Prepared for
Vallco Property Owner, LLC

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THE RISE (FORMERLY VALLCO TOWN CENTER)

OPERATIONAL HEALTH RISK ASSESSMENT TECHNICAL REPORT

CONTENTS

1. INTRODUCTION

Ramboll US Consulting, Inc. ("Ramboll") prepared this Operational Health Risk Assessment (HRA) Technical Report to support the proposed The Rise mixed-use development project in Cupertino, CA (the "Project"). This report analyzes the potential health risks associated with Project operations at offsite and onsite sensitive receptors. In the following sections, this report details the methodologies used to estimate Project operational emissions, model the air dispersion of those emissions to onsite and offsite locations, and estimate the potential health risk impacts associated with exposure to these emissions.

1.1 Project Understanding

The proposed Project is a mixed-use development that covers a site area of approximately 50 acres in the City of Cupertino. The Project is bounded to the north by Highway I-280, bounded to the west by Perimeter Road, and bounded to the South by Stevens Creek Boulevard. North Wolfe Road runs through the Project area and is the eastern boundary on the southern portion of the site. For the northern parcel of the site, Vallco Parkway is the southern boundary and Perimeter Road is the eastern boundary. The Project area is currently developed with a shopping mall ("The Mall") of approximately 1.2 million square feet.

The new development plan contains approximately 2,402 residential units covering 5.1 million square feet, 432 thousand square feet of retail, and 1.97 million square feet of office space. Project design features include two town squares, a green roof, and a central utilities plan at the northwestern extent of the Project boundary. The Project operational year evaluated in this report is 2023 ("Project build-out").

2. EMISSIONS ESTIMATES

To estimate health risk impacts from Project operations, toxic air contaminant (TAC) emissions were calculated for the Project. The proposed Project is expected to contain two sources of TACs during operational years – emergency generators and on-road vehicles. Ramboll estimated TAC emissions for the proposed Project using methodologies detailed in the sections below and summarized in **Table HRA-1**.

2.1.1 Emergency Generator Emissions

The proposed Project includes four 3,250 kW Tier 4 diesel fueled emergency generators; these generators are located at the central utility plant at the northwestern extent of the Project boundary. These emergency generators are required to support life safety systems and emergency elevators for Project buildings and the green roof in the case of a power outage or other emergency.

The TACs of concern from emergency engines included diesel particulate matter (DPM), particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$), and speciated total organic gases (TOG). Only emissions from non-emergency operation of the generators are considered in this health risk assessment (i.e., non-emergency maintenance and testing hours) consistent with Bay Area Air Quality Management District (BAAQMD) Regulation 2 Rule 5. More detail on chemical selection for the HRA can be found in Section 3 of this report.

DPM, $PM_{2.5}$ and TOG emissions from the four diesel engines were estimated using Tier 4 ARB and USEPA off-road diesel emergency engine standards emission factors (ARB 2013). Emission factors for TOG were converted from non-methane hydrocarbon (NMHC) values provided in the Tier standards using EPA hydrocarbon conversion factors (USEPA 2010). Detailed emergency engine emissions calculations can be found in **Table HRA-2**.

These emergency engines will be permitted with the BAAQMD as required and, as Tier 4 compliant generators, are expected to comply with applicable Best Available Control Technology (BACT) and Best Available Control Technology for Toxics (TBACT) requirements. All emergency engines were assumed to be 3,250 kW engines capable of operating up to 50 hours per year for non-emergency maintenance and testing operations.

2.1.2 On-Road Mobile Source Emissions

The Project would generate vehicle trips from residents traveling to and from the site and non-residents traveling to and from the site for work or commercial purposes. To estimate health risk impacts from vehicle traffic, Ramboll estimated TAC emissions from roadways within 1,000 ft of the Project boundary for both a background traffic scenario and a post-project traffic scenario using publicly available traffic data and a 2016 transportation impact analysis (TIA) prepared for the Project. The TACs considered include $PM_{2.5}$ from vehicle exhaust and brakewear and tirewear, DPM from diesel exhaust, and speciated TOG from gasoline vehicles (exhaust and evaporation).

Health risks were estimated for both of these emissions scenarios as described in **Sections 3 and 4** of this report. Project-related health risks from on-road emissions were estimated as the difference between the background and the post-project scenario health risks. Health risk impacts from the existing traffic on nearby roadways were estimated based on the background traffic scenario. The methodologies used to estimate emissions for the background and post-project scenarios are described, below.

2.1.2.1 Background Mobile Source Emissions

To estimate background on-road vehicle TAC emissions, Ramboll relied on emission factors from the most up to date version of the California Air Resources Board (CARB) Emission FACtor (EMFAC) model, EMFAC2021, along with background surface street average annual daily traffic (AADT) estimates based on a 2016 TIA prepared for the Project, and 2015 highway AADT estimates from the CalTrans Traffic Census database (CDT 2015). Roadways within 1,000 feet of the Project boundary were included in the HRA. The list of roadways evaluated in this assessment can be found in **Table HRA-3**. EMFAC2021 emission factors were gathered for the vehicle fleet mix in Santa Clara County based on a Project build-out year of 2023. TAC emissions estimated for the background traffic scenario can be found in **Table HRA-4**.

2.1.2.2 Post-Project Mobile Source Emissions

Post-project on-road vehicle TAC emissions were estimated using the same methodology as described above. However, the Project land-use conditions have changed slightly since the original 2016 TIA was prepared for the Project, thus, expected trip generation rates from the Project and subsequent AADT on local surface streets may also have changed. To account for this, Ramboll scaled the TIA's post-Project AADT estimates for nearby roadways using the ratio of the TIA's total expected gross[1] weekday Project trip generation and the total weekday trip generation estimated for the new Project land-uses (CalEEMod® 2020.4.0 default trip generation rates). The Project trip generation rates used for the TIA scaling can be found in **Table HRA-5**, and the TAC emissions estimated for the post-Project traffic scenario can be found in **Table HRA-6**.

[1] The trip generation rates used for this TIA scaling are the gross weekday trip generation rates from the TIA or CalEEMod defaults, and do not take into account trip reductions from Project design features nor account for existing Vallco mall trips.

3. ESTIMATED AIR CONCENTRATIONS

Toxic air contaminant (TAC) emissions, described in the above Section, from Project operational activities will be transported both inside and outside of the physical boundaries of the Project area, potentially impacting nearby residential areas or sensitive receptors. Methodologies used to estimate concentrations resulting from Project TAC emissions are provided below.

3.1 Chemical Selection

The cancer risk and chronic and acute hazard analyses in this HRA are based on TAC emissions from the proposed Project. Sources of TACs from the proposed Project include emergency engines and on-road gasoline and diesel engines. Accordingly, the chemicals evaluated in the health risk assessment are $PM_{2.5}$ in vehicle exhaust and brakewear and tirewear, DPM and $PM_{2.5}$ in diesel exhaust, and $PM_{2.5}$ and speciated TOG from gasoline vehicles (exhaust and evaporation).

Diesel exhaust, a complex mixture that includes hundreds of individual constituents (Cal/EPA 1998), is identified by the State of California as a known carcinogen (Cal/EPA 2015b). Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole (Cal/EPA 2015b). Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating cancer risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known and/or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that "potential cancer risk from inhalation exposure to whole diesel exhaust will exceed the multi-pathway cancer risk from the speciated components" (Cal/EPA 2003). The DPM analyses will be based on the surrogate approach for diesel exhaust from emergency engines and on-road vehicles, as recommended by Cal/EPA. Diesel exhaust has no acute toxicity value, and thus maximum one-hour impacts from diesel exhaust were not evaluated in this report.

TOG emitted from gasoline vehicle exhaust and evaporative losses are composed of a number of toxic components such as benzene, naphthalene and acetaldehyde. Unlike DPM, no surrogate method is currently approved to estimate health impacts from TOG as a whole. Thus, TOG impacts must be calculated using a component based method. Total TOG emissions from roadways are split into individual toxic components using the Bay Area Air Quality Management District's recommended gasoline speciation, outlined in **Table HRA-7** (BAAQMD 2011).

$PM_{2.5}$ is one of six EPA "criteria" pollutants considered harmful to public health and the environment. A safe threshold for $PM_{2.5}$ has not been established and research indicates that health effects still exist at low concentrations (BAAQMD 2012). In 2009, the EPA concluded that for both short-term and long-term exposure-there is a causal relationship between $PM_{2.5}$ concentrations and cardiovascular effects and mortality, and a likely causal relationship between $PM_{2.5}$ concentrations and respiratory effects (USEPA 2009). In this health risk assessment, consistent with BAAQMD guidance, $PM_{2.5}$ health impacts are estimated as concentrations resultant from Project sources.

3.2 Project Sources

Near-field air dispersion modeling of Project operational sources was conducted using the most recent version of the American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD Version 21112) to evaluate ambient air concentrations of TACs and $PM_{2.5}$ at receptors (USEPA 2021). Project operational TAC sources were grouped into two types: emergency generators and on-road traffic. Emergency generators were modeled as point sources in appropriate locations based on information from the Project sponsor, and on-road traffic sources are modeled as a series of adjacent volume sources following guidance for this type of activity (SCAQMD 2008). Traffic on roadways were modeled out to 1,000 feet from the project boundary (BAAQMD 2020a).

For each receptor location, the model generated air concentrations (or air dispersion factors as unit emissions that were modeled) that result from emissions from multiple sources. The receptor grid used in this HRA can be found in **Figure 1**, and the modeled source locations can be found in **Figure 2**.

The source parameters used for each modeled source can be found in **Table HRA-8** and were sourced from manufacturing specifications provided by the client.

3.3 Off-site Sources

Sources located outside the Project Area may pose impacts upon the proposed residential areas. These sources include roadways (Highway I-280 and local surface streets), and a gas station (southwest corner of Stevens Creek Boulevard and North Wolfe Road). Ramboll modeled all surface streets and highways within 1,000 ft of the Project boundary using AERMOD. Methodologies for estimating health impacts from other offsite sources are discussed in more detail in the Risk Characterization section below.

3.4 Meteorological Data

Air dispersion modeling requires the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. Ramboll used surface meteorological data from the San Jose Airport for years 2009 through 2013, with upper air data collected at the Oakland Airport for the same time period. The BAAQMD provided Ramboll with processed meteorological data that can be used directly in AERMOD.

3.5 Terrain Considerations

Elevation and land use data were imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey (USGS 2016). An important consideration in an air dispersion modeling analysis is the selection of whether or not to model an urban area. Here the model assumes an urban land use as has been done for similar projects in the area. Ramboll used 58,302, the 2010 population of the City of Cupertino, as the urban population in AERMOD (US Census Bureau 2010).

3.6 Emission Rates

Emissions from each source group were modeled using the χ/Q ("chi over q") method, such that each source has unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors with units of [μg/m^3]/[g/s].

For annual average ambient air concentrations, the estimated annual average dispersion factors were multiplied by the annual average emission rates. The emission rates will vary day to day, with some days having no emissions, for example emergency generators on days when testing is not conducted. For simplicity, the model assumed a constant emission rate during the entire year. For acute impacts, the maximum 1-hour ambient air concentrations are multiplied by the maximum hourly emission rate for a given activity.

Operational traffic emissions were modeled assuming emissions are not restricted and can occur over the course of 24 hours. Emissions were distributed over the hours of the day following the hour-of-day distribution in EMFAC2021 for Santa Clara County. Operational traffic emissions considered included running exhaust and running loss emissions, consistent with BAAQMD guidance (BAAQMD 2010).

As discussed in **Section 2** of this report, consistent with BAAQMD regulation 2 rule 5, this health risk assessment only considers emissions from non-emergency operation of the generators (i.e., planned maintenance and testing hours). Emergency generators were modeled assuming emissions will only occur between 6am and 4pm. Emergency generator emissions were modeled in AERMOD as horizontal point sources using parameters provided by the client and guidance from the AERMOD user's guide. See **Table 8** for the modeling parameters used in the AERMOD modeling.

3.7 Receptors

Receptors were located both on residential sites of the Project and on off-site areas within 1,000 feet of the Project area. Project residential receptors were modeled on multiple floors at a height of 1.5 meters and 4.5 meters above terrain height. Off-site receptors were modeled at a height of 1.5 meters above terrain height on as recommended in BAAQMD guidance (BAAQMD 2020a). Receptors were placed over all on-site residential areas with 10-meter spacing and along the boundaries of on-site residential areas. A receptor grid with 25-meter spacing was placed over all offsite locations out to 1,000 feet from the Project area. As discussed previously, average annual and 1-hour maximum dispersion factors are estimated for each receptor location. All receptor locations are shown in **Figure 1**.

4. RISK CHARACTERIZATION METHODS

Potential health impacts from the Project were evaluated both for residents near the Project area ("off-site residents") as well as residents who will move into the residential areas of the Town Center/Community ("on-site residents"). This report assesses cancer risk to residential receptors using the 2015 California Environmental Protection Agency Office of Environmental Health Risk Assessment (OEHHA) guidance.

4.1 Potentially Exposed Populations

This HRA evaluated Project related operational cancer risk, chronic HI and PM2.5 concentrations at off-site and on-site residential locations, as these health impacts are understood to only occur after long-term exposures to chemical concentrations. Acute HI is estimated at all modeled receptors, as acute impacts occur after short-term (one hour) exposure to chemical concentrations, an exposure condition which could occur at any location surrounding the Project.

4.2 Cancer Risk Exposure Assumptions

Off-site and on-site residents were evaluated for the operational scenario, assuming that they would be present at one location for a 30-year period. The exposure parameters used to estimate excess lifetime cancer risks for residential receptors are based on the 2015 Hot Spots Guidance (Cal/EPA 2015a), unless otherwise noted, and are presented in **Table HRA-9**.

4.3 Cancer Risk Calculation of Intake

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}, is calculated as follows:

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

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)

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i.

4.4 Toxicity Assessment

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, chronic hazard quotient (HQs) and acute HQ calculations for Project operation utilized the toxicity values for DPM and for TACs from speciated gasoline total organic gases (TOGs). For on-road traffic, the TOG speciation for gasoline engine exhaust is different from the TOG speciation for gasoline evaporative losses, so two gasoline TOG speciation profiles were used. Excess lifetime cancer risks[2] were 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 a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

Speciation profiles used in this analysis are provided in **Table HRA-7**. Toxicity values are as presented in **Table HRA-10**. Ramboll included toxicity for DPM and organic gases from on-road gasoline-powered vehicles (Cal/EPA 2015b). Ramboll also included speciated gasoline evaporative emissions from on-road vehicles.

4.5 Age Sensitivity Factors

The estimated excess lifetime cancer risks for residents were adjusted using the age sensitivity factors (ASFs) recommended in the Cal/EPA OEHHA Hot Spots Guidance (Cal/EPA 2015a). This approach accounts for an "anticipated special sensitivity to carcinogens" of infants and children. Cancer risk estimates are weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) is applied to ages 16 and above. Table **HRA-11** shows the ASFs used for the residents.

4.6 Estimation of Cancer Risks

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 a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific CPF.

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

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

Where:

$Risk_{inh}$ = Cancer Risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)

[2] Excess cancer risk as a result of the proposed project is the risk generated by that project that exceeds the risk that would otherwise exist.

C_i	=	Annual Average Air Concentration for chemical i (µg/m^3)
CF	=	Conversion Factor (mg/µg)
IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
CPF_i	=	Cancer Potency Factor for chemical i (mg chemical/kg body weight-day)$^{-1}$
ASF	=	Age Sensitivity Factor (unitless)

4.7 Estimation of Chronic and Acute Noncancer Hazard Indices

<u>Chronic HQ</u>

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 chronic HI.

$$HQ_i = C_i / cREL$$

Where:

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

<u>Acute HI</u>

The potential for exposure to result in adverse acute effects is evaluated by comparing the estimated one-hour maximum air concentration of chemical to the acute reference exposure level (aREL) for each chemical evaluated in this analysis. When calculated for a single chemical, the comparison yields an HQ. To evaluate the potential for adverse acute health effects from simultaneous exposure to multiple chemicals, the acute HQs for all chemicals are summed, yielding an acute HI.

$$HQ_i = C_i / aREL$$

Where:

HQ_i	=	Acute hazard quotient for chemical i
HI	=	Hazard index
Ci	=	One-hour maximum concentration of chemical i (µg/m^3)
$aREL_i$	=	Acute reference exposure level for chemical i (µg/m^3)

4.8 Off-site Source Screening

Sources within 1,000 feet of the Project boundary were evaluated for potential cumulative health risk impacts upon the planned on-site residential areas and the Project's maximally exposed offsite resident. These sources include background traffic on roadways (Highway I-280 and local surface streets), and any stationary sources within 1,000ft of the Project.

As described in **Section 3**, above, health risks from local surface streets and highways surrounding the Project were modeled using AERMOD and emissions calculated based on traffic counts from the original TIA and the CalTrans Traffic Census database for 2015 (CDT 2015).

BAAQMD's Permitted Sources Risk and Hazards Map published January 2020b shows one stationary source (a gas station) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source, combined with a BAAQMD-provided health risk scaling tool[3] to estimate impacts from the gas station upon the planned residential areas and the maximally exposed offsite resident receptor.

[3] For gas stations, BAAQMD provides a screening tool to scale reported maximum impacts to those at other locations. Available online at: http://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools

5. RESULTS

5.1.1 Operational HRA

Tables HRA-12 and **HRA-13** show the Project-related human health endpoints from operational sources such as Project-generated traffic and emergency generators. Table **HRA-12** shows impacts at existing offsite residential areas and **Table HRA-13** shows at future residential areas proposed as part of the Project. The estimated incremental excess cancer risks, chronic HIs, acute HIs, and $PM_{2.5}$ concentrations from Project TAC emissions do not exceed the BAAQMD thresholds at either existing offsite residential areas or at future residential areas proposed as part of the Project.

Tables HRA-14 and **HRA-15** show the cumulative human health endpoints from Project operational sources and off-site sources within 1,000 feet of the Project. The off-site sources include a gas station and background traffic, and Project sources include Project-generated traffic and emergency generators. Acute HI has no cumulative BAAQMD threshold, thus is not analyzed in this report. **Table HRA-14** shows impacts at existing offsite residential areas and **Table HRA-15** shows impacts at future residential areas proposed as part of the Project. The estimated cumulative excess cancer risks, chronic HIs, and $PM_{2.5}$ concentrations do not exceed the BAAQMD thresholds at either existing offsite residential areas or at future residential areas proposed as part of the Project.

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TABLES

Table HRA-1
Emissions Calculations Methodology for Operational Health Risk Assessment
The Rise
Cupertino, California

Type	Source	Methodology and Formula	Reference
Operational Generator Emissions[1]	Stationary Source	$E_{SS} = EF_{SS} * Hr * C$	ARB/USEPA Off-Road Engine Standards
Operational On-Road Mobile Sources[2]	Exhaust - Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2021
	Exhaust - Running Losses	$E_R = \Sigma(EF_{RL} * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021

Notes:

1. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources were calculated using the following formulas.
   E_R: running exhaust and running losses emissions (lb)
   EF_R: running emission factor (g/mile). From EMFAC2021
   VMT: vehicle miles traveled
   C: unit conversion factor

2. Operational emissions from the generator were calculated using the following formulas:
   E_{SS}: Stationary Source emissions.
   EF_{SS}: Stationary Source emission factor
   Hr: hours of operation per year (hr)
   C: unit conversion factor

Abbreviations:

ARB: California Air Resources Board
EF: Emission Factor
EMFAC: EMission FACtor Model
g: gram
HP: horsepower
lb: pound
LF: Load Factor
mi: mile
USEPA: United States Environmental Protection Agency
VMT: vehicle miles traveled

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Table HRA-2
Emergency Generator Emissions, Project Operations
The Rise
Cupertino, California

Generator	Generator Size (hp)		Permitted Non-Emergency Hours (hrs/year)	Engine Tier	Engine Emission Factors[1] (g/bhp-hr)			Annual Emissions[2] (ton/yr)		
	hp	kW			TOG	DPM	$PM_{2.5}$	TOG	DPM	$PM_{2.5}$
CUP1	4,358	3,250	50	Tier 4	0.15	0.020	0.020	0.037	0.0048	0.0048
CUP2	4,358	3,250	50	Tier 4	0.15	0.020	0.020	0.037	0.0048	0.0048
CUP3	4,358	3,250	50	Tier 4	0.15	0.020	0.020	0.037	0.0048	0.0048
CUP4	4,358	3,250	50	Tier 4	0.15	0.020	0.020	0.037	0.0048	0.0048

Notes:

1. Engine emission factors for PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on ARB Tier 4 standards for >1207-hp engines. Emission factors for TOG were converted from NMHC values provided in the Tier standards using EPA hydrocarbon conversion factors.
2. Emissions for emergency generators are calculated assuming each engine is 3250 kW and operates for the specified hours/year of non-emergency testing. Below is the calculation methodology:
   E = EF * HP * Hr
   Where:
   E = generator engine emissions
   EF = compression-ignition engine emission factor
   HP = generator horsepower
   Hr = generator hours
   Note that this analysis conservatively assumes operation at 100% capacity (load factor = 1) during emissions tests.

Abbreviations:

ARB: [California] Air Resources Board
LPG: Liquefied Petroleum Gas
NOx: nitrogen oxides
PM: particulate matter
ROG: reactive organic gases
USEPA: United States Environmental Protection Agency

References:

USEPA. 1996. AP 42, Volume I, Fifth Edition (1996). §3.3 Gasoline And Diesel Industrial Engines. Available online at:
USEPA. 2010. Conversion Factors for Hydrocarbon Emission Components, NR-002d. EPA-420-R-10-015. July. Available online at:
ARB. 2015. Non-road Diesel Engine Certification Tier Chart. Available online at: https://ww2.arb.ca.gov/resources/documents/non-road-diesel-engine-certification-tier-chart

Table HRA-3
Modeled Roadway Sources
The Rise
Cupertino, California

Source Group (SRCGRP)	Description	Source Type	Length (meters)
SCBF	Stevens Creek	roadway	288
SCBE		roadway	72
SCBD		roadway	96
SCBC		roadway	96
SCBB		roadway	192
SCBA		roadway	96
NWOLFA	North Wolfe Road / Miller Avenue	roadway	240
NWOLFB		roadway	240
NWOLFC		roadway	96
NWOLFD		roadway	96
NWOLFE		roadway	168
NWOLFF		roadway	120
NWOLFG		roadway	288
VPKWYD	Vallco Parkway	roadway	312
VPKWYC		roadway	72
VPKWYB		roadway	168
VPKWYA	4th Street	roadway	96
FINCH	Finch Avenue	roadway	240
PDRW	Perimeter Road	roadway	195
PDRE		roadway	555
AVEA	Avenue A	roadway	768
AVEB	Avenue B	roadway	636
DRIVEWYE	Wolfe Road / Vallco Driveway 2 East	roadway	12
DRIVEWYW	Wolfe Road / Vallco Driveway 2 West	roadway	12
SIXTHA	Wolfe Road/6th Street (Proposed)	roadway	168
SIXTHB		roadway	96
FIRST	Wolfe Road/Vallco Driveway 3	roadway	252
AVED	Vallco Parkway/Vallco Driveway 4	roadway	336
ONRE	I-280 S On Ramp, from S-bound Wolfe Road	roadway	702
CLVRE	I-280 S from S-bound Wolfe Road	roadway	894
OFFRE	Wolfe Road from I-280 S	roadway	348
OFFRW	Wolfe Road from I-280 N	roadway	654
CLVRW	I-280 N On Ramp from N-bound Wolfe Rd	roadway	414
ONRW	I-280 N On Ramp from S-bound Wolfe Rd	roadway	84
PORTN	North Portal Avenue	roadway	730
PORTS	South Portal Avenue	roadway	210
ESTATE	East Estates Drive	roadway	300
AVEDX	Avenue D - Offsite Driveway	roadway	36
PDREX	Perimeter Road Offsite Driveway	roadway	30
I280W	I-280 North (I-280 West)	roadway	819
I280E	I-280 South (I-280 East)	roadway	882

Notes:

1. Roadways within 1,000 ft of the Project boundary were included in the health risk assessment modeling.

Table HRA-4
Background Traffic Mobile TAC Emissions
The Rise
Cupertino, California

Link	Weekday Daily Traffic[1,3]	Link Length (meters)	Link Length (miles)	Miles/Day	Running Exhaust + Brakewear and Tirewear Emissions, All Vehicles	Running Exhaust Emissions, GAS Vehicles Only	Running Exhaust Emissions, DSL Vehicles Only[2]	Running Loss Emissions, Gas Vehicles Only
					[grams/day]	[grams/day]	[grams/day]	[grams/day]
					$PM_{2.5}$	TOG	PM_{10}	TOG
SCBF	41,371	288	0.18	7,402	60	350	6.7	433
SCBE	46,938	72	0.04	2,099	17	99	1.9	123
SCBD	47,076	96	0.06	2,807	23	133	2.6	164
SCBC	46,779	96	0.06	2,790	22	132	2.5	163
SCBB	45,658	192	0.12	5,446	44	258	5.0	319
SCBA	44,386	96	0.06	2,647	21	125	2.4	155
NWOLFA	53,383	240	0.15	7,959	64	376	7.3	466
NWOLFB	50,117	240	0.15	7,472	60	353	6.8	437
NWOLFC	48,017	96	0.06	2,864	23	135	2.6	168
NWOLFD	49,938	96	0.06	2,978	24	141	2.7	174
NWOLFE	40,940	168	0.10	4,273	34	202	3.9	250
NWOLFF	39,904	120	0.07	2,975	24	141	2.7	174
NWOLFG	23,922	288	0.18	4,280	34	202	3.9	250
VPKWYD	17,330	312	0.19	3,359	27	159	3.1	197
VPKWYC	18,645	72	0.04	834	6.7	39	0.76	49
VPKWYB	19,171	168	0.10	2,001	16	95	1.8	117
VPKWYA	3,406	96	0.06	203	1.6	10	0.19	12
FINCH	6,036	240	0.15	900	7.2	43	0.82	53
PDRW	3,747	195	0.12	454	3.7	21	0.41	27
PDRE	4,173	555	0.35	1,440	12	68	1.3	84
AVEA	2,363	768	0.48	1,127	9.1	53	1.0	66
AVEB	0	636	0.40	0	0	0	0	0
DRIVEWYE	713	12	0.01	5	0.043	0.25	0.0048	0.31
DRIVEWYW	447	12	0.01	3	0.027	0.16	0.0030	0.20
SIXTHA	2,608	168	0.10	272	2.2	13	0.25	16
SIXTHB	3,758	96	0.06	224	1.8	11	0.20	13
FIRST	5,035	252	0.16	788	6.3	37	0.72	46
AVED	3,449	336	0.21	720	5.8	34	0.66	42
ONRE	6,877	702	0.44	2,999	24	142	2.7	175
CLVRE	31,014	894	0.56	17,224	138	815	16	1,008
OFFRE	31,014	348	0.22	6,705	54	317	6.1	392
OFFRW	26,497	654	0.41	10,765	87	509	10	630
CLVRW	26,497	414	0.26	6,815	55	322	6.2	399
ONRW	9,868	84	0.05	515	4.1	24	0.47	30
PORTN	4,474	730	0.45	2,029	16	96	1.8	119
PORTS	2,917	210	0.13	380	3.1	18	0.35	22
ESTATE	3,215	300	0.19	599	4.8	28	0.55	35
AVEDX	3,208	36	0.02	72	0.58	3.4	0.065	4.2
PDREX	128	30	0.02	2	0.019	0.11	0.0022	0.14
I280W	80,500	819	0.51	40,977	329	1,938	37	2,398
I280E	80,500	882	0.55	44,130	355	2,087	40	2,582
Total Emissions					1,620	9,533	184	11,792

Notes:

1. Weekday daily traffic on each modeled roadway link was calculated by Ramboll based on Project vicinity roadway Annual Average Daily Traffic (AADT) and turning volume estimates provided in the Traffic Impact Analysis (TIA).
2. All PM_{10} emitted from diesel vehicles is assumed to be diesel particulate matter.
3. Weekday daily traffic for I280W and I280E was obtained from the Caltrans Traffic Census database for 2015.

RAMBOLL

Table HRA-5

Weekday Trip Generation, Project Land Uses

The Rise

Cupertino, California

Land Use[1]	Size	Units	Weekday Trip Generation[2]
Project Conditions			
Office	1,973,494	sf	19,222
Retail	432,213	sf	16,316
Green Roof (Park)	18	Acres	14
Residential	2,402	Units	13,067
Total Weekday Project Trips			**48,619**

Notes:

1. Land uses analyzed for trip generation estimations were based on Project square footages provided by the Project sponsor.
2. Trip generation estimates presented above are weekday trip rate estimates from CalEEMod® 2020.4.0 for different land uses. These trip generation rates represent total gross project trip generation and do not take into account any trip reductions from Project specific design features, and do not account for any existing Vallco mall trips. These trip generation rates are used only to scale the 2016 Traffic Impact Analysis for the project to account for any minor changes in vehicular trips as a result of changes to the expected Project land-uses since 2016. Available online at: https://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator Model

Table HRA-6
Post-Project Traffic Mobile TAC Emissions
The Rise
Cupertino, California

Original Traffic Impact Analysis Weekday Trip Generation: **56,985**
Project Weekday Trip Generation: **48,619**

Link	Original Weekday Daily Traffic[1,4]	Scaled Weekday Daily Traffic[2]	Link Length (meters)	Link Length (miles)	Miles/Day	Running Exhaust + Brakewear and Tirewear Emissions, All Vehicles	Running Exhaust Emissions, GAS Vehicles Only	Running Exhaust Emissions, DSL Vehicles Only[3]	Running Loss Emissions, Gas Vehicles Only
						[grams/day]			
						$PM_{2.5}$	TOG	PM_{10}	TOG
SCBF	46,118	45,421	288	0.18	8,126	65	384	7.4	475
SCBE	54,972	53,793	72	0.045	2,406	19	114	2.2	141
SCBD	55,375	54,157	96	0.060	3,230	26	153	2.9	189
SCBC	54,440	53,315	96	0.060	3,180	26	150	2.9	186
SCBB	57,044	55,372	192	0.12	6,604	53	312	6.0	386
SCBA	55,541	53,903	96	0.060	3,215	26	152	2.9	188
NWOLFA	63,754	62,232	240	0.15	9,278	75	439	8.5	543
NWOLFB	69,659	66,790	240	0.15	9,958	80	471	9.1	583
NWOLFC	66,603	63,874	96	0.060	3,809	31	180	3.5	223
NWOLFD	61,618	59,903	96	0.060	3,572	29	169	3.3	209
NWOLFE	50,312	48,936	168	0.10	5,107	41	242	4.7	299
NWOLFF	45,593	44,758	120	0.075	3,337	27	158	3.0	195
NWOLFG	26,310	25,960	288	0.18	4,644	37	220	4.2	272
VPKWYD	17,325	17,325	312	0.19	3,358	27	159	3.1	196
VPKWYC	17,106	17,332	72	0.045	775	6.2	37	0.71	45
VPKWYB	18,923	18,960	168	0.10	1,979	16	94	1.8	116
VPKWYA	2,810	2,898	96	0.060	173	1.4	8.2	0.16	10
FINCH	6,036	6,036	240	0.15	900	7.2	43	0.82	53
PDRW	13,997	12,492	195	0.12	1,514	12	72	1.4	89
PDRE	5,599	5,390	555	0.35	1,860	15	88	1.7	109
AVEA	2,640	2,599	768	0.48	1,240	10	59	1.1	73
AVEB	1,384	1,181	636	0.40	466	3.8	22	0.43	27
DRIVEWYE	6,919	6,008	12	0.0075	45	0.36	2.1	0.041	2.6
DRIVEWYW	9,681	8,325	12	0.0075	62	0.50	2.9	0.057	3.6
SIXTHA	3,566	3,425	168	0.10	357	2.9	17	0.33	21
SIXTHB	11,134	10,051	96	0.060	599	4.8	28	0.55	35
FIRST	1,223	1,782	252	0.16	279	2.2	13	0.25	16
AVED	596	1,015	336	0.21	212	1.7	10	0.19	12
ONRE	11,901	11,163	702	0.44	4,868	39	230	4.4	285
CLVRE	38,192	37,138	894	0.56	20,625	166	976	19	1,207
OFFRE	38,192	37,138	348	0.22	8,029	65	380	7.3	470
OFFRW	35,344	34,045	654	0.41	13,832	111	654	13	809
CLVRW	35,344	34,045	414	0.26	8,756	70	414	8.0	512
ONRW	9,868	9,868	84	0.052	515	4.1	24	0.47	30
PORTN	4,474	4,474	730	0.45	2,029	16	96	1.8	119
PORTS	2,917	2,917	210	0.13	380	3.1	18	0.35	22
ESTATE	4,173	4,032	300	0.19	751	6.0	36	0.68	44
AVEDX	3,280	3,269	36	0.022	73	0.59	3.5	0.067	4.3
PDREX	0	0	30	0.019	0	0	0	0	0
I280W	80,500	80,500	819	0.51	40977	329	1,938	37	2,398
I280E	80,500	80,500	882	0.55	44130	355	2,087	40	2,582
Total Emissions						**1,811**	**10,655**	**205**	**13,179**

Notes:

1. Weekday daily traffic on each modeled roadway link was calculated by Ramboll based on Project vicinity roadway Annual Average Daily Traffic (AADT) and turning volume estimates provided in the Traffic Impact Analysis (TIA). Highway traffic change due to Project is expected to be negligible compared to total AADT, thus no Project impacts were estimated on the highway.
2. Post-project vehicle traffic on each roadway was scaled based on the ratio of total expected weekday Project trip generation between the original Vallco Project analyzed in the TIA, and the redesign analyzed in this report.
3. All PM_{10} emitted from diesel vehicles is assumed to be diesel particulate matter.
4. Weekday daily traffic for I280W and I280E was obtained from the Caltrans Traffic Census database for 2015.

References:

Caltrans. Traffic Census Database. Available online at: http://www.dot.ca.gov/hq/tsip/gis/datalibrary/Metadata/AADT.html. Accessed February 14th, 2018.

Table HRA-7
Speciation Values
The Rise
Cupertino, California

Source	Emission Type	Fraction	Chemical[1]
Diesel Generators	**Exhaust PM**	1.0	Diesel PM
Diesel Roadway Traffic	**Exhaust PM**	1.0	Diesel PM
Gasoline Roadway Traffic	**Exhaust TOG**	0.0055	1,3-Butadiene
		0.0028	Acetaldehyde
		0.0013	Acrolein
		0.025	Benzene
		0.011	Ethylbenzene
		0.016	Formaldehyde
		0.016	Hexane
		0.0012	Methanol
		2.0E-04	Methyl Ethyl Ketone
		5.0E-04	Naphthalene
		0.031	Propylene
		0.0012	Styrene
		0.058	Toluene
		0.048	Xylenes
	Evaporative TOG	0.0036	Benzene
		0.0012	Ethylbenzene
		0.015	Hexane
		0.017	Toluene
		0.0058	Xylenes

Note:

1. Compounds presented in this table are only those air toxic contaminants with toxicity values from Cal/EPA (2015) evaluated in the health risk assessment. Speciation profiles presented in this table are from the following sources:

   Gasoline onroad exhaust/evaporative, TOG: BAAQMD 2012 Guidance

Abbreviations:

ARB: Air Resources Board
BAAQMD: Bay Area Air Quality Management District
EPA: Environmental Protection Agency
PM: particulate matter
TOG: total organic gas

References:

BAAQMD. 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. Available online at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf

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

Table HRA-8
Modeling Parameters
The Rise
Cupertino, California

Operational Sources

Source	Source Type	Number of Sources[1]	Stack Height [m]	Stack Velocity [m/s]	Exit Diameter [m]	Stack Temperature °F
Generators[2]	Point	4	18	55	0.51	887

Source	Source Type	Number of Sources[1]	Source Dimension [m]	Release Height [m]	Initial Vertical Dimension [m]	Initial Lateral Dimension [m]
On-Road Light Duty Vehicles[3]	Volume	Variable	Variable	0.6	0.14	Variable

Notes:

1. The number of on-road sources is based on the geometry of the truck or traffic routes. There is one generator point source for every generator included in the Project; this information was provided by the Project Sponsor.
2. Generators are modeled using parameters provided by the client. Exhaust velocity was calculated using information from the client and modeled using the horizontal stack option in AERMOD for horizontal exhaust vents.
3. Release parameters for the on-road fleet were selected based on communication with ARB. The initial lateral dimension for adjacent volume sources is calculated as the width of the roadway divided by 2.15 per USEPA AERMOD User's Guide Table 3-1. The initial vertical dimension for the adjacent volume sources is calculated as the release height divided by 4.3 based on Table 3-2 of the AERMOD User's Guide.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
°F - Fahrenheit
CEQA - California Environmental Quality Act
CRRP - Community Risk Reduction Plan
HRA - Health risk assessment
m - meter
m - meter
s - second
USEPA - United States Environmental Protection Agency

References:

Bay Area Air Quality Management District (BAAQMD). 2020. Health Risk Assessment Modeling Protocol. December. Available online at: https://www.baaqmd.gov/~/media/files/ab617-community-health/facility-risk-reduction/documents/baaqmd_hra_modeling_protocol-pdf.pdf?la=en

San Francisco Department of Public Health (SF DPH), San Francisco Planning Department (SF Planning), and Ramboll. 2020. San Francisco Citywide Health Risk Assessment: Technical Support Documentation.

USEPA. 2021. User's Guide for the AMS/EPA Regulatory Model (AERMOD). Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. EPA-454/B-20-001, April 2021). Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

Table HRA-9
Exposure Parameters
The Rise
Cupertino, California

Population	Receptor Age Group	Exposure Parameters					
		Daily Breathing Rate (DBR)[1] (L/kg-day)	Exposure Duration (ED)[2] (years)	Fraction of Time at Home (FAH)[3] (unitless)	Exposure Frequency (EF)[4] (days/year)	Averaging Time (AT) (days)	Intake Factor, Inhalation (IF_{inh}) (m^3/kg-day)
Residents	3rd Trimester	361	0.25	1	350	25,550	0.0012
	Age 0-<2 Years	1,090	2	1	350	25,550	0.030
	Age 2-<16 Years	572	14	1	350	25,550	0.11
	Age 16-30 Years	261	14	0.73	350	25,550	0.037

Notes:

1. Daily breathing rates reflect default breathing rates from OEHHA 2015 as follows: 95th percentile for 3rd trimester and age 0-<2 years; 80th percentile for ages 2-<9 years, 2-<16 years, and 16-30 years (per BAAQMD 2016 and 2020 Health Risk Assessment (HRA) Modeling Guidelines).
2. The total exposure duration for operation reflects the default residential exposure duration from Cal/EPA 2015.
3. Fraction of time at home was conservatively assumed to be 1 for age groups younger than 16 years old (100%). The FAH of 0.73 for age group 16 and above reflects the default value from Cal/EPA 2015.
4. Exposure frequency reflects default exposure frequency for residents from Cal/EPA 2015.

Calculation:

Resident:

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

CF = 0.001 (m^3/L)

Abbreviations:

Cal/EPA: California Environmental Protection Agency
L: liter
kg: kilogram
m^3: cubic meter

Reference:

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

BAAQMD. 2020. Health Risk Assessment (HRA) Modeling Protocol. December.

Cal/EPA. 2015. Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment (OEHHA). February. Available online at: http://oehha.ca.gov/air/hot_spots/hotspots2015.html.

Table HRA-10
Toxicity Values
The Rise
Cupertino, California

Fuel[1]	Source	Chemical	CAS Number	Cancer Potency Factor [mg/kg-day]$^{-1}$	Chronic REL (µg/m^3)	Acute REL (µg/m^3)
Diesel	PM_{10}	Diesel PM	9-90-1	1.1	5	-
Gasoline	TOG	1,3-Butadiene	106-99-0	0.6	2	660
		Acetaldehyde	75-07-0	0.01	140	470
		Acrolein	107-02-8	-	0.35	2.5
		Benzene[3]	71-43-2	0.1	3	27
		Ethylbenzene[3]	100-41-4	0.0087	2000	-
		Formaldehyde	50-00-0	0.021	9	55
		Hexane[3]	110543	-	7000	-
		Methanol	67-56-1	-	4000	28000
		Methyl Ethyl Ketone	78-93-3	-	-	13000
		Naphthalene	91-20-3	0.12	9	-
		Propylene	115-07-1	-	3000	-
		Styrene	100-42-5	-	900	21000
		Toluene[3]	108-88-3	-	420	5000
		Xylenes[3]	1330-20-7	-	700	22000

Notes:

1. For the health risk analysis, health effects will be evaluated for emissions from on-road truck trips, automobile traffic, and diesel generators.
2. Speciation fractions shown are for gasoline-fueled vehicles.

Abbreviations:

ARB - Air Resources Board
Cal/EPA - California Environmental Protection Agency
CAS - chemical abstract services
mg/kg-day - milligrams per kilogram per day
OEHHA - Office of Environmental Health Hazard Assessment
PM - particulate matter
REL - reference exposure level
TOG - Total Organic Gas

Reference:

Cal/EPA. 2020. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. October. Available at: https://ww2.arb.ca.gov/sites/default/files/classic//toxics/healthval/contable.pdf.

Table HRA-11
Age Sensitivity Factors
The Rise
Cupertino, California

Receptor Age Group	Age Sensitivity Factor[1] (ASF)
3rd Trimester	10
Age 0-<2 Years	10
Age 2-<16 Years	3
Age 16-30 Years	1

Note:

1. Based on OEHHA 2015. Age sensitivity factors are unitless.

Abbreviation:

OEHHA - Office of Environmental Health Hazard Assessment

References:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February. Available online at: http://oehha.ca.gov/air/hot_spots/hotspots2015.html.

Table HRA-12
Project-Related Operational Health Risk Impacts to Existing Residential Areas[1,2]
The Rise
Cupertino, California

Emission Source	Cancer Risk Impact (in one million)	Chronic Non-Cancer Hazard Index	Acute Non-Cancer Hazard Index[3]	Annual $PM_{2.5}$ Concentration (ug/m^3)
Mobile	4.5	0.0052	0.013	0.040
Emergency Generators	0.60	1.6E-04	--	8.0E-04
Project Operational Total	**5.0**	**0.0054**	**0.013**	**0.041**
BAAQMD Significance Threshold	10	1.0	1.0	0.30

Notes:

1. Evaluated project operational activities include new traffic associated with the Rise Project and 4 planned emergency generators.
2. The existing residential locations experiencing maximum project impacts are:

	UTMx	UTMy
Cancer, Chronic HI, $PM_{2.5}$	587360.20	4131425.31
Acute HI	587134.26	4131801.80

3. Diesel exhaust particulate matter (DPM) has no acute toxicity value, and thus maximum one-hour impacts from diesel exhaust were not evaluated in this report.

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
HI: health index
ug/m^3: micrograms per cubic meter
UTM: Universal Transverse Mercator coordinate system

Table HRA-13
Project-Related Operational Health Risk Impacts to Proposed Residential Areas[1,2]
The Rise
Cupertino, California

Emission Source	Cancer Risk Impact (in one million)	Chronic Non-Cancer Hazard Index	Acute Non-Cancer Hazard Index[3]	Annual $PM_{2.5}$ Concentration (ug/m^3)
Mobile	7.5	0.0088	0.015	0.067
Emergency Generators	0.053	1.4E-05	--	7.1E-05
Project Operational Total	**7.5**	**0.0088**	**0.015**	**0.067**
BAAQMD Significance Threshold	10	1.0	1.0	0.30

Notes:

1. Evaluated project operational activities include new traffic associated with the Rise Project and 4 planned emergency generators.
2. The proposed residential locations experiencing maximum project impacts are:

	UTMx	UTMy
Cancer, Chronic HI and $PM_{2.5}$	587087.72	4131178.60
Acute HI	587189.75	4131765.07

3. Diesel exhaust particulate matter (DPM) has no acute toxicity value, and thus maximum one-hour impacts from diesel exhaust were not evaluated in this report.

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
HI: health index
ug/m^3: micrograms per cubic meter
UTM: Universal Transverse Mercator coordinate system

Table HRA-14

Summary of Cumulative Health Risk Impacts to Existing Residential Areas
The Rise
Cupertino, California

Emission Source	Cancer Risk Impact (in one million)	Chronic Non-Cancer Hazard Index	Annual $PM_{2.5}$ Concentration (ug/m^3)
Existing Stationary Sources			
76 Gas Station (BAAQMD Permit 112405)	0.10	4.6E-04	n/a
Background Surface Street and Freeway Traffic	25	0.053	0.64
Subtotal	**25**	**0.053**	**0.64**
Project Traffic	4.5	0.0052	0.040
Project Generators	0.60	1.6E-04	8.0E-04
Total Cumulative Impact	**30**	**0.059**	**0.68**
BAAQMD Significance Threshold	100	10	0.80

Notes:

1. BAAQMD's Permitted Sources Risk and Hazards Map published January 2020 shows one stationary source (a gas station) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source, combined with a BAAQMD-provided health risk scaling tool to estimate impacts from the gas station upon the planned residential areas and the maximally exposed offsite resident receptor (approximately 970 ft).
2. The existing residential locations experiencing maximum project impacts are:

	UTMx	UTMy
Cancer, Chronic HI, $PM_{2.5}$	587360.20	4131425.31

3. The BAAQMD has no cumulative threshold for Acute HI, thus this health endpoint was not analyzed.

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
HI: health index
ug/m^3: micrograms per cubic meter
UTM: Universal Transverse Mercator coordinate system

Table HRA-15

Summary of Cumulative Health Risk Impacts to Proposed Residential Areas
The Rise
Cupertino, California

Emission Source	Cancer Risk Impact (in one million)	Chronic Non-Cancer Hazard Index	Annual $PM_{2.5}$ Concentration (ug/m^3)
Existing Stationary Sources			
76 Gas Station (BAAQMD Permit 112405)	0.17	7.7E-04	n/a
Background Surface Street and FreewayTraffic	19	0.040	0.49
Subtotal	**19**	**0.041**	**0.49**
Project Traffic	7.5	0.0088	0.067
Project Generators	0.053	1.4E-05	7.1E-05
Total Cumulative Impact	**26**	**0.050**	**0.56**
BAAQMD Significance Threshold	100	10	0.80

Notes:

1. BAAQMD's Permitted Sources Risk and Hazards Map published January 2020 shows one stationary source (a gas station) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source, combined with a BAAQMD-provided health risk scaling tool to estimate impacts from the gas station upon the planned residential areas and the maximally exposed offsite resident receptor (approximately 710 ft).

2. The proposed residential locations experiencing maximum project impacts are:

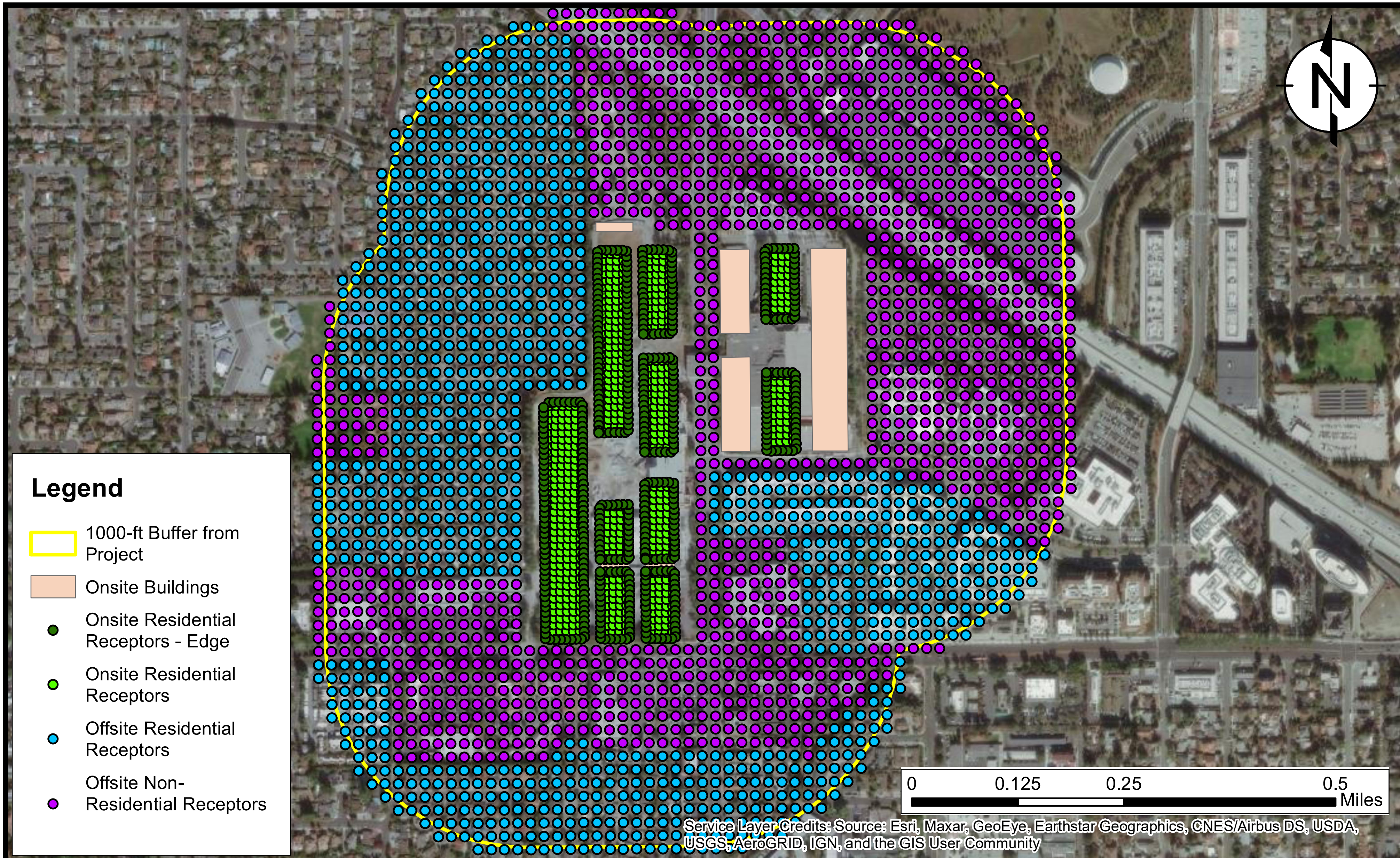
	UTMx	UTMy
Cancer, Chronic HI and $PM_{2.5}$	587087.72	4131178.60

3. The BAAQMD has no cumulative threshold for Acute HI, thus this health endpoint was not analyzed.

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
HI: health index
ug/m^3: micrograms per cubic meter
UTM: Universal Transverse Mercator coordinate system

FIGURES



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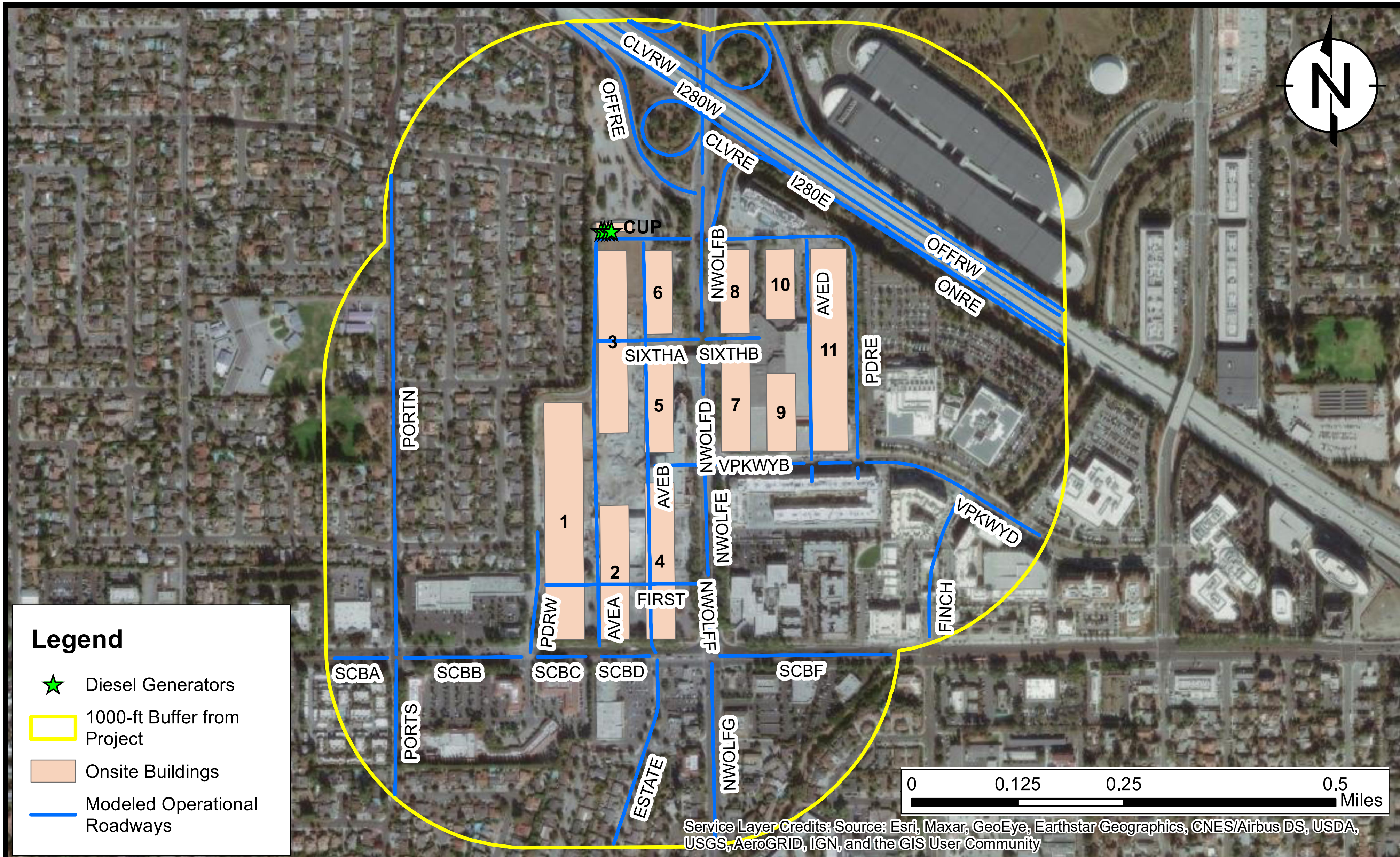
The Rise
Modeled Receptors
Onsite and Offsite
Cupertino, California

FIGURE 1

PROJECT: 1690006518



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DATE: 2022-02-04

The Rise

Operational Emission Sources

Traffic and Generators

Cupertino, California

FIGURE

2

PROJECT: 1690006518