APPENDIX D

HUMAN HEALTH RISK ASSESSMENT

Human Health Risk Assessment for Construction Emissions

Ocean Avenue Project
Santa Monica, California

Prepared for:

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1.0 INTRODUCTION

This report presents the results of a Human Health Risk Assessment (HRA) conducted by Wood Environment & Infrastructure, Inc. (Wood) for the City of Santa Monica (City). The purpose of the HRA is to evaluate potential health risks from construction-related emissions associated with the development of the proposed Ocean Avenue Project (Project), located on an approximately 82,500-square foot (sf) site at the corner of Ocean Avenue and Santa Monica Boulevard in the City of Santa Monica.

1.1 OBJECTIVES AND APPROACH

This HRA was conducted to evaluate and demonstrate compliance with the South Coast Air Quality Management District (SCAQMD) guidelines for health effects from construction-related Toxic Air Contaminant (TAC) emissions generated by construction activities associated with the proposed Project. The objective is to evaluate the potential health risks to surrounding sensitive receptors near the Project site and, if risks exists, identify mitigation measures to minimize exposure to TACs and decrease potential health risks during the proposed construction activities.

Based on the methodology established by the Office of Environmental Health Hazard Assessment (OEHHA; OEHHA 2015) and the SCAQMD (2018), the following thresholds have been established to determine the maximum individual cancer risk (MICR), and hazard index (HI) from construction emissions associated with the proposed Project:

- MICR – cancer risk of less than 10 in one million ($<10x10^{-6}$)
- HI – highest chronic health index of less than 1

1.2 PROJECT DESCRIPTION

The proposed Project would include a hotel, residential units, commercial restaurant and retail, a Cultural Use Campus, open space, and a three-level subterranean parking along the western boundary of the Downtown. The proposed mixed-use development would provide 122,400 square feet (sf) of full-service hotel space with up to 120 guestrooms, meeting and banquet rooms, and a hotel spa; 100 residential apartment units (including deed-restricted affordable units, replacement rent-controlled units, and market rate units); 36,110 sf of restaurant (including outdoor dining areas) and retail uses; and a 35,500-sf Cultural Use Campus (e.g., museum, gallery, event space, etc.). The Cultural Use Campus would include two existing City-designated Landmarks currently located at 1333 and 1337 Ocean Avenue, which would be rehabilitated and relocated on the northern portion of the Project site along Ocean Avenue as well as a new building located behind (i.e., to the east of) the City-designated Landmark buildings. The proposed Project would also include three underground levels providing a subterranean parking garage with capacity for up to approximately 285 vehicles as well as additional hotel, restaurant, and Cultural Use Campus space.

The proposed Project would construct five new buildings onsite that would range in maximum height from 57 feet to 130 feet. Construction of the proposed Project would involve several sequential activities, including site preparation; demolition of existing buildings and parking lots; excavation, including special treatment of the City-designated Landmark buildings; construction, including relocation of the City-designated Landmark buildings; and building finishing, including architectural coatings, landscaping, and rehabilitation of the City-designated Landmark buildings.

Construction of the Project would occur in a single phase. Total construction time is anticipated to be 34 to 36 months with 2 months for demolition, 4 to 6 months for the relocation of the City-designated landmarks, 3 months for excavation, and 25 months for construction from foundations to occupancy. A detailed description of the proposed construction activities is provided in Section 2.7, *Construction Activities* of the Environmental Import Report (EIR) that has been prepared for the proposed Project.

1.3 REPORT OUTLINE

The remainder of this document is organized as follows:

- Section 2.0, *Exposure Assessment* – This section describes the estimated emissions for the TACs and the exposure pathways evaluated.
- Section 3.0, *Toxicity Assessment* – This section presents the toxicity criteria used to evaluate potential acute and chronic noncarcinogenic health effects and carcinogenic risk.
- Section 4.0, *Risk Characterization* – This section presents the results of the risk assessment for the surrounding receptors evaluated.
- Section 5.0, *Conclusions* – This section summarizes the results of the risk assessment.
- Section 6.0, *References* – This section presents the references used in this risk assessment.

2.0 EXPOSURE ASSESSMENT

The following discussion summarizes and describes: 1) the source information and emission estimates used in environmental transport models; 2) potentially exposed sensitive receptors (i.e., residents and employees) and exposure pathways from the source to the receptors; and 3) the assumptions used in the exposure and risk modeling.

2.1 EMISSION ESTIMATES

The following source-specific emissions of TACs are summarized in Appendix A-1 for each year of the proposed Project. The HRA evaluates exposure to the emissions of 24 TACs associated with the following sources:

1. Construction equipment – Diesel Particulate Matter (PM) and speciated TACs from Diesel PM and Diesel Volatile Organic Compound (VOC) Exhaust were estimated from equipment related to: 1) demolition of existing buildings and surface parking lots; 2) relocation of City-designated Landmarks; 3) soil excavation/grading; 4) boring and trenching for City-designated Landmarks; 5) permanent relocation of City-designated Landmarks; 6) building construction; 7) paving; and 8) building finishing, including architectural coatings. Appendix A-2 describes the modeled timeline for each activity and presents the Diesel PM and VOC emission estimates predicted by CalEEMod Version 2016.3.2. The California Air Resources Board (ARB) Speciation Profile Number 425 was used to speciate TACs from Diesel PM and Speciation Profile Number 818 was used to speciate TACs from diesel VOC exhaust.
2. Onsite diesel trucks – Diesel PM and speciated TACs from Diesel PM and VOC Exhaust were estimated for both both vendor and haul truck trips. Appendix A-3 describes the modeled timeline for each of the individual construction activities and presents the Diesel PM and criteria pollutant emission estimates predicted by CalEEMod. The California ARB Speciation Profile Number 425 was used to speciate TACs from Diesel PM and Speciation Profile Number 818 was used to speciate TACs from Diesel VOC Exhaust.

3. Asphalt paving – Naphthalene emissions were speciated from VOC emissions estimated by CalEEMod from paving activities. Appendix A-2 presents the modeled timeline for paving and the VOC emissions estimated. The California ARB Speciation Profile Number 715 was used to speciate naphthalene from paving activities.
4. Architectural coating – Methylene chloride, benzene, ethylene glycol, and ethyl chloride emissions were estimated from the use of low-VOC paint during building finishing. Appendix A-2 presents the modeled timeline for coating and the VOC emissions estimated. The California ARB Speciation Profile Number 717 for water-based coatings was used to speciate TACs from coating activities.

Off-road construction equipment emissions were estimated from CalEEMod and onsite truck activity emissions were estimated from EMFAC2017 (California ARB 2017). EMFAC output is presented in Appendix A-4. Table 1 presents the total annual average and maximum hourly emissions in units of pounds per year (lb/yr) and pounds per hour (lb/hr) respectively, for the construction duration, beginning 2021 with completion anticipated in 2024.

2.2 POTENTIALLY EXPOSED RECEPTORS

According to OEHHA guidance (2015), risk assessments that utilize refined air dispersion modeling must provide a detailed analysis of the populations potentially exposed to the air emissions evaluated. This analysis includes identification of the point of maximum impact (PMI) and the Maximum Exposed Individual Resident (MEIR) in the areas of the redevelopment. Maximum exposure is influenced by distance to the source, climate, wind direction, and other environmental factors in the site vicinity, which can be determined based on dispersion modeling, as described below.

2.3 AIR DISPERSION AND EXPOSURE MODELING

This section presents the dispersion modeling approach. The discussion includes a description of: 1) the model selected; 2) meteorological data; and 3) modeling parameters.

2.3.1 AERMOD

The most recent version of AERMOD (Version 19191) was used to predict ambient concentrations resulting from construction emissions associated with the proposed Project. AERMOD is the recommended sequential model in the U.S. Environmental Protection Agency's (USEPA's) Guideline on Air Quality Models (40 Code of Federal Regulations [CFR] 51, Appendix W), the OEHHA Risk Assessment Guidelines (OEHHA 2015), and the SCAQMD Supplemental Guidelines for Preparing Risk Assessments (SCAQMD 2018). The following regulatory default options were used in AERMOD:

- Elevated terrain algorithms requiring input of terrain height data for receptors and emission sources;
- Stack tip downwash;
- Calms processing routines,
- Missing data processing routines;
- Urban roughness length of 1.0 meter; and
- Consistent with SCAQMD guidance for the South Coast Air Basin, urban dispersion coefficients were used in the air quality modeling.

The default options above are all appropriate for the Project site. It should be noted that under the default elevated terrain option, AERMOD will predict concentrations that are less than what would be

estimated from an otherwise identical flat terrain model at locations where the receptor elevations are lower than the base elevation of the source. Grid receptors placed on Ocean Avenue beach are at a slightly lower elevation than the sources at the Project site. AERMOD was not re-run using the non-default option of flat terrain since the applicable receptors are limited and not sensitive in nature. Specifically, the maximally impacted receptors and closest residents are adjacent to the Project site and at a similar base elevation. Therefore, performing a second AERMOD modeling run under the flat terrain assumption to evaluate the impacts to recreational receptors on the beach was not necessary.

The emission generating activities during the project are assumed to operate 8 hours per day from 8:00am to 4:00pm. It is appropriate to apply variable emission rates to discontinuous sources (i.e., emitting less than 24 hours per day) within the AERMOD code. These emission factors are applied in AERMOD as numbers of one or above (emitting) and zeros (not emitting) to each source for the hours modeled (on and off, respectively). Since modeling was conducted at a unit emission rate of 1 grams per second (g/s), this reduces the annual hours during the modeling period and the subsequent emission rate, a scaling factor of 3 was added to the work day emission hours (24 hours / 8 hours) to avoid underestimating period average concentrations used in the HRA. This is consistent with OEHHA and SCAQMD guidance that recommend the application of adjustment factors for discontinuous emissions. Specifically, if an offsite worker and the emissions have the same operating schedule (e.g., 8 hours per day, 5 days per week, and 52 weeks per year), SCAQMD (2018) recommends that the annual average concentrations predicted by AERMOD must be adjusted by a factor of 4.2 (i.e., 7 days/5 days x 24 hours/8 hours). Since the sources in AERMOD were only adjusted by hour of day and not day of week (meaning operations were modeled as occurring all seven days of the week), the adjustment factor for 7/5 adjustment factor was not needed.

The AERMOD input and output files are provided in Appendix B.

2.3.2 Receptors

Sensitive receptors – including residential buildings, schools, and recreational locations – were identified within 1,000 meters (3,281 feet) of the Project site and are summarized in Table 2. Based on the design of the proposed Project described in Section 2.0, *Project Description* of the EIR, iLanco Environmental, LLC (iLanco) placed a grid of receptors within 1,000 meters (3,281 feet) of the Project site, spread 100 meters (321 feet) apart. In order to estimate potential maximum impacts to neighboring sensitive receptors, a grid with 50-meter (165-foot) spacing was placed within 500 meters (1,641 feet) of the Project site, and 44 discrete receptors were added. Consistent with SCAQMD guidance (2018), property boundary receptors were placed at 20-meter (66-foot) spacing. A total of 894 receptors were evaluated. Receptors were not given "flagpole heights" in the modeling, which means they were modeled at ground surface. Receptor elevations were assigned by using USEPA's AERMAP (Version 18081) software tool, which is designed to extract elevations from U.S. Geological Survey (USGS) Digital Elevation Model (DEM) files, USGS National Elevation Dataset (NED) files, and Shuttle Radar Topography Mapping (SRTM) files. Figure 1 presents the extent of the 50-meter (165-foot) grid receptor network near the Project site and the sensitive receptors that were used in the modeling analysis.

2.3.3 Meteorological Data

AERMOD-ready meteorological data was downloaded directly from SCAQMD. SCAQMD used USEPA's AERMET Tool (Version 16216) to process the meteorological data for use with AERMOD. The SCAQMD meteorological files for the Santa Monica Municipal Airport (SMO) for the years 2012 through 2016 were used for modeling.

2.3.4 Source Parameters

Project related construction equipment, onsite trucks, and asphalt paving were modeled as area sources, while architectural coatings were modeled as a volume source. The source parameters used in the air dispersion modeling, such as Universal Transverse Mercator (UTM) coordinates, dimensions, and source height of each of the four modeled sources are provided in Table 3.

2.3.5 HARP Exposure and Risk Model

The Hot Spots Analysis and Reporting Program (HARP) Model (Version 2) developed by the California ARB (Air Dispersion Modeling and Risk Assessment Tool [ADMRT] Version 19121, released on May 1, 2019) was specifically designed for conducting Assembly Bill (AB) 2588 HRAs and was used to estimate the health risks associated with construction emissions associated with the proposed Project. HARP uses the existing output from the air dispersion model and the revised emission rates to predict air concentrations and health risks at the proposed redevelopment. The assumptions used in HARP are discussed in more detail below.

HARP incorporates the algorithms and exposure assumptions provided in OEHHA's guidance (2015) for estimating exposures for the AB 2588 program. HARP incorporates the dispersion coefficients predicted by AERMOD and emission rates to predict ground-level concentrations (GLCs) for each receptor. HARP then uses the ground-level concentrations, environmental fate assumptions, exposure parameters, and dose calculation algorithms recommended by OEHHA's guidance (2015) to estimate potential health effects for applicable receptors.

Exposure assumptions used in the HRA are presented in Table 4. OEHHA's guidance (2015) presents both high end and mean exposure assumptions to provide flexibility in presenting more refined risk estimates. The first tier of risk assessment is intended to be health-protective by using high-end estimates for the key intake exposure parameters. As presented in Table 4, this includes conservative breathing rates (a combination of the 95th and 80th percentiles). Specifically, for cancer risk estimates, both SCAQMD and the California ARB recommend the use of 95th percentile breathing rates for children from the 3rd trimester through 2 years of age, and 80th percentile breathing rates for all other ages for residential exposures (SCAQMD 2015; California ARB, 2015). For estimated risks to workers, point estimates of 8-hour breathing rates during moderate intensity activities are used.

The default residential exposure duration includes the assumption that residents live in their homes for 30 years. However, since the proposed construction activities would occur over a 36-month period between 2021 and 2024, the exposure duration for this assessment was limited to a total of 4 years. Additionally, due to varying emission rates of TACs over the construction duration, risk estimates were calculated individually for the years 2021, 2022, 2023, and 2024. Estimated annual cancer risks were then summed across these 4 years, while chronic noncancer and acute hazard indices are not cumulative across time and are instead represented by the maximum value between years.

2.4 AIR DISPERSION MODELING RESULTS

The air dispersion modeling was performed based on a unit emission rate of 1 g/s for the volume source and 1 gram per square meter per second ($g/m^2/s$) for the area sources averaged over its area. To estimate chemical-specific air concentrations for use in the health risk calculations, TAC and source-specific emission rates were applied in HARP.

The HRA considers impacts from the proposed Project emission scenarios from the beginning of construction in 2021 through completion of construction anticipated in 2024. Because emissions will change over the 3-year construction duration evaluated in the HRA, emissions and GLCs were estimated

on an annual basis. Since the proposed construction activities associated with the proposed Project are shorter than the default 30-year residential exposure duration, the first 4 years of a residential child's life was evaluated to be conservative. Specifically, the annual GLCs were averaged based on age groups selected according to OEHHA guidelines (2015): infant (3rd trimester fetus up to 2 years of age) and young child (the first 2 years of the 2 years to <6 years of age timeframe). Each year within these ranges were modeled separately in HARP, then the combined impacts on neighboring residential occupants were estimated by then summing chronic noncarcinogenic hazards and carcinogenic risks over the construction duration.

Since acute noncarcinogenic effects are evaluated over the short-term using maximum 1-hour concentrations, exposure cannot be averaged. The worst-case year was evaluated for each emissions scenario and 2022 emissions were selected to evaluate acute effects because the maximum 1-hour GLCs were the greatest (see Section 4.1.2, *Acute Noncarcinogenic Results*).

The maximally impacted receptors are presented in Figure 1. The PMI for cancer/chronic effects was predicted at the northern property line of the proposed Project, adjacent to the Flower Child/Élephante Building located at 1332 Second Street. This location will not be permanently occupied by a receptor so that is why it is referred to as the PMI. This location was evaluated as a worker receptor for carcinogenic effects because of the commercial operation of two restaurants located in this building. The PMI for acute effects was predicted at the southeastern property line of the Project site, located adjacent to Santa Monica Boulevard. The maximally exposed individual resident (MEIR) for all three health endpoints was identified as a receptor on the southwestern side of the Step Up on Second apartments located at 1328 Second Street, which is adjacent to the northern side of the Project site.

3.0 TOXICITY ASSESSMENT

This section describes the toxicity criteria for chemicals evaluated in this HRA. The potential health effects associated with each TAC are summarized in Table 6. Of the 24 chemicals evaluated in the HRA, 21 are considered to pose potential acute noncarcinogenic hazards, 20 are considered to pose potential chronic noncarcinogenic health effects, and 10 are considered to be carcinogenic. The toxicity criteria used in the HRA represented the most recent toxicity criteria in HARP and recommended by OEHHA and the California ARB at the time they were published. Specifically, the toxicity criteria used in the HRA are consistent with the September 19, 2019 version of the Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values (OEHHA and CARB 2019).

3.1 NONCARCINOGENS

For chronic and acute noncarcinogenic effects, observable biological effects are thought to occur only after a threshold dose is reached. To establish noncarcinogenic health criteria, this threshold dose usually is estimated from the no-observed adverse effect level (NOAEL) or the lowest-observed adverse effect level (LOAEL) determined in animal exposure studies by applying a series of uncertainty (i.e., safety) factors. For chemicals identified for evaluation in AB 2588, OEHHA and the California ARB provide Reference Exposure Levels (RELs) that represent levels of exposure below which adverse effects are not expected to occur with a substantial margin of safety. These RELs typically include uncertainty factors ranging from 10 to 1,000 to account for limitations in the quality or quantity of available data used to develop the RELs. RELs were published for inhalation exposure based on an acceptable air concentration (micrograms per cubic meter [$\mu g/m^3$]).

For the purpose of evaluating cumulative noncarcinogenic effects of chemical exposure, OEHHA has categorized end points for adverse health effects for acute and chronic exposure. Only effects of chemicals on the same health effect end point or organ system are considered additive. Potential end

points for acute and chronic toxicological effects have been classified into 12 categories in the OEHHA guidelines: alimentary (i.e., gastrointestinal and liver), bone, cardiovascular, reproductive/developmental, endocrine system, eyes, hematologic, immune system, kidney, central nervous system, respiratory, and skin (OEHHA 2015). The RELs for potential chronic and acute health effects are presented in Table 7 for the TACs evaluated.

3.2 CARCINOGENS

Regulatory guidance assumes that chemicals classified as carcinogens should be treated as if their risk is directly proportional to dose and that they have no threshold (OEHHA 2015). This approach means that only a zero dose is assumed to result in zero risk (i.e., for all doses, some risk is assumed to be present, increasing linearly with increasing dose). Various mathematical models are used to estimate theoretically plausible responses at these low doses. The OEHHA guidelines (2015) present Unit Risk Values (URVs) that conservatively quantify the likelihood of a carcinogenic response in an individual receiving a given dose of a chemical. URVs are published for inhalation exposure as the inverse of a concentration in air $(\mu g/m^3)^{-1}$ (OEHHA and California ARB 2019). Unlike noncarcinogenic effects, carcinogenic effects are considered additive for all chemicals. The URVs for chemicals emitted from the proposed construction activities are presented in Table 7.

In the Air Toxics program, OEHHA publishes age sensitivity factors (OEHHA 2015) to address potential increased susceptibility to cancer when exposed to certain chemicals as a child or adolescent. Early-in-life susceptibility to some carcinogens has been recognized by the scientific community but the data do not support applying a single factor to all carcinogens. However, the California legislature directed OEHHA to develop a methodology to address the issue. OEHHA's recommendation is to apply sensitivity factors based on age equally to all carcinogens: a 10-fold increase from the third trimester of pregnancy to 2 years of age and a 3-fold increase from 2 to 16 years of age. HARP applies these age sensitivity factors to all carcinogens evaluated.

4.0 RISK CHARACTERIZATION

This final step of the risk assessment integrates the exposure estimates developed for the chemical emissions (refer to Section 2.1, *Emissions Estimates*) and the health effects data from which toxicity criteria are established (refer to Section 3.0, *Toxicity Assessment*). The risk characterization section addresses both noncarcinogenic and carcinogenic health effects based on inhalation and non-inhalation exposure. The estimates of health risk are compared to thresholds published by the SCAQMD (refer to Section 1.1, *Objectives and Approach*). The threshold for SCAQMD is $1.0x10^{-5}$ (i.e., 1-in-one hundred thousand or 10-in-one million) for carcinogenic risk and 1.0 for the noncarcinogenic hazard index. As described in Section 2.3.5, *HARP Exposure and Risk Model*, health risks were estimated using ADMRT module of HARP; the modeling files are presented in Appendix C.

4.1 NONCARCINOGENIC HEALTH EFFECTS

Potential chronic and acute noncarcinogenic health effects associated with exposure to TACs emitted from the proposed construction activities have been evaluated using HARP. For acute inhalation exposure, HARP predicts the maximum hourly concentration and divides it by the appropriate acute REL provided by OEHHA (see Table 7) for each applicable TAC and estimates an acute hazard quotient. For chronic inhalation exposures, the predicted annual average air concentration for each chemical is divided by the chronic inhalation REL to predict a chronic hazard quotient.

Chronic and acute noncarcinogenic health effects were also evaluated in terms of their assumed potential additive effect on target organs or systems (e.g., respiratory or reproductive system). For acute and

chronic exposures, nine to twelve target organs or systems were evaluated using HARP, respectively. The chemicals that may affect the same target organ or system were evaluated by summing the individual hazard quotients to calculate a target organ-specific HI. The following sections present the results of the chronic and acute noncarcinogenic evaluations. Chronic and acute HIs less than or equal to 1.0 are considered to be without an appreciable noncarcinogenic public health impact with a substantial margin of safety, because exposure at or below the REL is not expected to pose significant adverse health hazards. Hazard indexes greater than 1.0 are considered significant under the SCAQMD guidelines (2018).

4.1.1 Chronic Noncarcinogenic Results

Results for chronic noncarcinogenic health effects on the respiratory system are presented in Table 8 by chemical and receptor. The highest target organ-specific chronic HI was 0.0059 for the MEIR and 0.0091 at the PMI. Therefore, the chronic hazards predicted for the sensitive offsite receptors, including neighboring residents of the project, are below the SCAQMD threshold. The organ/system endpoint with the highest HI was the respiratory system for both receptors; diesel PM contributed over 99 percent of the hazard index. Therefore, emission of TACs from the proposed construction activities are not expected to pose significant chronic noncarcinogenic health hazards for sensitive receptors near the Project site.

4.1.2 Acute Noncarcinogenic Results

Because acute noncarcinogenic effects are based on the predicted maximum 1-hour concentrations, combined exposure from emissions over multiple years of exposure is not applicable. Therefore, the maximum acute hazards were modeled for each worst-case hour during each year of construction, but only presented for 2022 because emissions during that year resulted in the highest hazard estimates in the 4 years evaluated.

Results for acute noncarcinogenic health effects are presented in Table 9 by chemical and receptor for 2022 results only. The highest predicted target organ specific acute HIs were 0.032 for the MEIR and 0.050 at the PMI. The organ/system endpoint with the highest HIs was the eye. The acute hazards predicted for the residents in the project are below the SCAQMD threshold. Therefore, the emission of TACs from the proposed construction activities are not expected to pose significant acute noncarcinogenic health hazards for sensitive receptors near the Project site.

4.2 CARCINOGENIC HEALTH EFFECTS

In accordance with the OEHHA guidance (2015), cancer risk estimates based on the theoretical upper-bound excess cancer risk should be evaluated for the maximum exposed individuals, and PMI, if different. Therefore, results for carcinogenic risk are presented by chemical in Table 10 for the PMI and MEIR.

For inhalation exposures, the theoretical upper-bound excess cancer risk was estimated assuming that an individual is exposed continuously to the annual average air concentrations for the 4 years of the proposed construction activities, averaged over a 70-year lifetime. This was modeled for a residential receptor by estimating cancer risk 1 year at a time, for each year of the proposed project, with the resident age starting at 3rd trimester, followed by 1, 2, and 3 years of age for the following three annual runs.

As presented in Table 10, cancer risk at the PMI, which is located on the property line adjacent to a commercial property, was evaluated as a commercial worker based on building occupancy. Similar to a resident, the worker was evaluated at the beginning of the standard OEHHA defined age group for adults, specifically modeling the ages of 16 through 19 years of age for the 36-month construction duration between 2021 and 2024. The theoretical carcinogenic risk for the PMI was estimated at 2.4×10^{-7}, which is well below the CEQA significance threshold.

As presented in Table 10, the theoretical carcinogenic risk for the MEIR – based on the 4 years of exposure to construction emissions averaged over the age-specific intervals evaluated – was 7.3×10^{-6}. Therefore, the predicted risks for both the MEIR and PMI do not exceed the SCAQMD threshold of 1.0×10^{-5}, indicating that unmitigated emissions associated with the proposed construction are acceptable.

5.0 CONCLUSIONS

Impacts of the proposed Project to the neighboring sensitive receptors were estimated from construction equipment, onsite truck traffic, asphalt paving, and architectural coatings over the 36-month construction duration. Cancer was evaluated based on the sum of annual average exposure from 2021 through 2024, while chronic noncancer hazards were evaluated for the worst-case year (2022) and acute noncancer hazards were evaluated for the worst-case hour in any year (also 2022). Based on the conditions evaluated, the results of the HRA indicated that unmitigated Project-related emissions are acceptable, and no mitigation measures need to be implemented.

6.0 REFERENCES

California Air Resources Board (CARB), 2015, User Manual for the Hotspots Analysis and Reporting Program (HARP) Air Dispersion Modeling and Risk Assessment Tool, Version 2, California Environmental Protection Agency, March 17.

CARB, 2017, Mobile Source Emission Inventory (MSEI) - Modeling Tools – EMFAC2017 Software, v.1.0.2 https://www.arb.ca.gov/emfac/2017

CARB, 2019, HARP2 Air Dispersion & Risk software, Version 2.0, ADMRT dated 19121, release date May 1, 2019.

Office of Environmental Health Hazard Assessment (OEHHA), 2015, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, February.

OEHHA/CARB, 2019, Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, September 19.

SCAQMD, 2018, AB 2588 and Rule 1402 Supplemental Guidelines (Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act) , July.

Tables

TABLE 1

TOTAL ANNUAL AVERAGE AND MAXIMUM HOURLY EMISSIONS RATES

Ocean Avenue

Santa Monica, California

CAS No.	Chemical	2021		2022		2023		2024	
		Annual Average Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	Annual Average Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	Annual Average Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	Annual Average Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)
Construction Equipment and On-site Trucks									
9901	Diesel PM	3.59E+00	--	1.63E+01	--	1.45E+01	--	1.00E+01	--
7440382	Arsenic	--	1.41E-08	--	3.19E-08	--	9.66E-09	--	9.66E-09
7440508	Copper	--	7.06E-08	--	1.59E-07	--	4.83E-08	--	4.83E-08
7782505	Chlorine	--	9.71E-07	--	2.19E-06	--	6.65E-07	--	6.64E-07
7440020	Nickel	--	5.36E-08	--	1.21E-07	--	3.67E-08	--	3.67E-08
7439976	Mercury	--	8.47E-08	--	1.91E-07	--	5.80E-08	--	5.79E-08
9960	Sulfates	--	4.92E-05	--	1.11E-04	--	3.37E-05	--	3.37E-05
7440622	Vanadium (Fume Or Dust)	--	8.18E-08	--	1.85E-07	--	5.60E-08	--	5.60E-08
106990	1,3-Butadiene	--	4.57E-05	--	1.07E-04	--	3.53E-05	--	3.53E-05
67561	Methanol	--	7.22E-06	--	1.68E-05	--	5.57E-06	--	5.57E-06
50000	Formaldehyde	--	3.54E-03	--	8.26E-03	--	2.73E-03	--	2.73E-03
75070	Acetaldehyde	--	1.77E-03	--	4.13E-03	--	1.37E-03	--	1.36E-03
78933	Methyl Ethyl Ketone (2-Butanone)	--	3.55E-04	--	8.29E-04	--	2.74E-04	--	2.74E-04
71432	Benzene	--	4.82E-04	--	1.12E-03	--	3.72E-04	--	3.71E-04
108883	Toluene	--	3.55E-04	--	8.27E-04	--	2.73E-04	--	2.73E-04
95476	o-Xylene	--	8.06E-05	--	1.88E-04	--	6.22E-05	--	6.22E-05
108383	m-Xylene	--	1.47E-04	--	3.43E-04	--	1.13E-04	--	1.13E-04
106423	p-Xylene	--	2.29E-05	--	5.34E-05	--	1.76E-05	--	1.76E-05
100425	Styrene	--	1.40E-05	--	3.26E-05	--	1.08E-05	--	1.08E-05
Asphalt Paving									
91203	Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-02	3.46E-05
Architectural Coatings									
75092	Methylene Chloride (Dichloromethane)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+01	3.98E-02
71432	Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E+00	2.17E-03
107211	Ethylene Glycol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E+00	3.62E-03
75003	Ethyl Chloride (Chloroethane)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+00	4.34E-03

Abbreviations

Diesel PM = Diesel engine exhaust, particulate matter
lb/yr = pounds per year
lb/hr = pounds per hour

TABLE 2

LOCATION OF SENSITIVE RECEPTORS

Ocean Avenue

Santa Monica, California

Sensitive Receptor	Type of Receptor	Address	UTM NAD83 Coordinates (meters)	
			X	Y
Luxury Apartments	Residential	1322 Second Street	361646	3764894
Palisades/Ocean Park	Recreational	Ocean Avenue	360634	3765736
Step Up on Second	Residential	1328 Second Street	361660	3764867
Chelsea Santa Monica	Residential	1318 Second Street	361645	3764898
Mayfair Residences	Residential	210 Santa Monica Blvd	361832	3764820
Pacific Plaza Apartments	Residential	1431 Ocean Avenue	361794	3764660
Residences along PCH/Ocean Front Walk	Residential	PCH/Ocean Front Walk	361561	3764697
Westside Villas Apartments	Residential	1299 Ocean Avenue	361554	3764953
Criterion Promenade	Residential	302 Arizona Avenue	361752	3765058
1221 Ocean Avenue Apartments	Residential	1221 Ocean Avenue	361493	3764991
First Presbyterian Nursery School	Childcare (2 to 6 years)	1220 Second Street	361493	3764991

Abbreviations:

NAD83 = North American Datum, 1983

TABLE 3

SOURCE INPUT PARAMETERS

Ocean Avenue

Santa Monica, California

Source ID	Source Description	Source Type [1]	Emission Rate (g/s-m^2) or (g/s)	UTM NAD83 Coordinates (meters)		Base Elevation (meters)	Dimensions			
				X	Y		Number of Vertices	Init. SY (meters)	Init. SZ (meters)	Release Height (meters)
CONS	Construction Equipment	Area	1.03E-04	361600.6	3764820.5	24.1	8.0	--	1.10	4.60
TRUCON	On-site Trucks	Area	1.03E-04	361600.6	3764820.5	24.1	8.0	--	1.10	4.60
PAVE	Asphalt paving	Area	1.03E-04	361600.6	3764820.5	24.1	8.0	--	0.21	0.90
ARCH	Architectural Coatings	Volume	1.00E+00	361719.7	3764819.0	23.3	--	7.09	15.03	16.2

Notes:

1. Emission rate for the volume source is presented in units of grams/second.

Abbreviations:

-- = not applicable

g/s = grams per second

g/s-m^2 = grams per second per meter squared

m^2 = meters squared

NAD83 = North American Datum, 1983

TABLE 4

HARP RISK MODELING AND EXPOSURE ASSESSMENT OPTIONS

Ocean Avenue

Santa Monica, California

Parameter Description	95th Percentile Assumption	80th Percentile Assumption	Rationale
Residential Cancer (30-year) Exposure - Inhalation	Age-weighted breathing rates (L/kg-day): 3rd trimester = 361 0<2 years = 1090	Age-weighted breathing rates (L/kg-day): 2<9 years = 631 2<16 years = 572 16<30 years = 261	OEHHA, 2015; CARB, 2015; and SCAQMD, 2018 [1]
Worker Cancer (25-year) Exposure - Inhalation	Age-weighted breathing rates (L/kg-day): 16<70 years = 230	--	OEHHA, 2015
Residential Chronic (30-year) Exposure - Inhalation	Age-weighted breathing rates (L/kg-day): 3rd trimester = 361 0<2 years = 1090 2<9 years = 861 2<16 years = 745 16<30 years = 335	--	OEHHA, 2015
Fraction of Time at Home	3rd trimester<2 years = 1.0 2<16 years = 1.0 16<30 years = 0.73		SCAQMD, 2018

Notes

1. 95th percentile breathing rates were used for exposure up to age 2, and the remaining 28 years used the applicable 80th percentile breathing rate as per CARB's Risk Management Policy (CARB, 2015 and SCAQMD, 2018).

Abbreviations

CARB= California Air Resources Board

OEHHA = Office of Environmental Health Hazard Assessment

L/kg-day = liter per kilogram body weight per day

SCAQMD = South Coast Air Quality Management District

TABLE 5

LOCATION OF KEY OFFSITE RECEPTORS

Ocean Avenue

Santa Monica, California

Model ID#	Receptor Type	Description	UTM Coordinates[1]
8	PMI - Chronic/Cancer	Northern property line of the Project; Flower Child/Élephante building	361687 , 3764840.7
16	PMI - Acute	Southeast property line of the Project; Santa Monica Blvd	361741 , 3764801.7
852	MEIR - Acute/Chronic/Cancer	Southwestern side of the Step Up on Second apartments; northern property line of the Project;	361651 , 3764858.2

Notes:

1. Universal Transverse Mercator (UTM) Coordinates, projected using NAD 83

Abbreviations:

PMI = Point of Maximum Impact

MEIR = Maximum Exposed Individual Resident

TABLE 6

HEALTH EFFECT CATEGORIES FOR TOXIC AIR CONTAMINANTS

Ocean Avenue

Santa Monica, California

CAS Number	Chemical	Carcinogenic Risk	Chronic Noncarcinogenic Effects	Acute Noncarcinogenic Effects
9901	Diesel PM	•	•	•
7440382	Arsenic	•	•	•
7440508	Copper			•
7782505	Chlorine		•	•
7440020	Nickel	•	•	•
7439976	Mercury		•	•
9960	Sulfates			•
7440622	Vanadium (Fume Or Dust)			•
106990	1,3-Butadiene	•	•	•
67561	Methanol		•	•
50000	Formaldehyde	•	•	•
75070	Acetaldehyde	•	•	•
78933	Butanone)			•
71432	Benzene	•	•	•
108883	Toluene		•	•
95476	o-Xylene		•	•
108383	m-Xylene		•	•
106423	p-Xylene		•	•
100425	Styrene		•	•
91203	Naphthalene	•	•	
75092	Methylene Chloride (Dichloromethane)	•	•	•
71432	Benzene	•	•	•
107211	Ethylene Glycol		•	
75003	Ethyl Chloride (Chloroethane)		•	

Abbreviations:

Diesel PM = Diesel engine exhaust, particulate matter

TABLE 7

TOXICITY CRITERIA FOR TOXIC AIR CONTAMINANTS

Ocean Avenue

Santa Monica, California

CAS Number	Chemical	Inhalation Cancer Unit Risk Value (URV) $(\mu g/m^3)^{-1}$	Inhalation Chronic REL ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)
9901	Diesel PM	1.1E+00	5.0E+00	--
7440382	Arsenic	1.2E+01	1.5E-02	2.0E-01
7440508	Copper	--	--	1.0E+02
7782505	Chlorine	--	2.0E-01	2.1E+02
7440020	Nickel	9.1E-01	1.4E-02	2.0E-01
7439976	Mercury	--	3.0E-02	6.0E-01
9960	Sulfates	--	--	1.2E+02
7440622	Vanadium (Fume Or Dust)	--	--	3.0E+01
106990	1,3-Butadiene	6.0E-01	2.0E+00	6.6E+02
67561	Methanol	--	4.0E+03	2.8E+04
50000	Formaldehyde	2.1E-02	9.0E+00	5.5E+01
75070	Acetaldehyde	1.0E-02	1.4E+02	4.7E+02
78933	Butanone)	--	--	1.3E+04
71432	Benzene	1.0E-01	3.0E+00	2.7E+01
108883	Toluene	--	3.0E+02	3.7E+04
95476	o-Xylene	--	7.0E+02	2.2E+04
108383	m-Xylene	--	7.0E+02	2.2E+04
106423	p-Xylene	--	7.0E+02	2.2E+04
100425	Styrene	--	9.0E+02	2.1E+04
91203	Naphthalene	1.2E-01	9.0E+00	--
75092	Methylene Chloride (Dichloromethane)	3.5E-03	4.0E+02	1.4E+04
71432	Benzene	1.0E-01	3.0E+00	2.7E+01
107211	Ethylene Glycol	--	4.0E+02	--
75003	Ethyl Chloride (Chloroethane)	--	3.0E+04	--

Abbreviations

-- = Not applicable

Diesel PM = Diesel engine exhaust, particulate matter

REL = reference exposure level

$\mu g/m^3$ = micrograms per cubic meter of air

$(\mu g/m^3)^{-1}$ = risk per micrograms per cubic meter of air

TABLE 8

POTENTIAL CHRONIC HAZARD INDEXES AT THE PMI AND MEIR BY CHEMICAL [1]

Ocean Avenue

Santa Monica, California

Toxic Air Contaminant	Point of Maximum Impact [2] (PMI)									Maximum Exposed Individual Resident [3] (MEIR)								
	2021 Receptor ID #8		2022 Receptor ID #8		2024 Receptor ID #8		2024 Receptor ID #8		Maximum Hazard Index	2021 Receptor ID #852		2022 Receptor ID #852		2023 Receptor ID #852		2024 Receptor ID #852		Maximum Hazard Index
	Hazard	% Cont.	Hazard	% Cont.	Hazard	% Cont.	Hazard	% Cont.		Hazard	% Cont.	Hazard	% Cont.	Hazard	% Cont.	Hazard	% Cont.	
Diesel PM [4]	2.0E-03	100%	9.1E-03	100%	8.0E-03	100%	5.6E-03	99.7%	9.1E-03	1.3E-03	100%	5.9E-03	100%	5.2E-03	100%	3.6E-03	99.6%	5.9E-03
Naphthalene	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	1.7E-05	0.3%	1.7E-05	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	1.3E-05	0.3%	1.3E-05
Methylene Chloride (Dichloromethane)	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00
Benzene	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00
Ethylene Glycol	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	2.1E-06	0.0%	2.1E-06	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	8.8E-07	0.0%	8.8E-07
Ethyl Chloride (Chloroethane)	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00
TOTAL	2.0E-03	100%	9.1E-03	100%	8.0E-03	100%	5.6E-03	100%	**9.1E-03**	1.3E-03	100%	5.9E-03	100%	5.2E-03	100%	3.6E-03	100%	**5.9E-03**

Note:

1. The hazard index for health effects on the respiratory system are presented.
2. Receptor ID #8 is located on the northeast fenceline of the proposed development.
3. Receptor ID #852 is located at the southwest side of the Step Up on Second apartments.
4. For chronic exposure, Diesel PM is evaluated as an unspeciated mixture.

Abbreviation

% Cont. = Percent contribution to total hazard index

Diesel PM = Diesel engine exhaust, particulate matter

TABLE 9

POTENTIAL ACUTE HAZARD INDEXES AT THE PMI AND MEIR BY CHEMICAL [1]

Ocean Avenue

Santa Monica, California

Toxic Air Contaminant [2]	Point of Maximum Impact [3] (PMI) Receptor ID #16		Maximum Exposed Individual Resident (MEIR) [4] Receptor ID #852	
	Hazard Quotient	% Cont.	Hazard Quotient	% Cont.
Arsenic	0.0E+00	0%	0.0E+00	0%
Copper	0.0E+00	0%	0.0E+00	0%
Chlorine	3.3E-06	0%	2.1E-06	0%
Nickel	0.0E+00	0%	0.0E+00	0%
Mercury	0.0E+00	0%	0.0E+00	0%
Sulfates	0.0E+00	0%	0.0E+00	0%
Vanadium (Fume Or Dust)	1.9E-06	0%	1.2E-06	0%
1,3-Butadiene	0.0E+00	0%	0.0E+00	0%
Methanol	0.0E+00	0%	0.0E+00	0%
Formaldehyde	4.7E-02	94%	3.0E-02	94%
Acetaldehyde	2.7E-03	6%	1.8E-03	6%
Methyl Ethyl Ketone (2-Butanone)	2.0E-05	0%	1.3E-05	0%
Benzene	0.0E+00	0%	0.0E+00	0%
Toluene	7.0E-06	0%	4.5E-06	0%
o-Xylene	2.7E-06	0%	1.7E-06	0%
m-Xylene	4.9E-06	0%	3.2E-06	0%
p-Xylene	7.6E-07	0%	4.9E-07	0%
Styrene	4.8E-07	0%	3.1E-07	0%
Naphthalene	0.0E+00	0%	0.0E+00	0%
Methylene Chloride (Dichloromethane)	0.0E+00	0%	0.0E+00	0%
Ethylene Glycol	0.0E+00	0%	0.0E+00	0%
Ethyl Chloride (Chloroethane)	0.0E+00	0%	0.0E+00	0%
Total Hazard Index	5.0E-02	100%	3.2E-02	100%

Note:

1. The hazard index for health effects on the eye are presented.
2. For acute exposure, Diesel PM is evaluated according to ARB speciation profiles #425 for PM10 and #818 for VOCs. Only compounds with an Acute REL are listed.
3. The highest hazard at the PMI occurred during 2022.
4. The highest hazard at the MEIR occurred during 2022.

Abbreviation

% Cont. = Percent contribution to total hazard index

Diesel PM = Diesel engine exhaust, particulate matter

TABLE 10

POTENTIAL CARCINOGENIC RISK AT THE PMI AND MEIR BY CHEMICAL

Ocean Avenue

Santa Monica, California

	Point of Maximum Impact (PMI) - Worker [1]										Maximum Exposed Individual Resident (MEIR) [2]									
	2021 Receptor #8		2022 Receptor #8		2023 Receptor #8		2024 Receptor #8		Total Risk		2021 Receptor #852		2022 Receptor #852		2023 Receptor #852		2024 Receptor #852		Total Risk	
Toxic Air Contaminant	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**	**Risk**	**% Cont.**
Diesel PM [3]	2.6E-08	11%	8.5E-08	36%	7.6E-08	32%	5.2E-08	22%	2.4E-07	100%	1.2E-06	16%	4.8E-06	67%	7.5E-07	10%	5.2E-07	7.1%	7.3E-06	100%
Naphthalene	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	3.2E-11	0%	3.2E-11	0.0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	3.5E-10	0%	3.5E-10	0%
Methylene Chloride (Dichloromethane)	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	5.5E-11	0%	5.5E-11	0.0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	3.5E-10	0%	3.5E-10	0%
Benzene	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	8.5E-11	0%	8.5E-11	0.0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	5.5E-10	0%	5.5E-10	0%
Ethylene Glycol	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%
Ethyl Chloride (Chloroethane)	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%	0.0E+00	0%
TOTAL	2.6E-08	11%	8.5E-08	36%	7.6E-08	32%	5.3E-08	22%	**2.4E-07**	**100%**	1.2E-06	16%	4.8E-06	67%	7.5E-07	10%	5.2E-07	7%	**7.3E-06**	**100%**

Note:

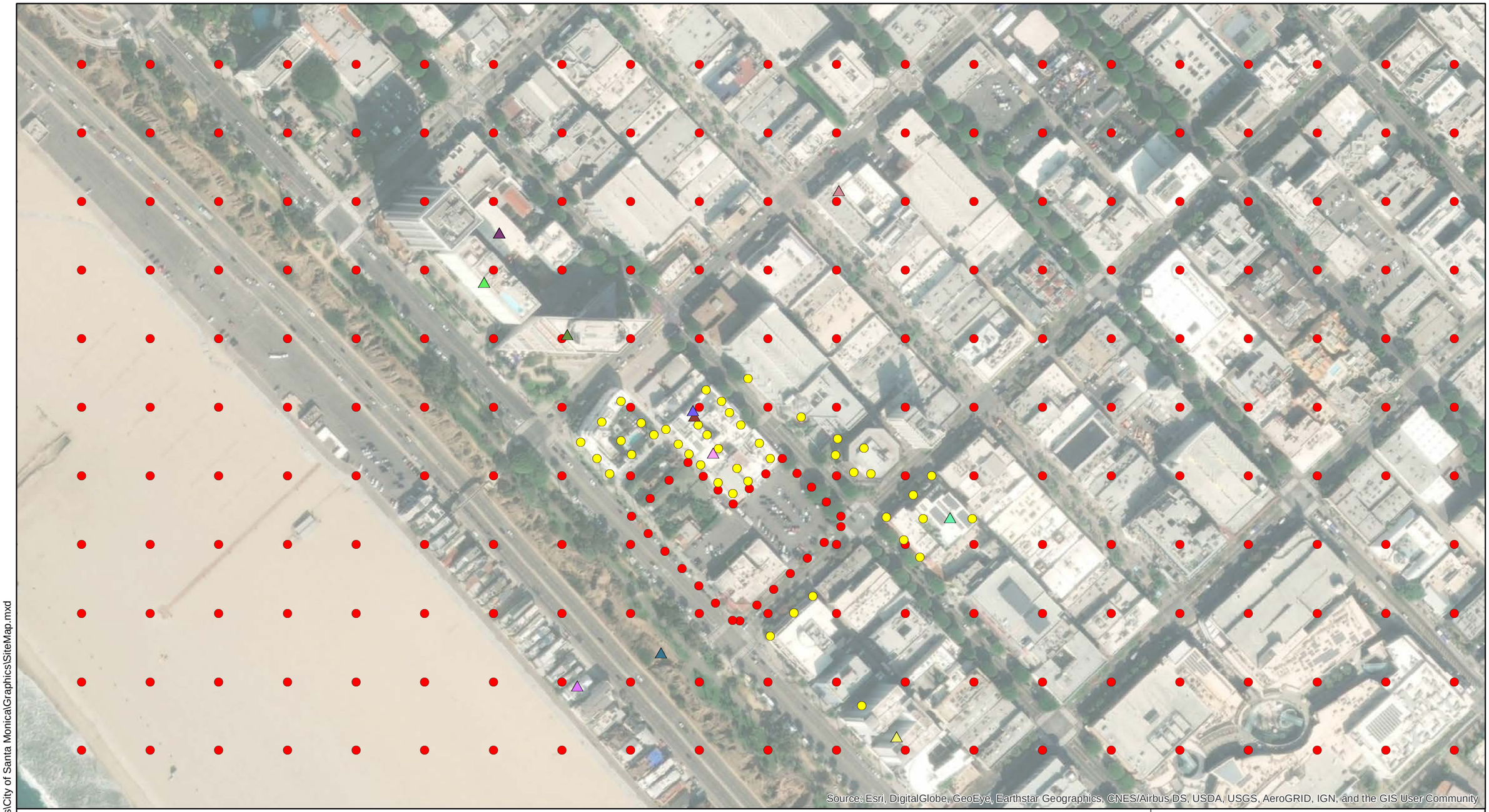
1. The PMI (Receptor ID#8) is located on the fenceline on the northeast side of the development. The closest building at 1332 Second Street is commercial, so the location is evaluated as a worker.
2. The MEIR (Receptor ID#852) is located at the southwest side of the Step Up on Second apartments.
3. For cancer risk, Diesel PM is evaluated as an unspeciated mixture.

Abbreviation

% Cont. = Percent contribution to total cancer risk

Diesel PM = Diesel engine exhaust, particulate matter

Figures



1220 Second Street
1221 Ocean Avenue
1299 Ocean Avenue
1318 Second Street
1322 Second Street
1328 Second Street
1431 Ocean Avenue
210 Santa Monica Blvd
302 Arizona Avenue
Ocean Avenue
PCH/Ocean Front Walk
Fenceline and Grid Receptors
Refined Sensitive Receptors

N

0 400 Feet

RECEPTOR LOCATION MAP
City of Santa Monica, California

wood.

By: DPV | Project No.: 1855100053
Date: 02/18/2020 | **Figure 1**

P:\Project\Inter-Office Projects\City of Santa Monica\Graphics\SiteMap.mxd

Appendix A
Source-Specific Emission Rates

APPENDIX A-1
SUMMARY OF SOURCE-SPECIFIC EMISSION RATES

Source ID	Source Description	CAS No.	Pollutant	Weight Fraction of PM10	Weight Fraction of VOC	2021 Annual (ton/yr)	2021 Peak Day (lb/day)	2022 Annual (ton/yr)	2022 Peak Day (lb/day)	2023 Annual (ton/yr)	2023 Peak Day (lb/day)	2024 Annual (ton/yr)	2024 Peak Day (lb/day)	**2021** Annual Average Emissions (lb/yr)	**2021** Maximum Hourly Emissions (lb/hr)	**2022** Annual Average Emissions (lb/yr)	**2022** Maximum Hourly Emissions (lb/hr)	**2023** Annual Average Emissions (lb/yr)	**2023** Maximum Hourly Emissions (lb/hr)	**2024** Annual Average Emissions (lb/yr)	**2024** Maximum Hourly Emissions (lb/hr)
CONS	**Construction equipment**	**9901**	**Unspeciated Diesel PM10 Exhaust**			**1.78E-03**	**6.72E-02**	**7.85E-03**	**1.47E-01**	**7.21E-03**	**4.62E-02**	**4.99E-03**	**4.62E-02**	3.56E+00		1.57E+01		1.44E+01		9.98E+00	
			Speciated PM (speciation profile 425):																		
		7440-38-2	Arsenic	5.00E-06			3.36E-07		7.36E-07		2.31E-07		2.31E-07		1.40E-08		3.06E-08		9.63E-09		9.63E-09
		7440-50-8	Copper	2.50E-05			1.68E-06		3.68E-06		1.16E-06		1.16E-06		7.00E-08		1.53E-07		4.81E-08		4.81E-08
		7782-50-5	Chlorine	3.44E-04			2.31E-05		5.06E-05		1.59E-05		1.59E-05		9.63E-07		2.11E-06		6.62E-07		6.62E-07
		7440-02-0	Nickel	1.90E-05			1.28E-06		2.79E-06		8.78E-07		8.78E-07		5.32E-08		1.16E-07		3.66E-08		3.66E-08
		7439-97-6	Mercury	3.00E-05			2.02E-06		4.41E-06		1.39E-06		1.39E-06		8.40E-08		1.84E-07		5.78E-08		5.78E-08
		9960	Sulfates	1.74E-02			1.17E-03		2.56E-03		8.05E-04		8.05E-04		4.88E-05		1.07E-04		3.36E-05		3.36E-05
		7440-62-2	Vanadium (Fume Or Dust	2.90E-05			1.95E-06		4.27E-06		1.34E-06		1.34E-06		8.12E-08		1.78E-07		5.58E-08		5.58E-08
			Unspeciated Diesel VOC Exhaust				**5.04E-01**		**1.15E+00**		**3.90E-01**		**3.90E-01**								
			Speciated VOC (speciation profile 818):																		
		106-99-0	1,3-Butadiene		0.00216		1.09E-03		2.48E-03		8.44E-04		8.44E-04		4.54E-05		1.03E-04		3.52E-05		3.52E-05
		67-56-1	Methanol		0.00034		1.72E-04		3.92E-04		1.33E-04		1.33E-04		7.17E-06		1.63E-05		5.55E-06		5.55E-06
		50-00-0	Formaldehyde		0.16749		8.43E-02		1.92E-01		6.54E-02		6.54E-02		3.51E-03		8.00E-03		2.72E-03		2.72E-03
		75-07-0	Acetaldehyde		0.08370		4.22E-02		9.60E-02		3.27E-02		3.27E-02		1.76E-03		4.00E-03		1.36E-03		1.36E-03
		78-93-3	Methyl Ethyl Ketone {2-Butanone}		0.01681		8.47E-03		1.93E-02		6.56E-03		6.56E-03		3.53E-04		8.04E-04		2.73E-04		2.73E-04
		71-43-2	Benzene		0.02278		1.15E-02		2.61E-02		8.89E-03		8.89E-03		4.78E-04		1.09E-03		3.70E-04		3.70E-04
		108-88-3	Toluene		0.01677		8.44E-03		1.92E-02		6.54E-03		6.54E-03		3.52E-04		8.01E-04		2.73E-04		2.73E-04
		95-47-6	O-Xylene		0.00381		1.92E-03		4.37E-03		1.49E-03		1.49E-03		8.00E-05		1.82E-04		6.20E-05		6.20E-05
		108-38-3	M-Xylene		0.00696		3.50E-03		7.98E-03		2.71E-03		2.71E-03		1.46E-04		3.32E-04		1.13E-04		1.13E-04
		106-42-3	P-Xylene		0.00108		5.45E-04		1.24E-03		4.22E-04		4.22E-04		2.27E-05		5.17E-05		1.76E-05		1.76E-05
		100-42-5	Styrene		0.00066		3.32E-04		7.57E-04		2.58E-04		2.58E-04		1.39E-05		3.16E-05		1.07E-05		1.07E-05
TRUCON	**Trucks on-site**		**Unspeciated Diesel PM10 Exhaust**			**1.38E-05**	**5.37E-04**	**2.96E-04**	**5.82E-03**	**2.71E-05**	**1.74E-04**	**1.49E-05**	**1.59E-04**	2.76E-02		5.93E-01		5.43E-02		2.97E-02	
			Speciated PM (speciation profile 425):																		
		7440-38-2	Arsenic	5.00E-06			2.68E-09		2.91E-08		8.70E-10		7.94E-10		1.12E-10		1.21E-09		3.62E-11		3.31E-11
		7440-50-8	Copper	2.50E-05			1.34E-08		1.45E-07		4.35E-09		3.97E-09		5.59E-10		6.06E-09		1.81E-10		1.65E-10
		7782-50-5	Chlorine	3.44E-04			1.85E-07		2.00E-06		5.99E-08		5.46E-08		7.69E-09		8.34E-08		2.49E-09		2.28E-09
		7440-02-0	Nickel	1.90E-05			1.02E-08		1.11E-07		3.31E-09		3.02E-09		4.25E-10		4.60E-09		1.38E-10		1.26E-10
		7439-97-6	Mercury	3.00E-05			1.61E-08		1.74E-07		5.22E-09		4.77E-09		6.71E-10		7.27E-09		2.17E-10		1.99E-10
		9960	Sulfates	1.74E-02			9.36E-06		1.01E-04		3.03E-06		2.77E-06		3.90E-07		4.22E-06		1.26E-07		1.15E-07
		7440-62-2	Vanadium (Fume Or Dust	2.90E-05			1.56E-08		1.69E-07		5.05E-09		4.61E-09		6.49E-10		7.03E-09		2.10E-10		1.92E-10
			Unspeciated Diesel VOC exhaust				**3.82E-03**		**3.71E-02**		**1.16E-03**		**1.10E-03**								
			Speciated VOC (speciation profile 818):																		
		106-99-0	1,3-Butadiene		0.00216		8.27E-06		8.02E-05		2.50E-06		2.37E-06		3.44E-07		3.34E-06		1.04E-07		9.90E-08
		67-56-1	Methanol		0.00034		1.31E-06		1.27E-05		3.95E-07		3.75E-07		5.44E-08		5.28E-07		1.65E-08		1.56E-08
		50-00-0	Formaldehyde		0.16749		6.40E-04		6.21E-03		1.94E-04		1.84E-04		2.67E-05		2.59E-04		8.07E-06		7.66E-06
		75-07-0	Acetaldehyde		0.08370		3.20E-04		3.10E-03		9.68E-05		9.19E-05		1.33E-05		1.29E-04		4.04E-06		3.83E-06
		78-93-3	Methyl Ethyl Ketone {2-Butanone}		0.01681		6.43E-05		6.24E-04		1.95E-05		1.85E-05		2.68E-06		2.60E-05		8.11E-07		7.69E-07
		71-43-2	Benzene		0.02278		8.71E-05		8.45E-04		2.64E-05		2.50E-05		3.63E-06		3.52E-05		1.10E-06		1.04E-06
		108-88-3	Toluene		0.01677		6.41E-05		6.22E-04		1.94E-05		1.84E-05		2.67E-06		2.59E-05		8.08E-07		7.67E-07
		95-47-6	O-Xylene		0.00381		1.46E-05		1.41E-04		4.41E-06		4.19E-06		6.07E-07		5.89E-06		1.84E-07		1.74E-07
		108-38-3	M-Xylene		0.00696		2.66E-05		2.58E-04		8.05E-06		7.64E-06		1.11E-06		1.07E-05		3.35E-07		3.18E-07
		106-42-3	P-Xylene		0.00108		4.13E-06		4.01E-05		1.25E-06		1.19E-06		1.72E-07		1.67E-06		5.21E-08		4.95E-08
		100-42-5	Styrene		0.00066		2.52E-06		2.45E-05		7.64E-07		7.25E-07		1.05E-07		1.02E-06		3.18E-08		3.02E-08

APPENDIX A-1
SUMMARY OF SOURCE-SPECIFIC EMISSION RATES

Source ID	Source Description	CAS No.	Pollutant	Weight Fraction of PM10	Weight Fraction of VOC	2021 Annual (ton/yr)	2021 Peak Day (lb/day)	2022 Annual (ton/yr)	2022 Peak Day (lb/day)	2023 Annual (ton/yr)	2023 Peak Day (lb/day)	2024 Annual (ton/yr)	2024 Peak Day (lb/day)	**2021** Annual Average Emissions (lb/yr)	**2021** Maximum Hourly Emissions (lb/hr)	**2022** Annual Average Emissions (lb/yr)	**2022** Maximum Hourly Emissions (lb/hr)	**2023** Annual Average Emissions (lb/yr)	**2023** Maximum Hourly Emissions (lb/hr)	**2024** Annual Average Emissions (lb/yr)	**2024** Maximum Hourly Emissions (lb/hr)
PAVE	**Paving**		**Unspeciated VOC Fugitive**			**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**2.20E-04**	**1.27E-02**								
			Speciated VOC (speciation profile 715):																		
		91-20-3	Naphthalene		0.06533	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-05	8.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-02	3.46E-05
ARCH	**Architectural coating**		**Unspeciated VOC fugitive**			**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**0.00E+00**	**1.95E-01**	**1.62E+01**								
			Speciated VOC (speciation profile 717):																		
		75-09-2	Methylene Chloride {Dichloromethane}		0.05883	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-02	9.55E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+01	3.98E-02
		71-43-2	Benzene		0.00321	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.25E-04	5.21E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E+00	2.17E-03
		107-21-1	Ethylene Glycol		0.00535	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-03	8.68E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E+00	3.62E-03
		75-00-3	Ethyl Chloride {Chloroethane}		0.00642	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-03	1.04E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E+00	4.34E-03

Notes:
Emissions from CalEEMod for CONS (offroad construction equipment) and from EMFAC2017 for TRUCON (for truck activity on-site).
Speciation profiles for DPM should only be used for the determination of the acute hazard index. For the determination of cancer risk and noncancer chronic hazard index, DPM emissions should be used without speciation because the ARB provides toxicity factors necessary to calculate cancer risk and noncancer chronic hazard index for DPM.
Speciation for diesel exhaust is from ARB Speciation Profiles: profile #425 for PM10 and profile 818 for VOC. Only compounds with an Acute REL are listed. https://ww3.arb.ca.gov/ei/speciate/speciate.htm. Accessed 11/2019.
Speciation for paving offgas is from ARB Speciation Profile #715 for VOC.
Speciation for architectural coating is from ARB Speciation Profile #717 for VOC.
Maximum hour emissions were divided by 24 hr/day not by 8 hr/day because AERMOD scalars aready account for daily hours of operation (i.e., the AERMOD scalars will convert the hourly emissions in this table to peak hourly emissions by multiplying the emissions by 3 for hours 9 through 16 and by 0 for all other hours).

APPENDIX A-2
ON-SITE CONSTRUCTION EMISSIONS BY PROJECT PHASE

Phase ID	Phase Name	Start Date	End Date	Days/ Week	Number of Days	Number of Days in 2021	Number of Days in 2022	Number of Days in 2023	Number of Days in 2024	Annual Emissions - PM10 diesel exhaust 2021 (ton/yr)	2022 (ton/yr)	2023 (ton/yr)	2024 (ton/yr)	Peak Day Emissions - PM10 diesel exhaust 2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)	Peak Day Emissions - VOC diesel exhaust 2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)
1	Demolition	11/1/2021	1/3/2022	6	55	53	2			1.78E-03	7.00E-05			0.0672	0.0672			0.5036	0.5036		
2	Pre-Excavation and Landmark Relocation	1/4/2022	6/4/2022	6	131		131				1.21E-03				0.0185				0.1384		
3	Grading	6/6/2022	9/10/2022	6	84		84				3.92E-03				0.0934				0.7445		
4	Boring and Trenching for Landmark Site	6/6/2022	6/18/2022	6	12		12				3.20E-04				0.0537				0.4025		
5	Permanent Relocation of Landmarks	6/20/2022	7/2/2022	6	12		12				1.10E-04				0.0185				0.1384		
6	Building Construction	9/12/2022	8/5/2024	6	595		96	312	187		2.22E-03	7.21E-03	4.32E-03		0.0462	0.0462	0.0462		0.3903	0.3903	0.3903
7	Paving	8/6/2024	9/14/2024	6	35				35				5.70E-04				0.0325				0.2435
8	Architectural Coating	9/16/2024	10/12/2024	6	24				24				1.00E-04				7.92E-03				5.94E-02
Total or Max					924	53	313	312	246	1.78E-03	7.85E-03	7.21E-03	4.99E-03	0.0672	0.1471	0.0462	0.0462	0.5036	1.147	0.3903	0.3903

Source: CalEEMod provided by Wood. CalEEMod Tables 3.2 'Mitigated Construction On-Site'. Note that in this case 'Mitigated' refers to project conditions, not CEQA mitigation.
Annual emissions used in cancer and non-cancer chronic evaluation.
Peak day emissions used in acute evaluation.

APPENDIX A-2
ON-SITE CONSTRUCTION EMISSIONS BY PROJECT PHASE

Phase ID	Phase Name	Annual Emissions - VOC paving fugitives				Peak Day Emissions - VOC paving fugitives				Annual Emissions - VOC architectural coating fugitives				Peak Day Emissions - VOC architectural coating fugitives			
		2021 (ton/yr)	2022 (ton/yr)	2023 (ton/yr)	2024 (ton/yr)	2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)	2021 (ton/yr)	2022 (ton/yr)	2023 (ton/yr)	2024 (ton/yr)	2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)
1	Demolition																
2	Pre-Excavation and Landmark Relocation																
3	Grading																
4	Boring and Trenching for Landmark Site																
5	Permanent Relocation of Landmarks																
6	Building Construction																
7	Paving				2.200E-04				0.0127								
8	Architectural Coating												1.95E-01				1.62E+01
Total or Max		0.00E+00	0.00E+00	0.00E+00	2.20E-04	0	0	0	0.0127	0.00E+00	0.00E+00	0.00E+00	1.95E-01	0	0	0	16.2353

APPENDIX A-3
ON-SITE TRUCK EMISSIONS BY PROJECT PHASE

Truck Idling

	On-site Emissions (lb/yr)		On-site Emissions (lb/day)	
Year	PM10	ROG	PM10	ROG
2021	0.0160	0.1137	0.0003	0.0022
2022	0.3433	2.1886	0.0034	0.0215
2023	0.0314	0.2090	0.0001	0.0007
2024	0.0172	0.1189	0.0001	0.0006

Notes:
Includes both vedor and haul truck trips from CalEEMod Output.
Idling emissions for construction trucks were based on EMFAC2017 emissions at 5 mph for heavy duty trucks, corrected by a speed correction factor.
Speed bin correction factor (mph) is 2.5 mph, per EMFAC2017 Vol II, Handbook for Project-Level Analyses, v1.0.2. March 1, 2018.
Assumes 5 min idling time per truck visit.

Truck Transit

	On-site Emissions (lb/yr)		On-site Emissions (lb/day)	
Year	PM10	ROG	PM10	ROG
2021	0.0116	0.0827	0.0002	0.0016
2022	0.2496	1.5917	0.0024	0.0156
2023	0.0229	0.1520	0.0001	0.0005
2024	0.0125	0.0865	0.0001	0.0005

Notes:
Includes both vedor and haul truck trips from CalEEMod Output.
On-site transit emissions were based on EMFAC2017 emissions at 5 mph.

Assumes 0.15 miles (800 feet) On-site transit.

Truck Total

	On-site Truck Emissions (lb/yr)		On-site Truck Emissions (lb/day)	
Year	PM10	ROG	PM10	ROG
2021	0.0276	0.1965	0.0005	0.0038
2022	0.5929	3.7803	0.0058	0.0371
2023	0.0543	0.3610	0.0002	0.0012
2024	0.0297	0.2053	0.0002	0.0011

Notes:
Includes both vedor and haul truck trips from CalEEMod

Includes both On-site idling (5 min per truck visit) and transit at 5 mph for 0.15 miles (800 feet) On-site transit.

Truck Trips

Truck Trips (1-way trips/year)

Phase ID	Phase Name	Start Date	End Date	Number of Days	Number of Days in 2021	Number of Days in 2022	Number of Days in 2023	Number of Days in 2024	Total Truck Trips	Truck Trips in 2021	Truck Trips in 2022	Truck Trips in 2023	Truck Trips in 2024	Daily Truck Trips in 2021	Daily Truck Trips in 2022	Daily Truck Trips in 2023	Daily Truck Trips in 2024
1	Demolition	11/1/2021	1/3/2022	55	53	2	0	0	320	308	12	0	0	6	6		
2	Pre-Excavation	1/4/2022	6/4/2022	131	0	131	0	0		0	0	0	0				
3	Grading	6/6/2022	9/10/2022	84	0	84	0	0	12,800	0	12,800	0	0		153		
4	Boring and Tre	6/6/2022	6/18/2022	12	0	12	0	0		0	0	0	0				
5	Permanent Rel	6/20/2022	7/2/2022	12	0	12	0	0		0	0	0	0				
6	Building Const	9/12/2022	8/5/2024	595	0	96	312	187	17,255	0	2784	9048	5423		29	29	29
7	Paving	8/6/2024	9/14/2024	35	0	0	0	35		0	0	0	0				
8	Architectural C	9/16/2024	10/12/2024	24	0	0	0	24		0	0	0	0				
Total										308	15,596	9048	5423	6	153	29	29

Notes:
Includes both vendor and haul truck trips from CalEEMod Output.
CalEEMod expresses haul trips as total trips and vendor trips as trips per day. Therefore, vendor trips in the CalEEMod output were multiplied by the total number of days and then allocated to each construction year for calculation purposes.

On-site Truck Idling Emission Calculations

On-site Idling Emissions (lb/truck trip)

Year	ROG	TOG	CO	Nox	SOx	CO2	CH4	PM10	PM2.5	N2O
2021	0.00036885	0.00041991	0.00063087	0.00246082	5.2518E-06	0.555897593	1.7132E-05	5.1795E-05	4.9554E-05	8.7379E-05
2022	0.000140335	0.00015976	0.000339081	0.001883428	5.2117E-06	0.551650547	6.5182E-06	2.201E-05	2.1057E-05	8.6712E-05
2023	2.30983E-05	2.6296E-05	0.000189917	0.001599076	5.177E-06	0.547976192	1.0729E-06	3.4736E-06	3.3233E-06	8.6134E-05
2024	2.1922E-05	2.4957E-05	0.00019135	0.001611089	5.1136E-06	0.541265567	1.0182E-06	3.1712E-06	3.034E-06	8.5079E-05

Notes:
On-site idling time assumed (min) per truck visit: 5

APPENDIX A-3
ON-SITE TRUCK EMISSIONS BY PROJECT PHASE

Idling Emission Factors (g/hr)

Year	ROG	TOG	CO	Nox	SOx	CO2	CH4	PM10	PM2.5	N2O
2021	4.0154	4.5712	6.8678	26.7890	0.0572	6051.6218	0.1865	0.5638	0.5395	0.9512
2022	1.5277	1.7392	3.6913	20.5034	0.0567	6005.3875	0.0710	0.2396	0.2292	0.9440
2023	0.2515	0.2863	2.0675	17.4079	0.0564	5965.3877	0.0117	0.0378	0.0362	0.9377
2024	0.2386	0.2717	2.0831	17.5387	0.0557	5892.3344	0.0111	0.0345	0.0330	0.9262

Notes:
Idling emissions for construction trucks were based on EMFAC2017 emissions at 5 mph for heavy duty trucks, corrected by a speed correction factor.
Speed bin correction factor (mph): 2.5 Source: EMFAC2017 Vol II, Handbook for Project-Level Analyses, v1.0.2. March 1, 2018.

On-site Truck Transit Emission Calculations

On-site Transit Emissions (lb/truck trip)

Year	ROG	TOG	CO	Nox	SOx	CO2	CH4	PM10	PM2.5	N2O
2021	0.0003	0.0003	0.0005	0.0018	0.0000	0.4043	0.0000	0.0000	0.0000	0.0001
2022	0.0001	0.0001	0.0002	0.0014	0.0000	0.4012	0.0000	0.0000	0.0000	0.0001
2023	0.0000	0.0000	0.0001	0.0012	0.0000	0.3985	0.0000	0.0000	0.0000	0.0001
2024	0.0000	0.0000	0.0001	0.0012	0.0000	0.3936	0.0000	0.0000	0.0000	0.0001

Notes:
On-site transit distance (mi) per 1-way truck trip: 0.076

On-site Transit Emission Factor (g/mi)

Year	ROG	TOG	CO	Nox	SOx	CO2	CH4	PM10	PM2.5	N2O
2021	1.6062	1.8285	2.7471	10.7156	0.0229	2420.6487	0.0746	0.2255	0.2158	0.3805
2022	0.6111	0.6957	1.4765	8.2014	0.0227	2402.1550	0.0284	0.0958	0.0917	0.3776
2023	0.1006	0.1145	0.8270	6.9632	0.0225	2386.1551	0.0047	0.0151	0.0145	0.3751
2024	0.0955	0.1087	0.8332	7.0155	0.0223	2356.9337	0.0044	0.0138	0.0132	0.3705

Notes:

APPENDIX A-3
ON-SITE TRUCK EMISSIONS BY PROJECT PHASE

Truck Total

On-site Truck Emissions

Annual Emissions - PM10 diesel exhaust				Peak Day Emissions - PM10 diesel exhaust				Peak Day Emissions - VOC diesel exhaust			
2021 (ton/yr)	2022 (ton/yr)	2023 (ton/yr)	2024 (ton/yr)	2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)	2021 (lb/day)	2022 (lb/day)	2023 (lb/day)	2024 (lb/day)
1.38E-05	2.96E-04	2.71E-05	1.49E-05	5.37E-04	5.82E-03	1.74E-04	1.59E-04	3.82E-03	3.71E-02	1.16E-03	1.10E-03

Notes:
Includes both vedor and haul truck trips from CalEEMod Output.
Includes both On-site idling (5 min per truck visit) and transit at 5 mph for 0.15 miles (800 feet) On-site transit.

APPENDIX A-4
EMFAC2017 OUTPUT

EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air Basin
Region: SOUTH COAST
Calendar Year: 2021
Season: Winter
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	SOx_RUNEX	CO2_RUNEX	CH4_RUNEX	PM10_RUNEX	PM2_5_RUNEX	N2O_RUNEX
SOUTH COAST	2021	T6 instate construction heavy	Aggregated	5	DSL	508.364836	1.606150969	1.82848062	2.74711446	10.7156068	0.02286909	2420.6487	0.0746016	0.2255386	0.2157819	0.3804923

EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air Basin
Region: SOUTH COAST
Calendar Year: 2022
Season: Winter
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	SOx_RUNEX	CO2_RUNEX	CH4_RUNEX	PM10_RUNEX	PM2_5_RUNEX	N2O_RUNEX
SOUTH COAST	2022	T6 instate construction heavy	Aggregated	5	DSL	515.766975	0.611084846	0.69567358	1.47652168	8.20136408	0.02269437	2402.155	0.0283833	0.0958401	0.0916941	0.3775853

EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air Basin
Region: SOUTH COAST
Calendar Year: 2023
Season: Winter
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	SOx_RUNEX	CO2_RUNEX	CH4_RUNEX	PM10_RUNEX	PM2_5_RUNEX	N2O_RUNEX
SOUTH COAST	2023	T6 instate construction heavy	Aggregated	5	DSL	522.555087	0.100581243	0.11450409	0.8269902	6.96315698	0.02254321	2386.1551	0.0046717	0.0151258	0.0144715	0.3750703

EMFAC2017 (v1.0.2) Emission Rates
Region Type: Air Basin
Region: SOUTH COAST
Calendar Year: 2024
Season: Winter
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	SOx_RUNEX	CO2_RUNEX	CH4_RUNEX	PM10_RUNEX	PM2_5_RUNEX	N2O_RUNEX
SOUTH COAST	2024	T6 instate construction heavy	Aggregated	5	DSL	517.832592	0.095459272	0.10867312	0.83322949	7.01546615	0.02226714	2356.9337	0.0044338	0.0138088	0.0132114	0.3704772

Appendix B
AERMOD Modeling Input and Output Files
(provided electronically)

Appendix C
HARP Modeling Input and Output
(provided electronically)