

Appendix C-3

Ambient Air Quality Analysis

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1. Introduction

This appendix describes the methods and results of an ambient air quality analysis (AAQA) for the Nevada Cement Company LLC Stockton Terminal Modernization Project (proposed project). The AAQA predicted ambient concentrations of criteria pollutants in the vicinity of the project site during proposed project operations, without mitigation. The modeled criteria pollutant included:

- Particulate matter less than 10 microns (PM₁₀);
- Particulate matter less than 2.5 microns (PM_{2.5});
- Nitrogen dioxide (NO₂);
- Sulfur dioxide (SO₂); and
- Carbon monoxide (CO).

Maximum predicted pollutant concentrations were compared to applicable ambient air quality standards and significant impact levels (SILs) to determine significance.

2. AAQA Approach

The AAQA followed San Joaquin Valley Air Pollution Control District (SJVAPCD) guidance APR-2030 (Project Ambient Air Quality Analysis Applicability Determination under CEQA) (SJVAPCD, 2018). In accordance with APR-2030, the AAQA consisted of a three-step process.

Step 1 of the AAQA was to determine whether maximum daily emissions would exceed 100 pounds per day (lb/day) for any of the following three categories:

- **Construction emissions.** Sources include off-road equipment (engine exhaust); construction tugboats, work boats, and construction barges (engine exhaust); demolition and material movement (dust); trucks and worker vehicles (engine exhaust, tire wear, brake wear, and road dust); a cargo vessel¹ at berth and maneuvering and transiting within the SJVAPCD (engine and boiler exhaust); and assist tugboats (engine exhaust).
- **Operational emissions from SJVAPCD-permitted equipment and activities.** Sources include on-site cementitious material conveying and loading (dust).
- **Operational emissions for non-permitted equipment and activities.** Sources include on-site mobile equipment (engine exhaust); trucks and worker vehicles (engine exhaust, tire wear, brake wear, and road dust); switch and line haul locomotives operating within the SJVAPCD (engine exhaust); bulk carrier vessels at berth and transiting within the SJVAPCD (engine and boiler exhaust)²; and assist tugboats (engine exhaust).

The estimated emissions for these three categories are summarized in Table C3-1. The operational emissions reflect project year 15 (assumed to be 2046) because year 15 would have the highest emissions of the three analysis years (year 1, year 5 and year 15). The table shows that the 100 lb/day screening threshold would be exceeded for the construction category (for nitrogen oxides [NO_x] and CO) and non-permitted operational category (for NO_x). The permitted operational category would not produce any exceedances of the threshold.

¹ One cargo vessel would be used to deliver the new ship unloader during project construction.

² Although project year 15 operations also include the use of cementitious barges, maximum day emissions would occur when two bulk carrier vessels would operate simultaneously.

APR-2030 states that, “When daily emission increases exceed 100 pounds per day for the construction category and either operational category, permitted or non-permitted sources, the AAQA shall evaluate sources from both operational categories, permitted or non-permitted sources combined, as described in Step 2 below.” Therefore, this AAQA evaluated the combined operational emissions from permitted and non-permitted sources, but it did not evaluate construction emissions.

The emission quantification methodology is described in detail in Appendix C-1.

Table C3-1. Maximum Daily Emissions Associated with the Unmitigated Proposed Project (lb/day)

Emissions Category	PM ₁₀	PM _{2.5}	NO _x [3]	SO _x [4]	CO	VOC
Construction Emissions [1]	31.3	10.7	488.5	16.0	144.5	33.6
Operational Emissions – Permitted Equipment and Activities [2]	3.2	3.2	--	--	--	--
Operational Emissions – Non-Permitted Equipment and Activities [2]	11.6	7.2	273.1	12.2	47.7	13.6
AAQA Screening Level	100	100	100	100	100	100
Exceed?	No	No	Yes	No	Yes	No

Notes:

[1] Maximum construction emissions would occur in the second year of construction (assumed to be 2027).

[2] Maximum operational emissions would occur in project year 15 (assumed to be 2046). The presented emissions represent the increment relative to the 2023 baseline (i.e., 2046 proposed project emissions minus 2023 baseline emissions).

[3] The dispersion model estimated the conversion of NO_x emissions into ambient NO₂ concentrations.

[4] The AAQA conservatively assumed that all sulfur oxides (SO_x) are SO₂.

Step 2 of the AAQA was to perform dispersion modeling to predict maximum ambient pollutant concentrations in the vicinity of the proposed project site. APR-2030 states that the dispersion modeling methodology should follow the SJVAPCD guidance in APR-1925 (Policy for District Rule 2201 AAQA Modeling) (SJVAPCD, 2024). Therefore, the dispersion modeling methodology was consistent with APR-1925 and is described in Section 3, below.

APR-2030 further states that the AAQA should evaluate all criteria pollutants if any one pollutant exceeds the 100 lb/day screening threshold. Therefore, the AAQA predicted maximum ambient concentrations of PM₁₀, PM_{2.5}, NO₂, SO₂, and CO. Per APR-1925, emissions of volatile organic compounds (VOC) were not modeled because there is no ambient air quality standard for that pollutant.

Step 3 of the AAQA was to determine whether maximum off-site ambient concentrations would be significant. The determination of significance was performed in two stages, in the following order:

- Step 3A. The AAQA modeled ambient pollutant concentrations associated with 2023 baseline operation and year 15 (2046) proposed project operation. The baseline concentrations were subtracted from the proposed project concentrations to determine the proposed project concentration increments. The total estimated concentrations, which consist of the proposed project concentration increments plus background concentrations, were then compared with the California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). If the total concentrations would be below the CAAQS and NAAQS, then the project would be considered to have a less than significant impact on ambient air quality, and the AAQA would be complete, with no need to proceed to Step 3B.
- Step 3B. For any pollutants where the project would cause or contribute to an exceedance of an ambient air quality standard (as determined in Step 3A), then the proposed project concentration increments (without

adding background concentrations) were compared to the Class II Significant Impact Levels (SILs) listed in APR-1925. If the concentration increments would be below the SILs, then the project would be considered to have a less than significant impact on ambient air quality. If the concentration increments would exceed the SILs, then the project would be considered to have a significant impact on ambient air quality.

The CAAQS, NAAQS, and SILs for the modeled pollutants are presented in Table C3-2.

Table C3-2. Criteria Pollutant Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS ($\mu\text{g}/\text{m}^3$) ^[1]	NAAQS ($\mu\text{g}/\text{m}^3$) ^[1]	SIL ($\mu\text{g}/\text{m}^3$) ^[2]
PM ₁₀	24 Hours	50	150	5
	Annual	20	--	1
PM _{2.5}	24 Hours	--	35 ^[3]	1.2
	Annual	12	9 ^[4]	0.13
CO	1 Hour	23,000	40,000	2,000
	8 Hours	10,000	10,000	500
NO ₂	1 Hour	339	188 ^[5]	7.5
	Annual	57	100	1
SO ₂	1 Hour	655	196 ^[6]	7.8
	24 Hours	105	--	5

Legend:

CAAQS = California Ambient Air Quality Standard

NAAQS = National Ambient Air Quality Standard

SIL = Significant Impact Level

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

Notes:

[1] Source: CARB, 2024. Table of Ambient Air Quality Standards. July 16. Available: <https://ww2.arb.ca.gov/resources/california-ambient-air-quality-standards>. Accessed 2/28/2026.

[2] Source: SJVAPCD, 2024. District Policy APR 1925. Policy for District Rule 2201 AAQA Modeling. May 6. Attachment B. Class II SILs (Non-Fugitive). Available: <https://www.valleyair.org/media/341fy4sn/apr-1925-rule-2201-aaqa-modeling-may-2024.pdf>. Accessed March 2026. The “non-fugitive” SILs were selected for this AAQA because non-fugitive sources would be the dominant contributors to the Proposed Project’s maximum PM₁₀ and PM_{2.5} concentration increments.

[3] The NAAQS applies to the 98th percentile of daily concentrations, averaged over three years.

[4] The NAAQS applies to the annual mean, averaged over three years.

[5] The NAAQS applies to the three-year average of the annual 98th percentile of the 1-hour daily maximum concentrations.

[6] The NAAQS applies to the three-year average of the annual 98th percentile of the 1-hour daily maximum concentrations.

3. Dispersion Modeling Methodology

This section describes the dispersion modeling inputs and methods used to predict off-site ambient air pollutant impacts for the AAQA. In addition to APR-2030 and APR-1925, the following regulatory guidance was used in developing the dispersion modeling methodology: SJVAPCD’s *Guidance for Air Dispersion Modeling* (SJVAPCD, 2022) and EPA’s *Guideline on Air Quality Models* (EPA, 2024a). Additionally, SJVAPCD staff was consulted on several occasions to clarify and confirm various aspects of the methodology (D. Garner, personal communication, October 30, 2025–March 16, 2026).

3.1 Model Selection

Air dispersion modeling was performed using the U.S. EPA AERMOD dispersion model, version 24142 (U.S. EPA 2024b). AERMOD model is a steady-state, multiple source, Gaussian dispersion model designed for applications which include flat areas as well as areas of ground elevations that exceed emission source stack heights. AERMOD is well suited for this analysis because it is: (1) accepted by the modeling community and regulatory agencies due to its ability to provide reasonable results for large industrial projects with multiple emission sources; (2) the model can handle various source types, including point, area, line, and volume; and (3) AERMOD has been approved by the U.S. EPA and SJVAPCD for its analysis of stationary and mobile sources.

3.2 Source Representation

The AAQA modeled operational emission sources both on-site and off-site. APR-2030 requires the AAQS to include off-site mobile sources operating within at least ¼-mile of the project boundary. To fully capture potential impacts in the communities closest to the Port (i.e., within the area roughly bounded by Interstate 5, Highway 4, and Navy Drive), this AAQA modeled off-site mobile sources operating within ½-mile of the nearest project boundary, twice the distance required by APR-2030. The off-site mobile sources would include trucks, vessels, barges, tugboats, and locomotives.

The following operational emission sources were modeled in AERMOD for the AAQA:

- **Trucks driving on-site and off-site.** On-site trucks would follow dedicated routes through the loading stations. The primary off-site truck route would follow Harbor Street and S Fresno Avenue. The analysis also assumed that 10 percent of trucks would use W Washington Street from Harbor Street to W Weber Avenue. Truck driving emissions would consist of engine exhaust, tire wear, brake wear, and road dust.
- **Trucks idling on-site.** Idling locations include the loading lanes (where trucks form a queue while waiting to enter the loading stations), loading stations, and hatch stations. Truck idling emissions would consist of engine exhaust.
- **Vessels arriving at and departing from Berth 2 and Berth 3/4.** The vessel arrival/departure route lies along the Stockton Deepwater Shipping Channel west of the project site. It also includes the turning basin east of the project site, where the vessel would be turned 180 degrees just prior to arrival or just after departure. Vessel emissions would consist of propulsion engine, auxiliary engine, and boiler exhaust.
- **Vessels docked at Berth 2 and Berth 3/4.** Vessel emissions would consist of auxiliary engine and boiler exhaust; propulsion engines would not operate while the vessels are docked. Note that during the 2023 baseline year, project-related vessels only docked at Berth 2.
- **Barges docked at Berth 2.** Barge emissions would consist of auxiliary engine exhaust. Note that barges would visit the project site only for the proposed project starting in year 15 (2046).
- Tugboats assisting vessels and barges, and propelling barges, during arrivals and departures and while the vessels are being secured to the dock. Tugboat emissions would consist of propulsion and auxiliary engine exhaust.
- Switch locomotives transporting railcars between the project site and the rail yard near Port Road M, south of the project site. Emissions would include engine exhaust. Note that line haul locomotives would not operate within ½ mile of the project site and therefore were not modeled.
- **Dust from the on-site loading of cementitious materials into trucks, railcars, and barges.** The loading spouts would be controlled by baghouse air filters. Dust emissions would consist of particulate exhaust from the baghouses.

- Dust from the on-site conveying of cementitious materials between the storage bunkers and the various truck, vessel, barge, and railcar loading and unloading stations. The conveyance system would be controlled by numerous baghouse air filters throughout the project site. Dust emissions would consist of particulate exhaust from the baghouses.
- Mobile on-site equipment, including front end loaders, a rail shuttlewagon, sweeper, forklift, manlift, welding machine, air compressor, and utility vehicles. Emissions would consist of engine exhaust.

Operational worker vehicle trips were not modeled in the AAQA because the incremental emissions change between baseline and the proposed project would be negligible relative to the other sources.

Table C3-3 presents the source parameters modeled in AERMOD for the AAQA. The rationale for the source parameter values is described in the table notes. The source parameters are generally consistent with SJVAPCD guidance and were developed through consultation with SJVAPCD staff.

Table C3-3. AERMOD Source Parameters

Emission Source Category	Source Type	Release Height (m)	Line Source Width (m)	Initial Horiz. Dimension (m)	Initial Vert. Dimension (m)	Stack Exit Temp. (K)	Stack Exit Velocity (m/s)	Stack Inside Diam. (m)	Notes
Trucks driving	Line	1.8	9.1-13.4	--	1.42	--	--	--	[1]
Trucks idling - loading lanes, hatch stations	Point	3.8	--	--	--	366	0.001	0.1	[2]
Trucks idling - loading stations	Volume	3.8	--	2.33	2.33	--	--	--	[3]
Vessels arriving and departing	Line	50	38	--	23.3	--	--	--	[4]
Vessels at berth	Point	33	--	--	--	618	16	0.5	[5]
Barges at berth (auxiliary engine)	Volume	6	--	1	1	--	--	--	[6]
Tugboats – arrival/departure assist	Line	6	15	--	2.79	--	--	--	[7]
Tugboats - docking assist	Area	6	--		2.79				[8]
Switch locomotives	Line	5	9.1	--	2.33	--	--	--	[9]
Loading dust - truck lanes 1 and 2	Volume	7.32	--	3.02	4.96	--	--	--	[10]
Loading dust - truck lanes 3 and 4	Volume	9.14	--	4.34	4.96	--	--	--	[10]
Loading dust - new truck loading station (pozzolan)	Volume	13.1	--	3.02	6.10	--	--	--	[10]
Loading dust - existing railcar loading station	Volume	9.14	--	1.84	4.25	--	--	--	[10]
Loading dust - new railcar loading station	Volume	18.0	--	1.84	8.36	--	--	--	[10]
Loading dust - barge loading	Volume	12.2	--	1	1	--	--	--	[11]
Conveying dust - baseline	Area	14.0	--	--	9.6	--	--	--	[12]
Conveying dust - proposed project	Area	21.0	--	--	17.7	--	--	--	[13]

Emission Source Category	Source Type	Release Height (m)	Line Source Width (m)	Initial Horiz. Dimension (m)	Initial Vert. Dimension (m)	Stack Exit Temp. (K)	Stack Exit Velocity (m/s)	Stack Inside Diam. (m)	Notes
Mobile onsite equipment	Area	5	--	--	1	--	--	--	[14]

Notes:

[1] Height is from Page 75 of SJVAPCD (2006). Width is the width of traveled way plus 10 feet (or 3 meters) mixing zone on each side.

[2] Parameters are from Page 76 of SJVAPCD (2006). Horizontal exhaust pipe was conservatively assumed.

[3] Emissions would occur within a structure with open sides. Assume the release height is the same as the point source release height. Table 3-3 of EPA (2024d) was used to determine the initial horizontal and vertical dimensions.

[4] Height and initial vertical dimension are from CARB (2006). Width is a typical vessel width (32m) plus 3 meters mixing zone on each side.

[5] Temperature, velocity, and diameter are from CARB (2006). Stack height was measured from an elevation diagram of a typical cement vessel.

[6] Assume the same height as mobile on-site equipment except add 1 meter to account for the barge deck height above the waterline. Assume nominal initial vertical and horizontal dimensions of 1 meter.

[7] Height and initial vertical dimension are from CARB (2006). Assume a typical tugboat width of 30 feet plus 10 feet mixing zone width on each side.

[8] From CARB (2006).

[9] Height and initial vertical dimension are from CARB (2006). Assume a locomotive width of 10 feet plus 10 feet mixing zone width on each side.

[10] Height was provided by the applicant. The baghouse would discharge inside a structure with open sides. Table 3-3 of EPA (2024d) was used to determine the initial horizontal and vertical dimensions.

[11] Assume the barge loading spout would be equipped with a dust filter that exhausts 40 feet above the waterline, consistent with typical marine bulk loading equipment of this type and capacity. Assume a nominal value of 1 meter for the initial vertical and horizontal dimensions.

[12] The average release height of all existing conveying baghouses is 46 feet (14 meters). The initial vertical dimension was derived from the range of baghouse heights using Table 3-3 of EPA (2024d).

[13] The average release height of all proposed conveying baghouses would be 68 feet (21 meters). The initial vertical dimension was derived from the range of baghouse heights using Table 3-3 of EPA (2024d).

[14] From Sacramento Metropolitan Air Quality Management District (SMAQMD, 2013). Assume the same parameters as construction equipment.

Figure C3-1 and Figure C3-2 show the on-site and off-site AERMOD source representations, respectively, for the 2023 baseline operation. Figure C3-3 and Figure C3-4 show the on-site and off-site AERMOD source representations, respectively, for year 15 (2046) proposed project operation.

Figure C3-1. AERMOD Source Representation for Baseline On-Site Operational Sources

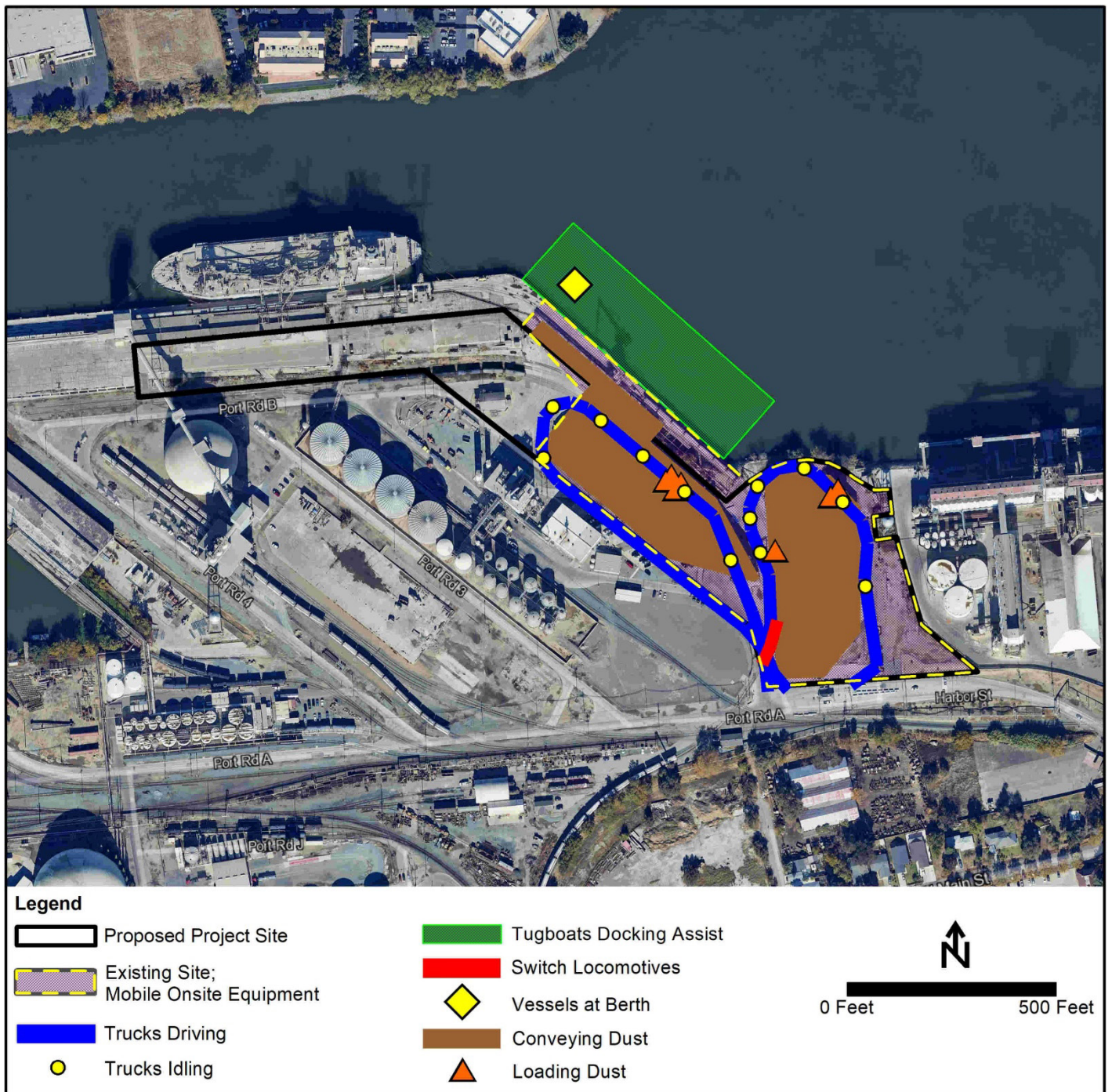


Figure C3-2. AERMOD Source Representation for Baseline Off-Site Operational Sources

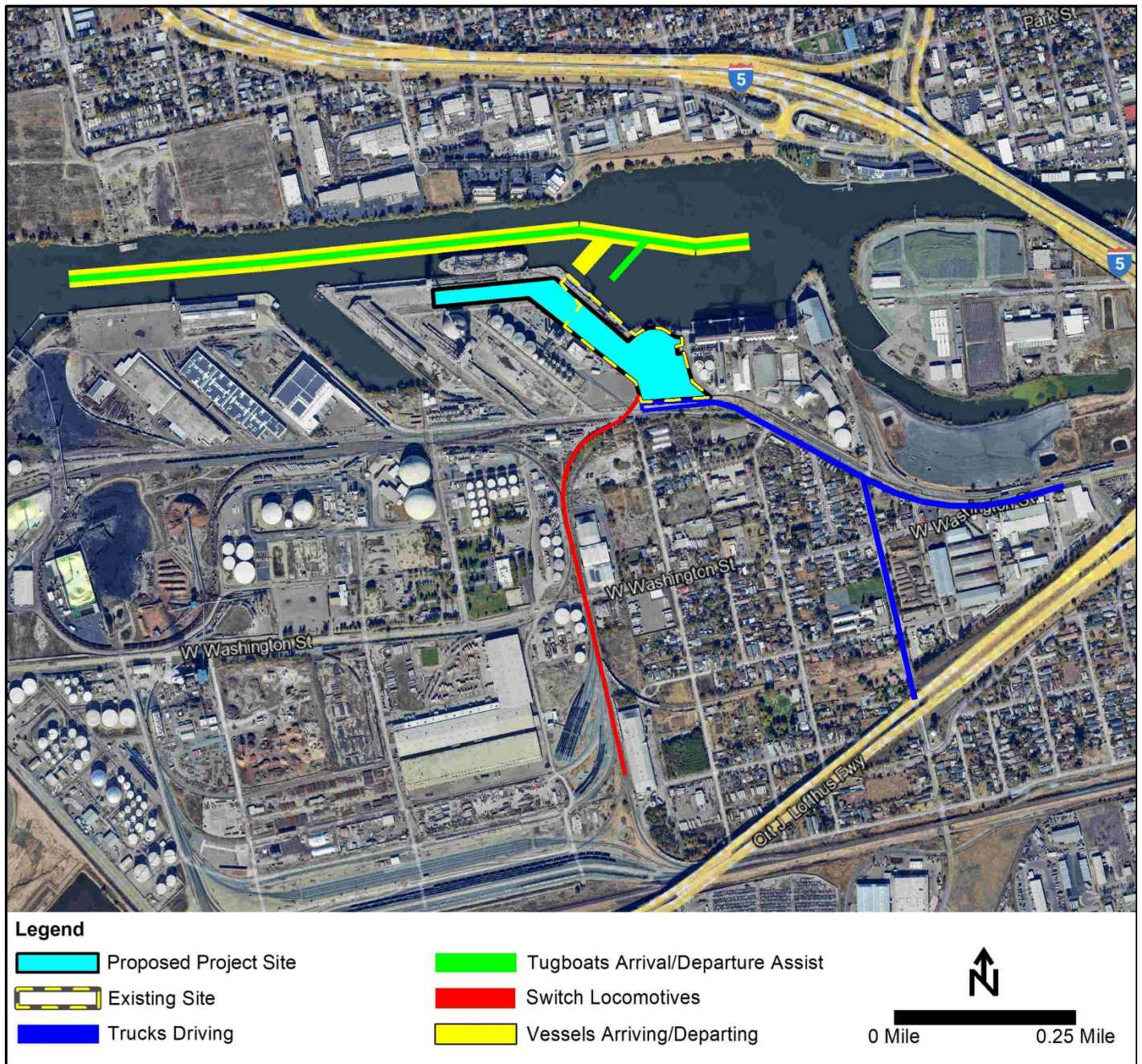


Figure C3-3. AERMOD Source Representation for Proposed Project On-Site Operational Sources

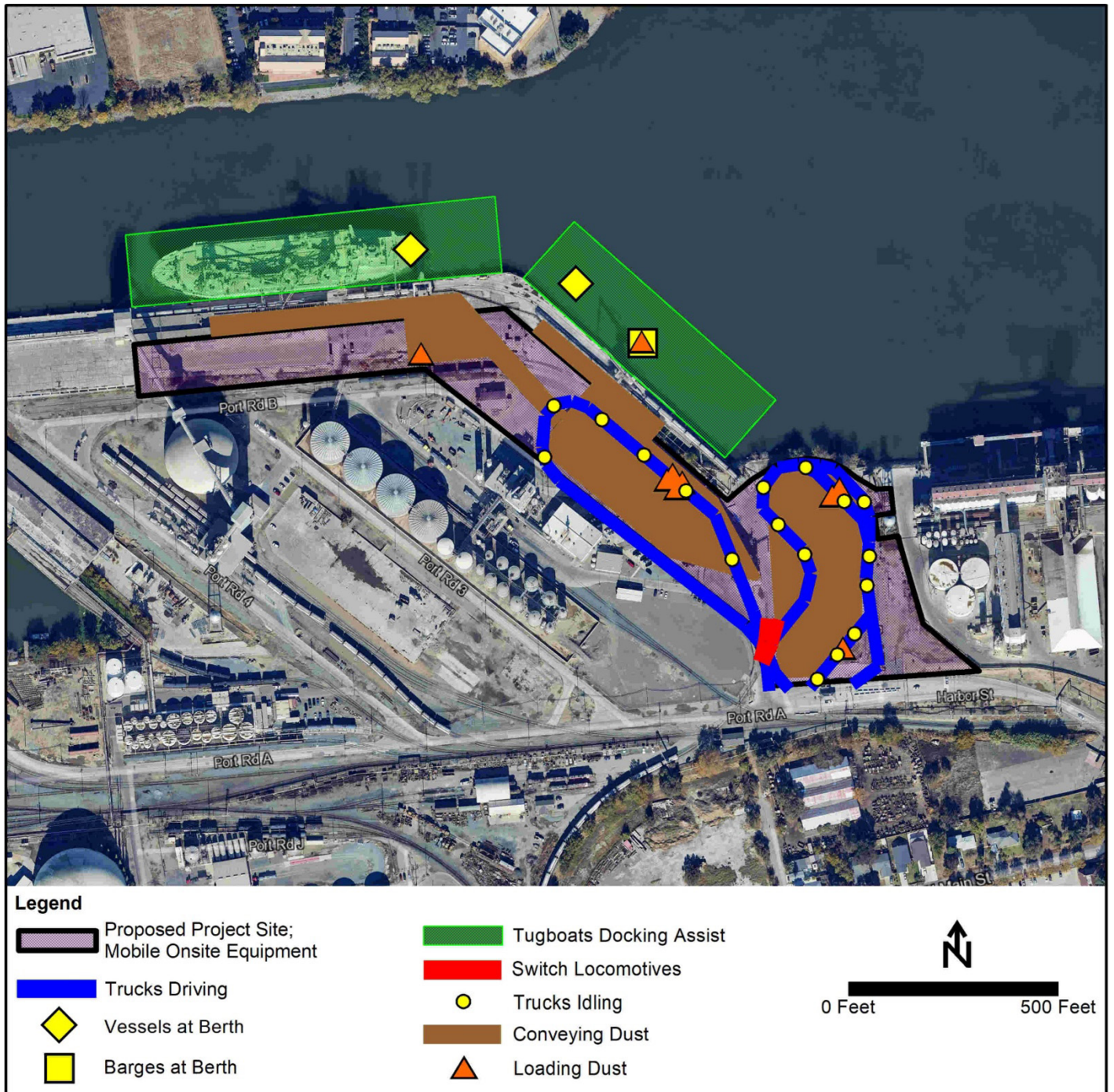
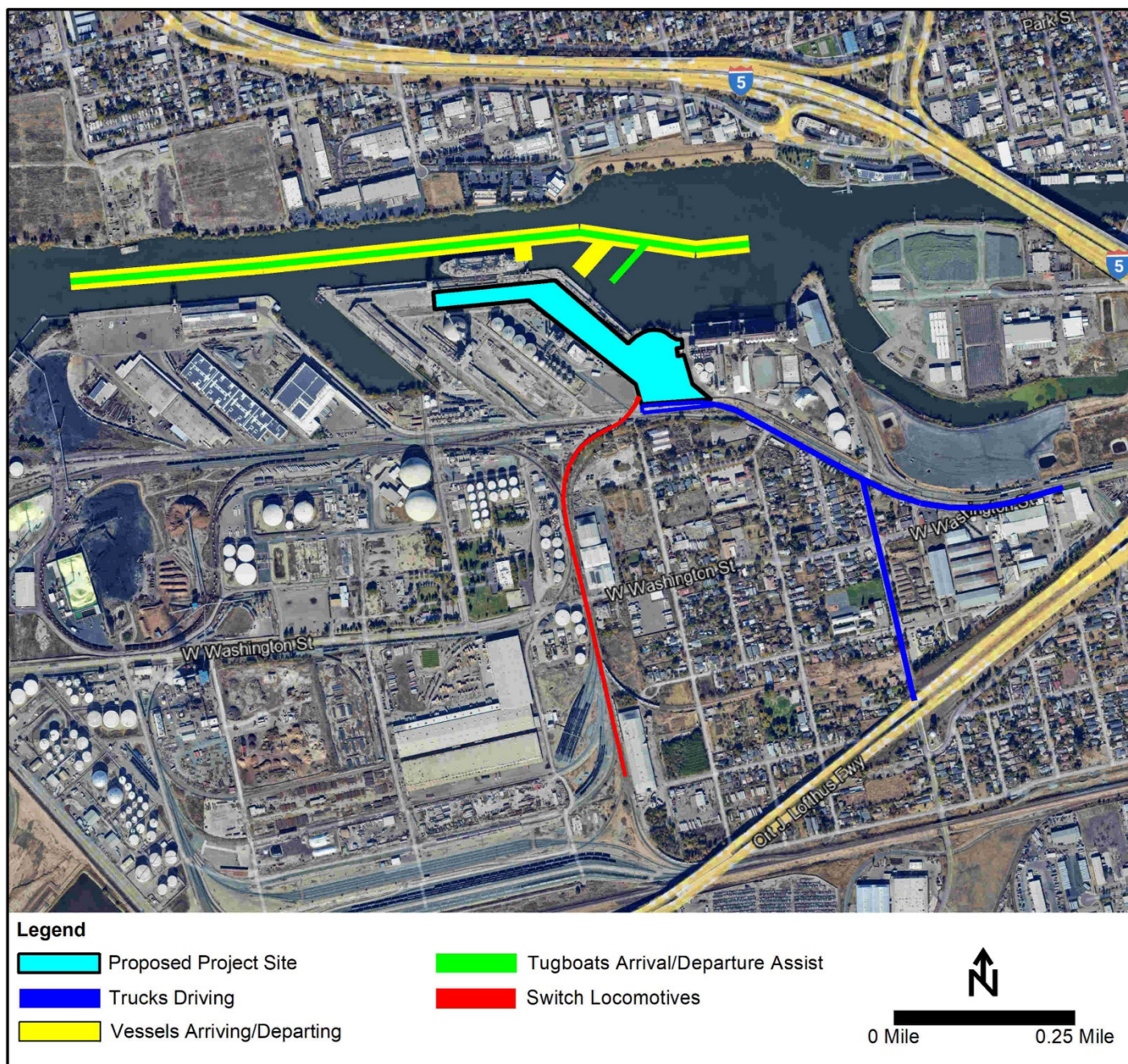


Figure C3-4. AERMOD Source Representation for Proposed Project Off-Site Operational Sources



3.3 Source Activity Assumptions

The AAQA modeled annual, peak day, peak 8-hour, and peak hour emissions of criteria pollutants associated with baseline and proposed project operation. The quantification methodologies for the annual and peak day emissions are described in Appendix C-1. This AAQA developed additional methodologies to estimate peak hour emissions. The methodologies were based on activity assumptions for the modeled sources. The annual, peak day, and peak hour

activity assumptions that formed the basis for the modeled emission rates are summarized in Table C3-4 for baseline and Table C3-5 for the proposed project. Peak 8-hour activity assumptions are not shown in the table because peak 8-hour emissions were simply (and conservatively) assumed to be 8 times the peak hour emissions.

Table C3-4. Baseline Operational Activity Assumed in the AAQA

Emission Source Category	Annual Activity	Peak Day Activity	Peak Hour Activity
Trucks ^[8]	21,666 one-way trips	83 one-way trips	5.2 one-way trips ^[1]
Vessels ^[3]	10 vessel calls (assume each vessel is at berth for 6 days and performs one arrival and one departure)	1 vessel at berth for 24 hours 1 vessel arrival or departure ^[9]	1 vessel at berth for 1 hour 1 vessel arrival or departure ^[9]
Barges ^[10]	No barges	No barges	No barges
Tugboats	2 tugboats per vessel assist	2 tugboats per vessel assist	2 tugboats per vessel assist
Switch Locomotives ^[2]	52 locomotive-hours	1 locomotive-hour	1 locomotive-hour ^[4]
Loading	341,003 tons of cementitious material ^[5]	6,000 tons of cementitious material ^[5]	N/A ^[6]
Conveying ^[7]	326,712 tons of cementitious material	5,445 tons of cementitious material	N/A ^[6]
Mobile Onsite Equipment	70 days for the front-end loaders 52 days for the shuttlewagon 260 days for all other equipment	21 hours for the front-end loaders 9 hours for the shuttlewagon 8 hours for all other equipment	1 hour for all equipment

Notes:

[1] Based on data provided by the applicant, truck activity was assumed to occur 21 hours per day, from 10pm to 7pm, with 50% of trips occurring from 0000 to 0800, 40% from 0800 to 1600, and 10% from 1600 to 2400.

[2] Activity levels are for switch locomotive operation within ½ mile of the project site.

[3] All vessel calls in the 2023 baseline year were to Berth 2.

[4] Assume one switch locomotive operates the entire hour.

[5] Baseline material loading emissions were apportioned 83% to truck loading and 17% to railcar loading, which is in proportion to their actual 2023 throughputs.

[6] Loading and conveying emissions consist of PM₁₀ and PM_{2.5}, which have no 8-hour or 1-hour ambient air quality standards.

[7] Conveying emissions were apportioned to the AERMOD area sources in proportion to the number of baghouse air filters represented by each source.

[8] Onsite truck emissions were distributed to the AERMOD roadway links in proportion to the number of loading lanes on each route. Offsite truck emissions were distributed to the AERMOD roadway links using data from the traffic study.

[9] The peak day and peak hour vessel assumptions (i.e., a vessel at berth while a vessel is arriving or departing) are conservative because the berth would be unoccupied when a vessel is arriving or departing.

[10] Barges were not part of site operations in the baseline year.

Table C3-5. Proposed Project Operational Activity Assumed in the AAQA

Emission Source Category	Annual Activity	Peak Day Activity	Peak Hour Activity
Trucks ^[9]	65,000 one-way trips	250 one-way trips	15.6 one-way trips ^[1]
Vessels	53 vessel calls ^[3] (assume each vessel is at berth for 3 days and performs one arrival and one departure)	2 vessels at berth for 24 hours ^[10] 1 vessel arrival or departure ^[11]	2 vessels at berth for 1 hour ^[10] 1 vessel arrival or departure ^[11]
Barges ^[13]	45 barge calls (assume each barge is at berth for 1 day and performs one arrival and one departure)	No barges ^[12]	No barges ^[12]
Tugboats	2 tugboats per vessel assist 1 tugboat per barge assist	2 tugboats per vessel assist	2 tugboats per vessel assist
Switch Locomotives ^[2]	250 locomotive-hours	4.2 locomotive-hours	1 locomotive-hour ^[4]
Loading	2,190,000 tons of cementitious material ^[5]	6,000 tons of cementitious material ^[6]	N/A ^[7]
Conveying ^[8]	2,352,000 tons of cementitious material	14,792 tons of cementitious material	N/A ^[7]
Mobile Onsite Equipment	159 days for the front-end loaders 218 days for the shuttlewagon 260 days for all other equipment	21 hours for the front-end loaders 9 hours for the shuttlewagon 8 hours for all other equipment	1 hour for all equipment

Notes:

Modeled activity levels reflect project year 15 (assumed to be 2046) because maximum emissions would occur in that year.

[1] Based on data provided by the applicant, truck activity was assumed to occur 21 hours per day, from 10pm to 7pm, with 50% of trips occurring from 0000 to 0800, 40% from 0800 to 1600, and 10% from 1600 to 2400.

[2] Activity levels are for switch locomotive operation within ½ mile of the project site.

[3] The AAQA assumed that approximately 95% of vessel calls would be to Berth 3/4 and 5% would be to Berth 2.

[4] Assume one switch locomotive operates the entire hour.

[5] Year 15 (2046) annual material loading emissions were apportioned 39% to truck loading, 51% to railcar loading, and 10 percent to barge loading, which is in proportion to their projected annual throughputs.

[6] Year 15 (2046) peak day material loading emissions were apportioned 24% to truck loading, 32% to railcar loading, and 44% to barge loading, which is in proportion to their projected average daily throughputs on their operating days (312 days/year for truck and railcar loading and 45 days/year for barge loading).

[7] Loading and conveying emissions consist of PM₁₀ and PM_{2.5}, which have no 8-hour or 1-hour ambient air quality standards.

[8] Conveying emissions were apportioned to the AERMOD area sources in proportion to the number of baghouse air filters represented by each source.

[9] Onsite truck emissions were distributed to the AERMOD roadway links in proportion to the number of loading lanes on each route. Offsite truck emissions were distributed to the AERMOD roadway links using data from the traffic study.

[10] The AAQA assumed both Berth 2 and Berth 3/4 would be occupied by an at-berth vessel for the peak day and peak hour.

[11] The peak day and peak hour vessel assumptions (i.e., two vessels at berth while a vessel is arriving or departing) are conservative because one berth would be unoccupied when a vessel is arriving or departing.

[12] Peak day and peak hour proposed project emissions would occur when both berths are occupied by vessels instead of barges; therefore, barge activity is not included in these scenarios.

[13] All barges would call at Berth 2. Barges would only operate starting in project year 15 (2046).

In 2011, the EPA issued a memorandum that provided additional dispersion modeling guidance for the 1-hour NO₂ NAAQS (EPA, 2011). One of the issues covered by the memorandum was how to model intermittent emission sources. (EPA did not define a usage threshold for an intermittent source but did use 500 hours per year as an example). Given the implications of the probabilistic form of the 1-hour NO₂ NAAQS (i.e., the three-year average of the annual 98th percentile of the 1-hour daily maximum concentrations), the EPA was concerned that modeling peak hour emissions continuously for intermittent sources would effectively impose an additional level of stringency beyond that intended by the level of the standard itself. As a result, the EPA concluded that it was appropriate to model impacts from intermittent sources based on an average hourly emission rate rather than the peak hourly emission rate. This approach would account for potential worst-case meteorological conditions while also accounting for the probability of the source to operate for a given hour. Therefore, for the 1-hour NO₂ NAAQS, this AAQA modeled the following intermittent sources with average hourly NO_x emissions instead of peak hour NO_x emissions:

- Vessels arriving and departing
- Vessels at Berth 2 during proposed project operation (Berth 2 would be used by vessels only when Berth 3/4 is not available)
- Tugboats
- Switcher locomotives

Peak hour emissions from these sources were modeled for all other pollutants with 1-hour ambient air quality standards, including CO, SO₂, and NO₂ for the CAAQS.

3.4 Temporal Distributions

Based on the proposed project description and additional information provided by the applicant, the AAQA applied hour-of-day (HROFDY) factors to the emissions in AERMOD to better represent the times of day that the source emissions would occur. The following assumptions were modeled for the baseline and proposed project scenarios:

- Emissions from truck idling, truck driving, and cementitious material loading into trucks were distributed from 10:00 p.m. to 7:00 p.m. (21 hours per day), with 50 percent of the emissions occurring from 12:00 a.m. to 8:00 a.m., 40 percent of the emissions occurring from 8:00 a.m. to 4:00 p.m., and 10 percent of the emissions occurring from 4:00 p.m. to 7:00 p.m. and 10:00 p.m. to 12:00 a.m. This emissions profile was used for all modeled averaging times (annual, 24-hour, 8-hour, and 1-hour).
- Emissions from switch locomotives were distributed uniformly from 6:00 a.m. to 10:00 p.m. for all modeled averaging times. For 1-hour and 8-hour averaging times, peak hour emissions were modeled for every hour within that time range.

Emissions from all other sources were distributed uniformly, 24 hours per day. For 1-hour and 8-hour averaging times, peak hour emissions were modeled for every hour.

3.5 Building Wake Effects

AERMOD can simulate the aerodynamic wake effects, also called downwash effects, of buildings and other large structures on the emission plumes from point sources (i.e., stacks). Therefore, EPA's BPIP-Prime, version 04274, was used to develop downwash parameters for input into AERMOD (EPA, 2004). Figure C3-5 shows the existing structures included in the downwash analysis for the baseline scenario. Figure C3-6 shows the proposed structures included in the downwash analysis for the proposed project.

Note that the aerial images used in the figures were photographed at a slight angle from vertical, resulting in the tops of buildings appearing to be slightly displaced from the bases of buildings. For the best accuracy, the building downwash analysis determined all structure locations at their bases.

Figure C3-5. Existing Structures Analyzed for Wake Effects

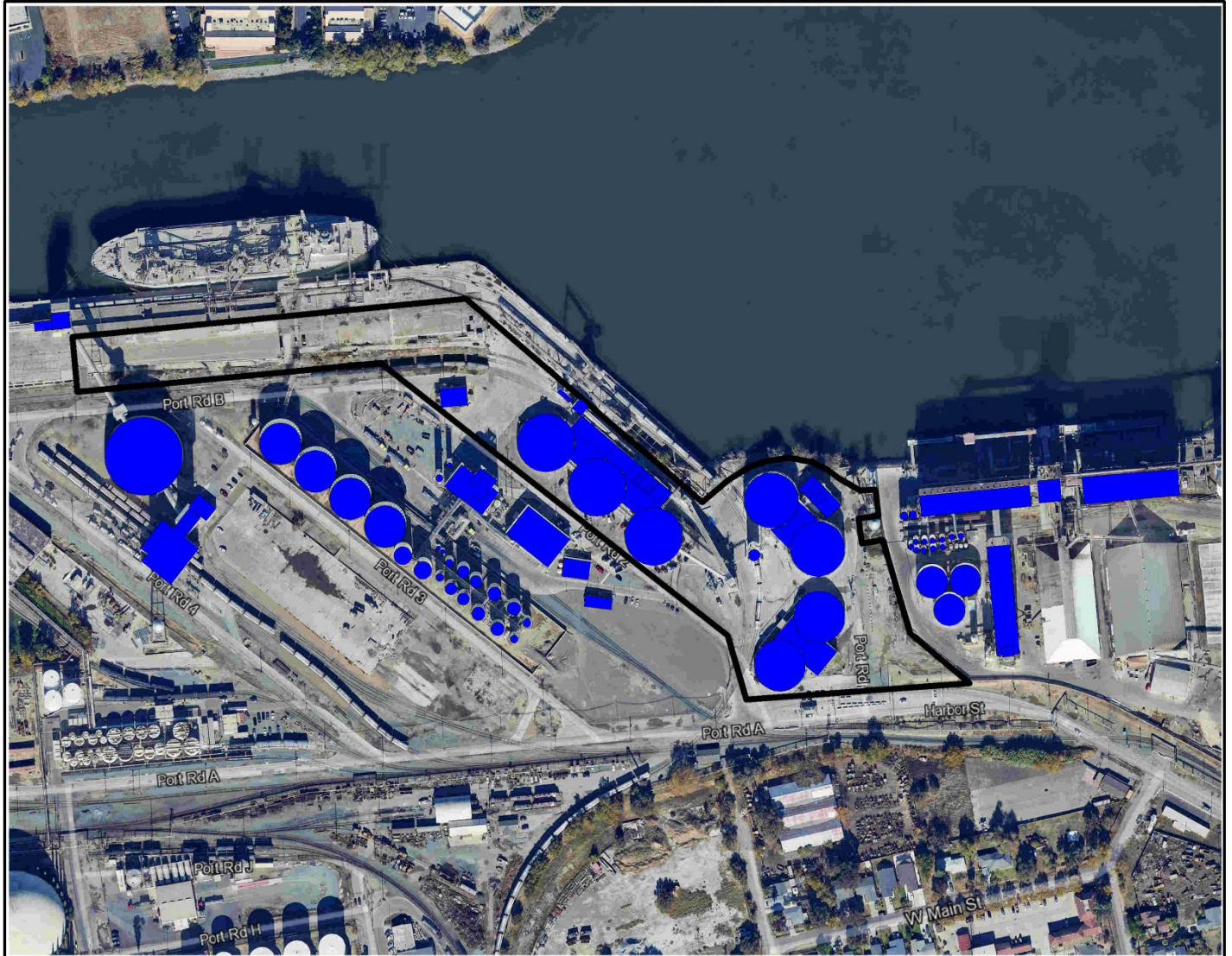
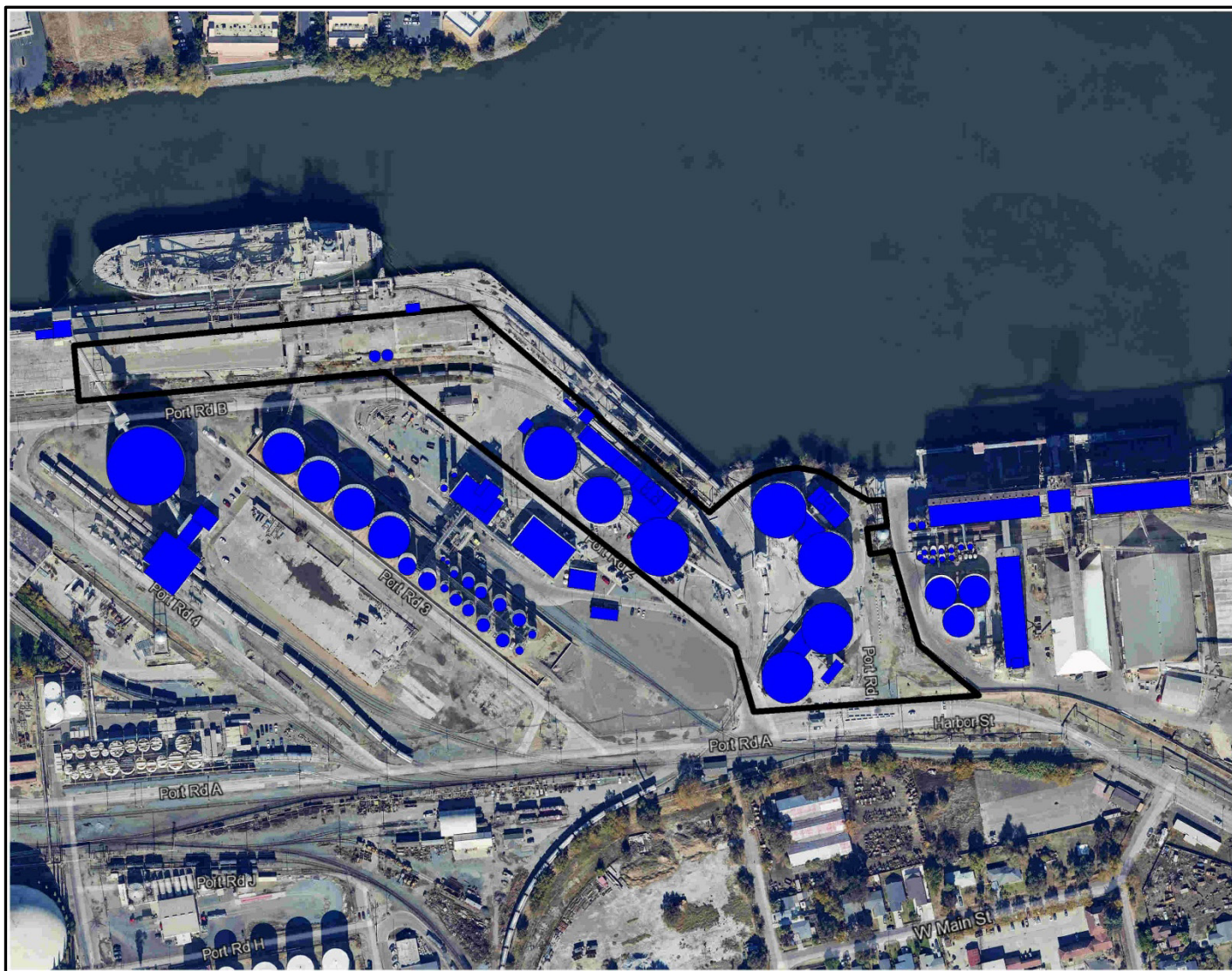


Figure C3-6. Proposed Structures Analyzed for Wake Effects

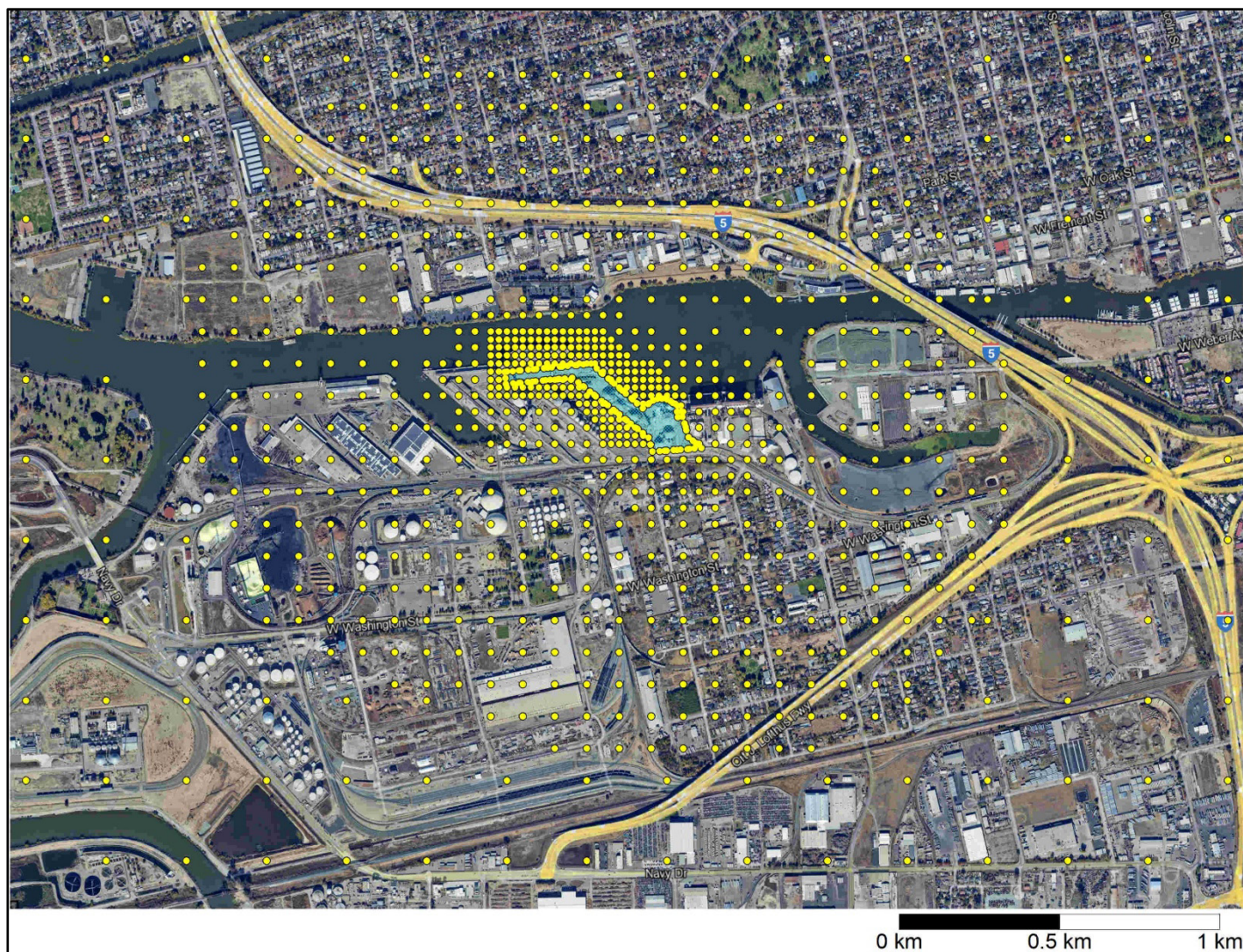


3.6 Receptor Locations

Cartesian coordinate receptor grids containing 987 individual receptor points, covering an area approximately 4 kilometers by 4 kilometers, were used to provide adequate spatial coverage surrounding the project site to assess ground-level pollutant concentrations, identify the extent of impacts, and identify maximum impact locations. Specifically, coarse grid receptors were positioned every 50 meters from the project site boundary to approximately 200 meters from the project site, then every 100 meters to approximately 1 kilometer from the project site, and then every 250 meters to approximately 2 kilometers from the project site. Additionally, fine grid receptors were positioned every 25 meters along the project site boundary and surrounding the coarse grid maximum impact locations.

Figure C3-7 shows the receptors used in AERMOD for criteria pollutants.

Figure C3-7. AERMOD Receptor Grid



3.7 Elevations

EPA's AERMAP, version 24142, was used to determine ground-level elevations of sources, receptors, and buildings for input into AERMOD (EPA, 2024b). The elevations were determined from a USGS 1 arc-second National Elevation Dataset (NED) file. All coordinates were referenced to Universal Transverse Mercator (UTM) North American Datum of 1983 (NAD83), Zone 10.

3.8 Meteorological Data

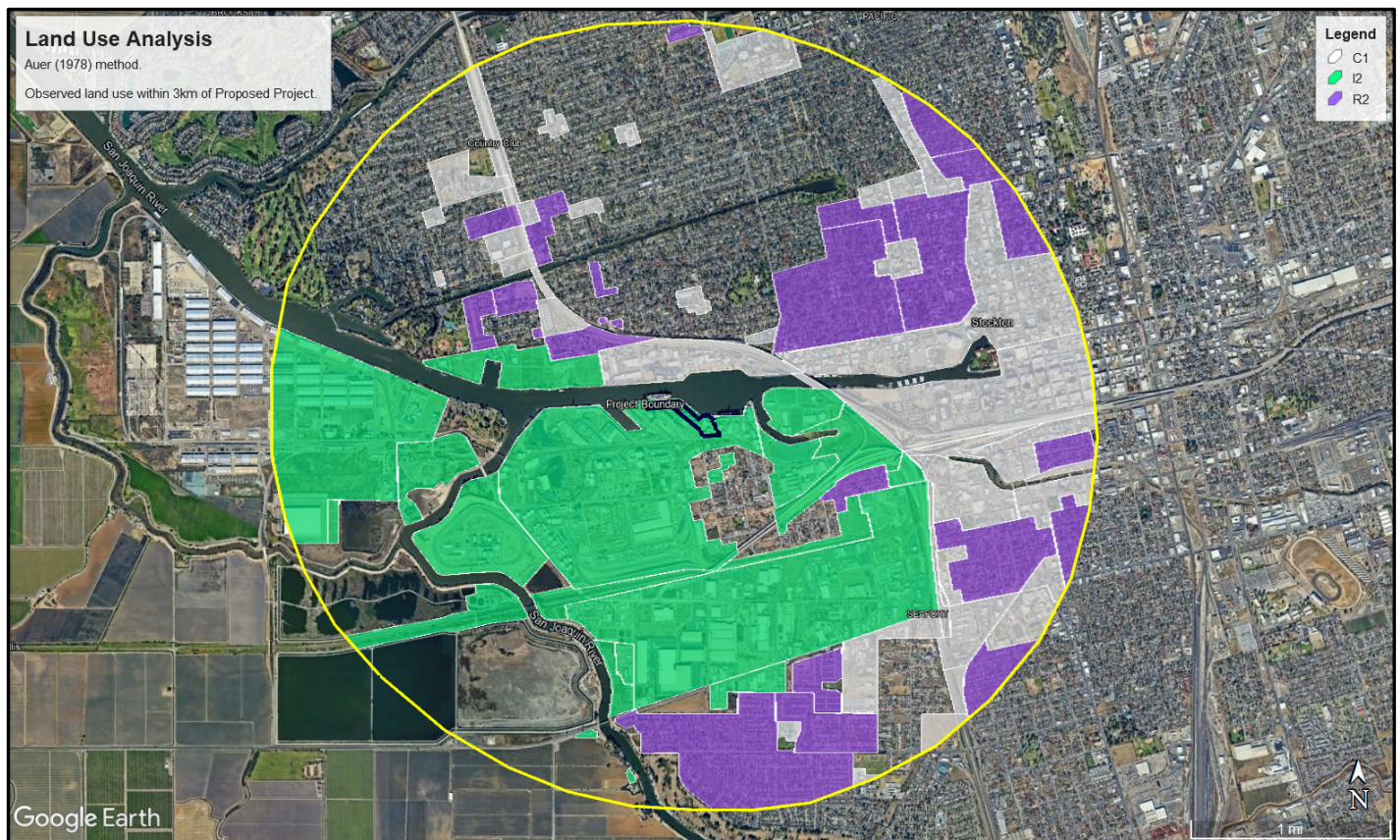
AERMOD used five consecutive years of hourly meteorological data recorded at Stockton Metropolitan Airport (Station ID 23237), about 5 miles southeast of the project site. The meteorological data set was prepared by and obtained from the SJVAPCD (2026). Stockton Metropolitan Airport is the closest and most representative station of SJVAPCD's available data sets. The data set covered the years 2018 through 2022. The SJVAPCD processed the raw meteorological data using EPA's AERMET, version 21112 (EPA, 2021).

3.9 Model Options

The regulatory default option was used in all AERMOD runs. The conversion of nitrogen oxide (NO_x) to NO_2 in ambient air was simulated in AERMOD using the Tier 2 Ambient Ratio Method (ARM2) with EPA default NO_x to NO_2 conversion factors. All sulfur oxide (SO_x) emissions were conservatively assumed to be SO_2 .

AERMOD was run with urban dispersion coefficients, based on the land use classification methodology developed by Auer (1978) and approved by the SJVAPCD (2022). The land use analysis, shown in Figure C3-8, determined that 55 percent of the area within 3 kilometers of the proposed project site is currently either industrial (“I2”), commercial (“C1”), or compact residential (“R2”). According to the SJVAPCD, a value above 50 percent requires the use of urban dispersion coefficients; below 50 percent requires the use of rural dispersion coefficients. AERMOD was run with an urban population of 324,975, representative of the City of Stockton in 2024, as published by the U.S. Census Bureau (2026).

Figure C3-8. Land Use Classification within 3 km of the Project Site



3.10 Modeled Averaging Times

For comparison to the NAAQS, special processing was used in AERMOD for 24-hour $\text{PM}_{2.5}$ and 1-hour NO_2 concentrations. Specifically, the 24-hour $\text{PM}_{2.5}$ concentrations for the NAAQS were modeled as the 98th percentile (8th highest) 24-hour concentration for each year of meteorological data, averaged over the five years of

meteorological data. The 1-hour NO₂ concentrations for the NAAQS were modeled as the 98th percentile (8th highest) of the 1-hour daily maximum concentrations for each year of meteorological data, averaged over the five years of meteorological data. The EPA states that modeling a 5-year average over a meteorological data set serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS (EPA, 2010).

Except for the two special processing cases for the NAAQS described above, all pollutants and averaging times were modeled as the highest predicted concentrations over the entire five-year meteorological data set.

3.11 Background Concentrations

Because they are absolute standards, the NAAQS and CAAQS must be compared to total pollutant concentrations rather than only the proposed project's concentration increments. Therefore, for this AAQA, it was necessary to add background pollutant concentrations to the modeled concentration increments to obtain total concentrations before comparing to the NAAQS and CAAQS. The background concentrations represent the ambient pollution levels already present in the area that are not attributable to the specific sources being modeled.

Table C3-6 shows the background concentrations used in the AAQA. The background concentrations are shown in their original unit of measure (UOM) and converted, where necessary, to units of micrograms per cubic meter (µg/m³) for dispersion modeling purposes. The background concentrations were derived from the last three available years of observations at the ambient monitoring stations most representative of the project site. The Stockton-University Park station (702 N Aurora Street) is the closest and most representative station and therefore was used for all pollutants except SO₂. The Fresno-Garland station (3727 N First St) was used for SO₂ because it is the only station in the San Joaquin Valley that measures SO₂. As directed by SJVAPCD staff, the ambient background data for these stations were obtained from EPA (2026) and EPA (2026b).

The derivation of each background concentration generally followed the form of its corresponding ambient air quality standard. Therefore, with four exceptions, the background concentrations conservatively represented the maximum recorded observations over the three years of historical data. The four exceptions are:

- The 24-hour PM_{2.5} background concentration for the NAAQS represents the three-year average of the 98th percentile of daily concentrations.
- The annual PM_{2.5} background concentration for the NAAQS represents the three-year average of the annual concentrations.
- The 1-hour NO₂ background concentration for the NAAQS represents the three-year average of the 98th percentile of 1-hour daily maximum concentrations.
- The 1-hour SO₂ background concentration for the NAAQS represents the three-year average of the 99th percentile of 1-hour daily maximum concentrations.

Table C3-6 also shows that the background concentrations already exceed the 24-hour PM₁₀ CAAQS, annual PM₁₀ CAAQS, annual PM_{2.5} NAAQS, even without adding the proposed project's contribution. Additionally, the background concentrations alone consume 97 percent of the 24-hour PM_{2.5} NAAQS and 89 percent of the annual PM_{2.5} CAAQS.

The background concentrations were not used when comparing modeled concentration increments to the SILs because the SILs are incremental, rather than absolute, thresholds.

Table C3-6. Background Pollutant Concentrations

Pollutant	Averaging Time	Unit of Measure (UOM)	Monitored Concentration (UOM) ^[1,2]			Background Concentration ^[3]		Ambient Air Quality Standard ^[4]	
			2022	2023	2024	(UOM)	(µg/m ³) ^[8]	California (µg/m ³)	National (µg/m ³)
PM ₁₀	24 Hour	µg/m ³	80	81	73	81	81	50	150
PM ₁₀	Annual	µg/m ³	29	25	25	29	29	20	--
PM _{2.5}	24 Hour 98% ^[5]	µg/m ³	35.2	35.4	32.6	34	34	--	35
PM _{2.5}	Annual (California)	µg/m ³	10.2	10.7	10.1	10.7	10.7	12	--
PM _{2.5}	Annual (National)	µg/m ³	10.2	10.7	10.1	10.3	10.3	--	9
CO	1 Hour	ppm	2.6	2.2	1.1	2.6	2,985	23,000	40,000
CO	8-Hour	ppm	1.7	1.4	0.7	1.7	1,952	10,000	10,000
NO ₂	1 Hour	ppb	44	45	32	45	85	339	--
NO ₂	1 Hour 98% ^[6]	ppb	39.3	38.7	29.4	36	67	--	188
NO ₂	Annual	ppb	8.3	8.0	9.0	9	17	57	100
SO ₂	1 Hour	ppb	3.4	5	10.7	11	28	655	--
SO ₂	1 Hour 99% ^[7]	ppb	3	4.8	5.6	4	12	--	196
SO ₂	24 Hour	ppb	1.2	2.3	2.2	2	6	105	--

Legend:

UOM = unit of measure

µg/m³ = micrograms per cubic meter

ppm = parts per million by volume

ppb = parts per billion by volume.

Notes:

[1] Source for data rows with no California standard: EPA, 2026. Air Quality Design Values. Available: <https://www.epa.gov/air-trends/air-quality-design-values>. Accessed 3/2/2026. Source for all data rows: EPA, 2026b. Monitor Values Report. Available: <https://www.epa.gov/outdoor-air-quality-data/monitor-values-report>. Accessed 2/28/2026. The Stockton-University Park station (702 N Aurora Street) was used for all pollutants except SO₂. The Fresno-Garland station (3727 N First St) was used for SO₂ because it is the only station in the San Joaquin Valley that measures SO₂.

[2] Unless otherwise noted, non-annual concentrations are the highest over the indicated year.

[3] Background concentrations are the highest of the three years, except for the following, which are three-year averages: 24-hour 98% PM_{2.5}, annual PM_{2.5} (national only), 1-hour 98% NO₂, and 1-hour 99% SO₂.

[4] Source: CARB, 2024. Table of Ambient Air Quality Standards. July 16. Available: <https://ww2.arb.ca.gov/resources/california-ambient-air-quality-standards>. Accessed 2/28/2026.

[5] 98th percentile of daily concentrations.

[6] 98th percentile of the 1-hour daily maximum concentrations.

[7] 99th percentile of the 1-hour daily maximum concentrations.

[8] The concentration in micrograms per cubic meter (µg/m³) is calculated as follows: µg/m³ = ppb x MW / 24.4. The molecular weights (MW) are 46.0055 for NO₂, 28.0101 for CO, and 64.066 for SO₂.

4. Modeled Air Quality Impacts

The AAQA modeled ambient pollutant concentrations associated with 2023 baseline operation and year 15 (2046) proposed project operation. The modeled baseline concentrations were subtracted from the modeled proposed

project concentrations at each receptor grid point to determine the proposed project concentration increments. As described in Step 3A of Section 2, the concentration increments were added to the background concentrations to obtain the total concentrations for comparison to the CAAQS and NAAQS.

Table C3-7 presents the maximum off-site total pollutant concentrations associated with unmitigated proposed project operation. Exceedances of a CAAQS or NAAQS are shown in bold. The table shows that the following total concentrations would exceed a CAAQS or NAAQS:

- The maximum 24-hour PM_{10} concentration of $82.8 \mu\text{g}/\text{m}^3$ would exceed the CAAQS of $50 \mu\text{g}/\text{m}^3$. This was a foregone conclusion because the background concentration of $81 \mu\text{g}/\text{m}^3$ already exceeds the CAAQS.
- The maximum annual PM_{10} concentration of $32.5 \mu\text{g}/\text{m}^3$ would exceed the CAAQS of $20 \mu\text{g}/\text{m}^3$. This was a foregone conclusion because the background concentration of $29 \mu\text{g}/\text{m}^3$ already exceeds the CAAQS.
- The maximum 24-hour $\text{PM}_{2.5}$ concentration of $35.4 \mu\text{g}/\text{m}^3$ would exceed the NAAQS of $35 \mu\text{g}/\text{m}^3$.
- The maximum annual $\text{PM}_{2.5}$ concentration of $14.2 \mu\text{g}/\text{m}^3$ would exceed the CAAQS of $12 \mu\text{g}/\text{m}^3$.
- The maximum annual $\text{PM}_{2.5}$ concentration of $13.8 \mu\text{g}/\text{m}^3$ would exceed the NAAQS of $9 \mu\text{g}/\text{m}^3$. This was a foregone conclusion because the background concentration of $10.3 \mu\text{g}/\text{m}^3$ already exceeds the NAAQS.

All maximum total concentrations of CO , NO_2 , and SO_2 would be below the CAAQS and NAAQS.

Table C3-7. Maximum Pollutant Concentrations Associated with Unmitigated Proposed Project Operation

Pollutant	Averaging Time	Background Concentration (µg/m³) ^[1]	Proposed Project Maximum Concentration Increment (µg/m³) ^[2]	Total Concentration (µg/m³) ^[3]	CAAQS (µg/m³)	NAAQS (µg/m³)	Exceeds CAAQS or NAAQS?
PM ₁₀	24 Hour	81	1.8	82.8	50	150	Yes
PM ₁₀	Annual	29	3.5	32.5	20	--	Yes
PM _{2.5}	24 Hour ^[4]	34	1.4	35.4	--	35	Yes
PM _{2.5}	Annual (State)	10.7	3.5	14.2	12	--	Yes
PM _{2.5}	Annual (National)	10.3	3.5	13.8	--	9	Yes
CO	1 Hour	2,985	280	3,265	23,000	40,000	No
CO	8-Hour	1,952	191	2,143	10,000	10,000	No
NO ₂	1 Hour (State)	85	10	95.5	339	--	No
NO ₂	1 Hour (National) ^[5]	67	12	79.3	--	188	No
NO ₂	Annual	17	1.9	18.9	57	100	No
SO ₂	1 Hour (State)	28	27	54.8	655	--	No
SO ₂	1 Hour (National)	12	27	38.8	--	196	No
SO ₂	24 Hour	6	0.8	6.8	105	--	No

Legend:

µg/m³ = micrograms per cubic meter

CAAQS = California Ambient Air Quality Standards

NAAQS = National Ambient Air Quality Standards.

Notes:

Exceedances of the AAQS are in bold.

[1] Obtained from actual monitoring data from 2022-2024.

[2] Modeled with AERMOD. Proposed Project Maximum Concentration Increment = Proposed Project Year 2046 Concentration minus CEQA Baseline Year 2023 Concentration, calculated at each modeled receptor grid point. The maximum concentration increment from all modeled receptor grid points is displayed.

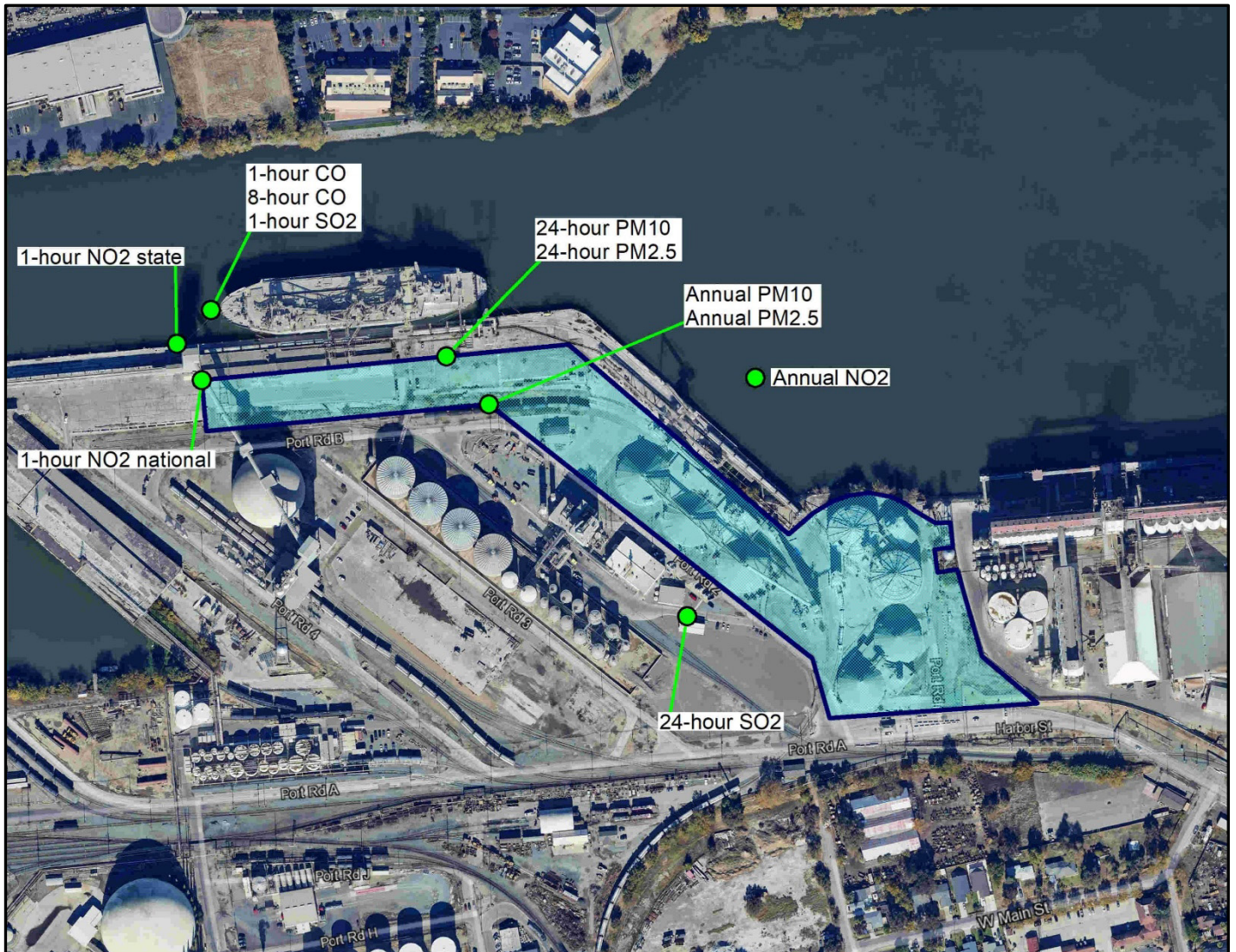
[3] Total Concentration = Background Concentration + Proposed Project Maximum Concentration Increment.

[4] Modeled as the 98th percentile (8th highest) daily concentration for each year of meteorological data, averaged over the five years of meteorological data.

[5] Modeled as the 98th percentile (8th highest) of the 1-hour daily maximum concentrations for each year of meteorological data, averaged over the five years of meteorological data.

Figure C3-9 shows the predicted locations of the maximum off-site pollutant concentrations associated with proposed project operation. All maximum locations would be within the port, in close proximity to the project site boundary and berths.

Figure C3-9. Maximum Receptor Locations Associated with Unmitigated Proposed Project Operations



Because the 24-hour and annual total concentrations of PM₁₀ and PM_{2.5} would exceed a CAAQS or NAAQS, it was necessary to proceed to Step 3B (Section 2) for those pollutants, which involved comparing their concentration increments (without adding background) to the SILs. Therefore, Table C3-8 presents the maximum off-site pollutant concentration increments of PM₁₀ and PM_{2.5} associated with unmitigated proposed project operation. Exceedances of a SIL are shown in bold. The table shows that the following concentration increments would exceed a SIL:

- The maximum annual PM₁₀ concentration increment of 3.5 µg/m³ would exceed the SIL of 1 µg/m³.
- The maximum 24-hour PM_{2.5} concentration increment of 1.7 µg/m³ would exceed the SIL of 1.2 µg/m³.
- The maximum annual PM_{2.5} concentration increment of 3.5 µg/m³ would exceed the SIL of 0.13 µg/m³.

The maximum 24-hour PM₁₀ concentration increment would be below the SIL. Therefore, based on these results, unmitigated proposed project operation would produce significant ambient pollutant impacts for annual PM₁₀, 24-hour PM_{2.5}, and annual PM_{2.5}. The geographical areas where the impacts would be significant (i.e., where the SILs

would be exceeded) are shown in Figure C3-10 for annual PM₁₀, Figure C3-11 for 24-hour PM_{2.5}, and Figure C3-12 for annual PM_{2.5}.

Table C3-8. Maximum Pollutant Concentration Increments Associated with Unmitigated Proposed Project Operation

Pollutant	Averaging Time	Proposed Project Maximum Concentration Increment (µg/m³) ^[1]	SIL (µg/m³)	Exceeds SIL?
PM ₁₀	24 Hour	1.8	5	No
PM ₁₀	Annual	3.5	1	Yes
PM _{2.5}	24 Hour ^[2]	1.7	1.2	Yes
PM _{2.5}	Annual	3.5	0.13	Yes

Legend:

µg/m³ = micrograms per cubic meter

SIL = Significant Impact Level.

Notes:

Exceedances of the SILs are in bold.

[1] Modeled with AERMOD. Proposed Project Maximum Concentration Increment = Proposed Project Year 2046 Concentration minus CEQA Baseline Year 2023 Concentration, calculated at each modeled receptor grid point. The maximum concentration increment from all modeled receptor grid points is displayed.

[2] The 24-hour PM_{2.5} concentration increments in Table C3-7 and Table C3-8 differ from each other because the value in Table C3-7 is the 98th percentile to align with the NAAQS, while the value in Table C3-8 is the overall maximum to align with the SIL.

Figure C3-10. Significant Impact Area for Annual PM_{10} Concentration Increments Associated with Unmitigated Proposed Project Operation

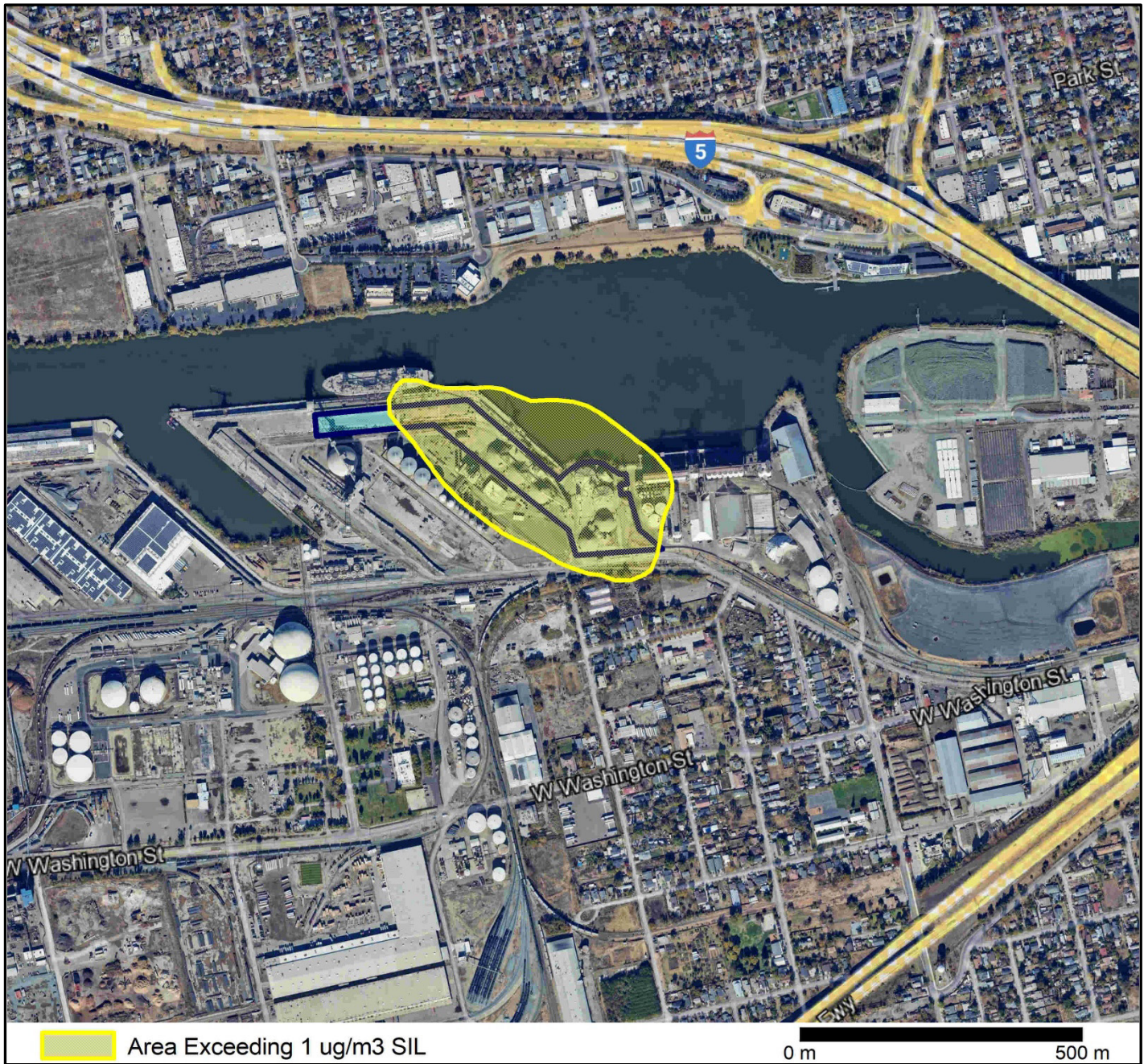


Figure C3-11. Significant Impact Area for 24-Hour $PM_{2.5}$ Concentration Increments Associated with Unmitigated Proposed Project Operation



Figure C3-12. Significant Impact Area for Annual $PM_{2.5}$ Concentration Increments Associated with Unmitigated Proposed Project Operation

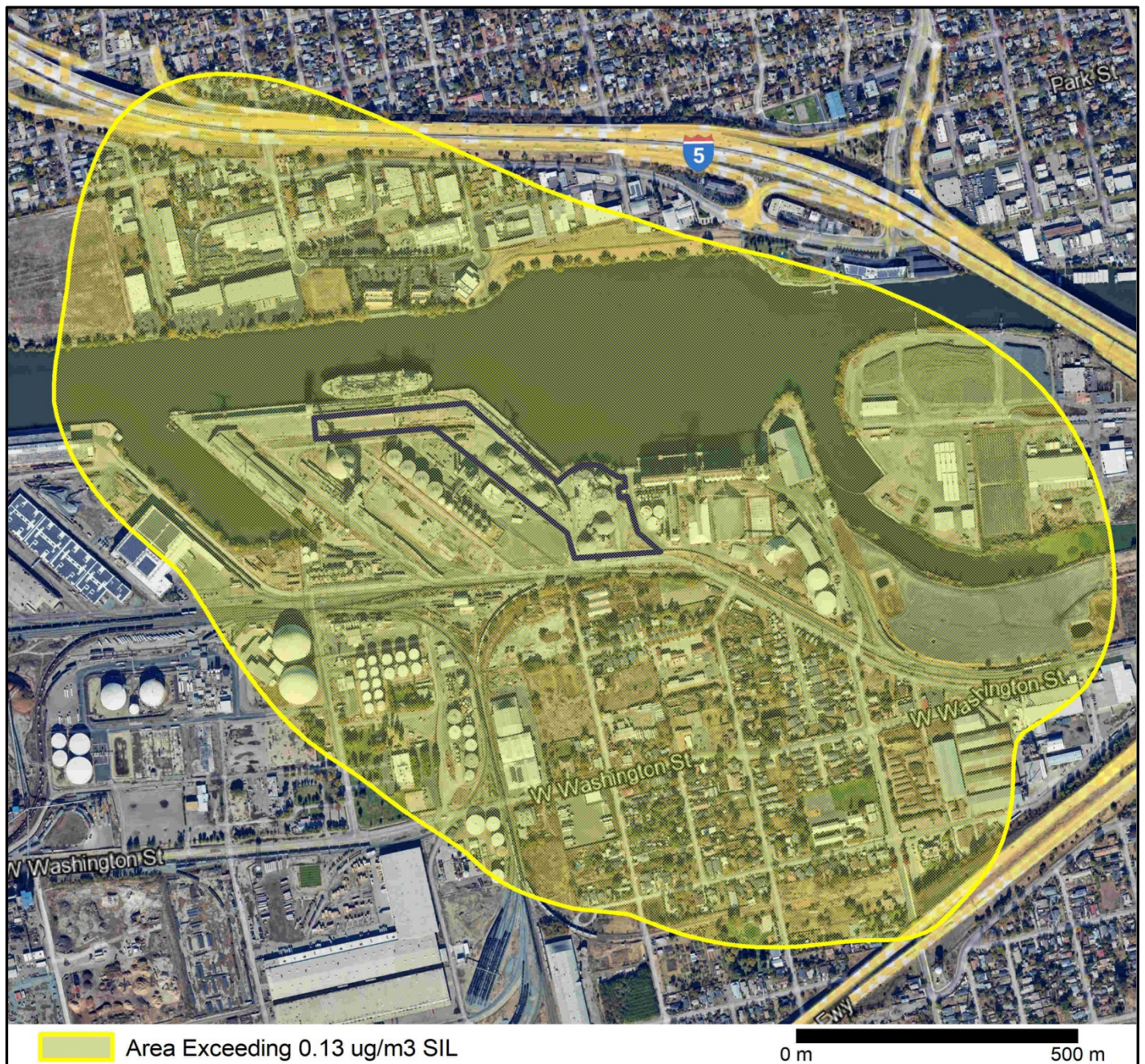


Table C3-9 shows the source contributions to the maximum annual PM_{2.5} concentration associated with unmitigated proposed project operation. The contributions are shown for annual PM_{2.5} because, as shown in Figure C3-12, this combination of pollutant and averaging time has the greatest geographical extent of proposed project impacts. The percent contributions correspond to the maximum receptor location (see Figure C3-9), which is on the project site boundary. The contributions would vary somewhat at other locations. The table shows that loading dust would account for approximately 95 percent of the proposed project impact. Loading and conveying dust together would account for approximately 99 percent of the proposed project impact.

Table C3-9. Source Contributions to the Maximum Annual PM_{2.5} Concentration Associated with Unmitigated Proposed Project Operation

Emission Source Category	Percent Contribution
Trucks	0.1%
Vessels	0.1%
Barges	0.1%
Tugboats	0.0%
Switch Locomotives	0.0%
Loading Dust	95.3%
Conveying Dust	3.8%
Mobile Onsite Equipment	0.5%

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