221,385

Soil Transported for Construction[2]			
Soil Quantity for Construction	Imported	[cubic yards]	0
	Exported	[cubic yards]	14,000

Trip Rates						
Phase Name	**Worker Trip Number[3] (trips/day)**	**Vendor Trip Number[3] (trips/day)**	**Hauling Trip Number[5] (total trips)**	**Worker Trip Length[4] (miles/trip)**	**Vendor Trip Length[4] (miles/trip)**	**Hauling Trip Length[4] (miles/trip)**
Demolition	15	0	1,007	10.8	7.3	20
Site Preparation	18	0	0	10.8	7.3	20
Grading	20	0	1,166	10.8	7.3	20
Building Construction	335	80	0	10.8	7.3	20
Paving	15	0	0	10.8	7.3	20
Architectural Coating	67	0	0	10.8	7.3	20

Notes

1. Demolition quantity was based on site plan existing constuction drawings, given building area and number of stories.
2. Soil quantities were obtained from grading plan earthwork quantities, provided by Harvest Properties.
3. Trip numbers are based on CalEEMod® default assumptions calculated from land uses provided by the Project Sponsor.
4. Trip lengths are obtained from CalEEMod®, based on transportation data from the county.
5. Hauling Trip numbers during the grading phase are provided by the Project Sponsor, based on the soil transport quantities and 12 cubic yards per hauling trip.

Table 5
Project Construction Emissions
Peninsula Heights Townhouses
San Mateo, California

Phase	Source	Total Construction CAP Emissions			
		ROG	NOx	PM_{10}	$PM_{2.5}$
		tons			
Demolition	On-Site	0.0297	0.299	1.5E-02	0
	Off-Site	0.0046	0.15	4.6E-04	4.4E-04
Site Preparation	On-Site	0.0194	0.203	1.0E-02	9.4E-03
	Off-Site	2.3E-04	1.5E-04	0	0
Grading	On-Site	0.063	0.696	0.0298	0.0274
	Off-Site	0.0057	0.17	5.4E-04	5.1E-04
Building Construction	On-Site	0.083	0.80	0.049	0.045
	Off-Site	0.16	1.3	0.0050	0.0047
Paving	On-Site	0.0097	0.092	4.7E-03	4.3E-03
	Off-Site	3.6E-04	2.2E-04	1.0E-05	1.0E-05
Architectural Coating	On-Site	2.0	0.0137	7.7E-04	7.7E-04
	Off-Site	0.0016	0.0010	3.0E-05	3.0E-05
Total		**2.42**	**3.70**	**0.11**	**0.11**

Scenario	Average Daily CAP Emissions			
	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day[2]			
Total Construction	12	18	1	1
BAAQMD CEQA Threshold	54	54	82	54
Exceeds Threshold?	NO	NO	NO	NO

Notes:

1. Emissions calculated in CalEEMod® version 2016.3.2 based on the Project acreage and land use size. Emissions assume the use of all Fleet-Average Tier Offroad Equipment.
2. Emissions divided by the CalEEMod® default number of working days (400) for the Project acreage.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
CEQA - California Environmental Quality Act
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

Reference:

California Environmental Quality Act (CEQA) Guidelines. 2017. Bay Area Air Quality Management District (BAAQMD). May. Available online at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

Table 6
Modeling Source Parameters
Peninsula Heights
San Mateo, California

Source	Source Type	Release Height[1]	Initial Vertical Dimension	Area[2,3]
		m	[unitless]	m^2
North Parcel	Polygon Area	5.00	1.16	31826
South Parcel	Polygon Area	5.00	1.16	38363

Notes:

1. Area source release height assumed to be 5 m, consistent with SCAQMD LST Guidance.
2. Modeled emission rates are 1/[Area] to generate unit dispersion factors.
3. The complete AERMOD input file can be found in Appendix C.

Abbreviations:

m - meter
SCAQMD - South Coast Air Quality Management District

Reference:

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

Table 7
Modeled Emission Rates
Peninsula Heights
San Mateo, California

Year	Annual $PM_{2.5}$ Emissions[1] (g/s)	Annual DPM Emissions[1,2] (g/s)
2021	0.0019	0.0020
2022	0.0012	0.0013
2023	8.3E-06	8.3E-06

1. Modeled construction emissions represent total annual emissions estimated using CalEEMod®. Project demolition area, and grading-phase haul trip rates were provided by the Project sponsor. For all other construction inputs, CalEEMod defaults were assumed.

2. DPM Emissions are assumed to be equal to PM_{10} emissions from CalEEMod for this analysis.

Abbreviations:
CalEEMod® - California Emissions Estimator Model®
DPM - Diesel Particulate Matter
g/s - grams per second
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in diameter
PM_{10} - Particulate Matter less than 10 microns in diameter

References:
CalEEMod® 2016.3.2 Available Online at: http://www.caleemod.com

Table 8
Cancer Risk Exposure Parameters
Peninsula Heights
San Mateo, California

Period	Receptor Type	Receptor Age Group	Year[1]	Exposure Parameters						
				Daily Breathing Rate (DBR)[2]	Age Sensitivity Factor (ASF)[5]	Exposure Duration (ED)	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Averaging Time (AT)	Intake Factor, Inhalation (IF_{inh})[6]
				[L/kg-day]		[years]	[unitless]	[days/year]	[days]	[m^3/kg-day]
Construction	Off-Site Resident	3rd Trimester	2021	361	10	0.25	1	350	25,550	0.0124
		Age 0-<2 Years	2021	1,090	10	0.25	1			0.037
		Age 0-<2 Years	2022	1,090	10	1.00	1			0.149
		Age 0-<2 Years	2023	1,090	10	0.0278	1			0.004

Notes:

1. Fraction of year represents the portion of the exposure time within a year that the age bin occupies for the specific receptor type, based on the CalEEMod default schedule for construction.
2. Daily breathing rates reflect default breathing rates from OEHHA 2015 and BAAQMD 2016 as follows: 95th percentile 24-hour daily breathing rate for age 0-<2 years (per BAAQMD 2016 guidance).
3. Fraction of time spent at home is conservatively assumed to be 1 (i.e. 24 hours/day) based on the recommendation from BAAQMD (BAAQMD 2016) and OEHHA (OEHHA 2015).
4. Exposure frequency reflects default residential exposure frequency from OEHHA 2015.
5. Based on OEHHA 2015. Age sensitivity factors are unitless.
6. Inhalation Factors calculated via the equation below:

Calculation:

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

CF = 0.001 (m^3/L)

Abbreviations:

ASF - age sensitivity factor
AT - averaging time
BAAQMD - Bay Area Air Quality Management District
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
FAH - fraction of time at home
IF_{inh} - intake factor
kg - kilogram
L - liter
m^3 - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment

Reference:

BAAQMD. 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. January.

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

Table 9
Toxicity Values
Peninsula Heights
San Mateo, California

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.

Abbreviations:

$\mu g/m^3$ - micrograms per cubic meter
ARB - Air Resources Board
Cal/EPA - California Environmental Protection Agency
$(mg/kg\text{-}day)^{-1}$ - per milligram per kilogram-day
OEHHA - Office of Environmental Health Hazard Assessment
PM - particulate matter
REL - reference exposure level

Reference:

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

Table 10
Summary of Project Health Risks
Peninsula Heights
San Mateo, California

Source	Receptor Type	Lifetime Excess Cancer Risk (in a million)[1]	Non-Cancer Hazard Index[2]	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)[3]
Construction	Off-Site Resident	4.9	0.006	0.029
	BAAQMD Thresholds	10	1.0	0.30

Notes:

1. Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to the emissions associated with the Project was calculated based on the modeled annual average DPM concentration, the intake factor for a resident child, the Cancer Potency Factors (CPF) for Diesel Particulate Matter (DPM), and the Age Sensitivity Factors (ASF).
2. The potential for exposure to result in adverse chronic noncancer effects is evaluated by comparing the estimated annual average air concentration to the noncancer chronic Reference Exposure Level (REL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a chronic hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the chronic hazard quotients for all chemicals are summed, yielding a hazard index (HI).
3. PM2.5 concentration and Non-Cancer Hazard Index represent annual values.
4. Thresholds are from BAAQMD CEQA Guideline (BAAQMD 2017)

Abbreviations:

µg - microgram

m^3 - cubic meter

PM - particulate matter

OEHHA - Office of Environmental Health Hazard Assessment

Reference:

BAAQMD. 2017. California Environmental Quality Act Air Quality Guidelines. May. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

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

Table 11
Cumulative Health Impacts from Project Construction and Nearby Sources on Offsite MEIR
Peninsula Heights
San Mateo, California

Source Type[1]	Sources	Distance from MEIR (feet)	Cancer Risk (in a million)	Chronic Hazard Index[3]	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Project	Construction	--	4.9	0.0062	0.029
Stationary Sources[2]	Hudson Peninsula Office Park LLC	543	0.032	--	--
Roadways[4]	Major Streets[5]	--	0.29	--	0.0074
	Highway[5]	--	10	--	0.26
Railways	Caltrain[5]	--	1.1	--	0.0022
		Total	**17**	**0.006**	**0.30**
		BAAQMD Threshold	100	10	0.8
		Exceed?	No	No	No

Notes:

1. Off-site construction impacts were determined from project-specific modeling and are summarized in Table 11. Health impacts from Existing Stationary Sources and Existing Rail and Roadway sources are estimated using Screening Tools from the Bay Area Air Quality Management District (BAAQMD). Impacts presented here are at the offsite MEIR.

2. Consistent with BAAQMD guidance, Ramboll included all facilities within 1,000 feet of the proposed Project as per the BAAQMD Stationary Source Screening Analysis Tool. Facility information was obtained from the Permitted Stationary Source Risks and Hazards Screening Tool. Only sources within 1,000 feet of the offsite MEIR are presented here. Values have been adjusted using BAAQMD's Diesel Internal Combustion (IC) Engine Distance Multiplier Tool.

3. The BAAQMD's screening tools do not estimate chronic hazards since the screening levels were found to be extremely low, and thus there are no chronic hazard values associated with highways, railways, or major streets.

4. Per BAAQMD guidance, Ramboll searched for additional nearby roads between 10,000 to 30,000 average daily trips. However, there were no roadways with average daily traffic between 10,000 and 30,000 trips per day within 1,000 ft of the offsite cancer and $PM_{2.5}$ MEIRs.

5. Cancer risk and $PM_{2.5}$ concentration values were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located on the offsite MEIR.

Abbreviations:

µg - microgram
BAAQMD - Bay Area Air Quality Management District
HI - Hazard Index
m - meter
m^3 - cubic meter
MEIR - Maximally Exposed Individual Resident
$PM_{2.5}$ - fine particulate matter

Sources:

BAAQMD. 2020. Stationary Source Screening Analysis Tool. San Mateo County. May 30. Available at: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools

Table 12
Cumulative Health Impacts from Nearby Sources on On-site MEIR
Peninsula Heights
San Mateo, California

Source Type[1]	Sources	Distance from MEIR (feet)	Cancer Risk (in a million)	Chronic Hazard Index[3]	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Stationary Sources[2]	Hudson Peninsula Office Park LLC	451	0.048	--	--
Roadways[4]	Major Streets[5]	--	0.28	--	0.0071
	Highway[5]	--	16	--	0.41
Railway	Caltrain[5]	--	1.0	--	0.0020
		Total	**17**	**0**	**0.42**
		BAAQMD Threshold	100	10	0.80
		Exceed?	No	No	No

Notes:

1. Health impacts from Existing Stationary Sources and Existing Rail and Roadway sources are estimated using Screening Tools from the Bay Area Air Quality Management District (BAAQMD). The on-site MEIR was determined at the location of the maximum total offsite sources risk.

2. Consistent with BAAQMD guidance, Ramboll included all facilities within 1,000 feet of the proposed Project as per the BAAQMD Stationary Source Screening Analysis Tool. Facility information was obtained from the Permitted Stationary Source Risks and Hazards Screening Tool. Only sources within 1,000 feet of the on-site MEIR are presented here. Values have been adjusted using BAAQMD's Diesel Internal Combustion (IC) Engine Distance Multiplier Tool.

3. The BAAQMD's screening tools do not estimate chronic hazards since the screening levels were found to be extremely low, and thus there are no chronic hazard values associated with highways, railways, or major streets.

4. Per BAAQMD guidance, Ramboll searched for additional nearby roads between 10,000 to 30,000 average daily trips. However, there were no roadways with average daily traffic between 10,000 and 30,000 trips per day within 1,000 ft of the on-site cancer and $PM_{2.5}$ MEIRs.

5. Cancer risk and $PM_{2.5}$ concentration values were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located on the on-site MEIR.

Abbreviations:

µg - microgram
BAAQMD - Bay Area Air Quality Management District
HI - Hazard Index
m - meter
m^3 - cubic meter
MEIR - Maximally Exposed Individual Resident
$PM_{2.5}$ - fine particulate matter

Sources:

BAAQMD. 2012. Stationary Source Screening Analysis Tool. San Mateo County. May 30. Available at: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools

FIGURES

C:\ArcGIS\Peninsula Heights\Peninsula Heights.mdx

PROJECT: 1690017566 | DATED: 08/13/2020 | DESIGNER: SEGRET.JP

Receptor Type

- Receptors <1000 ft
- Receptors >1000 ft
- Area Sources

0 500 1000 Feet

Modeled Sources and Receptors

Peninsula Heights Townhomes
San Mateo, California

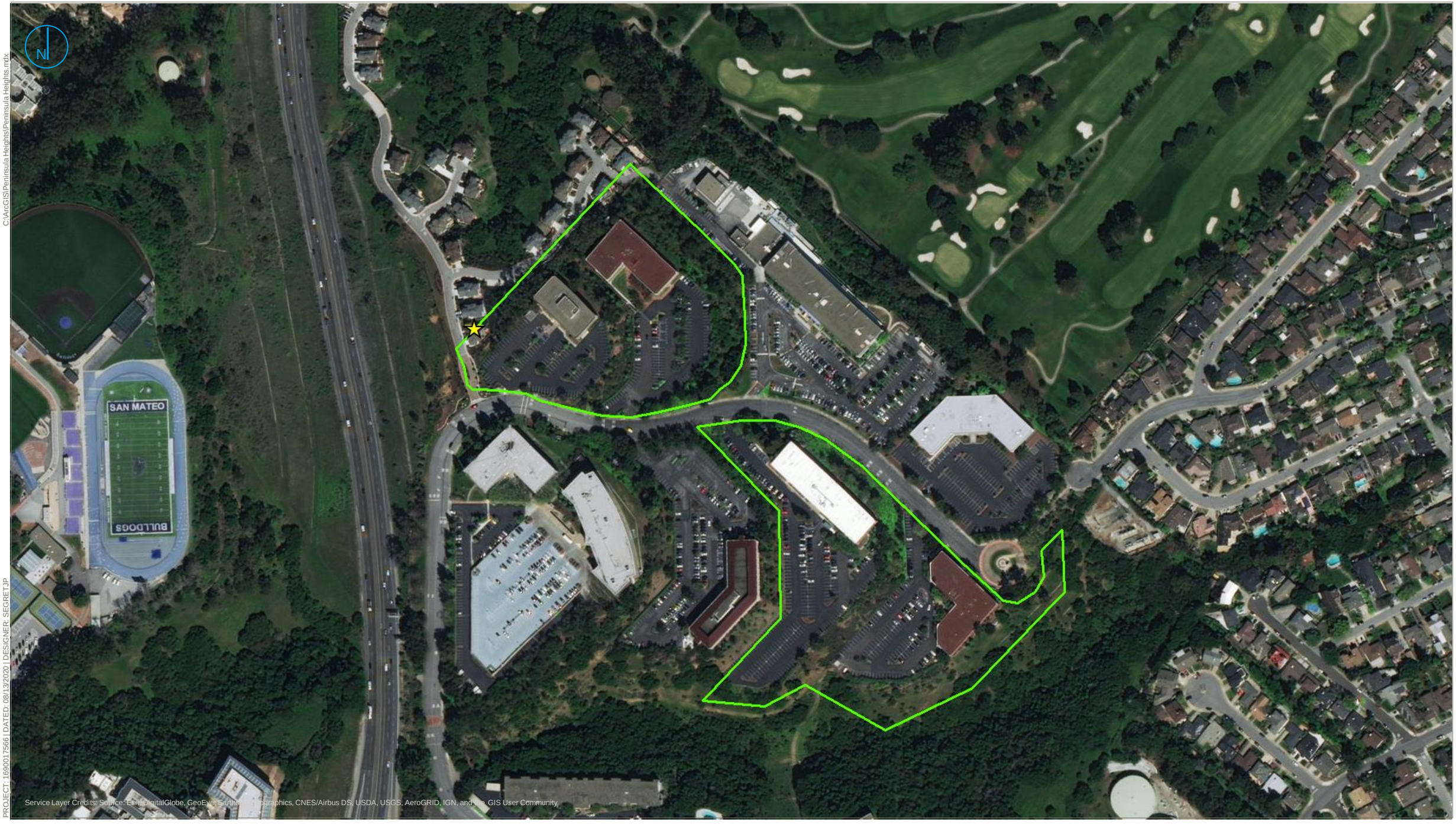
FIGURE 01

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

C:\ArcGIS\Peninsula Heights\Peninsula Heights.mdx

PROJECT: 1690017566 | DATED: 08/13/2020 | DESIGNER: SEGRET.JP



Receptor Type

☆ Offsite MEIR

▭ Area Sources

0 500 1000 Feet

Maximally Exposed Individual Resident (MEIR) Locations

Peninsula Heights Townhomes
San Mateo, California

FIGURE 02

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

APPENDIX A
CALEEMOD® OUTPUT FILES

APPENDIX B
PROJECT DESCRIPTION AND TRAFFIC STUDY

APPENDIX C
AERMOD INPUT FILES (PROVIDED ELECTRONICALLY)