24-031 - PLN22-0030 Attachment 7 Mobile Source HRA

MOBILE SOURCE HEALTH RISK ASSESSMENT

CITY OF SAN LEANDRO

PREPARED BY:

Haseeb Qureshi
hqureshi@urbanxroads.com

Michael Tirohn
mtirohn@urbanxroads.com

AUGUST 16, 2023

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
µg	Microgram
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
APS	Auxiliary Power System
AQMD	Air Quality Management District
ARB	Air Resources Board
BAAQMD	Bay Area Air Quality Management District
CEQA	California Environmental Quality Act
CPF	Cancer Potency Factor
DPM	Diesel Particulate Matter
EMFAC	Emission Factor Model
EPA	Environmental Protection Agency
HARP2	Hotspots Analysis and Reporting Program
HHD	Heavy Heavy-Duty
HI	Hazard Index
HRA	Health Risk Assessment
LHD	Light Heavy-Duty
MEIR	Maximally Exposed Individual Receptor
MEISC	Maximally Exposed Individual School Child
MEIW	Maximally Exposed Individual Worker
MHD	Medium Heavy-Duty
MMBtu	Million British thermal units
NAD	North American Datum
OEHHA	Office of Environmental Health Hazard Assessment
PM_{10}	Particulate Matter 10 microns in diameter or less
Project	24-031 - PLN22-0030 Attachment 7 Mobile Source HRA
REL	Reference Exposure Level
SCAQMD	South Coast Air Quality Management District
SRA	Source Receptor Area
TAC	Toxic Air Contaminant
TA	Traffic Analysis
URF	Unit Risk Factor
UTM	Universal Transverse Mercator

This page intentionally left blank

EXECUTIVE SUMMARY

This report evaluates the potential health risk impacts to sensitive receptors (which are residents) and adjacent workers associated with the development of the proposed Project, more specifically, health risk impacts as a result of exposure to Toxic Air Contaminants (TACs) including diesel particulate matter (DPM) as a result of heavy-duty diesel trucks accessing the site. This section summarizes the significance criteria and Project health risks.

The results of the health risk assessment from Project-generated DPM emissions are provided in Table ES-1, ES-2, and ES-3 below for the Project.

CONSTRUCTION IMPACTS

The land use with the greatest potential exposure to Project construction DPM source emissions is Location R4 which is located approximately 345 feet southwest of the Project site at an existing residence located at 2220 Sitka Street. R4 is placed at the private outdoor living area (backyard) facing the Project site. At the maximally exposed individual receptor (MEIR), the maximum incremental cancer risk attributable to Project construction DPM source emissions is estimated at 0.36 in one million, which is less than the Bay Area Air Quality Management District (BAAQMD) significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction activity. Location R4 is the nearest receptor and would experience the highest concentrations of DPM during Project construction due to meteorological conditions (wind speed and direction) in the Project vicinity. As such, all other receptors during construction activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

OPERATIONAL IMPACTS

Residential Exposure Scenario:

The residential land use with the greatest potential exposure to Project DPM source emissions is Location R4 which is located approximately 345 feet southwest of the Project site at an existing residence located at 2220 Sitka Street. R4 is placed at the private outdoor living area (backyard) facing the Project site. At the MEIR, the maximum incremental cancer risk attributable to Project DPM source emissions is estimated at 0.04 in one million, which is less than the BAAQMD's significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Location R4 is the nearest receptor and would experience the highest concentrations of DPM during Project operation due to meteorological conditions (wind speed and direction) in the Project vicinity. As such, all other receptors during operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

Worker Exposure Scenario[1]*:*

The worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6, which represents the adjacent potential worker receptor approximately 16 feet northeast of the Project site. At the maximally exposed individual worker (MEIW), the maximum incremental cancer risk impact is 0.05 in one million which is less than the BAAQMD's threshold of 10 in one million. Maximum non-cancer risks at this same location were estimated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Because all other modeled worker receptors would experience lower concentrations of DPM due to meteorological conditions (wind speed and direction) in the Project vicinity, all other worker receptors in the vicinity of the Project would be exposed to less emissions and therefore less risk than the MEIW identified herein. As such, the Project will not cause a significant human health or cancer risk to adjacent workers. The nearest modeled receptors are illustrated on Exhibit 2-D.

School Child Exposure Scenario:

The nearest school is Garfield Elementary School, located approximately 1,470 feet southwest of the Project site and represented by Location R5. The maximally exposed individual school child (MEISC) is the school receptor that would experience the highest modeled concentrations of DPM, and thus the highest risk. At the MEISC, the maximum incremental cancer risk impact attributable to the Project is calculated to be <0.01 in one million, which is less than the significance threshold of 10 in one million. At this same location, non-cancer risks attributable to the Project were calculated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Because all other modeled school receptors would be exposed to lower concentrations of DPM, all other school receptors in the vicinity of the of the Project would be exposed to less emissions and therefore less risk than the MEISC identified herein. As such, the Project will not cause a significant human health or cancer risk to nearby school children.

CONSTRUCTION AND OPERATIONAL IMPACTS

The land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R4. At the MEIR, the maximum incremental cancer risk attributable to Project construction and operational DPM source emissions is estimated at 0.40 in one million, which is less than the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction and operational activity. All other receptors during construction and operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

1 BAAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

TABLE ES-1: SUMMARY OF CONSTRUCTION CANCER AND NON-CANCER RISKS

Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
1.0 Year Exposure	Maximum Exposed Sensitive Receptor	0.36	10	NO
Time Period	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Annual Average	Maximum Exposed Sensitive Receptor	<0.01	1.0	NO

TABLE ES-2: SUMMARY OF OPERATIONAL CANCER AND NON-CANCER RISKS

Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
30 Year Exposure	Maximum Exposed Sensitive Receptor	0.04	10	NO
25 Year Exposure	Maximum Exposed Worker Receptor	0.05	10	NO
9 Year Exposure	Maximum Exposed Individual School Child	<0.01	10	NO
Time Period	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Annual Average	Maximum Exposed Sensitive Receptor	<0.01	1.0	NO
Annual Average	Maximum Exposed Worker Receptor	<0.01	1.0	NO
Annual Average	Maximum Exposed Individual School Child	<0.01	1.0	NO

TABLE ES-3: SUMMARY OF CONSTRUCTION AND OPERATIONAL CANCER AND NON-CANCER RISKS

Time Period	Location	Maximum Lifetime Cancer Risk (Risk per Million)	Significance Threshold (Risk per Million)	Exceeds Significance Threshold
30 Year Exposure	Maximum Exposed Sensitive Receptor	0.40	10	NO
Time Period	**Location**	**Maximum Hazard Index**	**Significance Threshold**	**Exceeds Significance Threshold**
Annual Average	Maximum Exposed Sensitive Receptor	<0.01	1.0	NO

1 INTRODUCTION

The purpose of this Health Risk Assessment (HRA) is to evaluate Project-related impacts to the nearest sensitive receptors (residents) and workers as a result of heavy-duty diesel trucks accessing the site.

The BAAQMD identifies that if a proposed Project is expected to generate/attract heavy-duty diesel trucks, which emit DPM, preparation of a mobile source HRA is recommended. This document serves to meet the BAAQMD's recommendation for preparation of a HRA. Cancer risk is expressed in terms of expected incremental incidence per million population. The BAAQMD has established an incidence rate of ten (10) persons per million as the maximum acceptable incremental cancer risk due to DPM exposure from a project such as the proposed Project. This threshold serves to determine whether or not a given project has a potentially significant development-specific and cumulatively considerable impact.

The BAAQMD has also established non-carcinogenic risk parameters for use in HRAs. Non-carcinogenic risks are quantified by calculating a "hazard index," expressed as the ratio between the ambient pollutant concentration and its toxicity or Reference Exposure Level (REL). An REL is a concentration at or below which health effects are not likely to occur. A hazard index less of than one (1.0) means that adverse health effects are not expected. In this HRA, non-carcinogenic exposures of less than 1.0 are considered less-than-significant. Both the cancer risk and non-carcinogenic risk thresholds are applied to the nearest sensitive receptors below.

1.1 SITE LOCATION

The proposed Project is located at 1700 Doolittle Drive in the City of San Leandro as shown on Exhibit 1-A.

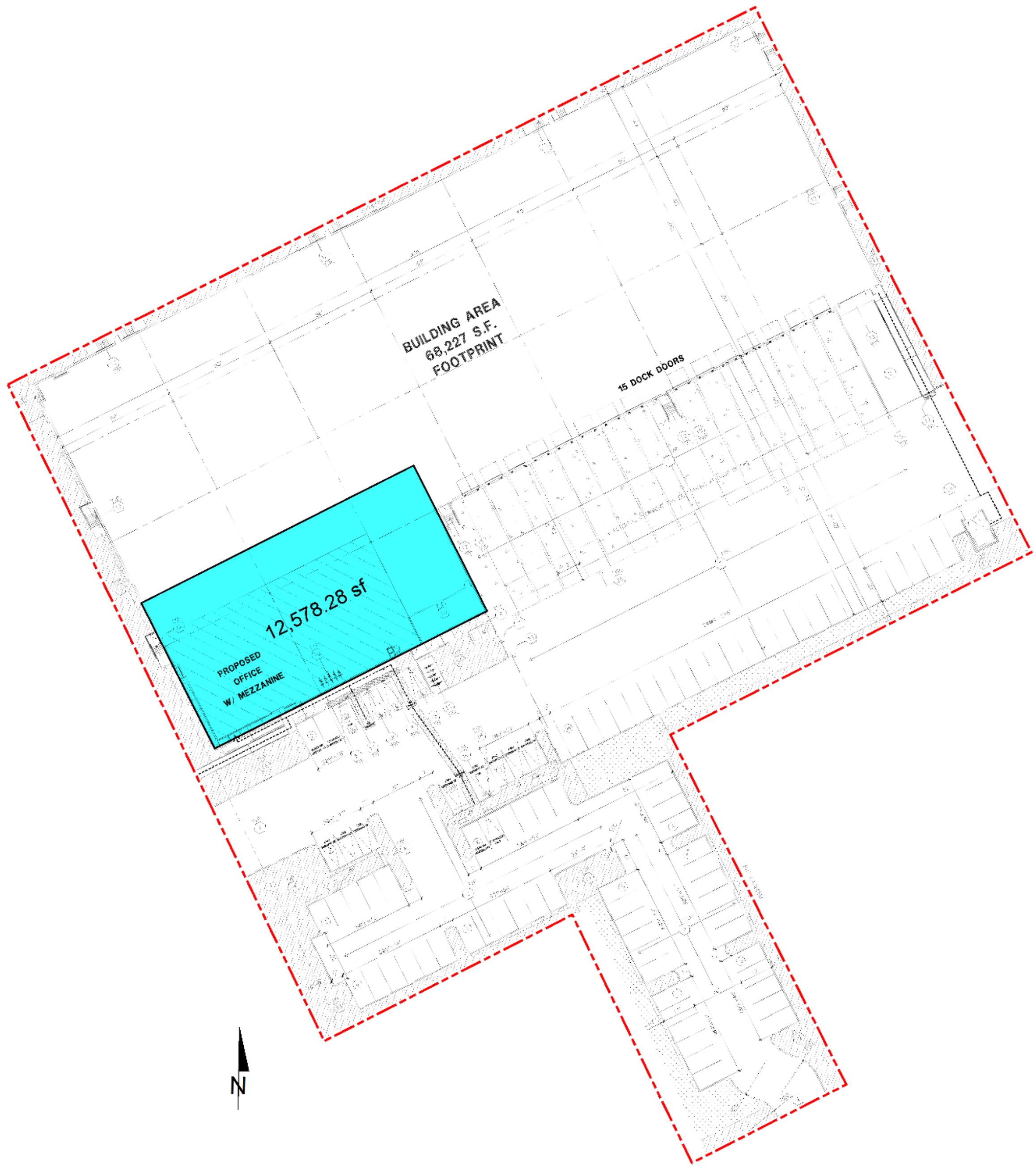
1.2 PROJECT DESCRIPTION

The proposed Project is to consist of the development of a warehouse building with up to 80,727 square feet (sf) of building space as shown on Exhibit 1-B.

The proposed Project is expected to generate approximately 396 total trips per day (198 vehicles inbound + 198 vehicles outbound) which include 374 total passenger vehicle trips per day (187 passenger vehicles inbound + 187 passenger vehicles outbound) and 22 total truck trips per day (11 trucks inbound + 11 trucks outbound) (1).

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN



This page intentionally left blank

2 BACKGROUND

2.1 BACKGROUND ON RECOMMENDED METHODOLOGY

This HRA is based on applicable guidelines to produce conservative estimates of human health risk posed by exposure to DPM. Even though the Project is not within the jurisdiction of the South Coast Air Quality Management District (SCAQMD), these recommendations are relevant for CEQA purposes since the BAAQMD does not provide similar guidance. The conservative nature of this analysis is due primarily to the following factors:

- The ARB-adopted diesel exhaust Unit Risk Factor (URF) of 300 in one million per μg/m^3 is based upon the upper 95 percentile of estimated risk for each of the epidemiological studies utilized to develop the URF. Using the 95th percentile URF represents a very conservative (health-protective) risk posed by DPM because it represents breathing rates that are high for the human body.
- The emissions derived assume that every truck accessing the Project site will idle for 15 minutes under the unmitigated scenario, and this is an overestimation of actual idling times and thus conservative.[2] The California Air Resources Board (CARB's) anti-idling requirements impose a 5-minute maximum idling time and therefore the analysis conservatively overestimates DPM emissions from idling by a factor of 3.

2.2 CONSTRUCTION HEALTH RISK ASSESSMENT

2.2.1 EMISSIONS CALCULATIONS

The emissions calculations for the construction HRA component are based on an assumed mix of construction equipment and hauling activity as presented in the *24-031 - PLN22-0030 Attachment 7 Mobile Source HRA Air Quality and Greenhouse Gas Assessment Evaluation* ("technical study") prepared by Urban Crossroads, Inc. (2)

Construction related DPM emissions are expected to occur primarily as a function of heavy-duty construction equipment that would be operating on-site.

As discussed in the technical study, the Project would result in approximately 244 total working-days of construction activity. The construction duration by phase is shown on Table 2-1. A detailed summary of construction equipment assumptions by phase is provided at Table 2-2. The CalEEMod emissions outputs are presented in Appendix 2.1. The modeled emission sources for construction activity are illustrated on Exhibit 2-A.

[2] Although the Project is required to comply with ARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions should be estimated for 15 minutes of truck idling (personal communication, in person, with Jillian Wong, December 22, 2016), which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc.

TABLE 2-1: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Site Preparation	2/1/2023	2/7/2023	5
Grading	2/8/2023	2/19/2023	8
Building Construction	2/20/2023	1/8/2024	230
Paving	12/14/2023	1/8/2024	18
Architectural Coating	12/14/2023	1/8/2024	18

TABLE 2-2: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Phase Name	Equipment	Amount	Hours Per Day
Site Preparation	Crawler Tractors	4	8
	Rubber Tired Dozers	3	8
Grading	Crawler Tractors	3	8
	Excavators	1	8
	Graders	1	8
	Rubber Tired Dozers	1	8
Building Construction	Cranes	1	8
	Tractors/Loaders/Backhoes	3	8
	Forklifts	3	8
	Generator Sets	1	8
	Welders	1	8
Paving	Pavers	1	8
	Paving Equipment	2	8
	Rollers	2	8
	Tractors/Loaders/Backhoes	1	8
Architectural Coating	Air Compressors	1	8

EXHIBIT 2-A: MODELED CONSTRUCTION EMISSION SOURCES

2.3 OPERATIONAL HEALTH RISK ASSESSMENT

2.3.1 ON-SITE AND OFF-SITE TRUCK ACTIVITY

Vehicle DPM emissions were calculated using emission factors for particulate matter less than 10µm in diameter (PM_{10}) generated with the 2021 version of the EMission FACtor model (EMFAC) developed by the CARB. EMFAC 2021 is a mathematical model that CARB developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the ARB to project changes in future emissions from on-road mobile sources (3). The most recent version of this model, EMFAC 2021, incorporates regional motor vehicle data, information and estimates regarding the distribution of vehicle miles traveled (VMT) by speed, and number of starts per day.

Several distinct emission processes are included in EMFAC 2021. Emission factors calculated using EMFAC 2021 are expressed in units of grams per vehicle miles traveled (g/VMT) or grams per idle-hour (g/idle-hr), depending on the emission process. The emission processes and corresponding emission factor units associated with diesel particulate exhaust for this Project are presented below.

For this Project, annual average PM_{10} emission factors were generated by running EMFAC 2021 in EMFAC Mode for vehicles in the Alameda County jurisdiction. The EMFAC Mode generates emission factors in terms of grams of pollutant emitted per vehicle activity and can calculate a matrix of emission factors at specific values of temperature, relative humidity, and vehicle speed. The model was run for speeds traveled in the vicinity of the Project. The vehicle travel speeds for each segment modeled are summarized below.

- Idling – on-site loading/unloading and truck gate
- 5 miles per hour – on-site vehicle movement including driving and maneuvering
- 25 miles per hour – off-site vehicle movement including driving and maneuvering.

Calculated emission factors are shown at Table 2-3. As a conservative measure, a 2024 EMFAC 2021 run was conducted and a static 2024 emissions factor data set was used for the entire duration of analysis herein (e.g., 30 years). Use of 2024 emission factors would overstate potential impacts since this approach assumes that emission factors remain “static” and do not change over time due to fleet turnover or cleaner technology with lower emissions that would be incorporated into vehicles after 2024. Additionally, based on EMFAC 2021, Light-Heavy-Duty Trucks are comprised of 46.0% diesel, Medium-Heavy-Duty Trucks are comprised of 89.5% diesel, and Heavy-Heavy-Duty Trucks are comprised of 93.0% diesel. Trucks fueled by diesel are accounted for by these percentages accordingly in the emissions factor generation. Appendix 2.2 includes additional details on the emissions estimates from EMFAC.

The vehicle DPM exhaust emissions were calculated for running exhaust emissions. The running exhaust emissions were calculated by applying the running exhaust PM_{10} emission factor (g/VMT) from EMFAC over the total distance traveled. The following equation was used to estimate off-site emissions for each of the different vehicle classes comprising the mobile sources (4):

$$Emissions_{Speed\ A} = EF_{Run\ Exhaust} \times Distance \times \frac{Number\ of\ Trips\ per\ Day}{Seconds\ per\ Day}$$

Where:

$Emissions_{Speed\ A}$	=	Vehicle emissions at a given speed A (g/s)
$EF_{Run\ Exhaust}$	=	EMFAC running exhaust PM_{10} emission factor at speed A (g/vmt)
$Distance$	=	Total distance traveled per trip (miles)

Similar to off-site traffic, on-site vehicle running emissions were calculated by applying the running exhaust PM_{10} emission factor (g/VMT) from EMFAC and the total vehicle trip number over the length of the driving path using the same formula presented above for on-site emissions. In addition, on-site vehicle idling exhaust emissions were calculated by applying the idle exhaust PM_{10} emission factor (g/idle-hr) from EMFAC and the total truck trip over the total assumed idle time (15 minutes). The following equation was used to estimate the on-site vehicle idling emissions for each of the different vehicle classes (4):

$$Emissions_{Idle} = EF_{Idle} \times Number\ of\ Trips \times Idling\ Time \times \frac{60\ minutes\ per\ hour}{seconds\ per\ day}$$

Where:

$Emissions_{Idle}$	=	Vehicle emissions during Idling (g/s)
EF_{Idle}	=	EMFAC idle exhaust PM_{10} emission factor (g/s)
$Number\ of\ Trips$	=	Number of trips per day
$Idling\ Time$	=	Idling time (minutes per trip)

TABLE 2-3: 2024 WEIGHTED AVERAGE DPM EMISSIONS FACTORS

Speed	Weighted Average
0 (idling)	0.07501 (g/idle-hr)
5	0.01981 (g/s)
25	0.00816 (g/s)

Each roadway was modeled as a line source (made up of multiple adjacent volume sources). Due to the large number of volume sources modeled for this analysis, the corresponding coordinates of each volume source have not been included in this report but are included in Appendix 2.3. The DPM emission rate for each volume source was calculated by multiplying the emission factor (based on the average travel speed along the roadway) by the number of trips and the distance traveled along each roadway segment and dividing the result by the number of volume sources along that roadway, as illustrated on Table 2-4. The modeled emission sources are illustrated on Exhibit 2-B for on-site sources and Exhibit 2-C for off-site sources. The modeling domain is limited to the Project's primary truck route and includes off-site sources in the study area for more than

¾ mile. This modeling domain is more inclusive and conservative than using only a ¼ mile modeling domain which is the distance supported by several reputable studies which conclude that the greatest potential risks occur within a ¼ mile of the primary source of emissions (5) (in the case of the Project, the primary source of emissions is the on-site idling and on-site travel).

EXHIBIT 2-B: MODELED ON-SITE EMISSION SOURCES

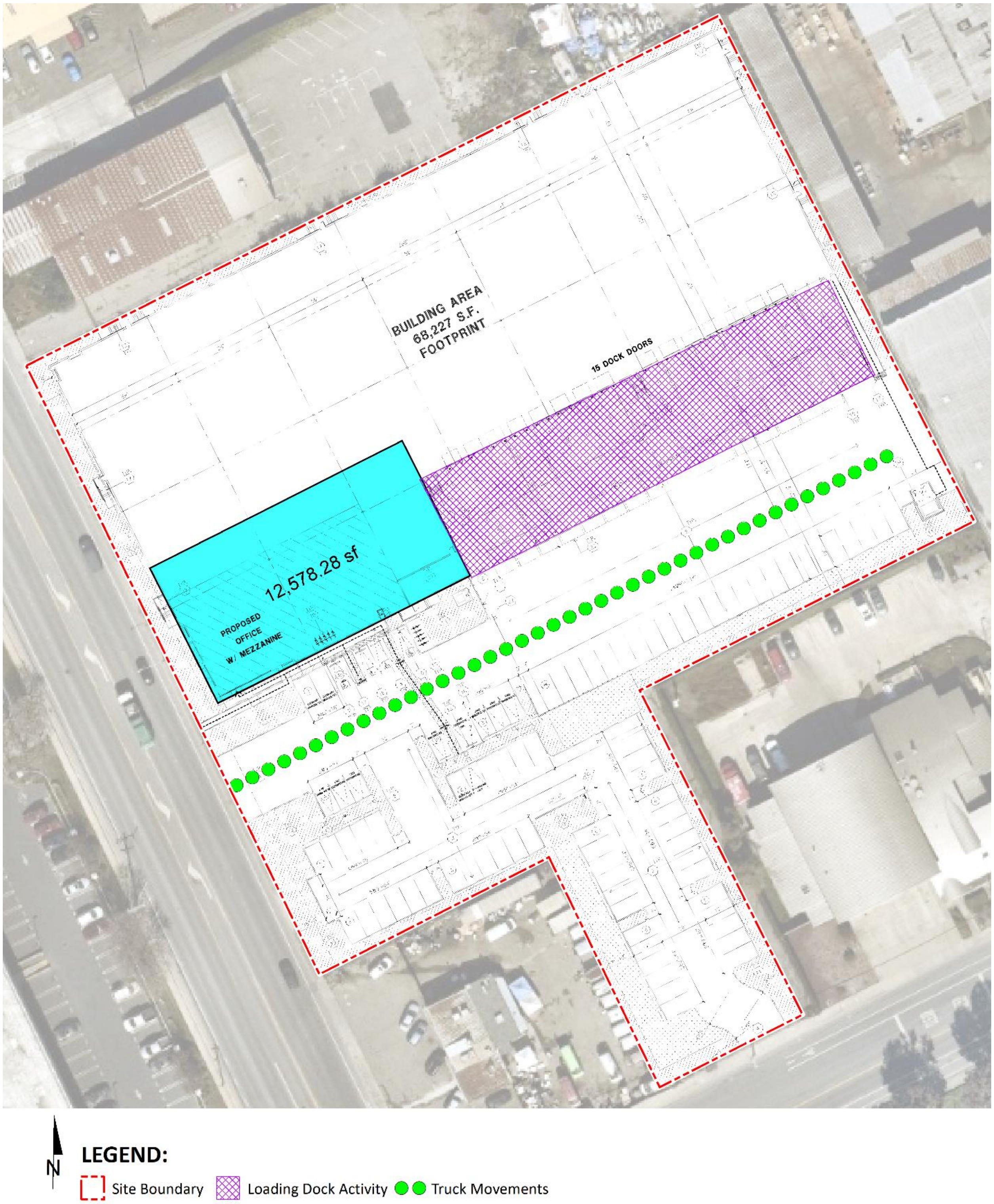


EXHIBIT 2-C: MODELED OFF-SITE EMISSION SOURCES

TABLE 2-4: DPM EMISSIONS FROM PROJECT TRUCKS (2024 ANALYSIS YEAR)

Truck Emission Rates						
Source	Trucks Per Day	VMT [a] (miles/day)	Truck Emission Rate [b] (grams/mile)	Truck Emission Rate [b] (grams/idle-hour)	Daily Truck Emissions [c] (grams/day)	Modeled Emission Rates (g/second)
On-Site Idling	11			0.0750	0.21	2.387E-06
On-Site Travel	22	1.73	0.0198		0.03	3.955E-07
Off-Site Travel - Doolittle Dr. N 50%	11	6.09	0.0082		0.05	5.755E-07
Off-Site Travel - Doolittle Dr. N 5%	1	0.20	0.0082		0.00	1.865E-08
Off-Site Travel - Doolittle Dr. S 50%	11	13.79	0.0082		0.11	1.302E-06
Off-Site Travel - Davis St. 45%	10	6.80	0.0082		0.06	6.418E-07

[a] Vehicle miles traveled are for modeled truck route only.

[b] Emission rates determined using EMFAC 2021. Idle emission rates are expressed in grams per idle hour rather than grams per mile.

[c] This column includes the total truck travel and truck idle emissions. For idle emissions this column includes emissions based on the assumption that each truck idles for 15 minutes.

On-site truck idling was estimated to occur as trucks enter and travel through the Project site. Although the Project's diesel-fueled truck and equipment operators will be required by State law to comply with CARB's idling limit of 5 minutes, staff at SCAQMD recommends that the on-site idling emissions be calculated assuming 15 minutes of truck idling (6), which would take into account on-site idling which occurs while the trucks are waiting to pull up to the truck bays, idling at the bays, idling at check-in and check-out, etc. As such, this analysis calculates truck idling at 15 minutes, consistent with SCAQMD's recommendation.

As summarized in the *24-031 - PLN22-0030 Attachment 7 Mobile Source HRA Traffic Analysis* prepared by Urban Crossroads, Inc., the proposed Project is expected to generate approximately 396 total trips per day (198 vehicles inbound + 198 vehicles outbound) which include 374 total passenger vehicle trips per day (187 passenger vehicles inbound + 187 passenger vehicles outbound) and 22 total truck trips per day (11 trucks inbound + 11 trucks outbound) (1).

2.4 EXPOSURE QUANTIFICATION

The analysis herein has been conducted in accordance with the guidelines in the Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis (7). The Environmental Protection Agency's (U.S. EPA's) AERMOD model has been utilized. For purposes of this analysis, the Lakes AERMOD View (Version 11.2.0) was used to calculate annual average particulate concentrations associated with site operations. Lakes AERMOD View was utilized to incorporate the U.S. EPA's latest AERMOD Version 22112 (8).

The model offers additional flexibility by allowing the user to assign an initial release height and vertical dispersion parameters for mobile sources representative of a roadway. For this HRA, the roadways were modeled as adjacent volume sources. Roadways were modeled using the U.S. EPA's haul route methodology for modeling of on-site and off-site truck movement. More specifically, the Haul Road Volume Source Calculator in Lakes AERMOD View has been utilized to determine the release height parameters. Based on the US EPA methodology, the Project's modeled sources would result in a release height of 3.49 meters and an initial lateral dimension of 4.0 meters, and an initial vertical dimension of 3.25 meters.

Model parameters are presented in Table 2-5 (9). The model requires additional input parameters including emission data and local meteorology. Meteorological data from the Riverside Airport (KRAL) monitoring station was used to represent local weather conditions and prevailing winds (10).

TABLE 2-5: AERMOD MODEL PARAMETERS

Dispersion Coefficient (Urban/Rural)	Urban (population 4,579,599)
Terrain (Flat/Elevated)	Elevated (Regulatory Default)
Averaging Time	1 year (5-year Meteorological Data Set)
Receptor Height	1.5 meters

Universal Transverse Mercator (UTM) coordinates for World Geodetic System (WGS) 84 were used to locate the Project site boundaries, each volume source location, and receptor locations in the Project site's vicinity. The AERMOD dispersion model summary output files for the proposed Project are presented in Appendix 2.3. Modeled sensitive receptors were placed at residential and non-residential locations.

Receptors may be placed at applicable structure locations for residential and worker property and not necessarily the boundaries of the properties containing these uses because the human receptors (residents and workers) spend a majority of their time at the residence or in the workplace's building, and not on the property line. It should be noted that the primary purpose of receptor placement is focused on long-term exposure. For example, the HRA evaluates the potential health risks to residents, workers, and school children over a period of 30, 25, or 9 years of exposure, respectively. Notwithstanding, as a conservative measure, receptors were placed at either the outdoor living area or the building façade, whichever is closer to the Project site.

For purposes of this HRA, receptors include both residential and non-residential (worker and school) land uses in the vicinity of the Project. These receptors are included in the HRA since residents, workers, and school children may be exposed at these locations over a long-term duration of 30, 25, or 9 years, respectively. This methodology is consistent with BAAQMD and Office of Environmental Health Hazard Assessment (OEHHA) recommended guidance.

Any impacts to residents or workers located further away from the Project site than the modeled residential and workers would have a lesser impact than what has already been disclosed in the HRA at the MEIR, MEIW, and MEISC because concentrations dissipate with distance.

All receptors were set to existing elevation height so that only ground-level concentrations are analyzed. United States Geological Survey (USGS) National Elevation Dataset (NED) terrain data based on a 1/3 arc-second topographic quadrangle map series using AERMAP was utilized in the HRA modeling to set elevations (11).

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the 2015 OEHHA Guidelines. Consistent with BAAQMD guidance, the analysis utilizes 95^{th} percentile daily breathing rates for the last trimester to birth and ages 0 to 2 years old, and the 80^{th} percentile daily breathing rate for age groups greater than age 2.

2.5 RISK CALCULATION

Excess 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 over a specified exposure duration. 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). A risk level of 10 in one million implies a likelihood that up to 10 people, out of one million equally exposed people would contract cancer if exposed continuously (24 hours per day) to the levels of toxic air contaminants over a specified duration of time.

In order to estimate impacts from construction equipment and truck emissions during Project construction and operational activities, health risk was calculated using CARB's Hotspots Analysis and Reporting Program (HARP2), version 22118 (12). HARP2 calculates cancer and non-cancer health risk based on the 2015 OEHHA Guidelines. Appendices 2.4 and 2.5 include the HARP2 model outputs for construction and operation, respectively.

Based on guidance from CARB and the California Environmental Protection Agency, OEHHA recommends a refinement to the standard point estimate approach when alternate human body weights and breathing rates are utilized to assess risk for susceptible subpopulations such as children. For the inhalation pathway, the procedure requires the incorporation of several discrete variates to effectively quantify dose. Once determined, contaminant dose is multiplied by the cancer potency factor (CPF) in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)-1 to derive the cancer risk estimate. Consistent with BAAQMD guidance, risk was calculated in HARP2 using the RMP Derived method, and the fraction of time at home adjustment was applied to age bins greater or equal to 16 years.

An evaluation of the potential noncarcinogenic effects of chronic exposures was also conducted. Adverse health effects are evaluated by comparing a compound's annual concentration with its toxicity factor or Reference Exposure Level (REL). The REL for diesel particulates was obtained from OEHHA for this analysis. The chronic reference exposure level (REL) for DPM was established by OEHHA as 5 $\mu g/m^3$ (13). Noncarcinogenic health risks were calculated using the HARP2 model.

2.6 POTENTIAL PROJECT-RELATED DPM SOURCE CANCER AND NON-CANCER RISKS

CONSTRUCTION IMPACTS

The land use with the greatest potential exposure to Project construction DPM source emissions is Location R4 which is located approximately 345 feet southwest of the Project site at an existing residence located at 2220 Sitka Street. R4 is placed at the private outdoor living area (backyard) facing the Project site. At the MEIR, the maximum incremental cancer risk attributable to Project construction DPM source emissions is estimated at 0.36 in one million, which is less than the BAAQMD significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction activity. Location R4 is the nearest receptor and would experience the highest concentrations of DPM during Project construction due to meteorological conditions (wind speed and direction) in the Project vicinity. As such, all other receptors during construction activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

OPERATIONAL IMPACTS

Residential Exposure Scenario:

The residential land use with the greatest potential exposure to Project DPM source emissions is Location R4 which is located approximately 345 feet southwest of the Project site at an existing residence located at 2220 Sitka Street. R4 is placed at the private outdoor living area (backyard) facing the Project site. At the MEIR, the maximum incremental cancer risk attributable to Project DPM source emissions is estimated at 0.04 in one million, which is less than the BAAQMD's significance threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Location R4 is the nearest receptor and would experience the highest concentrations of DPM during Project operation due to meteorological conditions (wind speed and direction) in the Project vicinity. As such, all other receptors during operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

Worker Exposure Scenario[3]*:*

The worker receptor land use with the greatest potential exposure to Project DPM source emissions is Location R6, which represents the adjacent potential worker receptor approximately 16 feet northeast of the Project site. At the MEIW, the maximum incremental cancer risk impact is 0.05 in one million which is less than the BAAQMD's threshold of 10 in one million. Maximum non-cancer risks at this same location were estimated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Because all other modeled worker receptors would experience lower concentrations of DPM due to meteorological conditions (wind speed and direction) in the Project vicinity, all other worker receptors in the vicinity of the Project would be exposed to less emissions and therefore less risk than the MEIW identified herein. As such, the Project will not cause a significant human health or cancer risk to adjacent workers. The nearest modeled receptors are illustrated on Exhibit 2-D.

School Child Exposure Scenario:

The nearest school is Garfield Elementary School, located approximately 1,470 feet southwest of the Project site and represented by Location R5. The MEISC is the school receptor that would experience the highest modeled concentrations of DPM, and thus the highest risk. At the MEISC, the maximum incremental cancer risk impact attributable to the Project is calculated to be <0.01 in one million, which is less than the significance threshold of 10 in one million. At this same location, non-cancer risks attributable to the Project were calculated to be <0.01, which would not exceed the applicable significance threshold of 1.0. Because all other modeled school receptors would be exposed to lower concentrations of DPM, all other school receptors in the vicinity of the of the Project would be exposed to less emissions and therefore less risk than the

3 BAAQMD guidance does not require assessment of the potential health risk to on-site workers. Excerpts from the document OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines—The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2003), also indicate that it is not necessary to examine the health effects to on-site workers unless required by RCRA (Resource Conservation and Recovery Act) / CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or the worker resides on-site.

MEISC identified herein. As such, the Project will not cause a significant human health or cancer risk to nearby school children.

CONSTRUCTION AND OPERATIONAL IMPACTS

The land use with the greatest potential exposure to Project construction and operational DPM source emissions is Location R4. At the MEIR, the maximum incremental cancer risk attributable to Project construction and operational DPM source emissions is estimated at 0.40 in one million, which is less than the threshold of 10 in one million. At this same location, non-cancer risks were estimated to be <0.01, which would not exceed the applicable threshold of 1.0. As such, the Project will not cause a significant human health or cancer risk to adjacent land uses as a result of Project construction and operational activity. All other receptors during construction and operational activity would experience less risk than what is identified for this location. The nearest modeled receptors are illustrated on Exhibit 2-D.

It should be noted that the receptors presented in Exhibit 2-D do not represent all modeled receptors.

EXHIBIT 2-D: RECEPTOR LOCATIONS

This page intentionally left blank

3 REFERENCES

1. **Urban Crossroads, Inc.** *San Leandro Industrial Traffic Analysis.* 2022.
2. —. *San Leandro Industrial Air Quality and Greenhouse Gas Assessment Evaluation.* 2022.
3. **California Air Resources Board.** EMFAC. [Online] https://www.arb.ca.gov/emfac/.
4. **California Department of Transportation.** EMFAC Software. [Online] http://www.dot.ca.gov/hq/env/air/pages/emfac.htm.
5. **Air Resources Board.** *Air Quality and Land Use Handbook: A Community Health Perspective.* 2005.
6. **Wong, Jillian.** *Planning, Rule Development & Area Sources.* December 22, 2016.
7. **South Coast Air Quality Managment District.** Mobile Source Toxics Analysis. [Online] 2003. http://www.aqmd.gov/ceqa/handbook/mobile_toxic/mobile_toxic.html.
8. **Environmental Protection Agency.** User's Guide for the AMS/EPA Regulatory Model (AERMOD). [Online] June 2022. https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf.
9. —. User's Guide for the AMS/EPA Regulatory Model (AERMOD). [Online] June 2022. https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf.
10. **South Coast Air Quality Management District.** Data for AERMOD. [Online] https://www.aqmd.gov/home/air-quality/meteorological-data/data-for-aermod.
11. **Environmental Protection Agency.** User's Guide for the AERMOD Terrain Preprocessor (AERMAP). [Online] 2018. https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aermap/aermap_userguide_v18081.pdf.
12. **California Air Resources Board.** Hot Spots Analysis and Reporting Program, version 22118. [Online] 2022. https://ww2.arb.ca.gov/our-work/programs/hot-spots-analysis-reporting-program.
13. **Office of Environmental Health Hazard Assessment.** Toxicity Criteria on Chemicals Evaluated by OEHHA. [Online] https://oehha.ca.gov/chemicals.

This page intentionally left blank

4 CERTIFICATIONS

The contents of this health risk assessment represent an accurate depiction of the impacts to sensitive receptors associated with the proposed 24-031 - PLN22-0030 Attachment 7 Mobile Source HRA Project. The information contained in this health risk assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me at (949) 660-1994.

Haseeb Qureshi
Associate Principal
URBAN CROSSROADS, INC.
(949) 660-1994
hqureshi@urbanxroads.com

EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June 2013
Planned Communities and Urban Infill – Urban Land Institute • June 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August 2007
AB2588 Regulatory Standards – Trinity Consultants • November 2006
Air Dispersion Modeling – Lakes Environmental • June 2006

This page intentionally left blank

APPENDIX 2.1:

CALEEMOD OUTPUTS

This page intentionally left blank

APPENDIX 2.2:

EMISSIONS SUMMARY

This page intentionally left blank

APPENDIX 2.3:

AERMOD MODEL INPUT/OUTPUT

This page intentionally left blank

APPENDIX 2.4:

HARP MODEL OUTPUTS – CONSTRUCTION

This page intentionally left blank

APPENDIX 2.5:

HARP MODEL OUTPUTS – OPERATION

This page intentionally left blank

APPENDIX 2.6:

RISK SUMMARY

This page intentionally left blank