Prepared for
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THE RISE

OPERATIONAL HEALTH RISK ASSESSMENT TECHNICAL REPORT

CONTENTS

1. INTRODUCTION

Ramboll Americas Engineering Solutions Inc. ("Ramboll") prepared this Operational Health Risk Assessment Technical Report (HRA) to support the proposed The Rise mixed-use development project in Cupertino, CA, in connection with the modification application submitted pursuant to SB 35 (Cal Gov. Code § 65913.4(g).) (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, as well as the results from this analysis. As a result of this analysis, all evaluated potential health risk impacts from the Project were found to be below applicable Bay Area Air Quality Management District (BAAQMD) and Cupertino Municipal Code (CMC) thresholds as outlined in Section 5.1.2 below.

1.1 Project Description

The proposed The Rise 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. The Project area is currently developed with a shopping mall of approximately 1.2 million square feet.

The new development plan contains 2,669 residential units, and approximately 230,000 square feet of retail and 1.95 million square feet of office space.[1] The conservative Project operational year evaluated in this report is 2024 ("Project build-out").

1.2 Scope of Analysis

The proposed project is located in the City of Cupertino (City), and thus is subject to the CMC. As detailed in CMC 17.04.040(A)(1)(a), projects for new non-residential land uses with the potential to generate 100 or more diesel truck trips per day or have 40 or more trucks with operating diesel-powered Transport Refrigeration Units (TRUs), or are within 1,000 feet of a sensitive land use (e.g., residential, schools, hospitals, nursing homes), are required to prepare and submit an operational HRA. Additionally, as detailed in CMC 17.04.040(A)(2)(a), an HRA is also required if residential land uses are proposed to be located within the "Conduct Further Study" locations on BAAQMD's Planning Healthy Places Map.

This HRA conducted for the Project satisfies these CMC requirements. This HRA details the methods used to conduct the assessment, which, as required by the CMC, align with the policies and procedures of California Environmental Protection Agency Office of Environmental Health Risk Assessment (OEHHA) and BAAQMD CEQA California Environmental Quality Act (CEQA) guidelines.

[1] The land uses evaluated in this HRA were used to estimate trip generation rates, as described in Section 2.1.2, and differ slightly from the final land usage square footages. Ramboll confirmed that the absolute percent difference in trips was <0.5%, which would result in very minor effects or no change to health risk results. Additionally, further program reductions, which would reduce estimated trip generation (and therefore emissions), such as reductions in office and/or retail areas, would not necessitate additional health risk analysis.

Emissions sources evaluated in this HRA include emergency generators, on-road mobile sources, transportation refrigeration units, and truck idling. Air dispersion modeling for the toxic air contaminants from these sources was conducted for impacts both on-site and off-site. Potential health impacts from the Project were evaluated both for residents near the Project area ("off-site residents"), off-site daycare receptors, off-site workers, as well as future residents who will move into the residential areas of the Project ("on-site residents").

1.3 Thresholds for Evaluation of Health Risks

The net results of the construction and operational health risk analyses were compared with the BAAQMD CEQA significance thresholds. Then maximum operational impacts were combined with the impacts of off-site sources of toxic air contaminants (TACs), such as existing traffic and nearby stationary sources, and compared against the BAAQMD CEQA cumulative thresholds. The thresholds are:

Single Source Impacts:

- An excess lifetime cancer risk level of more than 10 in one million;
- Non-cancer chronic and acute HIs greater than 1.0; and
- An incremental increase in the annual average $PM_{2.5}$ of greater than 0.3 micrograms per cubic meter ($\mu g/m^3$).

Cumulative Impacts:

- An excess lifetime cancer risk level of more than 100 in one million;
- A chronic non-cancer HI greater than 10.0; and
- An incremental increase in the annual average $PM_{2.5}$ concentration of greater than 0.8 $\mu g/m^3$.

As discussed in detail in **Section 3**, health impacts are based on emissions of TACs from project traffic, idling, and emergency generators. Diesel particulate matter (DPM) does not have an acute non-cancer toxicity value, so an acute HI from diesel exhaust was not estimated.

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 three sources of TACs during operational years – emergency generators, on-road vehicles, and idling from trucks and associated TRUs. 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 nine diesel fueled emergency generators; these generators are located at ground-level around the Project, as shown in **Figure 1**. These emergency generators are required to support life safety systems and emergency elevators for Project buildings in the case of a power outage or other emergencies.

The TACs of concern from emergency engines included diesel particulate matter (DPM) and particulate matter with an aerodynamic diameter of less than 2.5 microns ($PM_{2.5}$). Emissions from non-emergency (i.e., non-emergency maintenance and testing hours) as well as emergency operation of the generators are considered in this health risk assessment, consistent with Bay Area Air Quality Management District CEQA guidelines (BAAQMD 2023a). More detail on chemical selection for the HRA can be found in **Section 3** of this report.

Consistent with BAAQMD permitting requirements, any generators greater than 1000hp will be required to meet current BAAQMD Best Available Control Technology (BACT) and Best Available Control Technology for Toxics (TBACT) requirements, which will require them to be Tier 4F engines. Thus, Tier 4F emission factors were used for any generators over 1000hp. For generators less than 1000hp, DPM and $PM_{2.5}$ emissions from the diesel engines were estimated using manufacturer specification sheets provided by the project sponsor or, where manufacturer specifications were not available, emission factors were used consistent with minimum engine Tier required by BAAQMD BACT requirements for each engine size. Each generator less than 1000hp will be equipped with a diesel particulate filter (DPF), and thus a 90% control efficiency for DPM and $PM_{2.5}$ was applied.

All emergency engines were assumed to be capable of operating up to 50 hours per year for non-emergency maintenance and testing operations, and 100 hours per year for emergency operations, per BAAQMD guidance (BAAQMD 2023a). Detailed emergency engine emissions calculations can be found in **Table HRA-2**.

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 the background and post-project 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 2022 highway AADT estimates from the CalTrans Traffic Census database (CDT 2022). 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 2024. 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 and roadway layout 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[2] weekday Project trip generation and the total weekday trip generation estimated for the new Project land-uses (CalEEMod® 2022.1.3). To account for the differences in roadway layout between the TIA and the project, the TIA total volume was retained and redistributed among comparable roadways to more accurately spatially allocate traffic volumes. 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**.

2.1.2.3 Transportation Refrigeration Unit Emissions

TRUs are cooling units installed on trucks carrying perishable goods, such as food. It was assumed that the TRU is a separate engine that will run regardless of whether the truck engine is running. TRU emissions were calculated for this analysis to account for perishable goods delivery to the grocery store that is anticipated to be located within the proposed Project. It was assumed that all TRUs coming to the Project will be diesel-powered. Based on input from the Project sponsor, it was assumed that the diesel engines would be plugged in during unloading rather than rely on diesel power for the duration of unloading/loading activities. However, to provide for a reasonably conservative analysis, it was assumed that the diesel-powered TRUs would operate for 5 minutes during arrival and departure as a conservative estimate of the time required to plug in or unplug the TRU from the Project's power supply.

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[2] 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.

CARB adopted new regulatory requirements for TRUs in February 2022, which will require truck-based TRUs to turn over their fleet to meet a 100% zero-emission limit by end of 2029 and trailer-based TRUs to meet the Tier 4 final off-road emissions limit starting with model year 2023. CARB's web-based EMFAC tool was used to estimate DPM emissions of both truck- and trailer-based TRUs for the closest operational year of 2024. As a result, this analysis presents highly conservative calculations with respect to TRU emissions, as this analysis does not account for the phasing out of diesel-powered TRUs. For the refrigerated truck analysis, medium heavy-duty trucks (MHDT) were assumed to have truck-based TRUs and heavy heavy-duty trucks (HHDT) were assumed to have trailer-based TRUs.

Emissions during unloading were calculated using TRU trips per year, engine size and load factors from CARB's 2021 off-road inventory, and unloading time. Again, unloading times were assumed to be 5 minutes/trip, after which the TRU would be plugged in (and thus not emitting particulates or TACs), and TRU trips were assumed to be 13 trips/day,[3] which was used to calculate emissions occurring from TRUs while at loading docks (City and County of San Francisco 2022).

Additional details regarding these calculations are shown in **Tables HRA-7** and **HRA-8**.

2.1.2.4 Truck Idling Emissions

Emissions from truck engines idling at loading docks during loading and unloading were also calculated. It was assumed that all trucks comply with the California state law limiting idling to 5 minutes at the start and end of loading, for a total of 10 minutes of idling per truck trip onsite (California Air Resources Board 2004). The total number of idling trucks per day were based on the fleet mix of HHDT and MHDT from CARB's web-based EMFAC tool and the trip generation rates for retail land uses (CalEEMod® 2022.1 trip generation rates).

[3] TRU trips were based on the Whole Foods at 2675 Geary Boulevard Project EIR published on 12/14/2022.

3. ESTIMATED AIR CONCENTRATIONS

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, on-road gasoline and diesel engines, and truck idling and associated TRU operations. 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-9** (BAAQMD 2012a).

$PM_{2.5}$ 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 2012b). 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 22112) to evaluate ambient air concentrations of TACs and $PM_{2.5}$ at receptors (USEPA 2023). Project operational TAC sources were grouped into three types: emergency generators, on-road traffic, and truck/TRU idling. 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 on-road traffic (BAAQMD 2023a). Traffic on roadways were modeled out to 1,000 feet from the project boundary (BAAQMD 2023a). Truck idling was modeled as horizontal point sources to characterize release from horizontal vents based on information from the Project Sponsor; release height was set as 10 meters. Other modeling parameters (such as temperature and velocity) were chosen as follows: idling at the grocery delivery (loading/unloading) location using San Joaquin Valley Air Pollution Control District (SJVAPCD) guidance for TRUs, and idling at non-grocery delivery (loading/unloading) locations following SJAVPCD guidance for truck idling (SJVAPCD 2006). The source parameters used for each modeled source can be found in **Table HRA-10**.

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**.

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 2013 through 2017, with upper air data collected at the Oakland Airport for the same period. Processed meteorological data for AERMOD was provided by the BAAQMD.

3.5 Terrain Considerations

Elevation and land use data were imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey at a resolution of 1/3 arc-second (10m) (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 60,381 persons as the urban population for City of Cupertino for purposes of in AERMOD based on 2020 data (US Census Bureau 2020).

The direction-specific building downwash dimensions that were used as inputs were determined by the latest version (04274) of the Building Profile Input Program, PRIME (BPIP PRIME). Onsite and nearby offsite buildings were evaluated for downwash effects on each modeled point source.

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 [$\mu g/m^3$]/[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.

As discussed in **Section 2** of this report, consistent with BAAQMD CEQA guidelines, this health risk assessment considers generator emissions from non-emergency operation (i.e., non-emergency maintenance and testing hours) as well as emergency operations. Emergency generators were conservatively modeled assuming emissions could occur at any time of day. Emergency generator emissions were modeled in AERMOD as point sources using parameters provided by the project sponsor and default modeling parameters from BAAQMD CEQA Guidance (BAAQMD 2023a). See **Table HRA-10** 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 3 floors layered around potential emissions sources; for example, receptors were placed at a height of 1.5 meters, 4.5 meters, and 7.5 meters above terrain height for release points at 3 meters, and receptors were placed in the three floors below roof exhaust points. The residential receptor grid only included sections of buildings where floors expected to have residential uses, e.g., residents were not modeled in areas planned for parking. Receptors were placed over all on-site residential areas with 10-meter spacing.

Off-site receptors were modeled at a height of 1.5 meters above terrain height as recommended in BAAQMD CEQA Guidance (BAAQMD 2023a). A receptor grid with 20-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 2**.

4. RISK CHARACTERIZATION METHODS

Potential health impacts from the Project were evaluated both for residents near the Project area ("off-site residents"), off-site daycare receptors, off-site workers, as well as residents who will move into the residential areas of the Project ("on-site residents"). This report analyzed cancer risk, chronic non-cancer hazard index (HI), acute HI, and $PM_{2.5}$ at these receptors using 2015 Office of Environmental Health Hazard Assessment (OEHHA) guidance.

Risk was characterized using CARB's Hot Spots Analysis & Reporting Program Air Dispersion Modeling and Risk Tool (HARP), following BAAQMD CEQA guidelines and 2015 OEHHA Hot Spots Guidance.

4.1 Potentially Exposed Populations

This HRA evaluated Project-related operational cancer risk, chronic HI, and $PM_{2.5}$ concentrations at off-site residential and worker locations, 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

The exposure parameters used to estimate excess lifetime cancer risks for receptors are based on the 2023 BAAQMD CEQA Guidelines (BAAQMD 2023a) and 2015 OEHHA Hot Spots Guidance (Cal/EPA 2015a). Exposure parameters are presented in **Table HRA-11**.

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. On-site workers were evaluated for a 25-year exposure duration per OEHHA guidance. The exposure duration for daycare students was set to 9 years, conservatively assuming exposure from age zero to early elementary.

To account for the building envelope's effect on limiting outdoor ambient air pollutants from infiltrating into indoor spaces, Ramboll conducted a literature review of published research studies that estimated indoor to outdoor ratios of $PM_{2.5}$ concentrations. The following four studies accounted for the effect of window openings and methodologies are summarized in **Table A** below (Ji 2015, MacNeill 2012, Taylor 2014, Xu 2017). Based on these studies, an indoor reduction factor was applied to future onsite residents, to account for the reduction in air pollution and associated exposure to residential receptors. The indoor reduction factor is calculated based on a mean indoor/outdoor ratio of 0.5.

Table A. Summary of Indoor/Outdoor Ratio from Research Studies

Study	Estimated $PM_{2.5}$ Indoor/Outdoor Ratio	Location	Methodology
Ji 2015	U.S. specific ratio: Mean = 0.58 Max = 0.82	U.S., Europe, China	Literature review of published studies.

Study	Estimated $PM_{2.5}$ Indoor/Outdoor Ratio	Location	Methodology
MacNeill 2012	0.26-0.36	Canada	2-year personal exposure study with summer and winter sampling sessions in 40+ homes.
Taylor 2014	~0.7	United Kingdom	Building circulation simulation for 15 building archetypes in the entire London borough.
Xu 2017	0.7	China	Collected paired indoor/outdoor samples by Teflon filters during non-heating and heating seasons in 50+ homes.

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 (BAAQMD 2012a). Excess lifetime cancer risks[4] 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-9**. Toxicity values are as presented in **Table HRA-12**. 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.

Toxicity values for all TACs are consistent with OEHHA-approved values found in the HARP Air Dispersion Modeling and Risk Tool (CARB 2022).

4.5 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)
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)

4.6 Estimation of Chronic and Acute Noncancer Hazard Indices

Chronic HQ

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 HQ. To evaluate the potential for adverse chronic noncancer health effects from

[4] 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.

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)

Acute HI

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)

4.7 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 2022 (CalTrans 2022).

BAAQMD's Permitted Sources Risk and Hazards Map published April 2023 shows three stationary sources (two generators and a gas station) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source to estimate impacts from these stationary sources upon the planned residential areas and the maximally exposed offsite resident receptor (BAAQMD 2023b).

5. RESULTS

5.1.1 Operational HRA

Tables HRA-13 and **HRA-14** show the Project-related human health endpoints from operational sources such as Project-generated traffic, truck idling, and emergency generators. **Table HRA-13** summarizes the results of the Project-related analysis at existing offsite residential areas and **Table HRA-14** summarizes the results of the Project-related analysis at future residential areas proposed as part of the Project. The locations of maximum potential impact for future and existing residents are shown in **Figure 3.**

As shown in these tables, the estimated potential incremental excess cancer risks, chronic HIs, acute HIs, and $PM_{2.5}$ concentrations from Project TAC emissions do not exceed the BAAQMD or CMC thresholds at either existing offsite residential areas or at future residential areas proposed as part of the Project.

Tables HRA-15 and **HRA-16** 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, truck and emergency generators. Acute HI has no cumulative BAAQMD threshold, and thus is not analyzed in this report. **Table HRA-15** shows summarizes the results of the cumulative analysis at existing offsite residential areas and **Table HRA-16** summarizes the results of the cumulative analysis at future residential areas proposed as part of the Project.

As shown in these tables, the estimated cumulative excess cancer risks, chronic HIs, and $PM_{2.5}$ concentrations do not exceed the BAAQMD or CMC thresholds at either existing offsite residential areas or at future residential areas proposed as part of the Project.

5.1.2 Conclusions

This analysis identified the maximum highest (total worst-case) impacts that could occur at the MEISR and MEI associated with the Project. Based on the results of this operational HRA in **Section 5.1.1** above, the estimated potential incremental and cumulative excess cancer risks, chronic HIs, and $PM_{2.5}$ concentrations are below the BAAQMD and CMC thresholds, presented in **Section 1.3**, at both existing offsite residential areas and future residential areas proposed as part of the Project.

6. REFERENCES

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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 * (1-CE)	ARB/USEPA Off-Road Engine Standards
Operational On-Road Mobile Sources[2]	Exhaust - Running	E_R = Σ(EF_R * VMT * C) , where VMT = Trip Length * Trip Number	EMFAC2021
	Brake Wear and Tire Wear	$E_{BW,TW}$ = Σ($EF_{BW,TW}$ * VMT * C), where VMT = Roadway Link Length * Vehicle Counts	EMFAC2021
	Exhaust - Idling	E_I = Σ(EF_I * Trip Number *T_I* C)	EMFAC2021
	Exhaust - Running Losses	E_R = Σ(EF_{RL} * VMT * C) , where VMT = Trip Length * Trip Number	EMFAC2021
Other Operational Sources	Transportation Refrigeration Units[3]	E_I = Σ(EF_I * Trip Number *T_I* C)	EMFAC2021

Notes:

1. 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
   - CE: control efficiency
2. 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

   E_I: vehicle idling emissions (lb).
   - EF_I: vehicle idling emission factor (g/hr-trip).
   - T_I: idling time
   - C: unit conversion factor
3. Transportation refrigerant unit emissions were calculated for emissions at loading docks; idling time accounts for the unloading time as well as the fraction of time when the engine is on during TRU operation.
   E_I: vehicle idling emissions (lb).
   - EF_I: idling emission factor (g/idle-hr).
   - T_I: idling time
   - 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

References:

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

Generator	Generator Size (hp)		Hours[1] (hrs/year)	Engine Tier[2]	Controls[2]	Engine Emission Factors[2,3] (g/bhp-hr)		Annual Emissions[4] (ton/yr)	
	hp	kW				DPM	$PM_{2.5}$	DPM	$PM_{2.5}$
1	1006	750	150	Tier 2	DPF (90% control efficiency)	0.0021	0.0021	3.5E-04	3.5E-04
2	805	600	150	Tier 2		0.0050	0.0050	6.7E-04	6.7E-04
3	671	500	150	Tier 3		0.015	0.015	0.0017	0.0017
4	1,676	1,250	150	Tier 4	--	0.020	0.020	0.0055	0.0055
5	2,012	1,500	150	Tier 4	--	0.020	0.020	0.0067	0.0067
6	2,012	1,500	150	Tier 4	--	0.020	0.020	0.0067	0.0067
7	1,676	1,250	150	Tier 4	--	0.020	0.020	0.0055	0.0055
8	2,012	1,500	150	Tier 4	--	0.020	0.020	0.0067	0.0067
9	1,676	1,250	150	Tier 4	--	0.020	0.020	0.0055	0.0055

Notes:

1. Annual operational hours are inclusive of testing and maintenance hours and emergency operational hours. The ARB ATCM limits non-emergency use of emergency backup engines to 50 hours a year, and per BAAQMD's CEQA guidelines 100 emergency hours a year are required to be included in emissions estimates.
2. Engine ratings were provided by the Project Sponsor where available (Generators 1-2) or sourced from BAAQMD requirements for Best Available Control Technology (BACT) (Generators 3-9). A diesel particulate filter (Rypos Diesel Oxidation Catalyst) with a control efficiency of 90% was applied to non-Tier 4 engines, based on information from the project sponsor.
3. Engine emission factors for PM_{10} were sourced from generator spec sheets. Where generator specific emission factors were not available, emission factors were sourced from BAAQMD requirements for BACT. All engines were assumed to be diesel fueled and all PM_{10} is assumed to be diesel particulate matter.
4. Emissions for emergency generators are calculated assuming each engine 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
BACT: Best Available Control Technology
DPF:
LPG: Liquefied Petroleum Gas
NOx: nitrogen oxides
PM: particulate matter
ROG: reactive organic gases
USEPA: United States Environmental Protection Agency

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

Source Group (SRCGRP)	Description	Source Type	Length (meters)
STB	4th Street	roadway	95
STG	Avenue A	roadway	172
STJ	Avenue A	roadway	110
STK	Avenue A	roadway	246
STM	Avenue A	roadway	151
STD	Avenue B	roadway	141
STE	Avenue B	roadway	137
STL	Avenue B	roadway	81
STH	Avenue D - Offsite Driveway/Vallco Parkway/Vallco Driveway 4/Wolfe Road/ 6th St Proposed	roadway	221
ESTATE	East Estates Drive	roadway	287
FINCH	Finch Avenue	roadway	223
CLVRW	I-280 N On Ramp from N-bound Wolfe Rd	roadway	405
ONRW	I-280 N On Ramp from S-bound Wolfe Rd	roadway	78
I280W	I-280 North (I-280 West)	roadway	807
CLVRE	I-280 S from S-bound Wolfe Road	roadway	889
ONRE	I-280 S On Ramp, from S-bound Wolfe Road	roadway	693
I280E	I-280 South (I-280 East)	roadway	857
PORTN	North Portal Avenue	roadway	722
NWOLFA	North Wolfe Road / Miller Avenue	roadway	206
NWOLFE		roadway	154
NWOLFF		roadway	88
NWOLFG		roadway	261
NWOLFB		roadway	215
NWOLFC		roadway	71
NWOLFD		roadway	71
STC	Perimeter Road	roadway	86
STI		roadway	131
STO		roadway	33
STQ		roadway	397
PORTS	South Portal Avenue	roadway	201
SCBB	Stevens Creek	roadway	177
SCBA		roadway	80
SCBF		roadway	258
SCBD		roadway	72
SCBC		roadway	72
SCBE		roadway	67
VPKWYD	Vallco Parkway	roadway	291
VPKWYB		roadway	139
OFFRW	Wolfe Road from I-280 N	roadway	645
OFFRE	Wolfe Road from I-280 S	roadway	341
STA	Wolfe Road/6th Street (Proposed)	roadway	140
STF	Wolfe Road/Vallco Driveway 3	roadway	91
STN		roadway	40
STP		roadway	123

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
					Total	Gasoline	Diesel	Gasoline
STA	2,608	140	0.087	227	1.8	10.0	0.19	10.0
STB	3,406	95	0.059	201	1.6	8.8	0.17	8.8
STC	2,716	86	0.053	145	1.2	6.4	0.12	6.4
STD	0	141	0.088	0	0	0	0	0
STE	0	137	0.085	0	0	0	0	0
STF	1,807	91	0.057	102	0.81	4.5	0.088	4.5
STG	600	172	0.11	64	0.51	2.8	0.055	2.8
STH	10,414	221	0.14	1,430	11	63	1.2	63
STI	1,159	131	0.081	94	0.75	4.2	0.081	4.2
STJ	384	110	0.068	26	0.21	1.2	0.023	1.2
STK	856	246	0.15	131	1.0	5.8	0.11	5.8
STL	0	81	0.050	0	0	0	0	0
STM	524	151	0.094	49	0.39	2.2	0.042	2.2
STN	785	40	0.025	20	0.16	0.86	0.017	0.86
STO	1,031	33	0.021	21	0.17	0.93	0.018	0.93
STP	2,443	123	0.076	187	1.5	8.2	0.16	8.2
STQ	3,141	397	0.25	775	6.2	34	0.67	34
CLVRE	31,014	889	0.55	17,132	136	754	15	754
CLVRW	26,497	405	0.25	6,668	53	293	5.7	293
ESTATE	3,215	287	0.18	573	4.6	25	0.49	25
FINCH	6,036	223	0.14	836	6.6	37	0.72	37
I280W	66,500	807	0.50	33,346	265	1,467	29	1,467
I280E	66,500	857	0.53	35,412	281	1,558	30	1,558
NWOLFA	53,383	206	0.13	6,833	54	301	5.9	301
NWOLFE	42,100	154	0.10	4,029	32	177	3.5	177
NWOLFF	39,904	88	0.055	2,182	17	96	1.9	96
NWOLFG	23,922	261	0.16	3,880	31	171	3.3	171
OFFRE	31,014	341	0.21	6,571	52	289	5.6	289
OFFRW	26,497	645	0.40	10,620	84	467	9.1	467
ONRE	6,877	693	0.43	2,961	24	130	2.5	130
ONRW	9,868	78	0.048	478	3.8	21	0.41	21
PORTN	4,474	722	0.45	2,007	16	88	1.7	88
PORTS	2,917	201	0.12	364	2.9	16	0.31	16
SCBB	45,658	177	0.11	5,022	40	221	4.3	221
SCBA	44,386	80	0.050	2,206	18	97	1.9	97
SCBF	41,371	258	0.16	6,632	53	292	5.7	292
VPKWYD	17,330	291	0.18	3,134	25	138	2.7	138
VPKWYB	37,816	139	0.086	3,266	26	144	2.8	144
NWOLFB	50,117	215	0.13	6,695	53	295	5.7	295
NWOLFC	48,017	71	0.044	2,118	17	93	1.8	93
NWOLFD	49,938	71	0.044	2,203	18	97	1.9	97
SCBD	47,076	72	0.045	2,106	17	93	1.8	93
SCBC	46,779	72	0.045	2,093	17	92	1.8	92
SCBE	46,938	67	0.042	1,954	16	86	1.7	86
Total Emissions					**1,389**	**7,690**	**150**	**7,690**

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). The TIA was done for the original Vallco project in 2016 but is still assumed to be representative of traffic within the new project plans.
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 2022 using data from the intersection closest to the project site.

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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	1,898,419	sf	18,491
Retail	240,407	sf	9,075
Residential	2,669	Units	14,519
Total Weekday Project Trips			**42,085**

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® 2022.1 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. 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.caleemod.com/user-guide.

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: 42,085

Link	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
STA	3,316	140	0.087	288	2.3	13	0.25	13
STB	2,966	95	0.059	176	1.4	7.7	0.15	7.7
STC	8,202	86	0.053	439	3.5	19	0.38	19
STD	402	141	0.088	35	0.28	1.6	0.030	1.6
STE	390	137	0.085	33	0.26	1.5	0.029	1.5
STF	797	91	0.057	45	0.36	2.0	0.039	2.0
STG	652	172	0.11	70	0.56	3.1	0.060	3.1
STH	13,808	221	0.14	1,897	15	83	1.6	83
STI	1,325	131	0.081	107	0.85	4.7	0.092	4.7
STJ	417	110	0.068	29	0.23	1.3	0.024	1.3
STK	930	246	0.15	142	1.1	6.3	0.12	6.3
STL	230	81	0.050	12	0.092	0.51	0.010	0.51
STM	569	151	0.094	53	0.42	2.3	0.046	2.3
STN	346	40	0.025	8.5	0.068	0.37	0.0073	0.37
STO	3,114	33	0.020	63	0.50	2.8	0.054	2.8
STP	1,077	123	0.077	82	0.66	3.6	0.071	3.6
STQ	3,934	397	0.25	972	7.7	43	0.83	43
CLVRE	36,315	889	0.55	20,051	159	882	17	882
CLVRW	33,031	405	0.25	8,314	66	366	7.1	366
ESTATE	3,922	287	0.18	699	5.6	31	0.60	31
FINCH	6,036	223	0.14	835	6.6	37	0.72	37
I280W	66,500	807	0.50	33,331	265	1,466	29	1,466
I280E	66,500	857	0.53	35,406	281	1,558	30	1,558
NWOLFA	61,042	206	0.13	7,827	62	344	6.7	344
NWOLFE	60,424	154	0.10	5,772	46	254	5.0	254
NWOLFF	44,106	88	0.054	2,401	19	106	2.1	106
NWOLFG	25,686	261	0.16	4,158	33	183	3.6	183
OFFRE	36,315	341	0.21	7,689	61	338	6.6	338
OFFRW	33,031	645	0.40	13,238	105	582	11	582
ONRE	10,587	693	0.43	4,561	36	201	3.9	201
ONRW	9,868	78	0.049	480	3.8	21	0.41	21
PORTN	4,474	722	0.45	2,006	16	88	1.7	88
PORTS	2,917	201	0.12	364	2.9	16	0.31	16
SCBB	54,067	177	0.11	5,933	47	261	5.1	261
SCBA	52,624	80	0.049	2,603	21	115	2.2	115
SCBF	44,877	258	0.16	7,194	57	317	6.2	317
VPKWYD	17,326	291	0.18	3,138	25	138	2.7	138
VPKWYB	36,497	139	0.086	3,143	25	138	2.7	138
NWOLFB	64,550	215	0.13	8,635	69	380	7.4	380
NWOLFC	61,743	71	0.044	2,721	22	120	2.3	120
NWOLFD	58,564	71	0.044	2,581	21	114	2.2	114
SCBD	53205	72	0.045	2,397	19	105	2.1	105
SCBC	52,437	72	0.045	2,362	19	104	2.0	104
SCBE	52,872	67	0.042	2,201	17	97	1.9	97
Total Emissions					**1,546**	**8,557**	**167**	**8,557**

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 2022 using data from the intersection closest to the project site.

References:

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Table HRA-7
Idling Criteria Air Pollutants Emissions from Onsite Truck Activity
The Rise
Cupertino, California

Truck Idling Inputs

Scenario	Parameter	Value	Units
Project Operation	Year	2024	--
	Average Number of Refrigerated Grocery Trucks per Day[1]	13.3	one-way trips/day
	Average Number of Non-Refrigerated Grocery Trucks per Day[1]	34	one-way trips/day
	Average Number of Non-Refrigerated Trucks per Day[2]	104	one-way trips/day
	Idle Time[3]	5	min/one-way trip
	Operational Days per Year	365	days/yr
	Total Annual Grocery Trucks Idling	1,430	idle-hr/yr
	Total Annual Trucks Idling	3,170	idle-hr/yr

Truck Idling Emission Factors and Emissions

Truck Type	Pollutant	Idling Emission Factors[4] (g/idle-hr)	Emissions	Units
	2024			
Delivery Trucks	PM10	0.056	0.00020	tpy
Delivery Trucks	PM2.5	0.053	0.00019	tpy
Grocery Trucks	PM10	0.056	8.8E-05	tpy
Grocery Trucks	PM2.5	0.053	8.4E-05	tpy

Notes:

1. Grocery truck idling activity inputs were based on Whole Foods at 2675 Geary Boulevard Project EIR. Available online: https://ceqanet.opr.ca.gov/Project/2022060505
2. Truck idling activity inputs were based on fleetmix estimated using EMFAC2021 for the project and retail trip generations from CalEEMod® 2022.1 minus the grocery truck idling.
3. Based on Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling. Available at: https://ww2.arb.ca.gov/sites/default/files/2022-06/13_CCR_2485_OAL_06222022-2_ADA_06272022_0.pdf
4. Emission factors were estimated using EMFAC2021 to generate emission rates for Santa Clara County from diesel trucks.

Abbreviations

CO - carbon monoxide
CO_2e - carbon dioxide equivalents
EMFAC - EMission FACtors model
g - grams
idle-hr - hour spent idling
min - minute
NO_X - oxides of nitrogen
PM - particulate matter
ROG - reactive organic gases
tpy - tons per year
yr - year
MT - metric ton

References

ARB. 2021. EMission FACtors Model, 2021 (EMFAC2021). Available online at: https://arb.ca.gov/emfac/emissions-inventory

City and County of San Francisco. 2022. Whole Foods at 2675 Geary Boulevard Project EIR. December. Available online at: https://ceqanet.opr.ca.gov/2022060505/2

Table HRA-8

Transportation Refrigeration Unit (TRU) Criteria Air Pollutant Emissions from Project Operations
The Rise
Cupertino, California

TRU Usage Inputs [Unit]		Truck TRU	Trailer TRU
TRU Usage[1] [One-way trips/day]		7.2	6.1
Percent of time when engine is on during TRU operation [--][2]		62.5%	62.5%
Operational Days [days/yr]		365	
TRU Engine Operation During Unloading	Unloading Time per TRU[3] [hour/one-way trip]	0.08	0.08
	Annual Hours of Operation During Unloading [hr]	136	117

TRU Emission Factors

Source	Year[4]	Emission Factor (g/hour)[5]	
		PM_{10}	$PM_{2.5}$
Truck TRU	2024	1.8	1.7
Trailer TRU		1.1	1.0

TRU Emissions

TRU Type	Operation	Annual Average Emissions (tons/yr)	
		PM_{10}	$PM_{2.5}$
Truck TRU	Operation During Unloading	0.0003	0.0003
Trailer TRU	Operation During Unloading	1.4E-04	1.3E-04

Notes:

1. Approximate TRU usage were based on Whole Foods at 2675 Geary Boulevard Project EIR. Available online: https://ceqanet.opr.ca.gov/Project/2022060505
2. According to Appendix H: 2021 Update to Emissions Inventory for Transport Refrigeration Units, TRU engines are generally running about 62.5% of time that a TRU unit is turned on. Available online: https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf
3. Loading and unloading times were based on a commitment of the project sponsor to plug in TRU engines during loading and unloading. 5 minutes is a conservative estimate of the time it would take to plug in and unplug the units.
4. Criteria air pollutant emissions from TRUs were calculated for an operational year of 2024. This is highly conservative, given the adoption of a new state rule requiring the the phase out of diesel TRUs through 2030, which would reduce emissions to zero after 2030; emissions from TRUs would decrease over time as this rule goes into effect.
5. Emission factors were estimated using OFFROAD2021 for Transportation Refrigeration Unit vehicle classes in Santa Clara County. The year 2024 was used as a conservative earliest operating year for the project.

Abbreviations:

ARB - [California] Air Resources Board
g - gram
PM - particulate matter
hr - hour
mi - mile
NO_X - oxides of nitrogen
ROG - reactive organic gases
TRU - transportation refrigeration unit
yr - year

References:

California Air Resources Board. 2021 OFFROAD database. Available at: https://arb.ca.gov/emfac/emissions-inventory/.

California Air Resources Board. Appendix H: 2021 Update to Emissions Inventory for Transport Refrigeration Units. July.

California Air Resources Board. 2022. TRU Compliance Information. October. Available online: https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/tru-compliance-information#ze_truck

City and County of San Francisco. 2022. Whole Foods at 2675 Geary Boulevard Project. Available at: https://ceqanet.opr.ca.gov/Project/2022060505

Table HRA-9
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. 2023. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. October. Available at: https://ww2.arb.ca.gov/resources/documents/consolidated-table-oehha-carb-approved-risk-assessment-health-values.

Table HRA-10
Modeling Parameters
The Rise
Cupertino, California

Operational Sources

Source	Source Type	Number of Sources[1]	Stack Height	Stack Velocity	Exit Diameter	Stack Temperature
			[m]	[m/s]	[m]	°F
Generator 1	Horizontal Point	1	3.05	45.3	0.203	948.7
Generator 2	Horizontal Point	1	3.05	45.3	0.183	946
Generator 3	Point	1	25.9	45.3	0.183	872
Generator 4	Horizontal Point	1	3.05	45.3	0.183	884
Generator 5	Horizontal Point	1	3.05	45.3	0.183	965
Generator 6	Horizontal Point	1	3.05	45.3	0.183	965
Generator 7	Horizontal Point	1	3.05	45.3	0.183	884
Generator 8	Horizontal Point	1	3.05	45.3	0.183	965
Generator 9	Horizontal Point	1	3.05	45.3	0.183	884
Idling/Loading Docks[3]	Horizontal Point	18	3.05	51.71	0.1	199.1
Grocery Idling[3]	Horizontal Point	2	3.05	51.71	0.1	199.1

Source	Source Type	Number of Sources[1]	Source Dimension	Release Height	Initial Vertical Dimension	Initial Lateral Dimension
			[m]	[m]	[m]	[m]
On-Road Light Duty Vehicles[4]	Volume	Variable	Variable	1.3	1.21	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. Where generator-specific information was not available, default modeling parameters from BAAQMD CEQA guidance were used.
3. Release parameters for the truck idling locations were based on default modeling parameters from SJVAPCD 2006 modeling guidance along with guidance from the project sponsor.
4. Release parameters for the on-road fleet were based on default modeling parameters from BAAQMD CEQA guidance, for non-truck traffic modeled as volume sources.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
°F - Fahrenheit
CEQA - California Environmental Quality Act
HRA - Health risk assessment
m - meter
SJAVPCD - San Joaquin Valley Air Pollution Control District
m - meter
s - second
USEPA - United States Environmental Protection Agency

References:

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

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2006. Guidance for Air Dispersion Modeling.

United States Environmental Protection Agency (USEPA). 2023. 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-23-008, October 2023). Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

Table HRA-11
Exposure Parameters
The Rise
Cupertino, California

Receptor Type	Analysis Type	Exposure Duration[1] (Years)	Intake Scenario[2]	Exposure Pathways[3]	Deposition Rate[3] (m/s)	Climate[4]
Residential	Cancer	30	RMP Derived	Inhalation, Soil, Dermal, Mother's Milk	0.05	Cold
Residential	Chronic	N/A	OEHHA Derived	Inhalation, Soil, Dermal, Mother's Milk	0.05	Cold
Residential	Acute	N/A	N/A	Inhalation, Soil, Dermal, Mother's Milk	0.05	Cold
Worker	Cancer	25	OEHHA Derived	Inhalation, Soil, Dermal	0.05	Cold
Worker	Chronic	N/A	OEHHA Derived	Inhalation, Soil, Dermal	0.05	Cold
Worker	Acute	N/A	N/A	Inhalation, Soil, Dermal	0.05	Cold
Daycare	Cancer	9	OEHHA Derived	Inhalation, Soil, Dermal	0.05	Cold
Daycare	Chronic	N/A	OEHHA Derived	Inhalation, Soil, Dermal	0.05	Cold
Daycare	Acute	N/A	N/A	Inhalation, Soil, Dermal	0.05	Cold

Notes:

[1] Exposure duration for residents and workers were based on OEHHA default exposure durations. Daycare exposure was conservatively assumed to be 9 years to account for infant to early elementary children, based on a Environmental Data Resources Sensitive Receptor Search.

[2] The selected intake scenario was based on SCAQMD guidance, and is consistent with BAAQMD exposure factors.

[3] Exposure pathways and deposition rate were selected according to BAAQMD CEQA Guidelines; however, the primary risk driver is through inhalation as none of the chemicals evaluated in this HRA are multipathway.

[4] A cold climate is representative of San Francisco, per OEHHA (2015).

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
OEHHA - Office of Environmental Health Hazard Assessment
RMP - Risk Management Policy
SCAQMD - South Coast Air Quality Management District

References:

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

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

SCAQMD. 2020. AB 2588 and Rule 1402 Supplemental Guidelines. Available online at: http://www.aqmd.gov/docs/default-source/planning/risk-assessment/ab-2588-supplemental-guidelines.pdf?sfvrsn=19

Table HRA-12
Toxicity Values
The Rise
Cupertino, California

Fuel[1]	Source	Chemical	CAS Number	Cancer Potency Factor	Chronic REL	Acute REL
				[mg/kg-day]$^{-1}$	(µg/m^3)	(µg/m^3)
Diesel	PM_{10}	Diesel PM	9901	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	71-43-2	0.1	3	27
		Ethylbenzene	100-41-4	0.0087	2000	-
		Formaldehyde	50-00-0	0.021	9	55
		Hexane	110-54-3	-	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	108-88-3	-	420	5000
		Xylenes	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.

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. 2023. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. October. Available at: https://ww2.arb.ca.gov/resources/documents/consolidated-table-oehha-carb-approved-risk-assessment-health-values.

Table HRA-13

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)
Max Project Impact	8.6	0.0041	0.0035	0.0732
Roadway	7.6	0.0038	0.0035	0.072
Generators	0.82	2.2E-04	--	0.0011
Idling	0.17	4.5E-05	--	2.1E-04
BAAQMD Significance Threshold	10	1.0	1.0	0.30
MEIR Locations				
UTMx	587357.9	587357.9	587357.9	587357.9
UTMy	4131314.4	4131314.4	4131274.4	4131314.4

Notes:

1. Evaluated project operational activities include new traffic associated with the Rise Project, delivery truck idling, and 9 planned emergency generators.
2. 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

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)
Max Project Impact	6.6	0.0022	0.0038	0.031
Roadway	0.55	0.0013	0.0038	0.012
Generators	0.12	8.7E-04	--	1.7E-04
Idling	5.9	1.3E-05	--	0.018
BAAQMD Significance Threshold	10	1.0	1.0	0.30
MEIR Locations				
UTMx	587077.6	587287.6	587297.6	587087.6
UTMy	4131214.2	4131654.2	4131524.2	4131204.2

Notes:

1. Evaluated project operational activities include new traffic associated with the Rise Project, delivery truck idling, and 9 planned emergency generators.
2. The indoor reduction factor of 0.5 was applied to long-term health impacts (cancer risk, chronic HI, and PM2.5 concentrations) at future on-site residences to account for air filtration that will be installed.
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-15
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	Acute Non-Cancer Hazard Index[3]	Annual $PM_{2.5}$ Concentration (ug/m^3)
Main Street Cupertino Retail (Facility 22862)	0.16	0	--	0
United Pacific Gas Station (Facility 112405)	5.9	0.026	--	0
Sand Hill Construction Management (Facility 200369)	4.0	0.0010	--	0.0050
Background Surface Street and Freeway Traffic	24	0.012	0.018	0.23
Subtotal	**34**	**0.039**	**0.018**	**0.23**
Max Project Impact	8.6	0.0041	0.0035	0.073
Total Cumulative Impact	**42**	**0.043**	**0.022**	**0.30**
BAAQMD Significance Threshold	100	10	10	0.80
Exceed?	No	No	No	No

Notes:

1. BAAQMD's Permitted Sources Risk and Hazards Map published April 2023 shows three stationary sources (a gas station and two generators) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source, combined with the maximally exposed offsite resident receptor to estimate cumulative health risks for the Project.

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

Abbreviations:

BAAQMD - Bay Area Air Quality Management District

HI - health index

ug/m^3 - micrograms per cubic meter

UTM - Universal Transverse Mercator coordinate system

References:

Bay Area Air Quality Management District (BAAQMD). 2023. California Environmental Quality Act Air Quality Guidelines. April. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

BAAQMD. 2023. Stationary Source Screening Map. April. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools/health-risk-screening-and-modeling

Table HRA-16

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	Acute Non-Cancer Hazard Index[3]	Annual $PM_{2.5}$ Concentration (ug/m^3)
Main Street Cupertino Retail (Facility 22862)	0.16	0	--	0
United Pacific Gas Station (Facility 112405)	5.9	0.026	--	0
Sand Hill Construction Management (Facility 200369)	4.0	0.0010	--	0.0050
Background Surface Street and Freeway Traffic	3.9	0.0058	0.019	0.05
Subtotal	**14**	**0.033**	**0.019**	**0.06**
Max Project Impact	6.6	0.0022	0.0038	0.031
Total Cumulative Impact	**21**	**0.035**	**0.023**	**0.09**
BAAQMD Significance Threshold	100	10	10	0.80
Exceed?	No	No	No	No

Notes:

1. BAAQMD's Permitted Sources Risk and Hazards Map published April 2023 shows three stationary sources (a gas station and two generators) located within 1,000 feet of the Project boundary. Ramboll used BAAQMD published health risk information for this source, combined with the maximally exposed onsite resident receptor to estimate cumulative health risks for the Project.
2. The BAAQMD has no cumulative threshold for Acute HI, thus this health endpoint was not analyzed cumulatively.

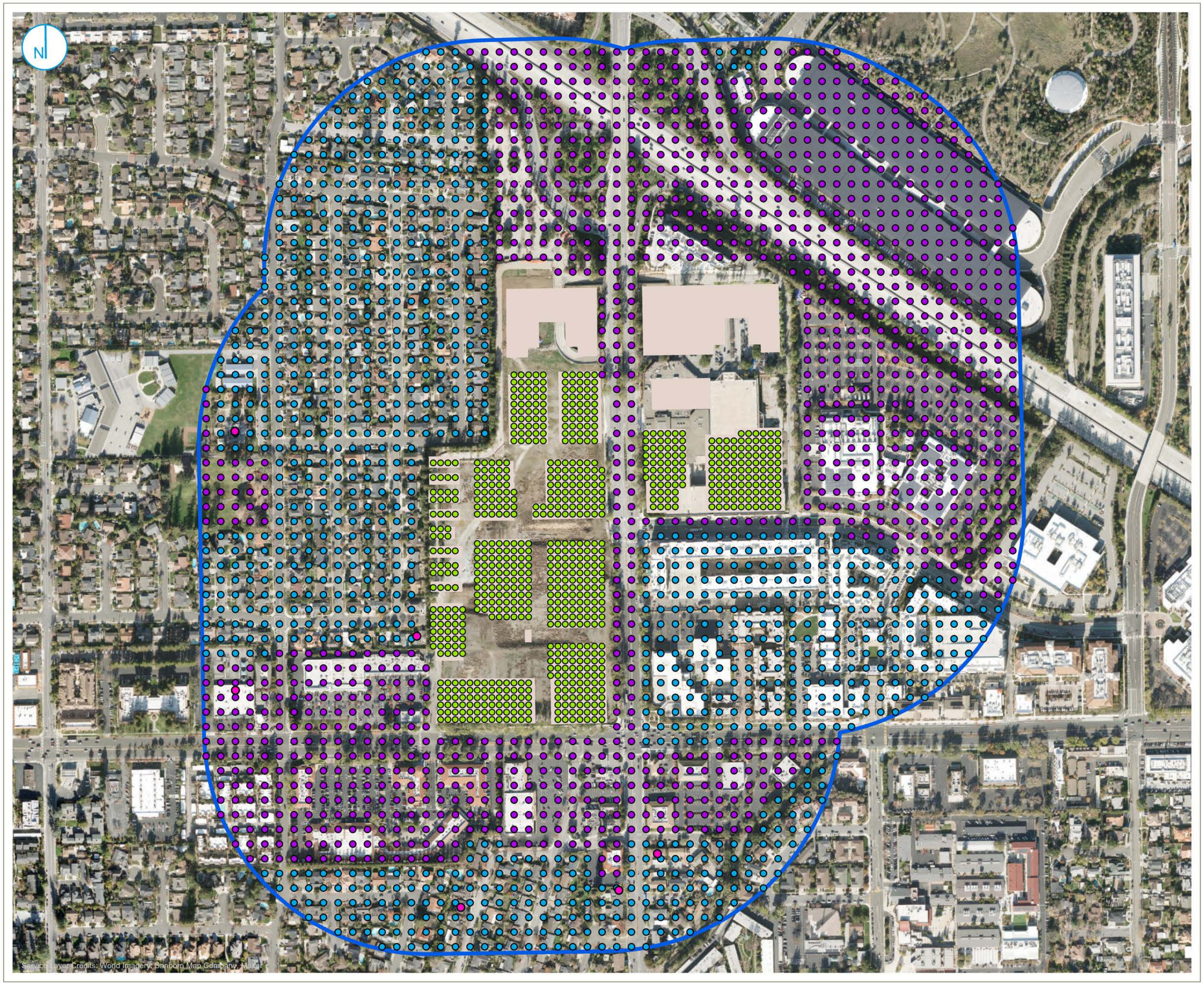
Abbreviations:

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

References:

Bay Area Air Quality Management District (BAAQMD). 2023a. California Environmental Quality Act Air Quality Guidelines. April. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines
BAAQMD. 2023. Stationary Source Screening Map. April. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools/health-risk-screening-and-modeling

FIGURES



1000-ft Buffer from Project
Onsite Buildings
Offsite Non-Residential Receptors
Offsite Residential Receptors
Sensitive Receptors
Onsite Residential Receptors

0 250 500 Feet

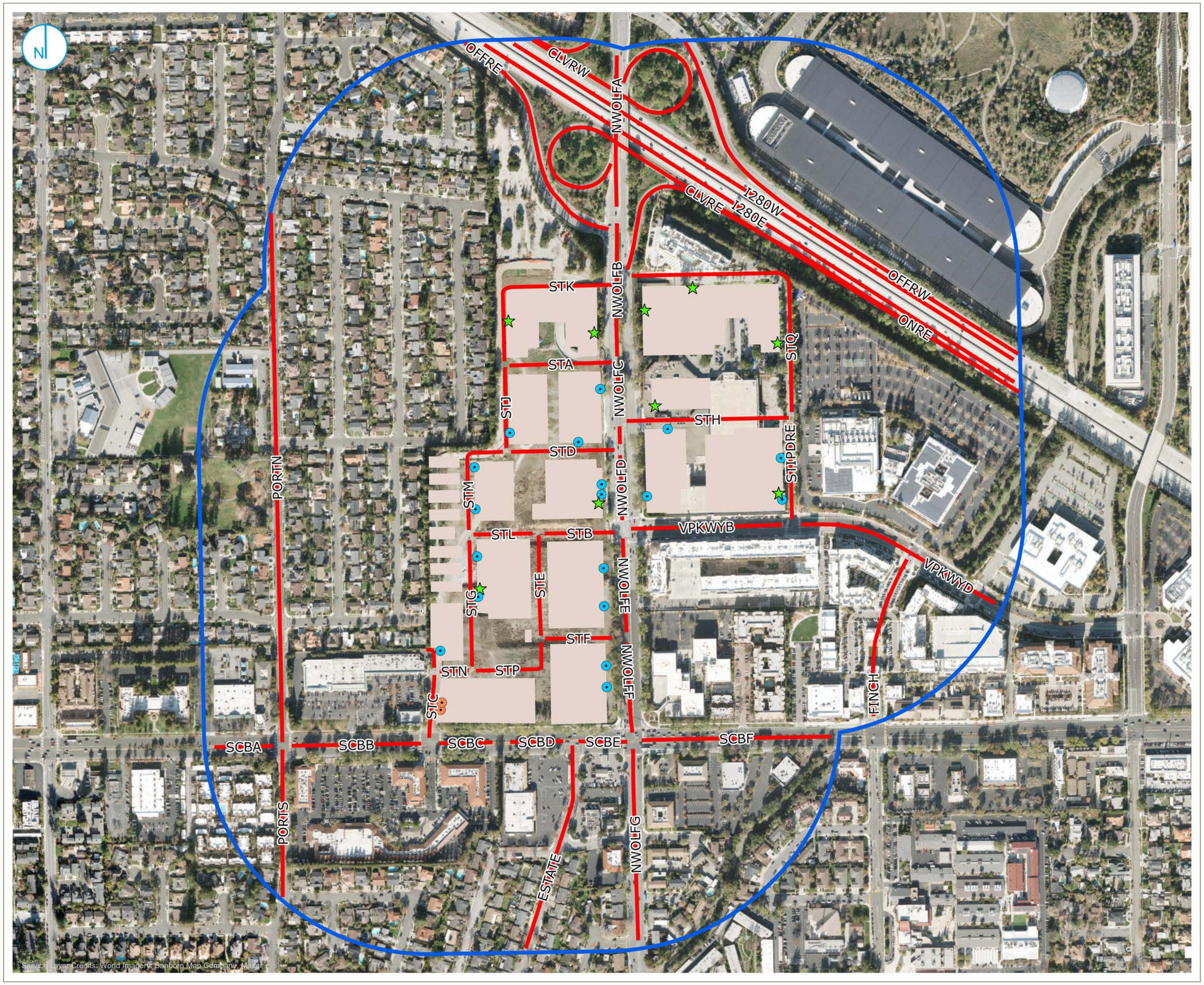
THE RISE
MODELED ONSITE AND OFFSITE RECEPTORS

The Rise
Cupertino, CA

FIGURE 01

Ramboll Americas Engineering Solutions
A RAMBOLL COMPANY

RAMBOLL



1000-ft Buffer from Project
Onsite Buildings
Modeled Operational Roadways
Grocery Idling
Idling/Loading Docks
Diesel Generators

0 250 500 Feet

THE RISE
OPERATIONAL EMISSION SOURCES

The Rise
Cupertino, CA

FIGURE 02

Ramboll Americas Engineering Solutions
A RAMBOLL COMPANY

RAMBOLL

Property Outline

- Existing Residence Acute HI
- Existing Residence Cancer Risk
- Existing Residence Chronic HI
- Existing Residence PM2.5 Concentration
- Future Residence Acute HI
- Future Residence Cancer Risk
- Future Residence Chronic HI
- Future Residence PM2.5 Concentration

THE RISE
MAXIMALLY EXPOSED RECEPTORS

The Rise
Cupertino, CA

FIGURE 03

Ramboll Americas Engineering Solutions
A RAMBOLL COMPANY