

Appendices

Appendix B2: Construction Health Risk Assessment

Appendices

This page intentionally left blank.

1. Construction Health Risk Assessment

1.1 INTRODUCTION

The Brea Mall—1065 Brea Mall, City of Brea—encompasses approximately 74 acres in northeast Orange County. As a result of the recent acquisition of the Sears parcel, the Simon Property Group (Simon Properties, or Applicant) is proposing redevelopment of that parcel and adjoining transition areas adjacent to Nordstrom and Macy’s at the Brea Mall. The proposed redevelopment would be on an approximately 17.5-acre site (“project area”) in the southwest portion of the Brea Mall. The Brea Mall is west of State Route 57 (SR-57) and is generally bounded by State College Boulevard to the east, Imperial Highway (State Route 90) to the south, South Randolph Avenue to the west, the City of Brea City Hall and Embassy Suites by Hilton to the northwest, and East Birch Street to the north.

In January 2020, the City issued a Draft Environmental Impact Report for the Brea Mall Mixed Use Project (SCH No. 20190800299) (DEIR), which proposed the redevelopment of an approximately 17.5-acre portion of the 73.8-acre Brea Mall. The redevelopment was triggered by the closure of Sears, one of the retail anchors at the mall, and the acquisition of the Sears parcel by Simon Properties, the majority landowner and operator of the Brea Mall, and project proponent. The DEIR analyzed the potential impacts of redeveloping the Sears parcel and immediately surrounding Mall property with a mixed-use project that would include new retail and restaurant spaces, for-rent residential apartments, a resort-type (lifestyle) fitness center, and a large central green which could be used as a plaza/gathering space for community events. The project proposed a net increase of 149,625 square feet of commercial square footage, and 312 residential units.

In March 2020, as a result of the Statewide restrictions imposed in response to the Covid-19 pandemic, including the temporary closure and subsequent limited re-opening of retail malls and restaurants within California, the project proponent requested that the application be placed on hold. In late 2020, the project proponent informed the City that they would like to continue processing its application, but that they had also made modifications to the proposed project and site plan in response to the changing retail, commercial and residential market.

The proposed project includes the same mix of retail, commercial, residential and recreational uses but on a slightly smaller scale and includes two options (Option 1 and Option 2) for development. Additionally, the footprint of the redevelopment work would cover approximately 15.5 acres, instead of the 17.5 acres. Under proposed project Option 1, there would be an increase of 85,425 square feet of new commercial uses and 390 apartment units; compared to a net increase of 149,625 square feet of new commercial uses and 312 units in the original application. Under proposed project Option 2, the lifestyle fitness would not be constructed. In its place, there would be a second residential building consisting of 280 multi-family units. Proposed project Option 2 would result in an overall reduction in commercial retail square footage and would reduce the amount of total commercial/retail square footage by 42,575 square feet and 670 units.

The proposed project would involve demolition, site preparation, grading, building construction, architectural coating, paving, and finishing and landscaping. The following provides the background methodology used for the construction health risk assessment for the proposed project.

Project construction would be phased over an approximately 40-month period for Option 1 and phased in over an approximately 66-month period for Option 2. Construction of either Option 1 or Option 2 is anticipated to commence in summer 2022. The nearest sensitive receptors to the project site are the single-family residences approximately 570 feet to the west fronting Pine Avenue. Guidance from the California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard Assessment (OEHHA), California Air Pollution Control Officers Association (CAPCOA), and the South Coast Air Quality Management District (South Coast AQMD) recommend the completion of health risk assessments (HRA) to determine the impacts of hazardous air emissions upon sensitive receptors in the vicinity of the project. As a result, a site-specific construction health risk assessment (HRA) has been prepared for the proposed project. This HRA considers the health impact to sensitive receptors (adults and children in the nearby residences) of construction emissions at the project site from diesel equipment exhaust (diesel particulate matter or DPM).

It should be noted that these health impacts are based on conservative (i.e., health protective) assumptions. The United States Environmental Protection Agency (USEPA, 2005) and the Office of Environmental Health Hazard Assessment (OEHHA, 2015) note that conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks. Therefore, the estimated risks may not necessarily represent actual risks experienced by populations at or near a site. The use of conservative assumptions tends to produce upper-bound estimates of exposure and thus risk.

For residential-based receptors, the following conservative assumptions were used:

- It was assumed that maximum-exposed off-site residential receptors (both children and adults) stood outdoors and are subject to DPM at their residence for 8 hours per day, and approximately 260 construction days per year. In reality, California residents typically will spend on average 2 hours per day outdoors at their residences (USEPA, 2011). This would result in lower exposures to construction related DPM emissions and lower estimated risk values.
- The calculated risk for infants from third trimester to age 2 is multiplied by a factor of 10 to account for early life exposure and uncertainty in child versus adult exposure impacts (OEHHA, 2015).

1.2 METHODOLOGY AND SIGNIFICANCE THRESHOLDS

For this HRA, the South Coast AQMD significance thresholds were deemed to be appropriate and the thresholds that were used for this project are shown below:

- Excess cancer risk of more than 10 in a million
- Non-cancer hazard index (chronic or acute) greater than 1.0

The methodology used in this HRA is consistent with the following South Coast AQMD and the OEHHA guidance documents:

- OEHHA. 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*. February, 2015.

Potential exposures to DPM from proposed project construction were evaluated for off-site sensitive receptors in close proximity to the site. Pollutant concentrations were estimated using an air dispersion model, and excess lifetime cancer risks and chronic non-cancer hazard indexes were calculated. These risks were then compared to the significance thresholds adopted for this HRA.

1.3 CONSTRUCTION EMISSIONS

Construction emissions were calculated as average daily emissions in pounds per day, using the proposed construction schedule and the latest version of California Emissions Estimation Model, known as CalEEMod Version 2020.4 (CAPCOA, 2021). DPM emissions were based on the CalEEMod construction runs, using annual exhaust PM₁₀ construction emissions presented in pounds (lbs) per day.

Option 1 was assumed to take place over 40 months (870 workdays or 3.34 years) from the beginning of June 2022 through September 2025. Option 2 was assumed to take place over 66 months (1,435 workdays or 5.5 years) from the beginning of June 2022 through September 2025, continuing February 2026 through March 2028. The average daily emission rates from construction equipment used during the proposed project were determined by dividing the annual average emissions for each construction year by the number of construction days per year for each calendar year of construction (i.e., 2022 through 2028). The off-site hauling emission rates were adjusted to evaluate localized emissions from the 0.56-mile haul route within 1,000 feet of the project site. The CalEEMod construction emissions output and emission rate calculations are provided in Appendix A of the HRA.

1.4 DISPERSION MODELING

Air quality modeling was performed using the AERMOD atmospheric dispersion model to assess the impact of emitted compounds on sensitive receptors near the project. The model is a steady state Gaussian plume model and is an approved model by South Coast AQMD for estimating ground level impacts from point and fugitive sources in simple and complex terrain. The on-site construction emissions for the project were modeled as poly-area sources. The off-site mobile sources were modeled as adjacent line volume sources. The model requires additional input parameters, including chemical emission data and local meteorology. Inputs for the construction emission rates are those described in Section 1.3. Meteorological data obtained from the South Coast AQMD for the nearest representative meteorological station (Fullerton Airport) with the five latest available years (2012 to 2016) of record were used to represent local weather conditions and prevailing winds. The prevailing wind direction at the Fullerton Airport meteorological station is to the northeast, and the wind rose is provided in Appendix A.

The modeling analysis also considered the spatial distribution and elevation of each emitting source in relation to the sensitive receptors. To accommodate the model's Cartesian grid format, direction-dependent calculations were obtained by identifying the Universal Transverse Mercator (UTM) coordinates for each source location. In addition, digital elevation model (DEM) data for the area were obtained and included in the model runs to account for complex terrain. An emission release height of 4.15 meters was used as representative of the stack exhaust height for off-road construction equipment and diesel truck traffic, and an initial vertical dispersion parameter of 1.93 m was used, per California Air Resources Board (CARB) guidance (2000).

To determine contaminant impacts during construction hours, the model's Hour-By-Day-of-Week (HRDOW) scalar option was invoked to predict ground-level concentrations for construction emissions generated between the hours of 7:00 AM and 4:00 PM with a 1-hour lunch break.

A unit emission rate of 1 gram per second was used for all modeling runs. The unit emission rates were proportioned over the poly-area sources for on-site construction emissions and divided between the volume sources for off-site hauling emissions. The maximum modeled concentrations from the output files were then multiplied by the emission rates calculated in Appendix A to obtain the maximum flagpole-level concentrations at the off-site maximum exposed receptor (MER). As shown in Figure 1, the MER is a single-family residence west of the site along Pine Avenue. The MER location is the receptor location associated with the maximum AERMOD predicted DPM concentrations from the on-site emission source because the calculated on-site emission rates are approximately 2 to 3 orders of magnitude higher than the calculated off-site emission rates (see Appendix A). Therefore, the maximum concentrations associated with the on-site emission sources produce the highest overall ground-level MER concentrations and, consequently, highest calculated health risks.

The air dispersion model output for the emission sources is presented in Appendix B. The model output DPM concentrations from the construction emission sources are provided in Appendix C.

1.5 RISK CHARACTERIZATION

1.5.1 Carcinogenic Chemical Risk

Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Therefore, any exposure will have some associated risk. The South Coast AQMD has established a maximum incremental cancer risk of 10 in a million (1×10^{-5} or 10×10^{-6}) for CEQA projects and the OEHHA also sets a typical risk management level as 10 in a million (OEHHA, 2015).

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer from exposure to a chemical at a given concentration. The cancer risk probability is determined by multiplying the chemical's annual concentration by its cancer potency factor (CPF), a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It is an upper-limit estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter ($\mu\text{g}/\text{m}^3$), averaged over a lifetime of 70 years.

Recent guidance from OEHHA recommends a refinement to the standard point estimate approach with the use of age-specific breathing rates and age sensitivity factors (ASFs) 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 for each age group. Once determined, contaminant dose is multiplied by the cancer potency factor in units of inverse dose expressed in milligrams per kilogram per day ($\text{mg}/\text{kg}/\text{day}$)⁻¹ to derive the cancer risk estimate. Therefore, the following dose algorithm was used to accommodate the unique exposures associated with each receptor type.

$$\text{Dose}_{\text{AIR, per age group}} = (C_{\text{air}} \times \text{EF} \times [\frac{\text{BR}}{\text{BW}}] \times A \times \text{CF})$$

Where:

Dose_{AIR}	=	dose by inhalation ($\text{mg}/\text{kg}/\text{day}$), per age group
C_{air}	=	concentration of contaminant in air ($\mu\text{g}/\text{m}^3$)
EF	=	exposure frequency (number of days/365 days)
BR/BW	=	daily breathing rate normalized to body weight ($\text{L}/\text{kg}/\text{day}$)
A	=	inhalation absorption factor (default = 1)
CF	=	conversion factor (1×10^{-6} , μg to mg , L to m^3)

The inhalation absorption factor (A) is a unitless factor that is only used if the cancer potency factor included a correction for absorption across the lung. The default value of 1 was used for this assessment. For residential receptors, the exposure frequency (EF) of 0.96 is used to represent 350 days per year to allow for a two-week period away from home each year (OEHHA, 2015). The 95th percentile daily breathing rates (BR/BW), exposure duration (ED), age sensitivity factors (ASFs), and fraction of time at home (FAH) for the various age groups are provided herein:

<u>Age Groups</u>	<u>BR/BW (L/kg-day)</u>	<u>ED</u>	<u>ASF</u>	<u>FAH</u>
Third trimester	361	0.25	10	0.85
0-2 age group	1,090	2	10	0.85
2-9 age group	861	7	3	0.72
2-16 age group	745	14	3	0.72
16-30 age group	335	14	1	0.73
16-70 age group	290	54	1	0.73

For construction analysis, the exposure duration spans the length of construction (e.g, 3.34 years for Option 1 and 5.5 years for Option 2). In addition, the construction duration each year was considered in the risk calculations to account for the number of days residents are exposed to construction emissions from 2022 through 2025 for Option 1 and 2022 through 2028 for Option 2. As the length of construction for either option is longer than 2.25 years, the third trimester, 0-2, and 2-9 age bins apply to the construction analysis for the off-site residential receptors.

To calculate the overall cancer risk, the risk for each appropriate age group is calculated per the following equation:

$$\text{Cancer Risk}_{\text{AIR}} = \text{Dose}_{\text{AIR}} \times \text{CPF} \times \text{ASF} \times \text{FAH} \times \frac{\text{ED}}{\text{AT}}$$

Where:

Dose _{AIR}	=	dose by inhalation (mg/kg-day), per age group
CPF	=	cancer potency factor, chemical-specific (mg/kg-day) ⁻¹
ASF	=	age sensitivity factor, per age group
FAH	=	fraction of time at home, per age group (for residential receptors only)
ED	=	exposure duration (years)
AT	=	averaging time period over which exposure duration is averaged (70 years)

The CPFs used in the assessment were obtained from OEHHA guidance. The excess lifetime cancer risks during the construction period to the maximally exposed resident were calculated based on the factors provided above. The cancer risks for each age group are summed to estimate the total cancer risk for each toxic chemical species. The final step converts the cancer risk in scientific notation to a whole number that expresses the cancer risk in “chances per million” by multiplying the cancer risk by a factor of 1x10⁶ (i.e., 1 million).

The calculated results are provided in Appendix C.

1.5.2 Non-Carcinogenic Hazards

An evaluation was also conducted of the potential non-cancer effects of chronic chemical exposures. Adverse health effects are evaluated by comparing the annual receptor level (flagpole) concentration of each chemical compound with the appropriate reference exposure limit (REL). Available RELs promulgated by OEHHA were considered in the assessment.

The hazard index approach was used to quantify non-carcinogenic impacts. The hazard index assumes that chronic sub-threshold exposures adversely affect a specific organ or organ system (toxicological endpoint). Target organs presented in regulatory guidance were used for each discrete chemical exposure. To calculate the hazard index, each chemical concentration or dose is divided by the appropriate toxicity value. This ratio is summed for compounds affecting the same toxicological endpoint. A health hazard is presumed to exist where the total equals or exceeds one.

The chronic hazard analysis for DPM is provided in Appendix C. The calculations contain the relevant exposure concentrations and corresponding reference dose values used in the evaluation of non-carcinogenic exposures.

1.6 CONSTRUCTION HRA RESULTS

The calculated results are provided in Appendix C and the results are summarized in Table 1.

TABLE 1. CONSTRUCTION RISK SUMMARY - UNMITIGATED

Receptor	Cancer Risk (per million)	Chronic Hazards
Maximum Exposed Receptor - Resident – Option 1	2.6	0.007
Maximum Exposed Receptor - Resident – Option 2	2.8	0.009
South Coast AQMD Threshold	10	1.0
Exceeds Threshold?	No	No

Note: Cancer risk calculated using 2015 OEHHA HRA guidance.

Cancer risk for the maximum exposed receptor from project-related construction emissions was calculated to be 2.6 in a million for Option 1 and 2.8 in a million for Option 2, which would not exceed the 10 in a million significance threshold. In accordance with the latest 2015 OEHHA guidance, the calculated total cancer risk conservatively assumes that the risk for the MER consists of a pregnant woman in the third trimester that subsequently gives birth to an infant during the construction period; therefore, all calculated risk values were multiplied by a factor of 10 for the first 2.25 years and by 3 for the remaining years. In addition, it was conservatively assumed that the residents were outdoors 8 hours a day and exposed to all of the daily construction emissions. For non-carcinogenic effects, the chronic hazard index identified for each toxicological endpoint totaled less than one for all the off-site sensitive receptors for both Option 1 and Option 2. Therefore, the project would not expose off-site sensitive receptors to substantial concentrations of air pollutant emissions during construction and impacts would be *less than significant*.

Although not needed to mitigate localized health risks, the following mitigation measure is proposed in the Draft Environmental Impact Report to reduce nitrogen oxide emissions:

Mitigation Measure AQ-1: The construction contractor(s) shall, at minimum, use equipment that meets the United States Environmental Protection Agency's (EPA) Tier 4 (Final) emissions standards for off-road diesel-powered construction equipment with more than 50 horsepower. Any emissions control device used by the contractor shall achieve emissions reductions that are no less than what

could be achieved by Tier 4 emissions standards for a similarly sized engine, as defined by the California Air Resources Board's regulations. Prior to construction, the project engineer shall ensure that all plans clearly show the requirement for EPA Tier 4 emissions standards for construction equipment over 50 horsepower for the specific activities stated above. During construction, the construction contractor shall maintain a list of all operating equipment associated with building demolition in use on the site for verification by the City. The construction equipment list shall state the makes, models, and numbers of construction equipment onsite. Equipment shall be properly serviced and maintained in accordance with the manufacturer's recommendations.

Mitigation Measure AQ-1 would further reduce the project's localized construction emissions, as shown in the following table. The results indicate that, with mitigation, the cancer risks and chronic hazard indices would be further reduced well below the South Coast AQMD's significance thresholds.

TABLE 2. CONSTRUCTION RISK SUMMARY - MITIGATED

Receptor	Cancer Risk (per million)	Chronic Hazards
Maximum Exposed Receptor - Resident – Option 1	0.3	0.001
Maximum Exposed Receptor - Resident – Option 2	0.4	0.001
South Coast AQMD Threshold	10	1.0
Exceeds Threshold?	No	No

Risks incorporate Mitigation Measure AQ-1, which includes using construction equipment which meets USEPA Tier 4 Final engine requirements for equipment over 50 horsepower.

Note: Cancer risk calculated using 2015 OEHHA HRA guidance.

2. References

California Air Pollution Control Officers Association (CAPCOA). 2021. California Emissions Estimator Model (CalEEMod). Version 2020.4. Prepared by: BREEZE Software, A Division of Trinity Consultants in collaboration with South Coast Air Quality Management District and the California Air Districts.

California Air Resources Board (CARB). 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*.

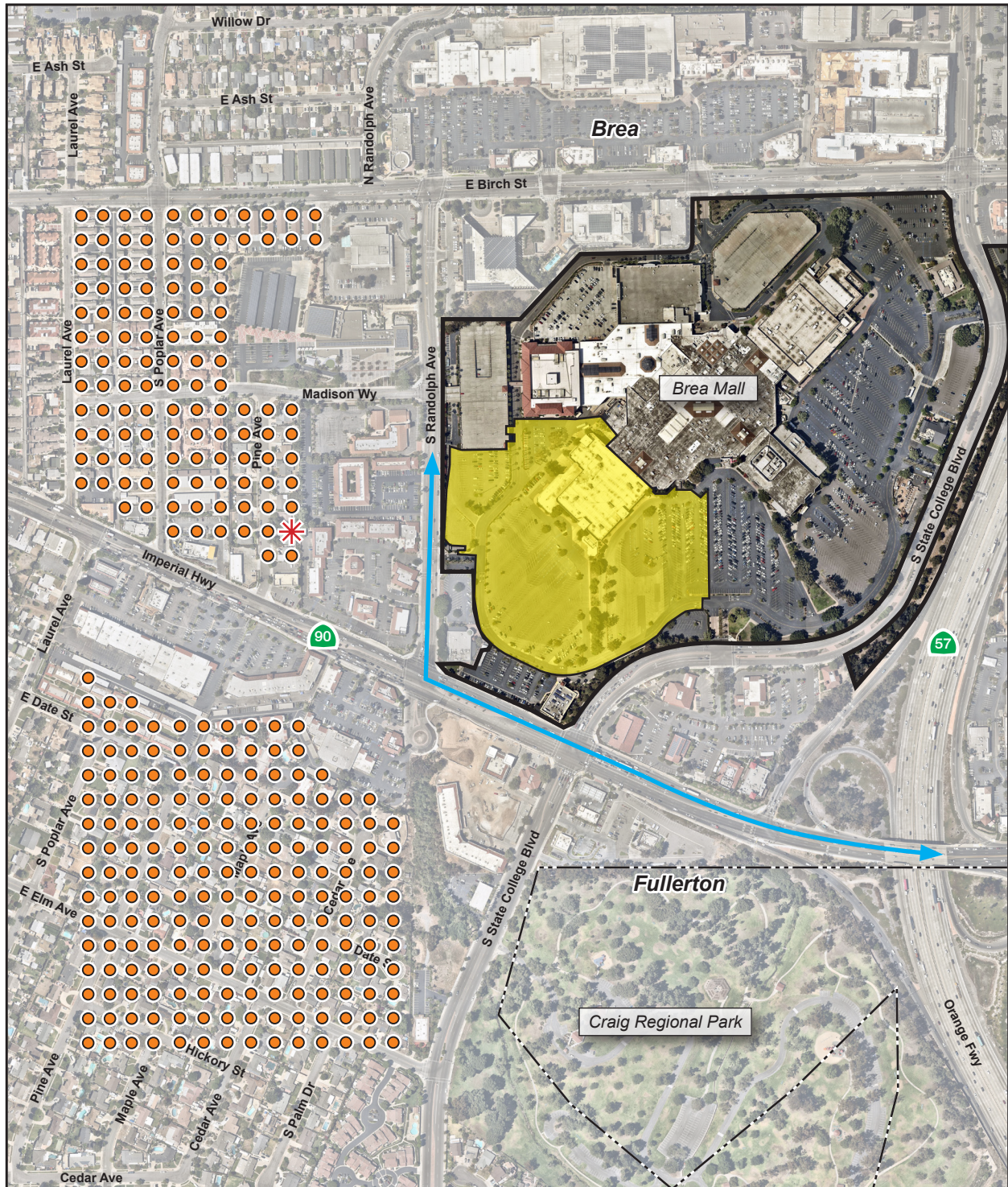
Office of Environmental Health Hazard Assessment (OEHHA). 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments*. Dated February 2015.

South Coast Air Quality Management District (South Coast AQMD). 2021, May 14 (accessed). 2012-2016. Meteorological Data Set for Fullerton Airport Meteorological Station. <http://www.aqmd.gov/home/air-quality/meteorological-data/data-for-aermod>.

United States Environmental Protection Agency (USEPA). 2011. *Exposure Factors Handbook 2011 Edition (Final)*. EPA/600/R-09/052F, 2011.

_____. 2005. *Guideline on Air Quality Models* (Revised). EPA-450/2-78-027R.

Figure 1 - Project Site and Off-Site Receptor Locations



- Construction Area
- ✱ Maximum Exposed Receptor - Residence
- ↔ Construction Truck Route
- Receptors - Residential
- Brea Mall Boundary
- City Boundary

0 700
Scale (Feet)



Base Map Source: Nearmap, 2021

Appendix A. Emission Rate Calculations

Average Daily Emissions and Emission Rates: Unmitigated Scenario, Option 1

Onsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)	# of Workdays/Year	Construction Duration ²
All Subphases	2022	0.1457	291.48	153	1.91	2.38E-01	3.00E-02	260	0.59
	2023	0.0946	189.28	260	0.73	9.10E-02	1.15E-02	260	1.00
	2024	0.0367	73.44	262	0.28	3.50E-02	4.41E-03	262	1.00
	2025	0.0265	53.00	195	0.27	3.40E-02	4.28E-03	261	0.75

Offsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000 ft (lbs/day) ³	Emission Rate (lbs/hr)	Emission Rate (g/s)
All Subphases	2022	0.0023	4.66	153	3.05E-02	8.47E-04	1.06E-04	1.33E-05
	2023	0.0050	10.08	260	3.88E-02	1.08E-03	1.35E-04	1.70E-05
	2024	0.0048	9.60	262	3.66E-02	1.02E-03	1.27E-04	1.61E-05
	2025	0.0036	7.12	195	3.65E-02	1.02E-03	1.27E-04	1.60E-05

Note: Emissions evenly distributed over 47 modeled volume sources.

	Offsite	
Hauling Length (miles)	20.0	miles
Haul Length within 1,000 ft of Site (mile) ³	0.56	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) ⁴	8	hours

¹ DPM emissions taken as PM₁₀ exhaust emissions from CalEEMod average daily emissions.

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

³ Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.56-mile route within 1,000 of the project site.

⁴ Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App C - Air Dispersion Model Output Files).

Average Daily Emissions and Emission Rates: Mitigated Scenario with Tier 4 Engines, Option 1

Onsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)	# of Workdays/Year	Construction Duration ²
All Subphases	2022	0.0112	22.36	153	0.15	1.83E-02	2.30E-03	260	0.59
	2023	0.0123	24.56	260	0.09	1.18E-02	1.49E-03	260	1.00
	2024	0.0087	17.44	262	0.07	8.32E-03	1.05E-03	262	1.00
	2025	0.0066	13.20	195	0.07	8.46E-03	1.07E-03	261	0.75

Offsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000 ft (lbs/day) ³	Emission Rate (lbs/hr)	Emission Rate (g/s)
All Subphases	2022	0.0023	4.66	153	3.05E-02	8.47E-04	1.06E-04	1.33E-05
	2023	0.0050	10.08	260	3.88E-02	1.08E-03	1.35E-04	1.70E-05
	2024	0.0048	9.60	262	3.66E-02	1.02E-03	1.27E-04	1.61E-05
	2025	0.0036	7.12	195	3.65E-02	1.02E-03	1.27E-04	1.60E-05

Note: Emissions evenly distributed over 47 modeled volume sources.

	Offsite	
Hauling Length (miles)	20.0	miles
Haul Length within 1,000 ft of Site (mile) ³	0.56	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) ⁴	8	hours

¹ DPM emissions taken as PM₁₀ exhaust emissions from CalEEMod average daily emissions.

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

³ Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.56-mile route within 1,000 of the project site.

⁴ Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App C - Air Dispersion Model Output Files).

Average Daily Emissions and Emission Rates: Unmitigated Scenario, Option 2

Onsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)	# of Workdays/Year	Construction Duration ²
All Subphases	2022	0.1457	291.48	153	1.91	2.38E-01	3.00E-02	260	0.59
	2023	0.0946	189.28	260	0.73	9.10E-02	1.15E-02	260	1.00
	2024	0.0367	73.44	262	0.28	3.50E-02	4.41E-03	262	1.00
	2025	0.0265	53.00	195	0.27	3.40E-02	4.28E-03	261	0.75
	2026	0.0283	56.60	239	0.24	2.96E-02	3.73E-03	261	0.92
	2027	0.0309	61.80	261	0.24	2.96E-02	3.73E-03	261	1.00
	2028	0.0105	21.04	65	0.32	4.05E-02	5.10E-03	260	0.25

Offsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000 ft (lbs/day) ³	Emission Rate (lbs/hr)	Emission Rate (g/s)
All Subphases	2022	0.0023	4.66	153	3.05E-02	8.47E-04	1.06E-04	1.33E-05
	2023	0.0090	18.08	260	6.95E-02	1.93E-03	2.42E-04	3.05E-05
	2024	0.0087	17.40	262	6.64E-02	1.85E-03	2.31E-04	2.91E-05
	2025	0.0066	13.16	195	6.75E-02	1.88E-03	2.35E-04	2.96E-05
	2026	0.0065	13.02	239	5.45E-02	1.52E-03	1.89E-04	2.39E-05
	2027	0.0068	13.52	261	5.18E-02	1.44E-03	1.80E-04	2.27E-05
	2028	0.0016	3.18	65	4.89E-02	1.36E-03	1.70E-04	2.14E-05

Note: Emissions evenly distributed over 47 modeled volume sources.

	Offsite	
Hauling Length (miles)	20.0	miles
Haul Length within 1,000 ft of Site (mile) ³	0.56	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) ⁴	8	hours

¹ DPM emissions taken as PM₁₀ exhaust emissions from CalEEMod average daily emissions.

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

³ Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.56-mile route within 1,000 of the project site.

⁴ Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App C - Air Dispersion Model Output Files).

Average Daily Emissions and Emission Rates: Mitigated Scenario with Tier 4 Engines, Option 2

Onsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Average Daily Emissions (lbs/hr)	Emission Rate (g/s)	# of Workdays/Year	Construction Duration ²
All Subphases	2022	0.0112	22.36	153	0.15	1.83E-02	2.30E-03	260	0.59
	2023	0.0123	24.56	260	0.09	1.18E-02	1.49E-03	260	1.00
	2024	0.0087	17.44	262	0.07	8.32E-03	1.05E-03	262	1.00
	2025	0.0066	13.20	195	0.07	8.46E-03	1.07E-03	261	0.75
	2026	0.0078	15.54	239	0.07	8.13E-03	1.02E-03	261	0.92
	2027	0.0085	16.96	261	0.06	8.12E-03	1.02E-03	261	1.00
	2028	0.0023	4.66	65	0.07	8.96E-03	1.13E-03	260	0.25

Offsite Construction PM10 Exhaust Emissions¹

	Year	Annual PM10 Exhaust Emissions (Tons/Year)	Annual PM10 Exhaust Emissions (lbs/Year)	# of Construction Days/Year	Average Daily Emissions (lbs/day)	Hauling Emissions w/in 1,000 ft (lbs/day) ³	Emission Rate (lbs/hr)	Emission Rate (g/s)
All Subphases	2022	0.0023	4.66	153	3.05E-02	8.47E-04	1.06E-04	1.33E-05
	2023	0.0090	18.08	260	6.95E-02	1.93E-03	2.42E-04	3.05E-05
	2024	0.0087	17.40	262	6.64E-02	1.85E-03	2.31E-04	2.91E-05
	2025	0.0066	13.16	195	6.75E-02	1.88E-03	2.35E-04	2.96E-05
	2026	0.0065	13.02	239	5.45E-02	1.52E-03	1.89E-04	2.39E-05
	2027	0.0068	13.52	261	5.18E-02	1.44E-03	1.80E-04	2.27E-05
	2028	0.0016	3.18	65	4.89E-02	1.36E-03	1.70E-04	2.14E-05

Note: Emissions evenly distributed over 47 modeled volume sources.

	Offsite	
Hauling Length (miles)	20.0	miles
Haul Length within 1,000 ft of Site (mile) ³	0.56	miles
Hours per work day (7:00 AM to 4:00 PM, 1-hour of breaks) ⁴	8	hours

¹ DPM emissions taken as PM₁₀ exhaust emissions from CalEEMod average daily emissions.

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App C - Risk Calculations).

³ Emissions from CalEEMod offsite average daily emissions, which is based on proportioned haul truck trip distances, are adjusted to evaluate emissions from the 0.56-mile route within 1,000 of the project site.

⁴ Work hours applied in By Hour/Day (HRDOW) variable emissions module in air dispersion model (see App C - Air Dispersion Model Output Files).

Appendix B. Air Dispersion Model Output

Control Pathway

AERMOD

Dispersion Options

Titles Construction HRA BRE-A-03.3, Brea Mall Redevelopment	
Dispersion Options ☒ Regulatory Default ☐ Non-Default Options	Dispersion Coefficient Urban Population: Name (Optional): Roughness Length:
	Output Type ☒ Concentration ☐ Total Deposition (Dry & Wet) ☐ Dry Deposition ☐ Wet Deposition
	Plume Depletion ☐ Dry Removal ☐ Wet Removal
	Output Warnings ☐ No Output Warnings ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type Averaging Time Options Hours ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☐ 24 ☐ Month ☒ Period ☐ Annual	Exponential Decay Half-life of 4.16 sec will be used Terrain Height Options ☐ Flat ☒ Elevated SO: Meters RE: Meters TG: Meters
Flagpole Receptors ☐ Yes ☒ No Default Height = 0.00 m	

Optional Files



Re-Start File



Init File



Multi-Year Analyses



Event Input File



Error Listing File

Detailed Error Listing File

Filename: brea.err

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: ..\met data\KFUL_v9.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: ..\met data\KFUL_v9.PFL

Format Type: Default AERMET format

Wind Speed



Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 29.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2012			
Upper Air		2012			

Data Period

Data Period to Process

Start Date: 1/1/2012

Start Hour: 1

End Date: 12/31/2016

End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Polygon Area Sources

Source Type: AREA POLY

Source: 1 (onsite)

Base Elevation (Optional)	Release Height [m]	Emission Rate [g/ (s-m^2)]	Initial Vertical Dim. [m]	Number of Vertices (or sides)	X Coordinate for Vertices [m]	Y Coordinate for Vertices [m]
105.81	4.15	0.00001	1.93	27	417764.71	3753093.80
		0.00001			417850.32	3753092.36
		0.00001			417848.89	3753127.62
		0.00001			417920.12	3753126.90
		0.00001			417932.35	3753138.41
		0.00001			417966.16	3753106.03
		0.00001			417956.81	3753096.68
		0.00001			418007.17	3753047.76
		0.00001			418028.04	3753044.88
		0.00001			418038.83	3753054.95
		0.00001			418079.12	3753045.60
		0.00001			418079.84	3752917.53
		0.00001			418064.01	3752917.53
		0.00001			418064.73	3752903.86
		0.00001			418042.43	3752903.14
		0.00001			418030.20	3752893.78
		0.00001			418017.97	3752872.92
		0.00001			418006.45	3752862.13
		0.00001			417932.35	3752831.19
		0.00001			417910.04	3752826.87
		0.00001			417881.98	3752832.63
		0.00001			417813.63	3752864.29
		0.00001			417802.84	3752880.11
		0.00001			417799.96	3752983.00
		0.00001			417776.94	3752983.00
		0.00001			417777.66	3752991.64
		0.00001			417762.55	3752991.64

Source Pathway - Source Inputs

AERMOD

Line Volume Sources

Source Type: LINE VOLUME

Source: 2 (offsite)

Length of Side [m]	Emission Rate [g/ s]	Building Height [m]	X Coordinate for Points [m]	Y Coordinate for points [m]	Base Elevation [m]	Release Height [m]
18.90	1.00000		417753.44	3753096.86	105.80	4.15
			417745.72	3752820.01	98.50	4.15
			417925.51	3752735.07	101.05	4.15
			418075.52	3752665.58	102.19	4.15
			418131.78	3752646.83	103.57	4.15
			418220.02	3752625.88	104.84	4.15
			418323.70	3752612.64	96.40	4.15

Source Pathway - Source Inputs

AERMOD

Volume Sources Generated from Line Sources

Line Source ID	Volume Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dimension [m]	Initial Vertical Dimension [m]
2	L0000001	417753.18	3753087.42	106.16	4.15	0.02128	18.90		8.79	1.93
	L0000002	417752.65	3753068.53	105.48	4.15	0.02128	18.90		8.79	1.93
	L0000003	417752.12	3753049.64	104.68	4.15	0.02128	18.90		8.79	1.93
	L0000004	417751.60	3753030.75	103.94	4.15	0.02128	18.90		8.79	1.93
	L0000005	417751.07	3753011.86	103.24	4.15	0.02128	18.90		8.79	1.93
	L0000006	417750.54	3752992.97	102.59	4.15	0.02128	18.90		8.79	1.93
	L0000007	417750.02	3752974.08	101.92	4.15	0.02128	18.90		8.79	1.93
	L0000008	417749.49	3752955.19	101.23	4.15	0.02128	18.90		8.79	1.93
	L0000009	417748.96	3752936.30	100.56	4.15	0.02128	18.90		8.79	1.93
	L0000010	417748.44	3752917.41	99.90	4.15	0.02128	18.90		8.79	1.93
	L0000011	417747.91	3752898.52	99.38	4.15	0.02128	18.90		8.79	1.93
	L0000012	417747.38	3752879.63	98.98	4.15	0.02128	18.90		8.79	1.93
	L0000013	417746.86	3752860.74	98.78	4.15	0.02128	18.90		8.79	1.93
	L0000014	417746.33	3752841.85	98.75	4.15	0.02128	18.90		8.79	1.93
	L0000015	417745.80	3752822.96	98.77	4.15	0.02128	18.90		8.79	1.93
	L0000016	417760.14	3752813.19	99.16	4.15	0.02128	18.90		8.79	1.93
	L0000017	417777.23	3752805.12	99.55	4.15	0.02128	18.90		8.79	1.93
	L0000018	417794.32	3752797.05	99.70	4.15	0.02128	18.90		8.79	1.93
	L0000019	417811.40	3752788.98	99.97	4.15	0.02128	18.90		8.79	1.93
	L0000020	417828.49	3752780.91	100.32	4.15	0.02128	18.90		8.79	1.93
	L0000021	417845.58	3752772.84	100.58	4.15	0.02128	18.90		8.79	1.93
	L0000022	417862.66	3752764.76	100.78	4.15	0.02128	18.90		8.79	1.93
	L0000023	417879.75	3752756.69	101.21	4.15	0.02128	18.90		8.79	1.93
	L0000024	417896.84	3752748.62	101.36	4.15	0.02128	18.90		8.79	1.93

Source Pathway - Source Inputs

AERMOD

Line Source ID	Volume Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation [m]	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dimension [m]	Initial Vertical Dimension [m]
2	L0000025	417913.92	3752740.55	101.17	4.15	0.02128	18.90		8.79	1.93
	L0000026	417931.03	3752732.52	101.08	4.15	0.02128	18.90		8.79	1.93
	L0000027	417948.18	3752724.58	101.26	4.15	0.02128	18.90		8.79	1.93
	L0000028	417965.32	3752716.63	101.49	4.15	0.02128	18.90		8.79	1.93
	L0000029	417982.47	3752708.69	101.52	4.15	0.02128	18.90		8.79	1.93
	L0000030	417999.62	3752700.75	101.52	4.15	0.02128	18.90		8.79	1.93
	L0000031	418016.77	3752692.80	101.72	4.15	0.02128	18.90		8.79	1.93
	L0000032	418033.91	3752684.86	101.85	4.15	0.02128	18.90		8.79	1.93
	L0000033	418051.06	3752676.92	101.95	4.15	0.02128	18.90		8.79	1.93
	L0000034	418068.21	3752668.97	102.09	4.15	0.02128	18.90		8.79	1.93
	L0000035	418085.80	3752662.16	102.53	4.15	0.02128	18.90		8.79	1.93
	L0000036	418103.73	3752656.18	102.88	4.15	0.02128	18.90		8.79	1.93
	L0000037	418121.66	3752650.21	103.24	4.15	0.02128	18.90		8.79	1.93
	L0000038	418139.79	3752644.93	103.69	4.15	0.02128	18.90		8.79	1.93
	L0000039	418158.17	3752640.56	104.24	4.15	0.02128	18.90		8.79	1.93
	L0000040	418176.56	3752636.20	104.75	4.15	0.02128	18.90		8.79	1.93
	L0000041	418194.94	3752631.83	104.92	4.15	0.02128	18.90		8.79	1.93
	L0000042	418213.33	3752627.46	104.95	4.15	0.02128	18.90		8.79	1.93
	L0000043	418231.95	3752624.35	104.97	4.15	0.02128	18.90		8.79	1.93
	L0000044	418250.69	3752621.96	104.90	4.15	0.02128	18.90		8.79	1.93
	L0000045	418269.44	3752619.57	103.31	4.15	0.02128	18.90		8.79	1.93
	L0000046	418288.18	3752617.17	100.43	4.15	0.02128	18.90		8.79	1.93
	L0000047	418306.93	3752614.78	97.51	4.15	0.02128	18.90		8.79	1.93

Source Pathway

AERMOD

Building Downwash Information

Option not in use

Emission Rate Units for Output

For Concentration

Unit Factor: 1E6
Emission Unit Label: GRAMS/SEC
Concentration Unit Label: MICROGRAMS/M**3

Source Groups

Source Group ID: Onsite	List of Sources in Group (Source Range or Single Sources)
	1
Source Group ID: Offsite	List of Sources in Group (Source Range or Single Sources)
	2

Variable Emissions

Source Pathway

AERMOD

Hour-of-Day / Day-of-Week Emission Rate Variation

Scenario: work

Source ID: 1

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	1.00	1.00	1.00	1.00	1.00
Day	13 - 18	0.00	1.00	1.00	1.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Saturday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Sunday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Source ID: 2

Weekdays

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	1.00	1.00	1.00	1.00	1.00
Day	13 - 18	0.00	1.00	1.00	1.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Saturday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Sunday

Hour	1 - 6	0.00	0.00	0.00	0.00	0.00	0.00
of	7 - 12	0.00	0.00	0.00	0.00	0.00	0.00
Day	13 - 18	0.00	0.00	0.00	0.00	0.00	0.00
	19 - 24	0.00	0.00	0.00	0.00	0.00	0.00

Receptor Pathway

AERMOD

Receptor Networks

Note: Terrain Elevations and Flagpole Heights for Network Grids are in Page RE2 - 1 (If applicable)
Generated Discrete Receptors for Multi-Tier (Risk) Grid and Receptor Locations for Fenceline Grid are in Page RE3 - 1 (If applicable)

Discrete Receptors

Discrete Cartesian Receptors

Record Number	X-Coordinate [m]	Y-Coordinate [m]	Group Name (Optional)	Terrain Elevations	Flagpole Heights [m] (Optional)
1	417557.71	3752959.10	UCART1	105.40	
2	417577.71	3752959.10	UCART1	104.97	
3	417592.49	3752963.28	UCART1	103.94	
4	417517.71	3752979.10	UCART1	106.02	
5	417537.71	3752979.10	UCART1	106.12	
6	417557.71	3752979.10	UCART1	106.02	
7	417577.71	3752979.10	UCART1	105.46	
8	417592.49	3752983.28	UCART1	104.15	
9	417517.71	3752999.10	UCART1	106.82	
10	417537.71	3752999.10	UCART1	106.31	
11	417557.71	3752999.10	UCART1	105.94	
12	417577.71	3752999.10	UCART1	105.15	
13	417592.49	3753003.28	UCART1	103.74	
14	417437.71	3753019.10	UCART1	107.78	
15	417457.71	3753019.10	UCART1	108.09	
16	417477.71	3753019.10	UCART1	108.26	
17	417497.71	3753019.10	UCART1	108.11	
18	417517.71	3753019.10	UCART1	107.38	
19	417537.71	3753019.10	UCART1	106.20	
20	417557.71	3753019.10	UCART1	105.52	
21	417577.71	3753019.10	UCART1	104.55	
22	417592.49	3753023.28	UCART1	103.20	
23	417397.71	3753039.10	UCART1	109.13	
24	417417.71	3753039.10	UCART1	108.97	
25	417437.71	3753039.10	UCART1	108.75	
26	417457.71	3753039.10	UCART1	108.75	
27	417477.71	3753039.10	UCART1	108.78	
28	417497.71	3753039.10	UCART1	108.45	
29	417517.71	3753039.10	UCART1	107.34	
30	417537.71	3753039.10	UCART1	105.60	

Receptor Pathway

AERMOD

31	417557.71	3753039.10	UCART1	104.64
32	417577.71	3753039.10	UCART1	103.59
33	417592.49	3753043.28	UCART1	102.53
34	417337.71	3753059.10	UCART1	107.63
35	417357.71	3753059.10	UCART1	108.62
36	417377.71	3753059.10	UCART1	109.56
37	417397.71	3753059.10	UCART1	109.80
38	417417.71	3753059.10	UCART1	109.68
39	417437.71	3753059.10	UCART1	109.43
40	417457.71	3753059.10	UCART1	109.29
41	417477.71	3753059.10	UCART1	109.23
42	417497.71	3753059.10	UCART1	108.45
43	417517.71	3753059.10	UCART1	106.82
44	417537.71	3753059.10	UCART1	104.67
45	417557.71	3753059.10	UCART1	103.59
46	417577.71	3753059.10	UCART1	102.63
47	417592.49	3753063.28	UCART1	101.87
48	417337.71	3753079.10	UCART1	108.23
49	417357.71	3753079.10	UCART1	109.21
50	417377.71	3753079.10	UCART1	110.01
51	417397.71	3753079.10	UCART1	110.26
52	417417.71	3753079.10	UCART1	110.16
53	417437.71	3753079.10	UCART1	109.88
54	417457.71	3753079.10	UCART1	109.70
55	417477.71	3753079.10	UCART1	109.59
56	417497.71	3753079.10	UCART1	108.33
57	417517.71	3753079.10	UCART1	106.16
58	417537.71	3753079.10	UCART1	103.64
59	417557.71	3753079.10	UCART1	102.51
60	417577.71	3753079.10	UCART1	101.69
61	417592.49	3753083.28	UCART1	101.21
62	417337.71	3753099.10	UCART1	108.79
63	417357.71	3753099.10	UCART1	109.59
64	417377.71	3753099.10	UCART1	110.24
65	417397.71	3753099.10	UCART1	110.39
66	417417.71	3753099.10	UCART1	110.15
67	417437.71	3753099.10	UCART1	109.79
68	417457.71	3753099.10	UCART1	109.73

Receptor Pathway

AERMOD

69	417477.71	3753099.10	UCART1	109.68
70	417497.71	3753099.10	UCART1	108.07
71	417517.71	3753099.10	UCART1	105.45
72	417537.71	3753099.10	UCART1	102.62
73	417557.71	3753099.10	UCART1	101.51
74	417577.71	3753099.10	UCART1	100.86
75	417592.49	3753103.28	UCART1	100.55
76	417337.71	3753119.10	UCART1	109.31
77	417357.71	3753119.10	UCART1	109.88
78	417377.71	3753119.10	UCART1	110.36
79	417397.71	3753119.10	UCART1	110.30
80	417417.71	3753119.10	UCART1	109.85
81	417437.71	3753119.10	UCART1	109.32
82	417457.71	3753119.10	UCART1	109.24
83	417477.71	3753119.10	UCART1	108.93
84	417497.71	3753119.10	UCART1	107.30
85	417517.71	3753119.10	UCART1	104.81
86	417537.71	3753119.10	UCART1	102.09
87	417557.71	3753119.10	UCART1	100.91
88	417577.71	3753119.10	UCART1	100.33
89	417592.49	3753123.28	UCART1	100.13
90	417337.71	3753139.10	UCART1	109.81
91	417357.71	3753139.10	UCART1	110.13
92	417377.71	3753139.10	UCART1	110.42
93	417397.71	3753139.10	UCART1	110.13
94	417417.71	3753139.10	UCART1	109.46
95	417437.71	3753139.10	UCART1	108.76
96	417457.71	3753139.10	UCART1	108.60
97	417477.71	3753139.10	UCART1	107.95
98	417497.71	3753139.10	UCART1	106.46
99	417517.71	3753139.10	UCART1	104.31
100	417537.71	3753139.10	UCART1	101.92
101	417557.71	3753139.10	UCART1	100.72
102	417577.71	3753139.10	UCART1	100.21
103	417592.49	3753143.28	UCART1	100.40
104	417337.71	3753159.10	UCART1	110.38
105	417357.71	3753159.10	UCART1	110.57
106	417377.71	3753159.10	UCART1	110.62

Receptor Pathway

AERMOD

107	417397.71	3753159.10	UCART1	110.27
108	417417.71	3753159.10	UCART1	109.60
109	417437.71	3753159.10	UCART1	108.90
110	417457.71	3753159.10	UCART1	108.71
111	417477.71	3753159.10	UCART1	108.06
112	417497.71	3753159.10	UCART1	106.57
113	417517.71	3753159.10	UCART1	104.55
114	417337.71	3753179.10	UCART1	110.84
115	417357.71	3753179.10	UCART1	110.90
116	417377.71	3753179.10	UCART1	110.76
117	417397.71	3753179.10	UCART1	110.29
118	417417.71	3753179.10	UCART1	109.60
119	417437.71	3753179.10	UCART1	108.96
120	417457.71	3753179.10	UCART1	108.85
121	417477.71	3753179.10	UCART1	108.43
122	417497.71	3753179.10	UCART1	107.03
123	417517.71	3753179.10	UCART1	105.02
124	417337.71	3753199.10	UCART1	111.21
125	417357.71	3753199.10	UCART1	111.16
126	417377.71	3753199.10	UCART1	110.83
127	417397.71	3753199.10	UCART1	110.21
128	417417.71	3753199.10	UCART1	109.48
129	417437.71	3753199.10	UCART1	108.92
130	417457.71	3753199.10	UCART1	108.94
131	417477.71	3753199.10	UCART1	108.86
132	417497.71	3753199.10	UCART1	107.61
133	417517.71	3753199.10	UCART1	105.61
134	417337.71	3753219.10	UCART1	111.29
135	417357.71	3753219.10	UCART1	111.24
136	417377.71	3753219.10	UCART1	110.86
137	417397.71	3753219.10	UCART1	109.87
138	417417.71	3753219.10	UCART1	108.75
139	417437.71	3753219.10	UCART1	107.86
140	417457.71	3753219.10	UCART1	107.62
141	417477.71	3753219.10	UCART1	107.64
142	417497.71	3753219.10	UCART1	106.97
143	417517.71	3753219.10	UCART1	105.61
144	417337.71	3753239.10	UCART1	111.09

Receptor Pathway

AERMOD

145	417357.71	3753239.10	UCART1	110.97
146	417377.71	3753239.10	UCART1	110.51
147	417397.71	3753239.10	UCART1	109.28
148	417417.71	3753239.10	UCART1	107.90
149	417437.71	3753239.10	UCART1	106.74
150	417457.71	3753239.10	UCART1	106.20
151	417477.71	3753239.10	UCART1	106.20
152	417497.71	3753239.10	UCART1	105.95
153	417517.71	3753239.10	UCART1	105.22
154	417337.71	3753259.10	UCART1	110.58
155	417357.71	3753259.10	UCART1	110.27
156	417377.71	3753259.10	UCART1	109.74
157	417397.71	3753259.10	UCART1	108.41
158	417417.71	3753259.10	UCART1	106.90
159	417437.71	3753259.10	UCART1	105.57
160	417457.71	3753259.10	UCART1	104.70
161	417477.71	3753259.10	UCART1	104.56
162	417497.71	3753259.10	UCART1	104.61
163	417517.71	3753259.10	UCART1	104.48
164	417337.71	3753279.10	UCART1	109.85
165	417357.71	3753279.10	UCART1	109.42
166	417377.71	3753279.10	UCART1	108.74
167	417397.71	3753279.10	UCART1	107.33
168	417417.71	3753279.10	UCART1	105.79
169	417437.71	3753279.10	UCART1	104.50
170	417457.71	3753279.10	UCART1	103.82
171	417477.71	3753279.10	UCART1	103.76
172	417497.71	3753279.10	UCART1	104.05
173	417517.71	3753279.10	UCART1	104.27
174	417337.71	3753299.10	UCART1	109.00
175	417357.71	3753299.10	UCART1	108.46
176	417377.71	3753299.10	UCART1	107.70
177	417397.71	3753299.10	UCART1	106.31
178	417417.71	3753299.10	UCART1	104.81
179	417437.71	3753299.10	UCART1	103.56
180	417457.71	3753299.10	UCART1	103.02
181	417477.71	3753299.10	UCART1	103.07
182	417497.71	3753299.10	UCART1	103.59

Receptor Pathway

AERMOD

183	417517.71	3753299.10	UCART1	104.14
184	417337.71	3753319.10	UCART1	107.98
185	417357.71	3753319.10	UCART1	107.34
186	417377.71	3753319.10	UCART1	106.62
187	417397.71	3753319.10	UCART1	105.42
188	417417.71	3753319.10	UCART1	104.04
189	417437.71	3753319.10	UCART1	102.79
190	417457.71	3753319.10	UCART1	102.31
191	417477.71	3753319.10	UCART1	102.51
192	417497.71	3753319.10	UCART1	103.24
193	417517.71	3753319.10	UCART1	104.11
194	417537.71	3753319.10	UCART1	104.73
195	417557.71	3753319.10	UCART1	105.16
196	417577.71	3753319.10	UCART1	105.64
197	417597.71	3753319.10	UCART1	106.27
198	417617.71	3753319.10	UCART1	107.06
199	417337.71	3753339.10	UCART1	106.60
200	417357.71	3753339.10	UCART1	106.10
201	417377.71	3753339.10	UCART1	105.54
202	417397.71	3753339.10	UCART1	104.65
203	417417.71	3753339.10	UCART1	103.54
204	417437.71	3753339.10	UCART1	102.46
205	417457.71	3753339.10	UCART1	102.22
206	417477.71	3753339.10	UCART1	102.67
207	417497.71	3753339.10	UCART1	103.49
208	417517.71	3753339.10	UCART1	104.43
209	417537.71	3753339.10	UCART1	105.26
210	417557.71	3753339.10	UCART1	105.95
211	417577.71	3753339.10	UCART1	106.52
212	417597.71	3753339.10	UCART1	107.02
213	417617.71	3753339.10	UCART1	107.48
214	417337.71	3753359.10	UCART1	105.27
215	417357.71	3753359.10	UCART1	104.96
216	417377.71	3753359.10	UCART1	104.54
217	417397.71	3753359.10	UCART1	103.89
218	417417.71	3753359.10	UCART1	103.05
219	417437.71	3753359.10	UCART1	102.24
220	417457.71	3753359.10	UCART1	102.28

Receptor Pathway

AERMOD

221	417477.71	3753359.10	UCART1	102.98
222	417497.71	3753359.10	UCART1	103.89
223	417517.71	3753359.10	UCART1	104.86
224	417537.71	3753359.10	UCART1	105.76
225	417557.71	3753359.10	UCART1	106.54
226	417577.71	3753359.10	UCART1	107.11
227	417597.71	3753359.10	UCART1	107.50
228	417617.71	3753359.10	UCART1	107.73
229	417337.71	3753379.10	UCART1	104.24
230	417357.71	3753379.10	UCART1	104.13
231	417377.71	3753379.10	UCART1	103.71
232	417397.71	3753379.10	UCART1	103.09
233	417417.71	3753379.10	UCART1	102.48
234	417437.71	3753379.10	UCART1	102.12
235	417457.71	3753379.10	UCART1	102.48
236	417477.71	3753379.10	UCART1	103.40
237	417497.71	3753379.10	UCART1	104.47
238	417517.71	3753379.10	UCART1	105.46
239	417537.71	3753379.10	UCART1	106.18
240	417557.71	3753379.10	UCART1	106.79
241	417577.71	3753379.10	UCART1	107.26
242	417597.71	3753379.10	UCART1	107.58
243	417617.71	3753379.10	UCART1	107.75
244	417347.11	3752405.97	UCART1	101.92
245	417367.11	3752405.97	UCART1	102.00
246	417387.11	3752405.97	UCART1	101.97
247	417407.11	3752405.97	UCART1	101.95
248	417427.11	3752405.97	UCART1	102.08
249	417447.11	3752405.97	UCART1	102.37
250	417467.11	3752405.97	UCART1	102.51
251	417487.11	3752405.97	UCART1	102.55
252	417507.11	3752405.97	UCART1	102.50
253	417527.11	3752405.97	UCART1	102.31
254	417547.11	3752405.97	UCART1	102.47
255	417567.11	3752405.97	UCART1	102.68
256	417587.11	3752405.97	UCART1	102.90
257	417607.11	3752405.97	UCART1	103.12
258	417627.11	3752405.97	UCART1	103.17

Receptor Pathway

AERMOD

259	417647.11	3752405.97	UCART1	103.14
260	417667.11	3752405.97	UCART1	102.91
261	417687.11	3752405.97	UCART1	102.46
262	417707.11	3752405.97	UCART1	101.81
263	417347.11	3752425.97	UCART1	102.03
264	417367.11	3752425.97	UCART1	102.10
265	417387.11	3752425.97	UCART1	102.21
266	417407.11	3752425.97	UCART1	102.40
267	417427.11	3752425.97	UCART1	102.68
268	417447.11	3752425.97	UCART1	102.89
269	417467.11	3752425.97	UCART1	102.93
270	417487.11	3752425.97	UCART1	102.91
271	417507.11	3752425.97	UCART1	102.86
272	417527.11	3752425.97	UCART1	102.65
273	417547.11	3752425.97	UCART1	102.64
274	417567.11	3752425.97	UCART1	102.73
275	417587.11	3752425.97	UCART1	102.89
276	417607.11	3752425.97	UCART1	103.12
277	417627.11	3752425.97	UCART1	103.27
278	417647.11	3752425.97	UCART1	103.28
279	417667.11	3752425.97	UCART1	103.10
280	417687.11	3752425.97	UCART1	102.71
281	417707.11	3752425.97	UCART1	101.98
282	417347.11	3752445.97	UCART1	102.42
283	417367.11	3752445.97	UCART1	102.51
284	417387.11	3752445.97	UCART1	102.68
285	417407.11	3752445.97	UCART1	102.87
286	417427.11	3752445.97	UCART1	103.10
287	417447.11	3752445.97	UCART1	103.22
288	417467.11	3752445.97	UCART1	103.22
289	417487.11	3752445.97	UCART1	103.18
290	417507.11	3752445.97	UCART1	103.13
291	417527.11	3752445.97	UCART1	103.02
292	417547.11	3752445.97	UCART1	103.03
293	417567.11	3752445.97	UCART1	102.98
294	417587.11	3752445.97	UCART1	102.92
295	417607.11	3752445.97	UCART1	102.93
296	417627.11	3752445.97	UCART1	103.06

Receptor Pathway

AERMOD

297	417647.11	3752445.97	UCART1	102.90
298	417667.11	3752445.97	UCART1	102.56
299	417687.11	3752445.97	UCART1	102.09
300	417707.11	3752445.97	UCART1	101.49
301	417347.11	3752465.97	UCART1	102.89
302	417367.11	3752465.97	UCART1	102.95
303	417387.11	3752465.97	UCART1	103.13
304	417407.11	3752465.97	UCART1	103.30
305	417427.11	3752465.97	UCART1	103.45
306	417447.11	3752465.97	UCART1	103.50
307	417467.11	3752465.97	UCART1	103.49
308	417487.11	3752465.97	UCART1	103.45
309	417507.11	3752465.97	UCART1	103.41
310	417527.11	3752465.97	UCART1	103.36
311	417547.11	3752465.97	UCART1	103.36
312	417567.11	3752465.97	UCART1	103.20
313	417587.11	3752465.97	UCART1	102.92
314	417607.11	3752465.97	UCART1	102.63
315	417627.11	3752465.97	UCART1	102.67
316	417647.11	3752465.97	UCART1	102.42
317	417667.11	3752465.97	UCART1	102.03
318	417687.11	3752465.97	UCART1	101.60
319	417707.11	3752465.97	UCART1	101.17
320	417347.11	3752485.97	UCART1	103.43
321	417367.11	3752485.97	UCART1	103.36
322	417387.11	3752485.97	UCART1	103.47
323	417407.11	3752485.97	UCART1	103.63
324	417427.11	3752485.97	UCART1	103.69
325	417447.11	3752485.97	UCART1	103.77
326	417467.11	3752485.97	UCART1	103.78
327	417487.11	3752485.97	UCART1	103.76
328	417507.11	3752485.97	UCART1	103.74
329	417527.11	3752485.97	UCART1	103.66
330	417547.11	3752485.97	UCART1	103.59
331	417567.11	3752485.97	UCART1	103.35
332	417587.11	3752485.97	UCART1	102.89
333	417607.11	3752485.97	UCART1	102.21
334	417627.11	3752485.97	UCART1	102.07

Receptor Pathway

AERMOD

335	417647.11	3752485.97	UCART1	101.80
336	417667.11	3752485.97	UCART1	101.52
337	417687.11	3752485.97	UCART1	101.27
338	417707.11	3752485.97	UCART1	101.03
339	417347.11	3752505.97	UCART1	103.94
340	417367.11	3752505.97	UCART1	103.75
341	417387.11	3752505.97	UCART1	103.77
342	417407.11	3752505.97	UCART1	103.89
343	417427.11	3752505.97	UCART1	103.98
344	417447.11	3752505.97	UCART1	104.09
345	417467.11	3752505.97	UCART1	104.09
346	417487.11	3752505.97	UCART1	104.05
347	417507.11	3752505.97	UCART1	104.03
348	417527.11	3752505.97	UCART1	103.97
349	417547.11	3752505.97	UCART1	103.86
350	417567.11	3752505.97	UCART1	103.51
351	417587.11	3752505.97	UCART1	102.90
352	417607.11	3752505.97	UCART1	102.09
353	417627.11	3752505.97	UCART1	101.76
354	417647.11	3752505.97	UCART1	101.63
355	417667.11	3752505.97	UCART1	101.48
356	417687.11	3752505.97	UCART1	101.08
357	417707.11	3752505.97	UCART1	100.09
358	417347.11	3752525.97	UCART1	104.42
359	417367.11	3752525.97	UCART1	104.15
360	417387.11	3752525.97	UCART1	104.07
361	417407.11	3752525.97	UCART1	104.15
362	417427.11	3752525.97	UCART1	104.28
363	417447.11	3752525.97	UCART1	104.41
364	417467.11	3752525.97	UCART1	104.40
365	417487.11	3752525.97	UCART1	104.34
366	417507.11	3752525.97	UCART1	104.29
367	417527.11	3752525.97	UCART1	104.28
368	417547.11	3752525.97	UCART1	104.13
369	417567.11	3752525.97	UCART1	103.65
370	417587.11	3752525.97	UCART1	102.90
371	417607.11	3752525.97	UCART1	102.05
372	417627.11	3752525.97	UCART1	101.56

Receptor Pathway

AERMOD

373	417647.11	3752525.97	UCART1	101.50
374	417667.11	3752525.97	UCART1	101.24
375	417687.11	3752525.97	UCART1	100.32
376	417707.11	3752525.97	UCART1	98.51
377	417347.11	3752545.97	UCART1	104.86
378	417367.11	3752545.97	UCART1	104.58
379	417387.11	3752545.97	UCART1	104.45
380	417407.11	3752545.97	UCART1	104.46
381	417427.11	3752545.97	UCART1	104.58
382	417447.11	3752545.97	UCART1	104.65
383	417467.11	3752545.97	UCART1	104.66
384	417487.11	3752545.97	UCART1	104.62
385	417507.11	3752545.97	UCART1	104.56
386	417527.11	3752545.97	UCART1	104.61
387	417547.11	3752545.97	UCART1	104.38
388	417567.11	3752545.97	UCART1	103.75
389	417587.11	3752545.97	UCART1	102.88
390	417607.11	3752545.97	UCART1	102.07
391	417627.11	3752545.97	UCART1	101.50
392	417647.11	3752545.97	UCART1	101.36
393	417667.11	3752545.97	UCART1	100.56
394	417687.11	3752545.97	UCART1	98.56
395	417707.11	3752545.97	UCART1	96.00
396	417347.11	3752565.97	UCART1	105.24
397	417367.11	3752565.97	UCART1	105.00
398	417387.11	3752565.97	UCART1	104.86
399	417407.11	3752565.97	UCART1	104.83
400	417427.11	3752565.97	UCART1	104.91
401	417447.11	3752565.97	UCART1	104.95
402	417467.11	3752565.97	UCART1	104.98
403	417487.11	3752565.97	UCART1	104.94
404	417507.11	3752565.97	UCART1	104.82
405	417527.11	3752565.97	UCART1	104.75
406	417547.11	3752565.97	UCART1	104.35
407	417567.11	3752565.97	UCART1	103.60
408	417587.11	3752565.97	UCART1	102.75
409	417607.11	3752565.97	UCART1	102.20
410	417627.11	3752565.97	UCART1	101.76

Receptor Pathway

AERMOD

411	417647.11	3752565.97	UCART1	101.52
412	417667.11	3752565.97	UCART1	100.78
413	417687.11	3752565.97	UCART1	99.08
414	417707.11	3752565.97	UCART1	96.34
415	417347.11	3752585.97	UCART1	105.58
416	417367.11	3752585.97	UCART1	105.40
417	417387.11	3752585.97	UCART1	105.28
418	417407.11	3752585.97	UCART1	105.23
419	417427.11	3752585.97	UCART1	105.23
420	417447.11	3752585.97	UCART1	105.27
421	417467.11	3752585.97	UCART1	105.29
422	417487.11	3752585.97	UCART1	105.23
423	417507.11	3752585.97	UCART1	105.08
424	417527.11	3752585.97	UCART1	104.85
425	417547.11	3752585.97	UCART1	104.30
426	417567.11	3752585.97	UCART1	103.52
427	417587.11	3752585.97	UCART1	102.79
428	417607.11	3752585.97	UCART1	102.53
429	417627.11	3752585.97	UCART1	102.28
430	417647.11	3752585.97	UCART1	101.96
431	417667.11	3752585.97	UCART1	101.35
432	417687.11	3752585.97	UCART1	100.13
433	417707.11	3752585.97	UCART1	97.42
434	417347.11	3752605.97	UCART1	105.86
435	417367.11	3752605.97	UCART1	105.73
436	417387.11	3752605.97	UCART1	105.65
437	417407.11	3752605.97	UCART1	105.58
438	417427.11	3752605.97	UCART1	105.48
439	417447.11	3752605.97	UCART1	105.52
440	417467.11	3752605.97	UCART1	105.51
441	417487.11	3752605.97	UCART1	105.44
442	417507.11	3752605.97	UCART1	105.27
443	417527.11	3752605.97	UCART1	104.95
444	417547.11	3752605.97	UCART1	104.42
445	417567.11	3752605.97	UCART1	103.85
446	417587.11	3752605.97	UCART1	103.42
447	417607.11	3752605.97	UCART1	103.34
448	417627.11	3752605.97	UCART1	103.26

Receptor Pathway

AERMOD

449	417647.11	3752605.97	UCART1	102.93
450	417667.11	3752605.97	UCART1	102.35
451	417687.11	3752605.97	UCART1	101.38
452	417707.11	3752605.97	UCART1	98.97
453	417347.11	3752625.97	UCART1	106.16
454	417367.11	3752625.97	UCART1	106.06
455	417387.11	3752625.97	UCART1	105.97
456	417407.11	3752625.97	UCART1	105.85
457	417427.11	3752625.97	UCART1	105.62
458	417447.11	3752625.97	UCART1	105.59
459	417467.11	3752625.97	UCART1	105.59
460	417487.11	3752625.97	UCART1	105.57
461	417507.11	3752625.97	UCART1	105.47
462	417527.11	3752625.97	UCART1	105.20
463	417547.11	3752625.97	UCART1	104.79
464	417567.11	3752625.97	UCART1	104.43
465	417587.11	3752625.97	UCART1	104.18
466	417607.11	3752625.97	UCART1	104.13
467	417627.11	3752625.97	UCART1	104.02
468	417647.11	3752625.97	UCART1	103.61
469	417667.11	3752625.97	UCART1	102.89
470	417687.11	3752625.97	UCART1	101.81
471	417707.11	3752625.97	UCART1	99.90
472	417347.11	3752645.97	UCART1	106.49
473	417367.11	3752645.97	UCART1	106.38
474	417387.11	3752645.97	UCART1	106.25
475	417407.11	3752645.97	UCART1	106.06
476	417427.11	3752645.97	UCART1	105.67
477	417447.11	3752645.97	UCART1	105.49
478	417467.11	3752645.97	UCART1	105.51
479	417487.11	3752645.97	UCART1	105.61
480	417507.11	3752645.97	UCART1	105.66
481	417527.11	3752645.97	UCART1	105.50
482	417547.11	3752645.97	UCART1	105.24
483	417567.11	3752645.97	UCART1	105.02
484	417587.11	3752645.97	UCART1	104.87
485	417607.11	3752645.97	UCART1	104.73
486	417627.11	3752645.97	UCART1	104.50

Receptor Pathway

AERMOD

487	417647.11	3752645.97	UCART1	103.94
488	417667.11	3752645.97	UCART1	102.99
489	417687.11	3752645.97	UCART1	101.66
490	417707.11	3752645.97	UCART1	100.16
491	417347.11	3752665.97	UCART1	106.75
492	417367.11	3752665.97	UCART1	106.69
493	417387.11	3752665.97	UCART1	106.51
494	417407.11	3752665.97	UCART1	106.13
495	417427.11	3752665.97	UCART1	105.48
496	417447.11	3752665.97	UCART1	104.84
497	417467.11	3752665.97	UCART1	104.86
498	417487.11	3752665.97	UCART1	105.28
499	417507.11	3752665.97	UCART1	105.73
500	417527.11	3752665.97	UCART1	105.75
501	417547.11	3752665.97	UCART1	105.49
502	417567.11	3752665.97	UCART1	105.21
503	417587.11	3752665.97	UCART1	104.94
504	417607.11	3752665.97	UCART1	104.48
505	417627.11	3752665.97	UCART1	104.08
506	417647.11	3752665.97	UCART1	103.23
507	417667.11	3752665.97	UCART1	101.95
508	417687.11	3752665.97	UCART1	100.36
509	417707.11	3752665.97	UCART1	98.86
510	417347.11	3752685.97	UCART1	106.78
511	417367.11	3752685.97	UCART1	106.80
512	417387.11	3752685.97	UCART1	106.56
513	417407.11	3752685.97	UCART1	105.96
514	417427.11	3752685.97	UCART1	104.98
515	417447.11	3752685.97	UCART1	104.07
516	417467.11	3752685.97	UCART1	104.13
517	417487.11	3752685.97	UCART1	104.75
518	417507.11	3752685.97	UCART1	105.38
519	417527.11	3752685.97	UCART1	105.37
520	417547.11	3752685.97	UCART1	105.13
521	417567.11	3752685.97	UCART1	104.83
522	417587.11	3752685.97	UCART1	104.46
523	417607.11	3752685.97	UCART1	103.83
524	417627.11	3752685.97	UCART1	103.31

Receptor Pathway

AERMOD

525	417647.11	3752685.97	UCART1	102.33
526	417667.11	3752685.97	UCART1	101.04
527	417347.11	3752705.97	UCART1	106.59
528	417367.11	3752705.97	UCART1	106.73
529	417387.11	3752705.97	UCART1	106.45
530	417407.11	3752705.97	UCART1	105.58
531	417427.11	3752705.97	UCART1	104.23
532	417447.11	3752705.97	UCART1	103.22
533	417467.11	3752705.97	UCART1	103.33
534	417487.11	3752705.97	UCART1	104.05
535	417507.11	3752705.97	UCART1	104.69
536	417527.11	3752705.97	UCART1	104.53
537	417547.11	3752705.97	UCART1	104.34
538	417567.11	3752705.97	UCART1	104.05
539	417587.11	3752705.97	UCART1	103.62
540	417607.11	3752705.97	UCART1	102.95
541	417627.11	3752705.97	UCART1	102.36
542	417347.11	3752725.97	UCART1	105.55
543	417367.11	3752725.97	UCART1	105.55
544	417387.11	3752725.97	UCART1	105.15
545	417407.11	3752725.97	UCART1	104.23
546	417427.11	3752725.97	UCART1	103.13
547	417447.11	3752725.97	UCART1	102.53
548	417467.11	3752725.97	UCART1	102.52
549	417487.11	3752725.97	UCART1	102.80
550	417507.11	3752725.97	UCART1	103.02
551	417527.11	3752725.97	UCART1	102.98
552	417547.11	3752725.97	UCART1	102.99
553	417567.11	3752725.97	UCART1	102.81
554	417587.11	3752725.97	UCART1	102.40
555	417347.11	3752745.97	UCART1	104.58
556	417367.11	3752745.97	UCART1	104.37
557	417387.11	3752745.97	UCART1	103.93
558	417407.11	3752745.97	UCART1	103.17
559	417427.11	3752745.97	UCART1	102.42
560	417447.11	3752745.97	UCART1	102.13
561	417467.11	3752745.97	UCART1	102.08
562	417487.11	3752745.97	UCART1	102.12

Receptor Pathway

AERMOD

563	417507.11	3752745.97	UCART1	102.07
564	417527.11	3752745.97	UCART1	102.00
565	417547.11	3752745.97	UCART1	102.02
566	417567.11	3752745.97	UCART1	101.87
567	417587.11	3752745.97	UCART1	101.53
568	417347.11	3752765.97	UCART1	103.71
569	417367.11	3752765.97	UCART1	103.22
570	417387.11	3752765.97	UCART1	102.81
571	417407.11	3752765.97	UCART1	102.43
572	417427.11	3752765.97	UCART1	102.13
573	417447.11	3752765.97	UCART1	102.04
574	417467.11	3752765.97	UCART1	102.02
575	417487.11	3752765.97	UCART1	101.98
576	417507.11	3752765.97	UCART1	101.78
577	417527.11	3752765.97	UCART1	101.55
578	417547.11	3752765.97	UCART1	101.38
579	417567.11	3752765.97	UCART1	101.19
580	417587.11	3752765.97	UCART1	100.95
581	417347.11	3752785.97	UCART1	103.42
582	417367.11	3752785.97	UCART1	102.99
583	417387.11	3752785.97	UCART1	102.79
584	417407.11	3752785.97	UCART1	102.74
585	417427.11	3752785.97	UCART1	102.70
586	417347.11	3752805.97	UCART1	103.54
587	417367.11	3752805.97	UCART1	103.25
588	417387.11	3752805.97	UCART1	103.23
589	417347.11	3752825.97	UCART1	104.26

Plant Boundary Receptors

Receptor Groups

Record Number	Group ID	Group Description
1	UCART1	Receptors generated from Uniform Cartesian Grid

Results Summary

Construction HRA
BREA-03.3, Brea Mall Redevelopment

Concentration - Source Group: OFFSITE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.74894	ug/m^3	417592.49	3752963.28	103.94	0.00	103.94	

Concentration - Source Group: ONSITE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
PERIOD		0.69937	ug/m^3	417592.49	3753003.28	103.74	0.00	103.74	

Appendix C. Construction Risk Calculations

Table C1
Residential MER Concentrations for Risk Calculations
Option 1

Contaminant	Source		Model Output ¹ (µg/m ³) (c)	Emission Rates ² (g/s) (d)	MER Conc. (µg/m ³) (e)	Total MER Conc. Annual Average (µg/m ³) (f)
(a)	(b)					
Unmitigated						
DPM	2022	On-Site Emissions	0.70	3.00E-02	2.10E-02	2.10E-02
		Truck Route	0.75	1.33E-05	1.00E-05	
	2023	On-Site Emissions	0.70	1.15E-02	8.02E-03	8.03E-03
		Truck Route	0.75	1.70E-05	1.27E-05	
	2024	On-Site Emissions	0.70	4.41E-03	3.09E-03	3.10E-03
		Truck Route	0.75	1.61E-05	1.20E-05	
	2025	On-Site Emissions	0.70	4.28E-03	2.99E-03	3.01E-03
		Truck Route	0.75	1.60E-05	1.20E-05	
Total DPM concentrations used for Cancer Risk and Chronic Hazard calculations						
Mitigated Run: Tier 4 Final Engines for eq. > 50 HP						
DPM	2022	On-Site Emissions	0.70	2.30E-03	1.61E-03	1.62E-03
		Truck Route	0.75	1.33E-05	1.00E-05	
	2023	On-Site Emissions	0.70	1.49E-03	1.04E-03	1.05E-03
		Truck Route	0.75	1.70E-05	1.27E-05	
	2024	On-Site Emissions	0.70	1.05E-03	7.33E-04	7.45E-04
		Truck Route	0.75	1.61E-05	1.20E-05	
	2025	On-Site Emissions	0.70	1.07E-03	7.46E-04	7.58E-04
		Truck Route	0.75	1.60E-05	1.20E-05	
Total DPM concentrations used for Cancer Risk and Chronic Hazard calculations						

Maximum Exposed Receptor (MER) UTM coordinates: 417592.49E, 3753003.28N

¹ Model Output at the MER based on unit emission rates for sources (1 g/s).

² Emission Rates from Emission Rate Calculations (Appendix A - Construction Emissions).

Table C2
Quantification of Health Risks for Off-site Residents
Option 1

Source (a)		MER	Weight	Contaminant (d)	URF (µg/m ³) ⁻¹ (e)	CPF (mg/kg/day) ⁻¹ (f)	Dose (by age bin)			Carcinogenic Risks			Total Cancer Risk per million (o)	Chronic Hazards ³	
		Conc. (µg/m ³) (b)	Fraction (c)				3rd Trimester (mg/kg-day) (g)	0 < 2 years (mg/kg-day) (h)	2 < 9 (mg/kg-day) (i)	3rd Trimester per million (k)	0 < 2 years per million (l)	2 < 9 per million (m)		Chronic REL (µg/m ³) (p)	RESP (q)
Unmitigated															
2022	On & Off-Site Emissions	2.10E-02	1.00E+00	DPM	3.0E-04	1.1E+00	7.27E-06	2.19E-05		2.32E-01	9.47E-01		1.18	5.0E+00	4.20E-03
2023		8.03E-03	1.00E+00		3.0E-04	1.1E+00		8.39E-06			1.07E+00		1.07	5.0E+00	1.61E-03
2024		3.10E-03	1.00E+00		3.0E-04	1.1E+00		3.24E-06	2.56E-06		2.73E-01	2.81E-02	0.30	5.0E+00	6.20E-04
2025		3.01E-03	1.00E+00		3.0E-04	1.1E+00			2.48E-06			6.01E-02	0.06	5.0E+00	6.01E-04
Total												2.6	0.007		
Mitigated Run: Tier 4 Final Engines for eq. > 50 HP															
2022	On & Off-Site Emissions	1.62E-03	1.00E+00	DPM	3.0E-04	1.1E+00	5.61E-07	1.69E-06		1.79E-02	7.31E-02		0.1	5.0E+00	3.24E-04
2023		1.05E-03	1.00E+00		3.0E-04	1.1E+00		1.10E-06			1.40E-01		0.1	5.0E+00	2.11E-04
2024		7.45E-04	1.00E+00		3.0E-04	1.1E+00		7.79E-07	6.15E-07		6.57E-02	6.75E-03	0.1	5.0E+00	1.49E-04
2025		7.58E-04	1.00E+00		3.0E-04	1.1E+00			6.26E-07			1.51E-02	0.0	5.0E+00	1.52E-04
Total												0.3	0.001		

Maximum Exposed Receptor (MER) UTM coordinates: 417592.49E, 3753003.28N

OEHHA age bin exposure year(s)		3rd Trimester 2022	0 < 2 years 2022-2024	2 < 9 years 2024-2025
Dose Exposure Factors: xposure frequency (days/year)		350	350	350
inhalation rate (L/kg-day) ¹		361	1090	861
inhalation absorption factor		1	1	1
conversion factor (mg/µg; m ³ /L)		1.0E-06	1.0E-06	1.0E-06
Risk Calculation Factors: age sensitivity factor		10	10	3
averaging time (years)		70	70	70
per million		1.0E+06	1.0E+06	1.0E+06
fraction of time at home		0.85	0.85	0.72
exposure durations per age bin		exposure durations (year)		
Construction Year		3rd Trimester	0 < 2 years	2 < 9 years
2022	Duration ² 0.59	0.25	0.34	
2023	1.00		1.00	
2024	1.00		0.66	0.34
2025	0.75			0.75
Total	3.34	0.25	2.00	1.09

¹ Inhalation rate taken as the 95th percentile breathing rates (OEHHA, 2015).

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App A - Construction Emissions).

³ Chronic Hazards for DPM using the chronic reference exposure level (REL) for the Respiratory Toxicological Endpoint.

Table C3
Residential MER Concentrations for Risk Calculations
Option 2

Contaminant	Source		Model Output ¹ (µg/m³)	Emission Rates ² (g/s)	MER Conc. (µg/m³)	Total MER Conc. Annual Average (µg/m³)
(a)	(b)		(c)	(d)	(e)	(f)
Unmitigated						
DPM	2022	On-Site Emissions	0.70	3.00E-02	2.10E-02	2.10E-02
		Truck Route	0.75	1.33E-05	1.00E-05	
	2023	On-Site Emissions	0.70	1.15E-02	8.02E-03	8.04E-03
		Truck Route	0.75	3.05E-05	2.28E-05	
	2024	On-Site Emissions	0.70	4.41E-03	3.09E-03	3.11E-03
		Truck Route	0.75	2.91E-05	2.18E-05	
	2025	On-Site Emissions	0.70	4.28E-03	2.99E-03	3.02E-03
		Truck Route	0.75	2.96E-05	2.22E-05	
	2026	On-Site Emissions	0.70	3.73E-03	2.61E-03	2.63E-03
		Truck Route	0.75	2.39E-05	1.79E-05	
	2027	On-Site Emissions	0.70	3.73E-03	2.61E-03	2.63E-03
		Truck Route	0.75	2.27E-05	1.70E-05	
	2028	On-Site Emissions	0.70	5.10E-03	3.57E-03	3.58E-03
		Truck Route	0.75	2.14E-05	1.61E-05	
Total DPM concentrations used for Cancer Risk and Chronic Hazard calculations						
Mitigated Run: Tier 4 Final Engines for eq. > 50 HP						
DPM	2022	On-Site Emissions	0.70	2.30E-03	1.61E-03	1.62E-03
		Truck Route	0.75	1.33E-05	1.00E-05	
	2023	On-Site Emissions	0.70	1.49E-03	1.04E-03	1.06E-03
		Truck Route	0.75	3.05E-05	2.28E-05	
	2024	On-Site Emissions	0.70	1.05E-03	7.33E-04	7.55E-04
		Truck Route	0.75	2.91E-05	2.18E-05	
	2025	On-Site Emissions	0.70	1.07E-03	7.46E-04	7.68E-04
		Truck Route	0.75	2.96E-05	2.22E-05	
	2026	On-Site Emissions	0.70	1.02E-03	7.16E-04	7.34E-04
		Truck Route	0.75	2.39E-05	1.79E-05	
	2027	On-Site Emissions	0.70	1.02E-03	7.16E-04	7.33E-04
		Truck Route	0.75	2.27E-05	1.70E-05	
	2028	On-Site Emissions	0.70	1.13E-03	7.90E-04	8.06E-04
		Truck Route	0.75	2.14E-05	1.61E-05	
Total DPM concentrations used for Cancer Risk and Chronic Hazard calculations						

Maximum Exposed Receptor (MER) UTM coordinates: 417592.49E, 3753003.28N

¹ Model Output at the MER based on unit emission rates for sources (1 g/s).

² Emission Rates from Emission Rate Calculations (Appendix A - Construction Emissions).

Table C4
Quantification of Health Risks for Off-site Residents
Option 2

Source (a)	MER	Weight	Contaminant (d)	URF ($\mu\text{g}/\text{m}^3$) ⁻¹ (e)	CPF ($\text{mg}/\text{kg}/\text{day}$) ⁻¹ (f)	Dose (by age bin)			Carcinogenic Risks			Total Cancer Risk per million (o)	Chronic Hazards ³			
	Conc. ($\mu\text{g}/\text{m}^3$) (b)	Fraction (c)				URF ($\mu\text{g}/\text{m}^3$) ⁻¹ (e)	CPF ($\text{mg}/\text{kg}/\text{day}$) ⁻¹ (f)	3rd Trimester	0 < 2 years	2 < 9	3rd Trimester		0 < 2 years	2 < 9	Chronic REL ($\mu\text{g}/\text{m}^3$) (p)	RESP (q)
	(g)	(h)						(i)	per million (k)	per million (l)	per million (m)					
Unmitigated																
2022	On & Off-Site Emissions	2.10E-02	1.00E+00	DPM	3.0E-04	1.1E+00	7.27E-06	2.19E-05		2.32E-01	9.47E-01		1.18	5.0E+00	4.20E-03	
2023		8.04E-03	1.00E+00		3.0E-04	1.1E+00		8.41E-06			1.07E+00		1.07	5.0E+00	1.61E-03	
2024		3.11E-03	1.00E+00		3.0E-04	1.1E+00		3.25E-06	2.57E-06		2.74E-01	2.82E-02	0.30	5.0E+00	6.22E-04	
2025		3.02E-03	1.00E+00		3.0E-04	1.1E+00			2.49E-06			6.03E-02	0.06	5.0E+00	6.03E-04	
2026		2.63E-03	1.00E+00		3.0E-04	1.1E+00			2.17E-06			6.43E-02	0.06	5.0E+00	5.25E-04	
2027		2.63E-03	1.00E+00		3.0E-04	1.1E+00			2.17E-06			7.02E-02	0.07	5.0E+00	5.25E-04	
2028		3.58E-03	1.00E+00			3.0E-04	1.1E+00			2.96E-06			2.40E-02	0.02	5.0E+00	7.16E-04
Total												2.8	0.009			
Mitigated Run: Tier 4 Final Engines for eq. > 50 HP																
2022	On & Off-Site Emissions	1.62E-03	1.00E+00	DPM	3.0E-04	1.1E+00	5.61E-07	1.69E-06		1.79E-02	7.31E-02		0.09	5.0E+00	3.24E-04	
2023		1.06E-03	1.00E+00		3.0E-04	1.1E+00		1.11E-06			1.42E-01		0.14	5.0E+00	2.13E-04	
2024		7.55E-04	1.00E+00		3.0E-04	1.1E+00		7.89E-07	6.23E-07		6.66E-02	6.84E-03	0.07	5.0E+00	1.51E-04	
2025		7.68E-04	1.00E+00		3.0E-04	1.1E+00			6.34E-07			1.53E-02	0.02	5.0E+00	1.54E-04	
2026		7.34E-04	1.00E+00		3.0E-04	1.1E+00			6.06E-07			1.80E-02	0.02	5.0E+00	1.47E-04	
2027		7.33E-04	1.00E+00		3.0E-04	1.1E+00			6.05E-07			1.96E-02	0.02	5.0E+00	1.47E-04	
2028		8.06E-04	1.00E+00			3.0E-04	1.1E+00			6.65E-07			5.39E-03	0.01	5.0E+00	1.61E-04
Total												0.4	0.001			

Maximum Exposed Receptor (MER) UTM coordinates: 417592.49E, 3753003.28N

OEHHA age bin exposure year(s)		3rd Trimester 2022	0 < 2 years 2022-2024	2 < 9 years 2024-2025
Dose Exposure Factors: xposure frequency (days/year)		350	350	350
inhalation rate (L/kg-day) ¹		361	1090	861
inhalation absorption factor		1	1	1
conversion factor (mg/µg; m ³ /L)		1.0E-06	1.0E-06	1.0E-06
Risk Calculation Factors:				
age sensitivity factor		10	10	3
averaging time (years)		70	70	70
per million		1.0E+06	1.0E+06	1.0E+06
fraction of time at home		0.85	0.85	0.72

¹ Inhalation rate taken as the 95th percentile breathing rates (OEHHA, 2015).

² Construction durations determined for each year to adjust receptor exposures to the exposure durations for each construction year (see App A - Construction Emissions).

³ Chronic Hazards for DPM using the chronic reference exposure level (REL) for the Respiratory Toxicological Endpoint.

exposure durations per age bin			exposure durations (year)		
Construction Year	Duration ²		3rd Trimester	0 < 2 years	2 < 9 years
2022	0.59		0.25	0.34	
2023	1.00			1.00	
2024	1.00			0.66	0.34
2025	0.75				0.75
2026	0.92				0.92
2027	1.00				1.00
2028	0.25				0.25
Total	5.50		0.25	2.00	3.25