# Appendix C

Health Risk Assessment

# Draft

# Health Risk Assessment

# for the

# Roseville Industrial Park Project

Prepared By:

Ascent Environmental
600 B Street, Suite 300
Sacramento, CA 95814
Contact: Poonam Boparai
poonam.boparai@ascentenvironmental.com

and

Shaurya Johari
Shaurya.johari@ascentenvironmental.com

June 2022

20210066.01

# TABLE OF CONTENTS



## Attachments



## Figures



## Tables

This page intentionally left blank.

# 1 INTRODUCTION

Panattoni Development Company (Panattoni or project applicant) is proposing to develop a property in the City of Roseville with a range of industrial uses, including light manufacturing, warehousing, and distribution uses (totaling up to 2,430,000 square feet [sf]). The project would be developed in four phases, depending on market demand. Up to 15 buildings would be constructed, ranging in size from approximately 80,000 sf to approximately 300,500 sf and connected by a bridge across Pleasant Grove Creek and Pleasant Grove Creek Bypass Channel. The project also includes an electrical substation south of Pleasant Grove Creek. Construction and operation of the project would be a source of air pollutants that would have health impacts on the nearby residences and other sensitive land uses such as schools and hospitals. The focus of this health risk assessment (HRA) is to evaluate the potential exposure of nearby residential receptors to construction and operations related toxic air contaminants (TACs), specifically diesel particulate matter (DPM), from diesel-powered equipment and vehicles during construction and operational activities for the Roseville Industrial Park Project (proposed project). The primary sources of DPM emissions would be movement of off-site diesel trucks and on-site equipment.

The HRA was conducted in accordance with the Office of Environmental Health Hazard Assessment's (OEHHA) 2015 Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015). The methodology was reviewed and approved by Placer County Air Pollution Control District (PCAPCD). This report is organized in two primary sections, the first discusses the methodology used in analyzing the health risks and the second presents the results of the HRA.

# 2 METHODOLOGY

This section is organized by first discussing the overall approach used to conduct the construction and operational HRAs, then addressing the specific inputs and calculation methods used to quantify the risks from the construction and operation of the proposed Roseville Industrial Park Project.

## 2.1 HEALTH RISK ASSESSMENT METHODLOGY AND APPROACH

To determine the public health impacts of TACs emitted during construction and operation of the proposed Roseville Industrial Park Project, the emissions sources of concern were first inventoried. The various emissions source parameters (e.g., exhaust flow rates, exhaust temperatures, and locations) were used to model the dispersion of pollutants into the atmosphere based on local meteorological conditions.

Air dispersion modeling was conducted using California Air Resources Board (CARB)-approved American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee modeling system (AERMOD) Version 21112. AERMOD was used to obtain ground level concentrations (GLCs) over a receptor grid surrounding the Facility. The resulting GLCs of each pollutant were input into the Hotspots Analysis and Reporting Program Version 21081 (HARP2) software, to match the GLCs with known pollutant risk values to determine the spatial distribution of cancer and chronic non-cancer health risks at each receptor. Results are presented graphically on maps including risk isopleths and aerial imagery.

The specific TACs analyzed in this HRA are based on the list provided in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (Consolidated Table) (CARB 2018). Any substances in this table that did not have risk values were excluded from the analysis. The Consolidated Table includes DPM in the list of TACs. According to Appendix D of OEHHA's 2015 HRA guidance, referred to in the Consolidated Table, respirable particulate matter with aerodynamic diameter of 10 micrometers or less ($PM_{10}$) $PM_{10}$ is the basis for OEHHA's potential risk calculations for DPM (CARB 2018). Thus, estimated emissions of $PM_{10}$ from diesel combustion sources were used as a proxy for DPM in the risk assessment.

Details pertaining to each component of the HRA (e.g., source inventory, air dispersion modeling, emission rate calculations, and risk calculations) are discussed in further detail below.

## 2.2 SOURCE INVENTORY

For this HRA, construction-related emissions sources include on-site diesel equipment such as scrapers, graders, loaders, cranes, forklift, generator sets, welders, rollers, pavers, pavement equipment, excavators, and dozers performing various activities and off-site diesel hauling and vendor trucks that travel to and from the project site. Emissions sources during operations would include DPM emissions from on-site equipment like forklifts, yard trucks, truck idling, and diesel emergency generators and off-site hauling and vendor trucks traveling to and from the project site.

### 2.2.1 Emission Rates

The emission rates from each emissions source, measured as mass over time, were used to calculate the TAC GLCs at receptor locations, measured in micrograms per cubic meter ($\mu g/m^3$). Average annual and hourly emission rates were calculated based on (1) the operation schedule of each emissions source and (2) the emission factors of each source based on the type of equipment and amount of fuel combusted or evaporation factors associated with the use. The methods used to estimate the individual emission rates vary by the type of TAC source (e.g., construction equipment, stationary sources, and truck hauling), and are discussed separately in further detail below for the construction and operational analyses.

## 2.3 AIR DISPERSION MODELING

### 2.3.1 Modeling Approach

Dispersion modeling was conducted using AERMOD Version 21112 for two scenarios: Scenario 1 (construction + operation scenario) assumes that a fetus in the 3rd trimester (within the mother's womb) commences its 30-year exposure starting in year 2023 (construction start year), covering the entire 7 years of construction and progressive project occupancy starting in 2025 through 2029 and covering another 23 years once the project is fully built out between 2030 and through 2052; Scenario 2 (full operation scenario) assumes that a fetus in the 3rd trimester commences its 30-year exposure starting in the 1st year of full buildout in 2030 and last until 2060. Emissions source data, receptor locations and parameters, on-site buildings, terrain data, and meteorological data were the primary inputs into AERMOD to determine how emissions would be dispersed and the resulting GLCs. Most of these inputs varied depending on the scenario being modeled. However, all modeled scenarios used the same receptor locations, terrain data, and meteorological data.

Terrain, meteorology, and buildings close to the emissions sources greatly influence the dispersion of pollutants. The presence of on-site buildings was modeled to account for the effect of the buildings by emissions sources to divert the dispersion of pollutants, also referred to as building downwash. Local terrain data were obtained from CARB's digital elevation files for the Citrus Heights, Pleasant Grove, Rio Linda, and Roseville areas (CARB 2015). Meteorology data were obtained from CARB's website. The surrounding area of the project site was assumed to have a general dispersion coefficient representative of rural areas, as more than 60 percent of the development within a 3-kilometer (km) radius of the project site is rural. Modeling was conducted using the Universal Transverse Mercator coordinate system for zone 10 north and the geographic datum from the World Geodetic System (WGS) in 1984. Relative concentrations were averaged over an 8-year period (2014-2018), based on the meteorological data available.

Air dispersion modeling was conducted using a unit emission rate of 1.0 gram per second (g/s) for all modeled volume sources. Point sources were individually modeled using a unit emission rate of 1.0 g/s and then the number of point sources were adjusted in HARP using the multiplier option. Volume sources were modeled as having an emission rate of 1.0 g/s for construction or operational area that was represented. This resulted in GLC values per unit emission rate ($\chi/Q$) ($[\mu g/m^3]/[g/s]$), that were then multiplied in HARP2 by emission rates calculated for each source. This approach enabled the AERMOD output files to be assigned appropriate emission rates and cancer and non-cancer risk values to estimate concentrations and health risk levels from each individual source at each receptor location. Apart from these inputs and assumptions, AERMOD's default dispersion options were selected.

## METEOROLOGICAL DATA

The Sacramento Metropolitan Air Quality Management District's (SMAQMD) meteorological station at the Sacramento International Airport was identified by PCAPCD staff to have the most representative data for the project site due to similar geography and meteorological conditions. The Sacramento International Airport Station has elevated wind patterns closest to the project site. It is around 13 miles away from the project site.

Ascent obtained preprocessed 4-year meteorological data (2014-2018) from CARB for use in the air dispersion modeling. A wind rose displaying the wind speed and wind direction is shown in Figure 1. The wind primarily blows towards the north. Dispersion modeling applied the time-averaged, simplified representation of turbulent, atmospheric transport to approximate how pollutants are carried, mixed, dispersed, and diluted by the local winds based on data from the Sacramento International Airport station.

## RECEPTOR GRID

A nested grid was placed out to 4200 m from the project site boundary to encompass nearby residential land uses. The nested grid was placed with 20 m and 500 m spacing between receptors nearest and farthest to the project site. Receptors on the project site were removed. Receptors that did not correspond with an existing or proposed sensitive land use were also removed to aid model runtime. In addition, discrete receptors were added to correspond with locations of schools within two miles of the project site. All receptors were given a flagpole receptor height of 1.8 m to represent average breathing height per the latest Office of Environmental Health Hazard Assessment (OEHHA) guidance (OEHHA 2015: 4-22).

**Table 1 Additional Receptors**

| Receptor | Receptor Type | Easting X (m)[1] | Northing Y (m)[1] |
|---|---|---|---|
| Orchid Ranch Elementary School | School | 639651.33 | 4294395.78 |
| West Park High School | School | 641151.33 | 4294095.78 |
| Chilton Middle School | School | 641351.33 | 4293295.78 |
| Junction Elementary School | School | 641951.33 | 4293295.78 |

Notes: m = meter.

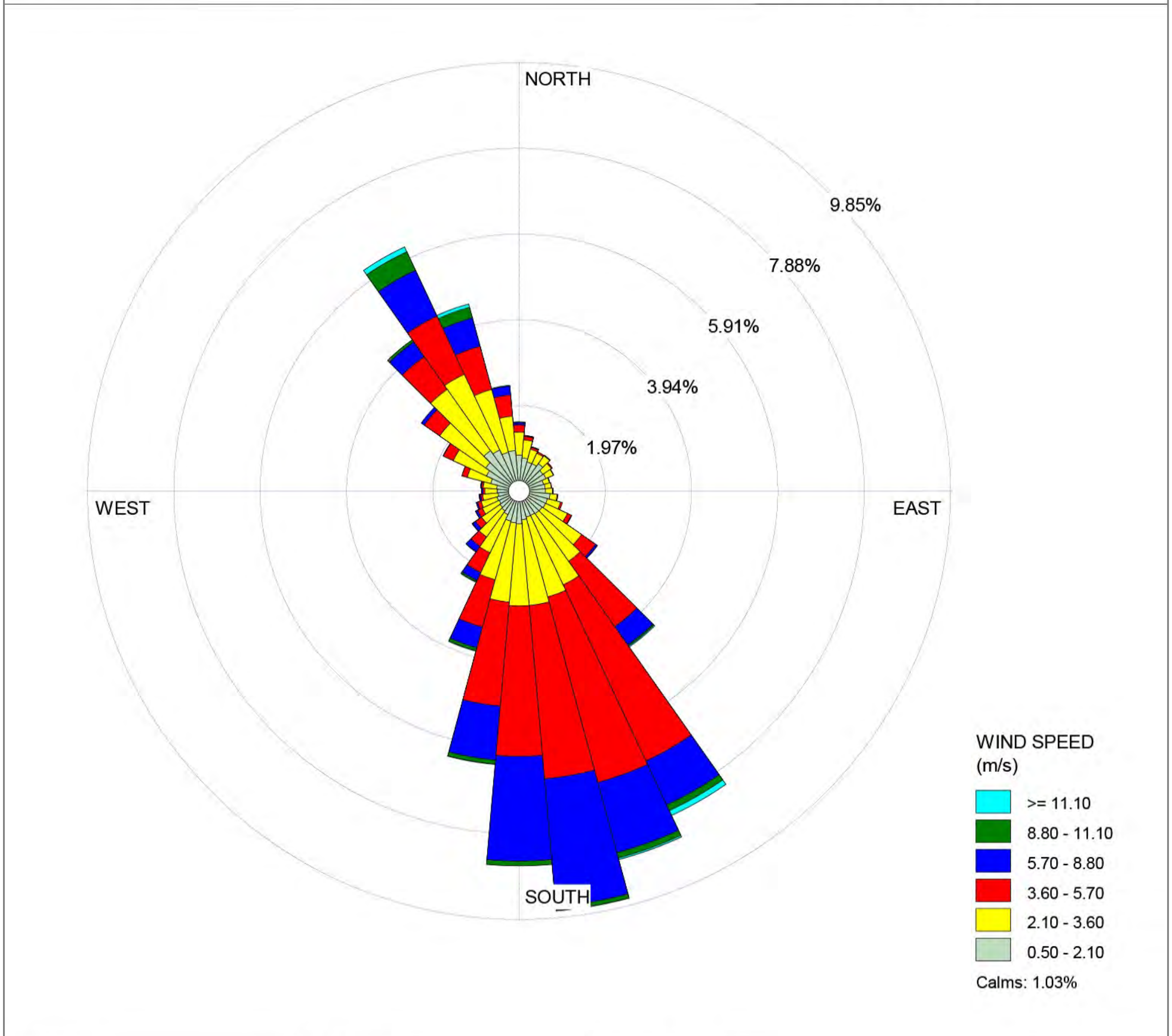
1. Based on Universal Transverse Mercator coordinates.

Source: Data provided by Ascent Environmental in 2022.

The receptor grid and identified discrete receptors used for the construction and operational HRA are shown in Figure 2.

WIND ROSE PLOT:
**Sacramento International Airport**

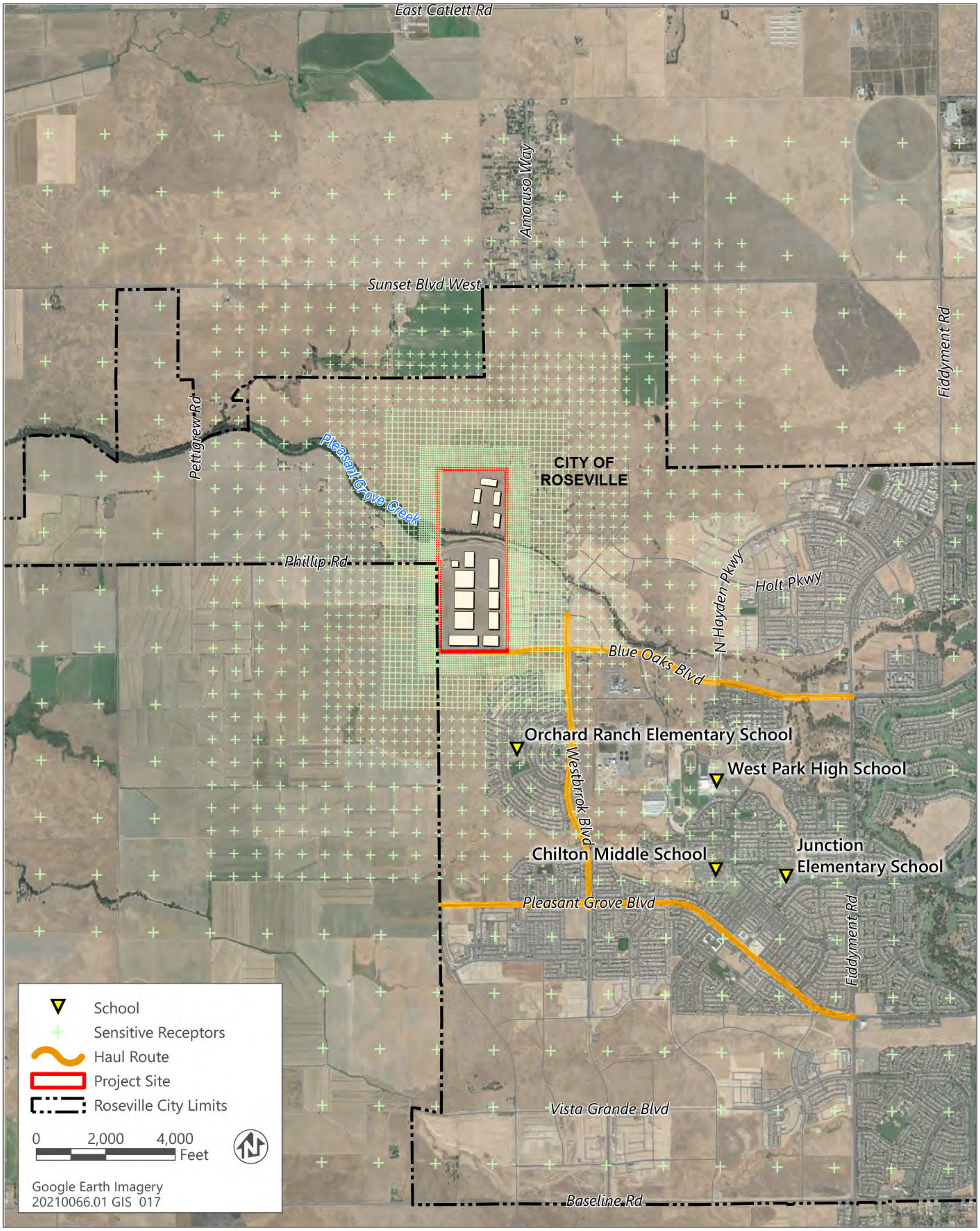
DISPLAY:
**Wind Speed**
**Direction (blowing from)**




| COMMENTS: | DATA PERIOD: | COMPANY NAME: | |
|---|---|---|---|
| | **Start Date: 1/1/2014 - 00:00**<br>**End Date: 12/25/2018 - 23:59** | MODELER: | |
| | CALM WINDS:<br>**1.03%** | TOTAL COUNT:<br>**43513 hrs.** | |
| 20210066.01 GRX 024 | AVG. WIND SPEED:<br>**3.64 m/s** | DATE:<br>**3/13/2022** | PROJECT NO.: |

Source: Figure created by Ascent Environmental in 2022 using WRPLOT View Version 10.2.1 Data provided by the Sacramento Metropolitan Air Pollution Control District in 2022.

Figure 1 Wind Rose for Sacramento International Airport Station (2014-2018)




Source: Adapted by Ascent in 2022.

Figure 2 Receptor Grid and Sensitive Receptors of Interest

## 2.4 CANCER AND NON-CANCER RISK CALCULATION

Cancer and non-cancer risks were modeled in HARP2 using relative GLC outputs from AERMOD and calculated emission rates from each source. HARP2 was used to calculate absolute GLCs from each source at each receptor and determine the cancer and non-cancer risks based on the pollutant. Receptor exposure rates and parameters varied depending on the scenario being analyzed. For example, Scenario 1 assumed that construction and operations would occur for 7 years, and full buildout operations would occur for the next 23 years adding up to a 30-year exposure.

CARB developed HARP2 as a tool to implement risk assessments and incorporates requirements from OEHHA's HRA guidelines (OEHHA 2015). HARP2 uses the most current OEHHA potency factors for cancer and reference exposure levels for acute and chronic non-cancer risks.

Consistent with PCAPCD guidance, the HRA follows the OEHHA Tier 1 level of evaluation to calculate the health risk impacts at all receptors, including the residential, hospital patients, and childcare facilities. Risk modeling was performed in HARP2 to estimate cancer and non-cancer health risks for residential receptor types (sensitive receptors are analyzed as residential receptor types). The assessment of cancer risk and chronic non-cancer health indices use the long-term period (annual) average emissions.

Based on OEHHA guidance, cancer risk is calculated by multiplying the daily inhalation or oral dose (i.e., to characterize non-inhalation risk) by a cancer potency factor, the age sensitivity factor, the frequency of time spent at home (for residents), and the exposure duration divided by averaging time, to yield the excess cancer risk. Then, excess cancer risk is calculated separately for each age grouping and summed to yield cancer risk at the receptor location. These assumptions were used to calculate the cancer risk in HARP2 based on the mandatory minimum pathways included in the model (i.e., inhalation, soil, dermal, and mother's milk) for residential cancer risks. For receptor locations, cancer risks were calculated based on an exposure over a period of 30 years. Though residential receptors are considered as sensitive receptor in the analysis, cancer risks were also estimated at additional receptors, such as schools within two miles of the project site.

Non-cancer risks are measured in terms of health hazard indices (HHI). Chronic HHIs are the sum of the individual substance chronic hazard indices for all TACs affecting the same target organ system, respectively. Individual substance indices are calculated as the ratio of the calculated ground-level concentration to the reference exposure levels (REL), which are regularly published by OEHHA (OEHHA 2015: 6-7). If the reported concentration of a given chemical is less than its REL, then the hazard index would be less than 1.0. Chronic risks were calculated for long term exposure in both scenarios in HARP2. Note that 8-hour chronic risks were not analyzed because all chronic risks HHIs were found to be less than significant and chronic risks are lower under an 8-hour exposure duration than a long-term duration.

## 2.5 HEALTH RISK CEQA THRESHOLDS OF SIGNIFICANCE

According to PCAPCD, a project's impact on health risks would be considered significant under CEQA if the project-related increase in risks would exceed the thresholds shown in Table 2. Results of this HRA are compared to the PCAPCD-adopted thresholds of significance.

**Table 2 Significant Health Risk Levels**

| | Significant Risk Threshold |
|---|---|
| Maximum Incremental Cancer Risk[1] | 10 in a million |
| Total Chronic Non-Cancer Health Hazard Index[2] | 1 |

1. Maximum Incremental Cancer Risk is the maximum lifetime excess cancer risk estimate (per million) at residential or worker receptor (whichever is greater). The maximum estimated risk generally is possible at only one location. All other locations show lower risks. Actual cancer risk would likely be less.

2. Total Chronic Health Hazard Index (THI) is the sum of the ratios of the average annual exposure level of each compound to the compound's Reference Exposure Level (REL). Actual chronic THI would likely be less.

Source: PCAPCD 2017.

## 2.6 CONSTRUCTION HEALTH RISK ASSESSMENT METHODS

This section provides additional details specific to the construction HRA, including air dispersion model setup, emission rate calculations, and risk calculations.

The construction HRA focuses primarily on exposure to sensitive receptors from emissions of DPM. Risks from DPM far outweigh those associated with other pollutants generated during construction activities and, therefore, is the TAC of primary concern. DPM from construction activities results from the combustion of diesel fuel in on-site off-road construction equipment and from hauling and vendor trucks traveling between off-site material sources and the project area. DPM emissions were based on estimated construction mass emissions and risks associated with the DPM emissions were based on air dispersion modeling associated with the areas in which construction activity would occur. Methods for these procedures are described in further detail herein.

### 2.6.1 Source Inventory

Construction-related emissions would be generated from various activities associated with project construction, such as rough grading, infrastructure construction, asphalt paving, building construction, architectural coatings, and construction workers commuting. Construction emissions for construction worker vehicles traveling to and from the project site, in addition to vendor trips (construction materials delivered to the project site) and haul trips (dump trucks and concrete trucks) were also accounted for in the analysis. Localized air quality in the project area would be affected by both heavy-duty construction equipment usage on site as well as local traffic due to equipment delivery and construction worker commuting. Recommendations from the PCAPCD CEQA Handbook were used, as applicable, to analyze the air pollutant emissions from these activities (PCAPCD 2017).

Although buildout of the project would depend on market conditions, the project could be built out and fully operational as early as 2030. Therefore, to provide a conservative air quality analysis, construction was assumed to be completed over a 7-year period, with construction of Phase 1 starting in 2023. Anticipated timelines and duration of construction for each phase was provided by the project applicant as shown in Table 3.

**Table 3 Proposed Phasing Plan with Construction and Operations Schedule**

| Phase | Buildings[1] | Square Footage | Construction | Operations |
|---|---|---|---|---|
| 1 | A B C | 436,368 | 2023 – 2024 | 2025 |
| 2 | D E | 526,128 | 2024 – 2025 | 2026 |
| 3 | F G H I | 1,036,824 | 2026 – 2027 | 2028 |
| 4 | J K L M N | 422,280 | 2028 – 2029 | 2030 |
| **Buildout** | **All** | **2,421,600** | **Noted above** | **2030** |

1 Construction of the electrical substation was assumed to occur in Phase 2.

Source: Information provided by the project applicant in 2021.

For the purposes of the HRA, short-term construction-related emissions of DPM were estimated using the California Emissions Estimator Model (CalEEMod) Version 2020.4.0. CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential pollutant emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operational activities (including vehicle use).

The project location was selected as PCAPCD to correspond with the air district's jurisdiction in CalEEMod. The land use selected for the project in CalEEMod was Industrial Park based on the land uses assigned in the project's transportation analysis using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 11th Edition* (ITE 2021). The total square footage to be developed would be 2,421,600 sf, as shown in Table 3 by project phase.

Modeling was based on project-specific information (e.g., size, area to be graded) where available, reasonable assumptions based on typical construction activities, and default values in CalEEMod that are based on the project's location and land use type. The project applicant provided anticipated construction activities and duration of each activity for Phase 1 as shown in Table 4. Because timing of subsequent phases would be dependent on market demand, similar information was not available for Phases 2 through 4. The relative length of each construction stage for Phase 1 was used along with the duration of overall construction activities for each subsequent phase to approximate various construction stages for Phases 2 through 4. A bridge connecting the north and south parcel would be construction during Phase 3. To estimate the emissions from the bridge construction, Road Construction Emissions Model version 9 was used. The project site is predominantly flat; therefore, no import/export of soil material was assumed.

**Table 4 Proposed Construction Schedule for Phase 1**

| Activity | Start Date | End Date |
|---|---|---|
| Site Preparation | 1/1/2023 | 3/1/2023 |
| Trenching | 2/1/2023 | 4/1/2023 |
| Grading | 2/1/2023 | 4/1/2023 |
| Building Construction | 2/1/2023 | 12/1/2023 |
| Paving | 10/1/2023 | 12/1/2023 |
| Architectural Coating | 10/1/2023 | 12/1/2023 |

Source: Data provided by the project applicant in 2021.

Off-road equipment refers to the equipment that would operate on-site (and in the adjacent off-site areas, for off-site improvements) to move dirt and materials around, and include equipment such as scrapers, graders, loaders, cranes, forklift, generator sets, welders, rollers, pavers, pavement equipment, excavators, and dozers. This equipment is anticipated to operate during construction of all project phases.

The emission levels for off-road equipment are based on the emission factors, horsepower, load factor, and activity level of the equipment. The emission factors are generally described as an emission rate per horsepower and time of operation and depend on the type of equipment, horsepower, and model year of the equipment. The horsepower is the power of an engine—the greater the horsepower, the greater the power to be able to move dirt and materials around. In general, a greater horsepower also results in greater emissions. The load factor is the average power of a given piece of equipment while in operation compared with its maximum rated horsepower. A load factor of 1.0 indicates that a piece of equipment continually operated at its maximum operating capacity. The activity level is generally represented by the number of hours the equipment is in operation during a time period such as a day. CalEEMod combines the emission factors, horsepower, load factor, and activity level to provide an estimate of the criteria air pollutants generated from each construction component and set of sources (e.g., off-road equipment).

Equipment tiers refers to the adoption of emission standards established by the US Environmental Protection Agency (EPA) and CARB that apply to diesel engines in off-road equipment. The "tier" of an engine depends on the model year and horsepower rating; generally, the newer a piece of equipment is, the greater the tier it is likely to have. Beginning in year 2011, new off-road mobile engines sold that are equal to or greater than 175 horsepower (hp) and non-emergency stationary engines less than 10 liters per cylinder and equal to or greater than 175 hp are required to meet Tier 4 Interim standards (40 Code of Federal Regulations, part 1039). Tier 4 Final for engines greater than 130 hp are required as of 2014.

CalEEMod contains a default inventory of construction equipment for various land uses that incorporates estimates of the number of equipment, their age, their hp, and equipment tier from which rates of emissions are developed. For the unmitigated emissions estimates, all equipment is assumed to be the CalEEMod defaults. The analysis assumes that the on-site equipment would be in the on position for 8 hours per day consistent with CalEEMod defaults. This is used to calculate average annual emissions which are required for the regional analysis, because project emissions can occur on any day of the week.

On-site equipment used during concrete pouring was assumed to occur over an 8-hour period. Concrete pouring would occur for a limited number of days for each phase and not throughout the entire concrete pouring stage. It is assumed that during concrete pour days, no other construction would occur on the project site. Therefore, to calculate annual average emissions, it is necessary to base emissions upon a realistic work schedule. The analysis assumes a more realistic annual average use of construction equipment by assuming that the maximum equipment use would occur for five days per week occurring for 8 hours per day (including the concrete pouring phase). An annual average and daily emission inventories were estimated using this methodology.

Construction data including construction equipment assumptions as included in CalEEMod, are shown in Attachment A.

### Construction Trips

Construction trips refer to the number of trips to the project site from off-site locations and include the following groups:

- Workers: These are trips from construction workers from their residence to the project site. The CalEEMod default worker trip length of 16.8 miles was used in the analysis. The CalEEMod default vehicle fleet mix was used for construction worker trips.
- Vendors: These trips include water trucks and service/support trucks bringing smaller materials to the project site. The CalEEMod vendor trip length default of 6.6 miles was used in the analysis. The CalEEMod default vehicle fleet was used for vendor trips.
- Haul Trucks: Dump truck trips, support haul trucks, concrete trucks, and material delivery trips were represented as haul trips, with a mileage of 20 miles per trip (increased from the default of 20 miles). The CalEEMod default vehicle fleet was used for haul trips.

CalEEMod utilizes CARB's EMission FACtor model (EMFAC), version EMFAC2017, emissions factors for on-road sources. Construction trips emissions were calculated in CalEEMod using updated EMFAC2021 emissions factors. CalEEMod input data are included as Attachment A.

## 2.6.2 Emission Rates

Emissions rates for construction activity were based on on-site equipment operations and off-site hauling activity near the project site. Total construction $PM_{10}$ exhaust emissions, the proxy for DPM, across the project buildout period were estimated from CalEEMod. These emissions were estimated for each phase and maximum annual emission was considered for the duration of the construction phase. Table 5 shows the on-site and off-site emissions estimated by CalEEMod.

**Table 5 Proposed Construction Schedule for Phase 1**

| Phase | On-Site Exhaust $PM_{10}$ (tons/year) | Off-Site Exhaust $PM_{10}$ (tons/year) |
|---|---|---|
| 1 | 0.1571 | 0.0043 |
| 2 | 0.1310 | 0.0043 |
| 3 | 0.1137 | 0.0071 |
| 4 | 0.1136 | 0.0031 |

Notes: $PM_{10}$ = respirable particulate matter with aerodynamic diameter of 10 micrometers or less.

Source: Modeled by Ascent Environmental in 2022.

## 2.6.3 Air Dispersion Modeling Assumptions

### SOURCE TYPE AND INPUT PARAMETERS

To represent site locations where construction activities would occur, construction emission sources (i.e., the use of heavy-duty equipment on-site) was modeled as an array of adjacent volume sources. Each volume source was assumed to have 25-meter (m) sides, 5 m release height, an initial lateral dimension of 5.81 m, and an initial vertical dimension of 1 m, the latter two attributes were calculated from the length of the volume source side. The release height of 5 m was considered from SMAQMD's construction health risk guidance (SMAQMD 2013) because OEHHA's guidance did not have any specific release height information for construction equipment and PCAPCD does not have its own health risk guidance document. SMAQMD's guidance was used because SMAQMD is the nearest jurisdiction to PCAPCD with this level of health risk guidance. Construction hours would be 8 hours per day and would occur for 5 days a week. Table 3 provides the square footage of buildings constructed in each phase.

For construction activities, three haul routes (each with separate ingress and egress points) were modeled as line volume sources to represent a series of volume sources. The line volume sources represent the haul truck emissions traveling to and from the site. These line sources were assumed to have an adjacent configuration of volume sources spaced at 8.5-meter intervals, with a 6.8 m plume height, 8.5 m plume width, and a 3.4 m release height. These were calculated based on the assumption that trucks traveling on these routes would have an average height of 4 m (13.5 feet) and width of 2.5 m (8 feet). Figures 3 through 6 shows modeled construction emission sources.

Detailed information about the sources is provided in Attachment A.

## 2.6.4 Cancer and Non-Cancer Risk Assumptions

Table 6 summarizes the parameters and assumptions used for construction-related risks, accounting for the 7-year construction period of the proposed Roseville Industrial Park Project.

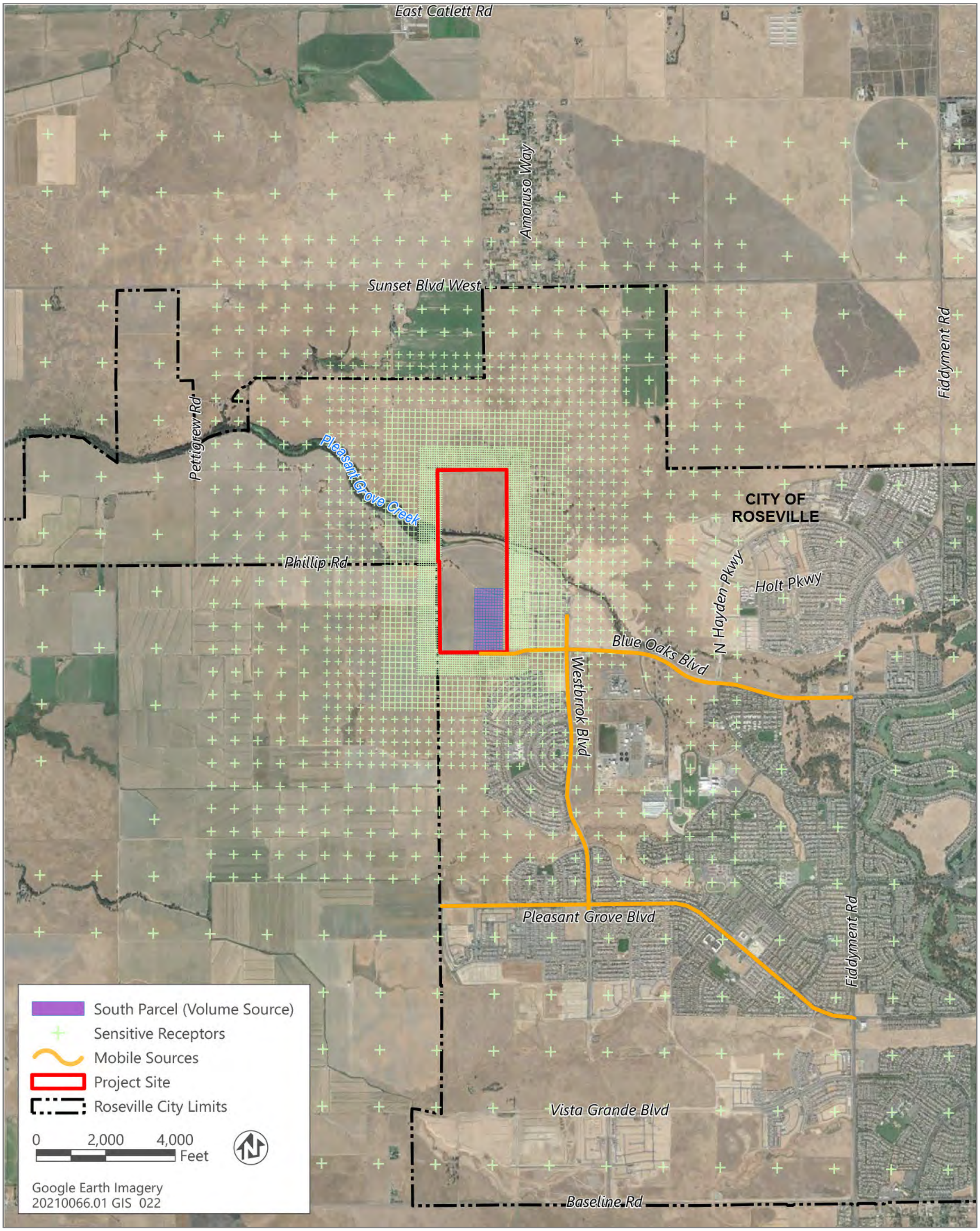
**Table 6 Risk Parameters for Cancer and Non-Cancer Risk for Construction[1]**

| Risk Parameters | Sensitive Receptors |
|---|---|
| Analysis Type | Cancer and Chronic Non-Cancer Risk |
| Receptor Type | Individual Residential and Schools |
| Exposure Duration | 7, 23, and 30 years |
| Starting Age | 3rd Trimester |
| Intake Rate Percentile | OEHHA Derived Method |
| Risk Pathways Evaluated | Mandatory Minimum Pathways |
| Deposition Rate | 0.05 m/s |
| FAH | Off |
| 8-Hour Breathing Rates | N/A |
| Climate | Mixed |

Notes: N/A = not applicable; OEHHA = Office of Environmental Health Hazard Assessment; RMP = Risk Management Policy; m/s = meters per second; FAH = fraction of time at home.

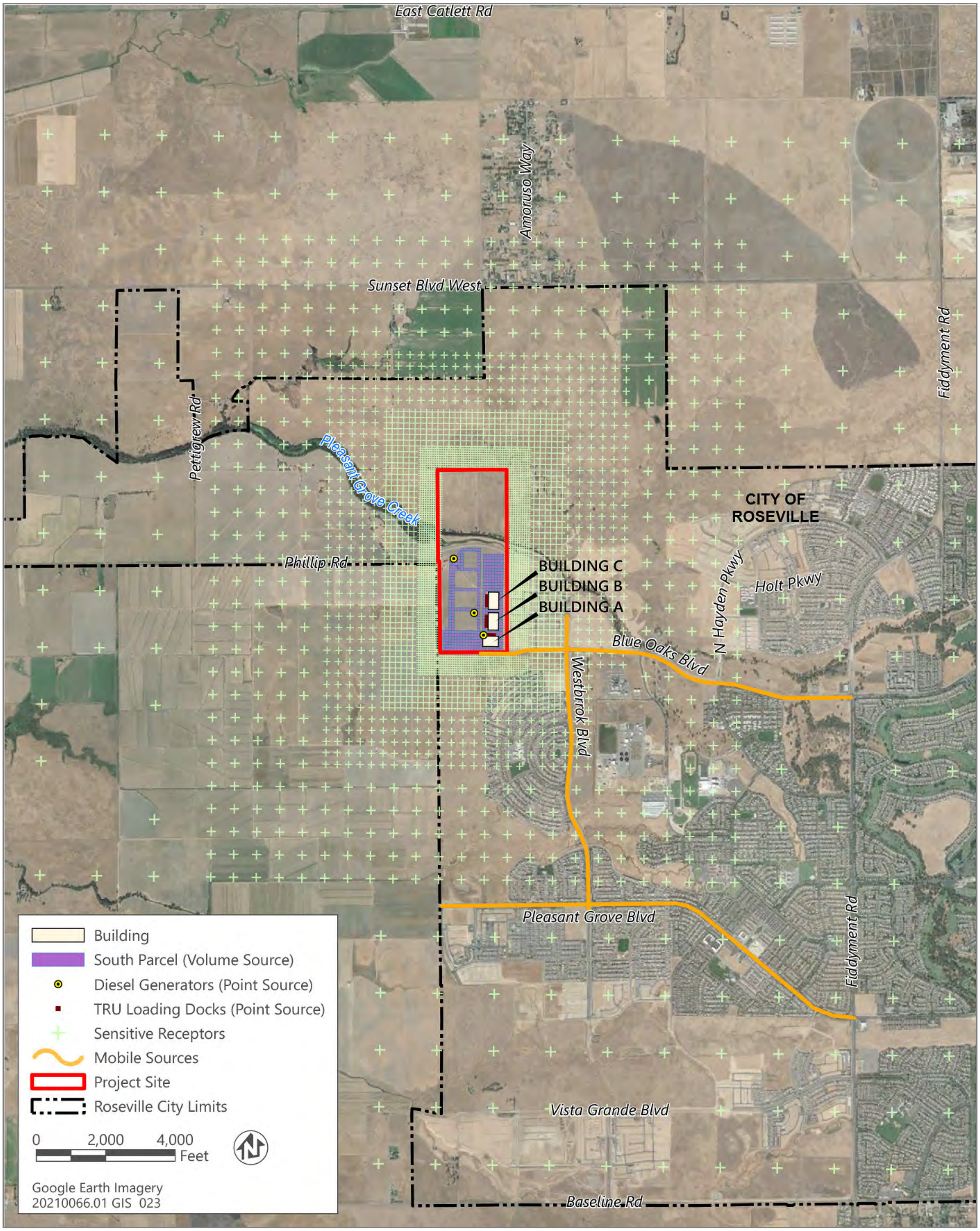
1. Analysis was prepared consistent with OEHHA Guidance (OEHHA 2015).

Source: Prepared by Ascent Environmental in 2022.



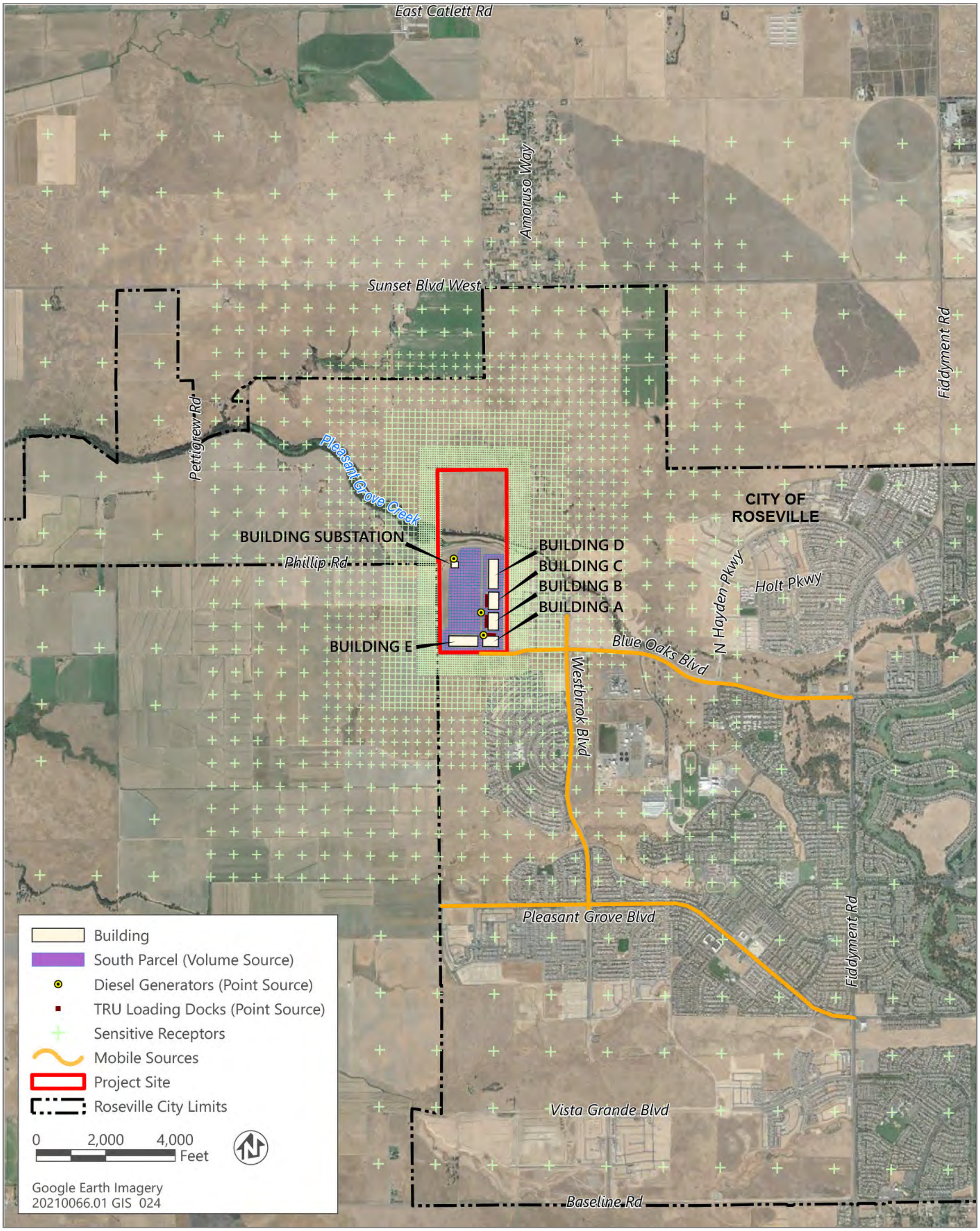

Source: AERMOD Version 10.2.1 model by Ascent in 2022.

Figure 3 Modeled Construction Emissions Sources (Phase 1)



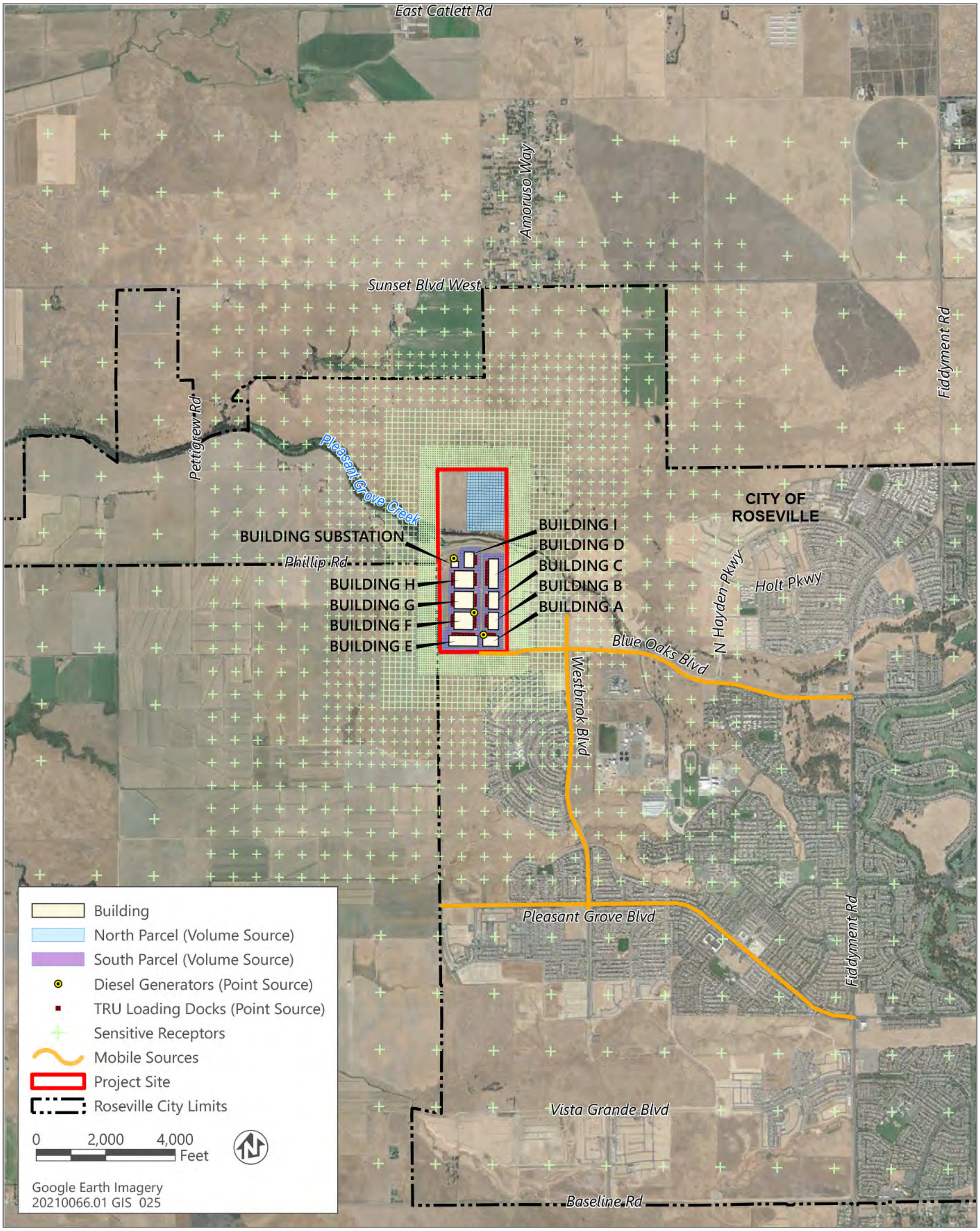

Source: AERMOD Version 10.2.1 model by Ascent in 2022.

## Figure 4 Modeled Construction Emissions Sources (Phase 2)




Source: AERMOD Version 10.2.1 model by Ascent in 2022.

Figure 5 Modeled Construction Emissions Sources (Phase 3)




Source: AERMOD Version 10.2.1 model by Ascent in 2022.

## Figure 6 Modeled Construction Emission Sources (Phase 4)

# 2.7 OPERATIONAL HEALTH RISK ASSESSMENT METHODS

The HRA evaluates health risks associated with sources that would occur during the operation of the proposed Roseville Industrial Park Project. An inventory of future TAC sources was conducted to identify all sources that are included in the HRA. Air dispersion modeling was conducted using specific or estimated source parameters for all sources identified in the inventory. For future sources, source parameters were built off existing similar industries. The results of the air dispersion modeling were used to calculate health risk under both modeling scenarios (i.e., full buildout of 23 years after 7 years of construction and full buildout of 30 years). Methods specific to operational risk sources are described below.

## 2.7.1 Source Inventory

Operational emissions occur once the project commences operation. For purposes of this analysis, project buildout will occur in four phases. Therefore, operational emissions are analyzed for each phase's buildout year and the full buildout year (2030). This analysis focuses on DPM emissions for the purposes of the HRA.

### MOBILE SOURCES

Vehicle emissions refer to exhaust emissions from the automobiles and delivery trucks that would travel to and from the project site each day. The following procedures were used to estimate the mobile source DPM emissions based on emission factors from EMFAC2021.

To quantify mobile source operational emissions, the following information is required:

- Trip generation – the number of vehicles that are expected to move to and from the project site each day.
- Vehicle fleet mix – the mix of vehicle types (i.e., automobiles, trucks, gasoline or diesel-fueled, etc.).
- Trip lengths – the distance each vehicle travels during each trip.
- Emission factors – the amount of emissions generated as a function of vehicle type, vehicle speed, calendar year, vehicle model year, and fuel type for a given amount of vehicle idling time or distance traveled.

### TRIP GENERATION RATES

Trip generation quantifies the number of trips that a project generates each day during all facets of its operations. The trip generation is determined by multiplying an appropriate trip generation rate for a particular land use descriptive of the project by the quantity of that land use. Trip generation rates are determined for daily traffic, morning peak hour inbound and outbound traffic, and the evening peak hour inbound and outbound traffic for the proposed land use. The trip generation rates used for this project were derived from the project's transportation analysis prepared by Fehr & Peers as described below (Fehr & Peers 2021).

Table 7 shows the project's estimated weekday daily, AM peak hour, and PM peak hour trip generation. As shown, the project would generate approximately 8,200 daily trips, with the AM and PM peak hours each generating 820 trips. Trips during these two periods would be highly directional, with 81 percent inbound in the AM peak hour and 78 percent outbound during the PM peak hour.

**Table 7 Project Trip Generation**

| Land Use | ITE Code | 1000 Sq. Ft. | Daily | | AM Peak Hour of Adjacent Street | | | | PM Peak Hour of Adjacent Street | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trip Rate | Trips | Trip Rate | Vehicle Trips | | | Trip Rate | Vehicle Trips | | |
| | | | | | | In | Out | Total | | In | Out | Total |
| Industrial Park | 130 [1] | 2,421.7 | 3.37 | 8,160 | 0.34 | 667 | 156 | 823 | 0.34 | 181 | 642 | 823 |

[1] Weighted average trip rates applied.

Source: Data provided by Fehr & Peers in 2021.

## Vehicle Fleet Mix

The vehicle fleet mix is defined as the mix of motor vehicle classes active during project operation. Emission factors are assigned to the expected vehicle mix as a function of calendar year, vehicle class, speed, and fuel type. For the purposes of the HRA, only diesel-powered vehicles are considered.

The project's transportation analysis includes a vehicle fleet mix for passenger vehicles and trucks. EMFAC2021 was used to derive a complete mix of vehicles consisting of the following vehicle classes:

- Passenger Vehicles: an evenly distributed mix of light duty automobiles (LDA) and light duty trucks (LDT1 and LDT2) – identified as passenger vehicles in the transportation analysis.
- Trucks: a 50-50 mix of medium-heavy duty trucks (MHDT) and heavy-heavy duty trucks (HHDT) with gross weight of 14,001 to 33,000 pound and over 33,000 pounds, respectively – identified as trucks in the transportation analysis.

Due to the variability in the mix of passenger vehicles that could travel to and from the project site, including the possibility of diesel-powered light-duty trucks accessing warehousing operations, it was conservatively assumed that the light-duty fleet would be entirely fueled by diesel.

The project would predominantly consist of warehousing and distribution uses, some of which may require the use of Transportation Refrigeration Units (TRUs). TRUs are refrigeration systems powered by diesel internal combustion engines designed to refrigerate or heat perishable products that are transported in various containers, including truck vans, semi-truck trailers, shipping containers, and railcars. TRU engines usually range from less than 15 to 50 hp, with the most common size being about 35 hp (CARB 2003). For the purposes of this analysis, TRUs were conservatively assumed to be 80 percent of the total HHDT and operate at 35 horsepower and a load factor of 60 percent (CARB 2003). Through the TRU Airborne Toxic Control Measure, CARB limits particulate matter emissions to 0.02 grams per horsepower-hour under the ultra-low emission performance standard. This limit was used as the emission factor to estimate DPM emissions from TRUs. In addition, the on-site exhaust emissions from idling of MHDT and HHDT were also estimated using emissions factors from the EMFAC2021 model.

Refer to Section 3.3, "Transportation and Circulation," in the Draft EIR for details about the forecasted trip generation and vehicle miles traveled.

For dispersion modeling, segments of Blue Oaks Boulevard, Westbrook Boulevard, and Pleasant Grove Boulevard were used. For each roadway segment, the total number of vehicles was forecasted. The number of vehicles was then broken down into several vehicle types, as mentioned above. The daily truck trips were assumed to be 14 percent of the total trips (i.e., 8,160), which was estimated by Fehr & Peers. The rest of the trips were assumed to be passenger vehicles. Vehicle emissions were then estimated for each roadway segment by using the traffic volumes extracted from the traffic model forecasts, the length of the roadway segment, and the emission factors from EMFAC2021.

## Off-Road Equipment

Operation of tenant uses on-site could include use of diesel off-road equipment such as diesel generators. Tenants could also potentially use forklifts and yard trucks during project operations, but they would be electricity powdered (Wertheim, pers. comm., 2022) and, thus, they were not considered for this analysis. These potential equipment types were developed based on a study done by the South Coast Air Quality Management District (2014) in consultation with the project applicant. As details on potential future tenants are unknown, a specific list of off-road equipment that could be used during project operations is not available.

With respect to the diesel backup generators, the following parameters are assumed:

- Diesel Backup Generators – 5 generators of 900 kilowatt (kW) each and would be used as-needed basis. Per PCAPCD Rule 502 – New Source Review, any emergency engines may operate no more than 100 hours per year for maintenance and testing, emissions testing or initial start-up testing.

### 2.7.2 Emission Rates

Emissions rates for project operations were based on on-site equipment operations and off-site hauling activity at the project site. Total operational $PM_{10}$ exhaust emissions, the proxy for DPM, were estimated from CalEEMod. Table 8 shows the on-site and off-site emissions estimated by CalEEMod.

**Table 8 On-site and Off-site Emission Estimates for Operations**

| Sources | Exhaust $PM_{10}$ (tons/year) |
| --- | --- |
| Off-Site – Passenger Vehicles | 0.0358 |
| Mobile - Heavy-Duty Vehicles | 0.0833 |
| On-Site – Diesel Generators | 0.0011 |
| **Total** | **1.1202** |

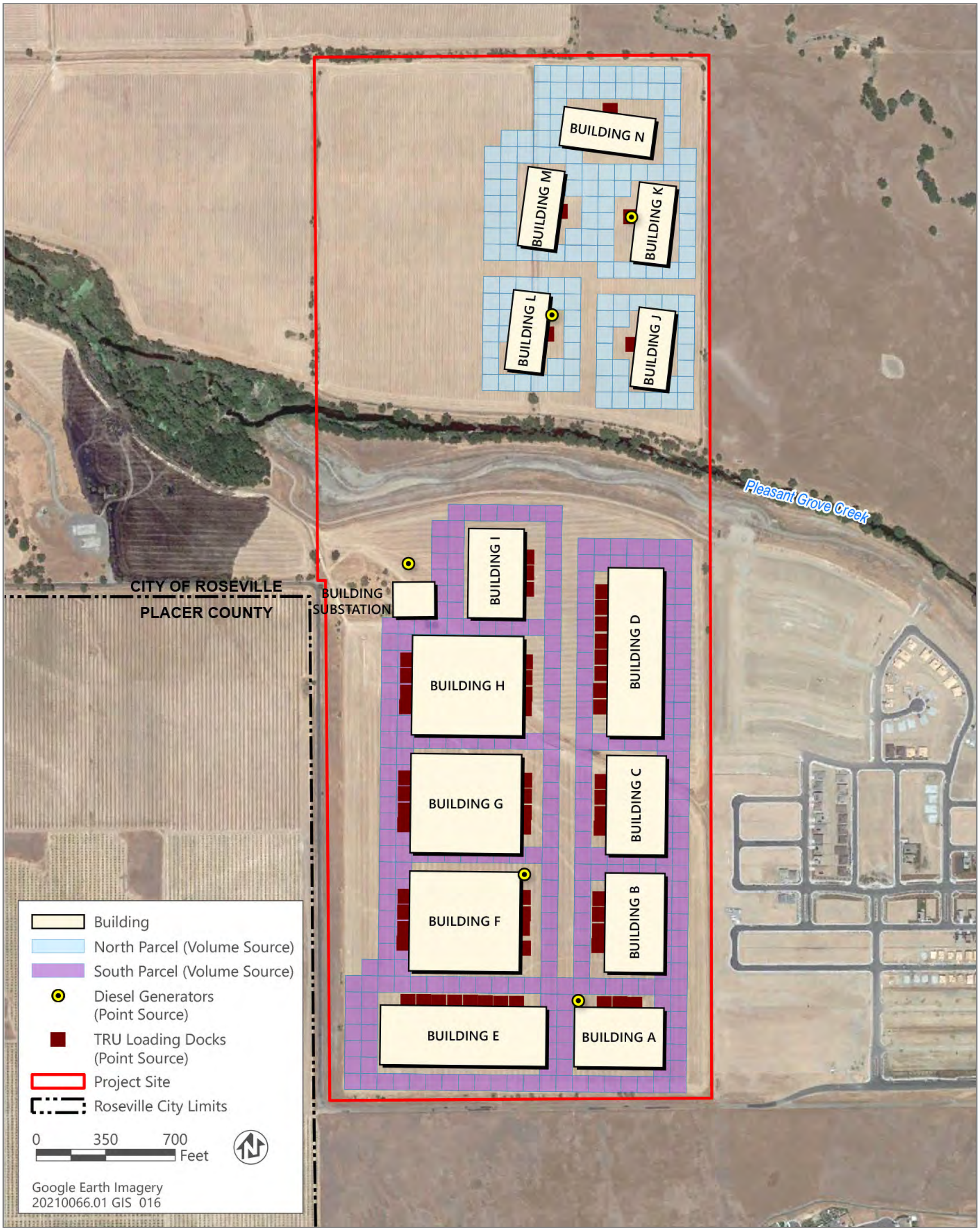
Note: Forklifts and yard trucks are assumed to be electric. $PM_{10}$ = respirable particulate matter with aerodynamic diameter of 10 micrometers or less.

Source: Modeled by Ascent Environmental in 2022.

### 2.7.3 Air Dispersion Modeling Input Parameters

For on-site operational emissions sources, generators and TRUs were modeled as point sources at the proposed loading docks. Based on data provided by the project applicant, loading docks are anticipated to be used for 4 hours per day, 7 days a week which is consistent with operation of similarly sized projects. Typically, off-road activity from diesel-powered on-site equipment (e.g., forklifts and yard trucks) would be modeled as an array of volume sources. However, because both forklifts and yard trucks were assumed to be electric, based on correspondence with the applicant, no volume sources were modeled for operational activities (Wertheim, pers. comm., 2022). Dispersion modeling inputs information is provided in Attachment A.

For off-site operational activities, three haul routes (each with separate ingress and egress points) were modeled as line volume sources to represent a series of volume sources. The line volume sources represent the haul truck emissions traveling to and from the site. These line sources were assumed to have an adjacent configuration of volume sources spaced at 8.5-meter intervals, with a 6.8 m plume height, 8.5 m plume width, and a 3.4 m release height. These were calculated based on the assumption that trucks traveling on these routes would have an average height of 4 m (13.5 feet) and width of 2.5 m (8 feet). Figure 7 shows modeled operational emission sources. Detailed information about the sources is provided in Attachment A.




Source: AERMOD Version 21112 model by Ascent in 2022.

Figure 7 Modeled Operational Emission Sources

### 2.7.4 Cancer and Non-Cancer Risk Assumptions

Table 9 summarizes the parameters and assumptions used for operations-related risks, accounting for Scenario 1 and Scenario 2 period parameters for the proposed Roseville Industrial Park Project.

**Table 9 Risk Parameters for Cancer and Non-Cancer Risk for Construction[1]**

| Risk Parameters | Sensitive Receptors |
|---|---|
| Analysis Type | Cancer and Chronic Non-Cancer Risk |
| Receptor Type | Individual Residential and Schools |
| Exposure Duration | 7, 23, and 30 years |
| Starting Age | 3rd Trimester |
| Intake Rate Percentile | OEHHA Derived Method |
| Risk Pathways Evaluated | Mandatory Minimum Pathways |
| Deposition Rate | 0.05 m/s |
| FAH | Off |
| 8-Hour Breathing Rates | N/A |
| Climate | Mixed |

Notes: N/A = not applicable; OEHHA = Office of Environmental Health Hazard Assessment; RMP = Risk Management Policy; m/s = meters per second; FAH = fraction of time at home.

1. Analysis was prepared consistent with OEHHA Guidance (OEHHA 2015).

Source: Prepared by Ascent Environmental in 2022.

# 3 RESULTS

## 3.1 CANCER RISK AND NON-CANCER RISK

### 3.1.1 Scenario 1

This scenario was modeled to assess the health risk starting from 2023 where a fetus in the 3rd trimester (within the mother's womb) would be exposed to DPM due to both construction and operations. In this scenario, cancer and non-cancer risk from DPM emissions from all the construction phases and operation of the respective completed phases were estimated for an exposure duration of 7 years. After the completion of the construction period, the scenario also added the risks from operations for an exposure year of 23 years, resulting in a total exposure period of 30 years. The health risks from each phase of the construction and operations were added for each individual receptor point to yield a cumulative health risk impact for Scenario 1. The total cancer risk at the maximally exposed individual resident (MEIR) receptor, located just east of the southeast corner of the project site, was found to be 7.8 in a million and the HHI, which indicates chronic non-cancer risk, was found to be less than 0.01. For informational purposes, the total cancer risk at the point of maximum impact (PMI), located at the southeast corner of the project site, was found to be 10.9 in a million and had an HHI of less than 0.01. Thus, the cancer and non-cancer risks would not exceed PCAPCD's threshold, and the impact from Scenario 1 would be **less than significant**.

The location of the MEIR is shown in Figures 8 and 9. The PMI is located at the center of the highest contour, which is shown more clearly in Figure 9. Table 10 shows the cancer and chronic non-cancer risk for all the phases of construction and full buildout operations. No contours are shown for non-cancer risks because the estimated non-cancer risks are more than 10 times below the threshold.

**Table 10 Calculated Construction and Operational Cancer and Non-Cancer Risk**

| Phase | Point of Maximum Impact (PMI)[1] | | Maximum Exposed Individual Receptor (MEIR)[2] | |
|---|---|---|---|---|
| | Cancer Risk (Chances in a Million) | Chronic Non-Cancer Risk (HHI) | Cancer Risk (Chances in a Million) | Chronic Non-Cancer Risk (HHI) |
| Phase 1 Construction only | 2.9 | 0.005 | 3.0 | 0.003 |
| Phase 2 Construction and operations | 1.2 | 0.002 | 1.2 | 0.001 |
| Phase 3 Construction and operations | 1.2 | <0.001 | 1.2 | <0.001 |
| Phase 4 Construction and operations | <1 | <0.001 | <1 | <0.001 |
| Full Buildout Operations[3] | 4.6 | <0.001 | 2.0 | <0.001 |
| Scenario 1 (construction + operations)[4] | 10.9 | 0.007 | 7.8 | 0.005 |
| Scenario 2 (operations)[5] | 4.8 | <0.001 | 2.1 | <0.001 |
| PCAPCD Thresholds of Significance | 10 | 1 | 10 | 1 |
| Exceeded Threshold | No | No | No | No |

Notes: HHI = Health Hazard Index; PCAPCD = Placer County Air Pollution Control District.

1 Point of Maximum Impact was at the receptor with X-Coordinate: 639500.25 & Y-Coordinate: 4295294.49.

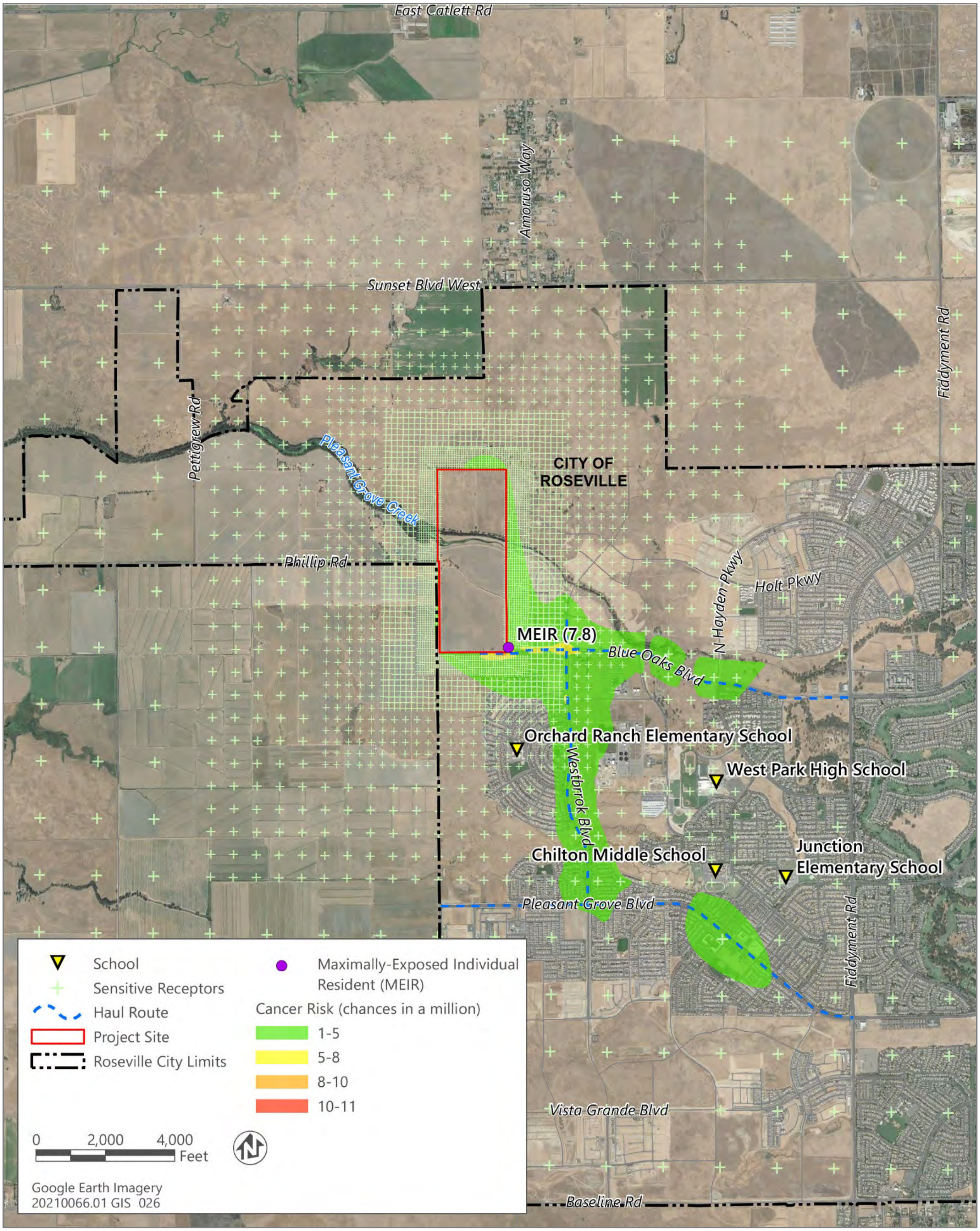
2 Maximum Exposed Individual Receptor was at the receptor with X-Coordinate:639511.33 & Y-Coordinate: 4295335.78.

3 Full buildout (operations only) scenarios are modelled for 23 years.

4 The health risk from the 23-year full buildout scenario is added with the health risk from all the construction phases over 7 years to indicate risk in the case of Scenario 1 (i.e., health risk exposure to the sensitive receptor due to both construction and operational activities). The emissions estimation in CalEEMod was done for a duration of 6 years of active construction.

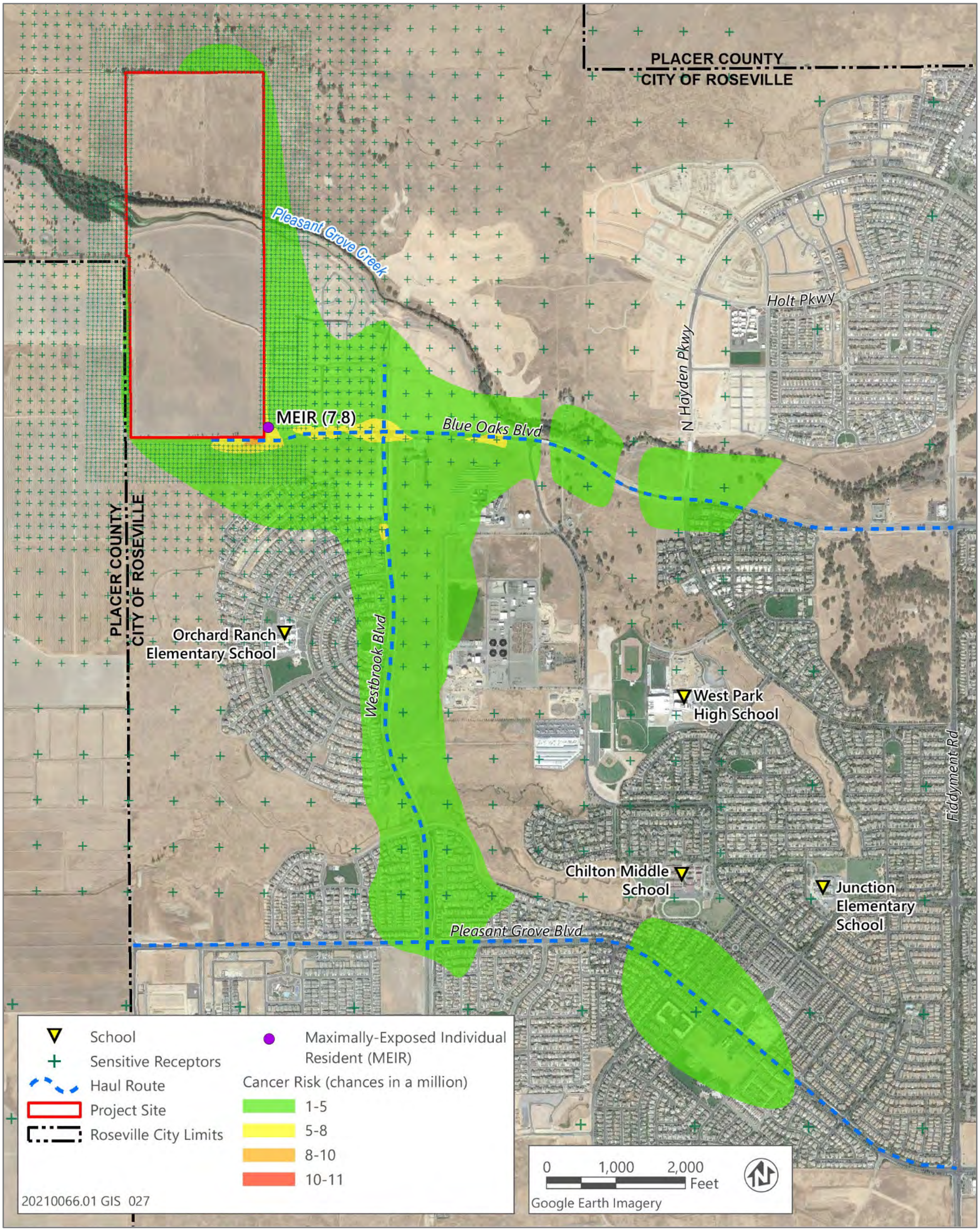
5 The health risk from the 30-year full buildout scenario reflects Scenario 2 (i.e., health risk exposure to the sensitive receptor due to operations only).

Source: Modeling performed by Ascent Environmental in 2022.




Source: adapted by Ascent in 2022.

**Figure 8 Cancer Risk for Project Construction and Operations – Unmitigated Scenario (View 1)**




Source: Adapted by Ascent in 2022.

Figure 9 Cancer Risk for Project Construction and Operations – Unmitigated Scenario (View 2)

### 3.1.2 Scenario 2

This scenario was modeled to assess the health risk starting from 2030 where a fetus in the 3rd trimester (within the mother's womb) would be exposed to DPM due to only operations of the project. In this scenario, cancer and non-cancer risk from DPM emission from operations were estimated for an exposure duration of 30 years. The highest risk in this case was also found to be 4.8 in a million and the HHI was found to be less than one. Thus, the cancer and non-cancer risks would not exceed PCAPCD's threshold, and the impact from Scenario 2 would be **less than significant**.

Table 10 shows the cancer and chronic non-cancer risk from full buildout operations. Due to the low cancer and non-cancer risk values, contours for Scenario 2 were not added to the report.

### 3.1.3 Exposure to Additional Receptors

Some additional sensitive receptors were also analyzed in this study. These receptors are schools within two miles of the project site. For both Scenarios 1 and 2, the cancer and non-cancer risks at all the additional receptors were less than one in a million and the chronic non-cancer risk at all the additional receptors was less than 0.001. Table 11 shows the cancer and chronic non-cancer risks at all the additional receptors.

**Table 11 Cancer and Non-Cancer Risk at Additional Receptors**

| Receptor | Scenario 1[3] Cancer Risk[2] | Scenario 1[3] Chronic Non-Cancer Risk[1] | Scenario 2[3] Cancer Risk[2] | Scenario 2[3] Chronic Non-Cancer Risk[1] |
|---|---|---|---|---|
| Orchid Ranch Elementary School | 0.48 | <0.001 | 0.20 | <0.001 |
| West Park High School | 0.31 | <0.001 | 0.19 | <0.001 |
| Chilton Middle School | 0.58 | <0.001 | 0.41 | <0.001 |
| Junction Elementary School | 0.27 | <0.001 | 0.18 | <0.001 |

1 Chronic non-cancer risk is measured in terms of Health Hazard Index (HHI). The HHI can't be added and hence won't have any total value in the case of Scenario 1.

2 Cancer risk is measured per million population.

3 Both the scenarios assume that the maximum cancer and chronic non-cancer risk identified at a receptor would be risk for all the receptors, considering it as a worst case.

Source: Data provided by Ascent Environmental in 2022.

### 3.1.4 Conclusion

For both Scenarios 1 and 2, the cancer risk was estimated to be less than 10 in a million and the HHI for chronic non-cancer risk was less than one. The cancer risk for the additional receptors was also less than 10 in a million and HHI less than one. According to PCAPCD's guidance, impacts on health risks would be considered significant under CEQA if the project-related increase in risks would exceed the threshold of 10 in a million and HHI more than one. Further, mitigation measures recommended for Impact 3.4-2 in Section 3.4, "Air Quality," of the Draft EIR would further reduce the amount of diesel emitted by including 110/208-volt power outlets to supply auxiliary equipment power through electricity for truck idling. In addition, recommended mitigation would reduce fuel consumption with installation of electric vehicle (EV)-ready parking for 10 percent of the total parking spaces, which would promote the use of electricity powered vehicles. With these mitigation measures, the health impacts from the project would be further reduced. Thus, the impact due to construction and operations of the proposed Roseville Industrial Park Project would be **less than significant**.

# 4 REFERENCES

California Air Resources Board. 2003. *Revised Staff Report: Initial Statement of Reasons for Proposed Rulemaking*. Available: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fww2.arb.ca.gov%2Fsites%2Fdefault%2Ffiles%2Fbarcu%2Fregact%2Ftrude03%2Frevisor.doc&wdOrigin=BROWSELINK. Accessed January 20, 2022.

———. 2015. Digital Elevation Model files for HARP. Available: https://www.arb.ca.gov/toxics/harp/dems.htm. Accessed March 11, 2022.

———. 2018 (August). Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. Available: https://www.arb.ca.gov/toxics/healthval/contable.pdf. Accessed March 11, 2022.

CARB. *See* California Air Resources Board.

Fehr & Peers. 2021. *Roseville Industrial Park – Proposed Land Use Assumptions and Trip Generation Estimates*.

OEHHA. *See* Office of Environmental Health Hazard Assessment.

Office of Environmental Health Hazard Assessment. 2015. *Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments*. Available: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed March 11, 2022.

PCAPCD. *See* Placer County Air Pollution Control District.

Placer County Air Pollution Control District. 2017. *CEQA Handbook*. Available: https://www.placerair.org/1801/CEQA-Handbook. Accessed January 18, 2022.

Sacramento Metropolitan Air Quality Management District. 2013. Dispersion Modeling of Construction-Generated PM10 Emissions. *Available:* https://www.airquality.org/LandUseTransportation/Documents/Ch3PMDispersionModelingGuidanceFINAL7-2013.pdf. Accessed: June 14, 2022.

SCAQMD. *See* South Coast Air Quality Management District.

South Coast Air Quality Management District. 2014. SCAQMD High Cube Warehouse Truck Trip Study White Paper Summary of Business Survey Results. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/high-cube-warehouse-trip-rate-study-for-air-quality-analysis/business-survey-summary.pdf. Accessed March 11, 2022.

Wertheim, Abbie. Development Manager. Panattoni Development Company, Inc. June 6, 2022—email to Mike Parker and Sarah Henningsen of Ascent Environmental responding to questions about electrification of forklifts and yard trucks.