AIR QUALITY IMPACT EVALUATION

PROPOSED DEVELOPMENT PROJECT
2900 NORTH WESTERN AVENUE
CHICAGO, ILLINOIS 60618

Prepared For:
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1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

This air quality impact evaluation (AQIE) report has been prepared to review potential impacts from a proposed development project located at 2900 North Western Avenue in Chicago, Illinois (Project). The 134,201 square foot property lot is located within Chicago's 35th Ward within a designated Environmental Justice area of concern. According to the City of Chicago Zoning and Land Use Map, the facility is presently zoned as Light Industry District (M2-3). This AQIE report is required under Chicago Air Quality Ordinance Municipal Code Section 17-9-0117-G.1.

This evaluation examines Project operational air quality impacts at on-site and off-site receptor locations. In accordance with the Chicago Air Quality Ordinance and the Chicago Department of Public Health's (CDPH) Air Quality Impact Evaluation Intern Guidance (September 2021), emission sources include on-site stationary and mobile sources and off-site mobile sources of particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), and nitrogen dioxide (NO_2). Off-site mobile sources at roadways and intersections were identified using results from a traffic impact study (Traffic Study) conducted by Kenig, Lindgren, O'Hara, Aboona, Inc., dated December 1, 2023 (KLOA 2023).

Impacts from these sources were modeled and results were examined to determine if the proposed Project has the potential to cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$, PM_{10}, or NO_2. Air quality impacts from these sources were modeled using the United States Environmental Protection Agency's (USEPA) - American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). AERMOD is a steady-state Gaussian air dispersion model based on planetary boundary layer theory that incorporates building downwash algorithms, advanced depositional parameters, local terrain and urban heat island effects, and advanced meteorological turbulence calculations.

1.2 PROPOSED PROJECT DESCRIPTION

The proposed Project consists of a warehouse facility on North Western Avenue in Chicago, Illinois. The Project site is located between North Campbell Avenue and North Western Avenue, and north of West George Street. North Elston Avenue is located directly southwest of the site, and the Chicago River is located approximately 530 feet east of Project site. The Project site is located in a mixed industrial and residential area of Chicago and situated near commercial businesses as well as residences.

2.0 METHODOLOGY AND ASSUMPTIONS

2.1 MODELS

Emissions of $PM_{2.5}$, PM_{10}, and NO_2 from on-site and off-site emission sources were modeled using USEPA's AERMOD air dispersion model. USEPA's Motor Vehicle Emission Simulator (MOVES) emission modeling system was used to calculate emissions from passenger vehicles and trucks traveling on-site and off-site on nearby roadways as well as idling at nearby intersections. Emission factors from MOVES were provided by the Chicago Department of Public Health (CDPH) referenced lookup table.

2.2 AIR POLLUTANTS

The pollutants modeled for this Project are 24-hour $PM_{2.5}$ emissions, annual $PM_{2.5}$ emissions, 24-hour PM_{10} emissions, and 1-hour NO_2 emissions. Sources of these pollutants include natural gas-fired equipment combustion emissions for warehouse and office comfort heating systems, paved roads fugitive emissions, and project-generated on-site and off-site traffic engine exhaust emissions (passenger vehicles and trucks).

2.3 ASSUMPTIONS

The following assumptions were made to model and assess potential air quality impacts due to the Project.

2.3.1 On-Site Comfort Heating Equipment

2.3.1.1 Natural Gas-Fired Heaters

Building comfort heating requirements will be provided by direct expansion (DX) cooling and natural gas heating roof top unit (RTU) equipment. The roof top unit equipment planned for this project consists of one natural gas fired roof top unit heater rated at 400,000 British Thermal Units (BTUs) per hour, two natural gas fired roof top unit heaters rated at 350,000 BTUs per hour, eight natural gas fired roof top unit heaters rated at 224,000 BTUs per hour, three natural gas fired roof top unit heaters rated at 110,000 BTUs per hour, and one natural gas fired makeup air unit (MAU) heater rated at 3,270,0000 BTUs per hour.

Emissions from the natural gas fired heating equipment were estimated using AP-42 emission factors and operation six months (October 15th through April 15th) per year, or 4,380 hours per year. The heat content for natural gas was assumed to be 1,020 BTU per standard cubic foot.

The heaters were assumed to be located on the rooftop of the building and exhaust heated air within the building. Emissions from the heaters were modeled in AERMOD as a single volume source approximately covering the footprint of the building.

Hot water heaters to be used on-site will be electric and therefore will generate no combustion emissions. The use of electric water heaters was chosen as part of the development's sustainability goals.

2.3.1.2 Forklifts

Two propane fueled forklifts are planned to be operated at the site. The exact manufacturer and model of forklift to be used is unknown at the time the AQIE was conducted. Emissions were estimated using AP-42 emission factors, and assuming an average fuel use of one gallon of propane per hour, and total operating hours of 4,380 hours per year for both forklifts.

2.3.2 Paved Roads

Fugitive emissions from on-site and off-site mobile equipment (passenger vehicles and trucks) traveling on paved roads were estimated using the procedure in AP-42 Chapter 13.2.1, equation (2). The following assumptions were made when calculating emission factors for paved roads:

- The estimated weekday morning and weekday evening peak traffic volumes that will be generated by the proposed development was determined based on additional passenger vehicle trip and additional truck trip distribution assignments provided in Figure 10 and Figure 11 of the Traffic Study.
- Silt loading values were pro-rated to conservatively assume winter precipitation occurs in six out of twelve months per year at the project site.
- Mean vehicle weight was calculated as a weighted average of all site-generated vehicles traveling on each roadway section. Average weight for passenger vehicles was assumed to be 2.05 tons, average tractor trailer weight was assumed to be 28.75 tons, and average single-unit truck weight was assumed to be 11.38 tons.
- The number of wet days was approximated as 121 days based on AP-42 Figure 13.2.1-2.
- Emissions for paved roads were modeled conservatively assuming the peak hour in terms of traffic volumes applied to all hours of the day with site-generated traffic.

2.3.3 Mobile Equipment – Vehicle Exhaust Emissions

2.3.3.1 Assumptions For All Mobile Equipment

Exhaust emissions from on-site and off-site mobile equipment (passenger vehicles and trucks) were estimated using Motor Vehicle Emissions Simulator (MOVES) emission factor tables. The following assumptions were made when selecting emission factors from these tables:

- Vehicle types assumed to operate at or near the Project site include "passenger car," "combination short-haul truck," and "single unit short-haul truck."
- Fuel types assumed were based on default selections provided in MOVES guidance: gasoline for passenger vehicles and diesel for all trucks.
- Emission factors were selected for the year 2023.
- Road type selected was "urban unrestricted access."
- Average passenger car height was assumed to be 1.53 meters. Average truck height was assumed to be 4 meters. Vehicle heights for roadway sections with both passenger car and truck traffic were calculated by pro-rating the heights according to the percentage of each type of traffic expected to travel on that roadway section.
- Average passenger car width was assumed to be 1.98 meters. Average truck width was assumed to be 2.59 meters.
- Model parameters, including plume height and width, release height, and initial vertical dimension were calculated in accordance with CDPH guidance.
- Hourly exhaust emissions for project-generated traffic were prorated by hour of the day, in accordance with project hourly trip generation values provided in Table 2 of the Traffic Study.

2.3.3.2 Project-Generated Traffic

- Project-generated traffic was divided between George Street, Campbell Avenue, Western Avenue, Elston Avenue, Diversey Avenue, and the three planned site access entrances. Roadway sections and associated traffic volumes were determined based on information provided in Figures 8 and 9 of the Traffic Study.
- Roadway section lengths were estimated using Google Earth and AERMOD View.
- Traffic on roadway sections were modeled as line volume sources.
- Vehicle speeds were determined using speed limit information obtained from Google Street View or assumed as follows: 30 miles per hour for traffic on Campbell Avenue, Elston Avenue, Diversey Avenue, Western Avenue, and 20 miles per hour for traffic on George Street.
- Road widths were estimated to the nearest meter using Google Earth.

2.3.3.3 Idling

- Traffic volumes were assigned to seven different idling areas, which consisted of three off-site intersections, three site access entrances, and one truck loading dock area as identified in the Traffic Study.
- Idling times for off-site intersections were based on level of service delays for year 2029 projected conditions as identified in Tables 3, 4, and 5 of the Traffic Study.
- Idling areas were modeled as area or area poly sources. Sources for intersections encompassed the full width of the roadway out to approximately 25 meters from the center of the intersection in all directions that project-generated traffic is expected. Traffic volumes were based on information provided in the Traffic Study.
- It was assumed that passenger cars will not idle in on-site parking lots.

2.4 BACKGROUND CONCENTRATIONS

Background concentrations for each of the pollutants and associated NAAQS examined in this study were provided from ambient air monitoring stations located near the Project site. The Project location is in the CDPH's "northeast" category: within four miles of the lakeshore and north of the Eisenhower Expressway. Background concentrations for proposed projects in the "northeast" category consist of data from the following air monitors: "Village Hall" and "Kennedy Near Road 2 and CTA Building".

Ambient air monitoring station data and background concentrations for each of the studied NAAQS are presented in Table 1.

2.5 AERMOD MODEL INPUTS

- Location of the Project site and location and dimensions of the building and site access points were determined from the Traffic Study, a preliminary site drawing, and Google Earth.
- Site plans and mechanical drawing were provided by Lipo Structures, Inc. - Architect.
- Emissions from fourteen natural gas fired rooftop unit (RTU) heaters were modeled as a single volume spread across the footprint of the building.
- Emissions from one natural gas fired markup air unit (MAU) heater was modeled as a single volume spread across the footprint of the building.
- Emissions from the two planned forklifts were modeled as an area source covering the footprint of the building.
- Exhaust emissions from mobile sources (vehicle traffic) and emissions from vehicle travel on paved roads off-site were modeled as line volume sources.

- Due to site design and limited space, it is assumed that vehicles (passenger cars and trucks) will not be traveling around site.
- Vehicle exhaust emissions in idling areas (intersections and on-site loading docks) were modeled as area or area poly sources.
- In accordance with CDPH guidance, urban dispersion coefficients were used. A population of 9,618,502 derived from the 2020 census for the Chicago Metropolitan Statistical Area was used.
- Building downwash effects were not applicable because there are no emission stacks from the rooftop.
- Surface and upper air meteorological data from the O'Hare meteorological station were used, in accordance with CDPH guidance for projects in the "northeast" category. Meteorological data was obtained from the CDPH website.

3.0 EMISSIONS SOURCES AND FACTORS

3.1 STATIONARY SOURCES

3.1.1 Natural Gas-Fired Heaters

Building comfort heating requirements will be provided by direct expansion (DX) cooling and natural gas heating roof top unit (RTU) equipment. The roof top unit equipment planned for this project consists of one natural gas fired roof top unit heater rated at 400,000 British thermal units (BTUs) per hour, two natural gas fired roof top unit heaters rated at 350,000 BTUs per hour, eight natural gas fired roof top unit heaters rated at 224,000 BTUs per hour, three natural gas fired roof top unit heaters rated at 110,000 BTUs per hour, and one natural gas fired makeup air unit (MAU) heater rated at 3,270,0000 BTUs per hour.

Emissions from the heaters were calculated conservatively assuming 100-percent rating and operation twenty-four hours per day for six months (October 15th through April 15th) per year, or 4,380 hours per year. This assumption is conservative as the heating units will likely only operate for a portion of each day, and not all days of every month during this time period.

Emission rates from the heaters were estimated using AP-42 emission factors from Chapter 1.4 for Natural Gas Combustion, Tables 1.4-1 and 1.4-2. For NO_x emissions, the emission factors for small boilers rated less than 100 million BTU (MMBTU) per hour were used. Emission factors were converted to pound per MMBTU assuming 1,020 BTU per standard cubic foot of natural gas, in accordance with footnote (a) to AP-42 Table 1.4-2.

Emission factors used for natural gas-fired heating units are shown in Table 2.

3.1.2 Forklifts

It is assumed that two propane fired forklifts will operate at the facility. Emissions from the forklifts were estimated assuming an average propane usage rate of one gallon of propane per hour of operation, and conservatively assuming total operating hours of 4,380 hours per year for both forklifts. Propane emission factors from AP-42 Chapter 1.5, "Liquefied Petroleum Gas Combustion," were used.

Emission factors used for the forklift are shown in Table 3.

3.2 MOBILE SOURCES

Mobile sources for this Project consisted of exhaust emissions from off-site vehicle traffic, emissions from vehicles traveling on paved roads, and idling areas consisting of off-site intersections, site access entrances, and on-site loading docks.

3.2.1 On-Site And Off-Site Traffic

Project-generated traffic was divided between George Street, Campbell Avenue, Western Avenue, Elston Avenue, Diversey Avenue, and the three proposed site access entrances. A total of fourteen different off-site roadway sections and site access entrances were identified:

1. Western Avenue south of Elston Avenue-Diversey Avenue (source ROAD1)
2. Western Avenue between Elston Avenue-Diversey Avenue and George Street (source ROAD2)
3. Western Avenue north of George Street (source ROAD3)
4. George Street west of Campbell Avenue (source ROAD4)
5. George Street between Campbell Avenue and site access entrance (source ROAD5)
6. George Street between site access entrance and Western Avenue (source ROAD6)
7. Campbell Avenue between Diversey Avenue and George Street (source ROAD7)
8. Campbell Avenue to Elston Avenue (source ROAD8)
9. Campbell Avenue between George Street-Elston Avenue and site access entrance (source ROAD9)
10. Campbell Avenue north to truck site access entrance (source ROAD10)
11. Diversey Avenue between Campbell Avenue-Elston Avenue (source ROAD11)
12. Diversey Avenue going east of Western Avenue (source ROAD12)
13. Elston Avenue between Diversey Avenue and Western Avenue (source ROAD13)
14. Traffic traveling around on-site (passenger vehicles and trucks) (source ONSITETRAFF).

Roadway section lengths were estimated using Google Earth and AERMOD View. Traffic volumes for each roadway section were determined using information provided in Figures 8 and 9 of the Traffic Study. Emission rates were pro-rated by hour of day using the 24-hour trip generation totals provided in Table 2 of the Traffic Study. Existing traffic counts identified the peak hour volumes on the road system occurring from 8:00 AM to 9:00 AM and 4:00 PM to 5:00 PM. The maximum emission rate was assumed to occur during the 8:00 AM to 9:00 AM hour, as indicated by the highest number of trips generated for that hour as shown in Table 2 of the Traffic Study. All other hours were pro-rated to a lower emission rate according to the total number of trips generated during that hour compared to the highest hour.

Emissions from traffic traveling on these roadway sections were calculated using MOVES emission factors provided in lookup tables by the CDPH. Emission factors were selected based on year of operation, vehicle type, fuel type, road type, and vehicle speed. Emission factors were selected for 2023. Vehicle type was either passenger car or combination short haul truck. Passenger vehicles were assumed to use gasoline and all trucks were assumed to use diesel fuel. Road type for all roadway sections was urban unrestricted access.

Road type for all roadway sections was urban unrestricted access. Vehicle speeds were conservatively assumed based on information provided in the traffic impact study or on road type and number of lanes.

Vehicle speeds were conservatively assumed based on speed limit signs visible on that roadway section using Google Street View or based on road type and number of lanes. Vehicles traveling on Campbell Avenue, Western Avenue Elston Avenue, and Diversey Avenue were assumed to travel at approximately 30 miles per hour. Vehicles traveling on George Street were assumed to travel at approximately 20 miles per hour. Vehicle speeds were conservatively chosen at the lower range of expected vehicle speed for each roadway section, because at slower rates of speed (generally less than about 45 miles per hour for passenger cars), the MOVES emission factors result in higher emissions.

Emission factors used for off-site traffic are shown in Table 4.

3.2.2 Idling Areas

Idling areas for project generated traffic consisted of three off-site intersections, three site access entrances and the truck loading dock area. Seven total idling areas were identified based on information provided in the traffic impact study:

1. Western Avenue and Diversey-Elston Avenue intersection (source IDLE1)
2. Western Avenue and George Street intersection(source IDLE2)
3. George Street and site access intersection (source IDLE3)
4. George Street and Campbell-Elston Avenue intersection (source IDLE4)
5. Campbell Avenue and car site access intersection (source IDLE5)
6. Campbell Avenue and truck site access intersection (source IDLE6)
7. Loading Docks (source IDLE7)

Intersections were modeled as area or area poly sources encompassing the entire width of the roadway and extending to approximately 25 meters from the center of the intersection in all directions that project-generated traffic is expected. Traffic volumes were based on information provided in the Traffic Study.

Idling times for intersections were based on level of service delays identified in the traffic impact study. Emissions from idling were adjusted based on the time of day. .The maximum emission rate was assumed to occur during the 8:00 AM to 9:00 AM hour, as indicated by the highest number of trips generated for that hour as shown in Table 2 of the Traffic Study. All other hours were pro-rated to a lower emission rate according to the total number of trips generated during that hour compared to the highest hour.

Emissions from idling traffic were calculated using MOVES emission factors provided in lookup tables by the CDPH. Emission factors were selected based on year of operation, vehicle type and fuel type. 2023 was selected as the year. Vehicle type was either passenger car or combination short haul truck. Passenger vehicles were assumed to use gasoline and trucks were assumed to use diesel fuel.

Emission factors used for idling areas are shown in Table 4.

3.2.3 On-Site And Off-Site Paved Roads

Emissions from vehicles (passenger vehicles and trucks) traveling on paved roads were calculated for the same roadway sections described above for both on-site and off-site paved road locations.

Emissions from off-site mobile equipment (passenger vehicles and trucks) traveling on paved roads were estimated using the procedure in AP-42 Chapter 13.2.1, equation (2). Particle size multipliers for PM_{10} and $PM_{2.5}$ were taken from AP-42 Table 13.2.1-1. Road surface silt loading was calculated for each roadway section using default values for public roads from AP-42 Table 13.2.1-2. Average daily traffic for each roadway section was determined based on total projected traffic volumes as provided in Figure 10 of the Traffic Study. Silt loading values were pro-rated to conservatively assume winter precipitation occurs in six out of twelve months per year at the project site.

Mean vehicle weight was calculated as a weighted average of all site-generated vehicles traveling on each roadway section. The number and type of site-generated vehicles traveling on each roadway section was determined using Figures 8 and 9 of the Traffic Study. Average weight for passenger vehicles was assumed to be 4,095 pounds (2.05 tons) and average truck weight was assumed to be 57,500 pounds (28.75 tons). The number of wet days was approximated as 121 days based on AP-42 Figure 13.2.1-2.

To be conservative in the modeling, the maximum emission rates were applied to all hours of the day for emissions from paved roads. Maximum emission rates were determined assuming using the worst-case number of site-generated vehicles during peak morning and evening times.

Emission factors used for off-site paved roads are shown in Table 5.

4.0 MODEL INPUTS AND PARAMETERS

4.1 HEATING UNIT EMISSION SOURCE INPUTS

Building comfort heating requirements will be provided by direct expansion (DX) cooling and natural gas heating roof top unit (RTU) equipment. The roof top unit equipment planned for this project consists of one natural gas fired roof top unit heater rated at 400,000 British Thermal Units (BTUs) per hour, two natural gas fired roof top unit heaters rated at 350,000 BTUs per hour, eight natural gas fired roof top unit heaters rated at 224,000 BTUs per hour, three natural gas fired roof top unit heaters rated at 110,000 BTUs per hour, and one natural gas fired makeup air unit (MAU) heater rated at 3,270,0000 BTUs per hour.

The heaters were assumed to be located on the rooftop of the building and exhaust within the building. Emissions from the heaters were in AERMOD modeled as a single volume source approximately covering the footprint of the building. Release height for these emission units was assumed to be half of the building height, or 35.0 feet. The length of side was determined by normalizing the volume source dimensions to a square, or the square root of the length times the width. The initial lateral dimension was calculated as the length of side divided by 4.3. The initial vertical dimension was calculated as the height of the building divided by 2.15.

4.2 MOBILE EMISSION SOURCE INPUTS

4.2.1 On-Site And Off-Site Traffic

Roadway sections representing on-site and off-site traffic sources were modeled in AERMOD as line volume sources. Roadway section lengths were determined based on information provided in the traffic impact study or estimated using Google Earth and AERMOD View.

Model parameters for each source were calculated in accordance with CDPH guidance. Plume height for each source was calculated as 1.7 times the vehicle height. Plume width was calculated as vehicle width plus 6 meters for a single lane or road width plus 6 meters for two lanes. Road width for each section was estimated to the nearest meter using Google Earth. Release height was calculated as half of the plume height. Initial vertical dimension was calculated as plume height divided by 2.15. Vehicle heights were assumed to be 1.53 meters for passenger cars and 4 meters for trucks. Vehicle widths were assumed to be 1.98 meters for passenger cars and 2.59 meters for trucks.

For roadway sections with both passenger vehicle and truck traffic, a combined vehicle height and combined vehicle width was calculated for each source based on the percentage of cars and trucks expected to travel on that section of road.

Model parameters for off-site traffic sources are shown in Table 6.

4.2.2 Idling Areas

Idling areas were modeled in AERMOD as area or area poly sources. Sources for intersections encompassed the full width of the roadway out to approximately 25 meters from the center of the intersection in all directions that project-generated traffic is expected. Traffic volumes were based on information provided in the traffic impact study.

Model parameters for each source were calculated in accordance with CDPH guidance. Plume height for each source was calculated as 1.7 times the vehicle height. Release height was calculated as half of the plume height. Initial vertical dimension was calculated as plume height divided by 2.15. Vehicle heights were assumed to be 1.53 meters for passenger cars and 4 meters for trucks. For idling areas with both passenger car and truck traffic, a combined vehicle height was calculated for each source based on the percentage of cars and trucks expected to idle in that area.

Model parameters for idling areas are shown in Table 6.

4.2.3 Paved Roads Emission Sources Inputs

Emissions from vehicle travel on paved roads were combined with exhaust emissions from mobile sources for the same roadway sections described above and were modeled in AERMOD as line volume sources. Roadway section lengths were estimated using Google Earth and AERMOD View.

Model parameters for each source were calculated in accordance with CDPH guidance. Plume height for each source was calculated as 1.7 times the vehicle height. Plume width was calculated as vehicle width plus 6 meters for a single lane or road width plus 6 meters for two lanes. Road width for each section was estimated to the nearest meter using Google Earth. Release height was calculated as half of the plume height. Initial vertical dimension was calculated as plume height divided by 2.15. Vehicle heights were assumed to be 1.53 meters for passenger cars and 4 meters for trucks. Vehicle widths were assumed to be 1.98 meters for passenger cars and 2.59 meters for trucks. For roadway sections with both passenger car and truck traffic, a combined vehicle height and combined vehicle width was calculated for each source based on the percentage of cars and trucks expected to travel on that section of road.

4.2.4 Forklifts

Emissions from use of the forklifts onsite were modeled in AERMOD as an area source covering the footprint of the building.

Model parameters for forklift emissions were calculated in accordance with CDPH guidance. Plume height for each source was calculated as 1.7 times the equipment height. Equipment height

was estimated based on a commonly available propane forklift. Release height was calculated as half of the plume height. Initial vertical dimension was calculated as plume height divided by 2.15.

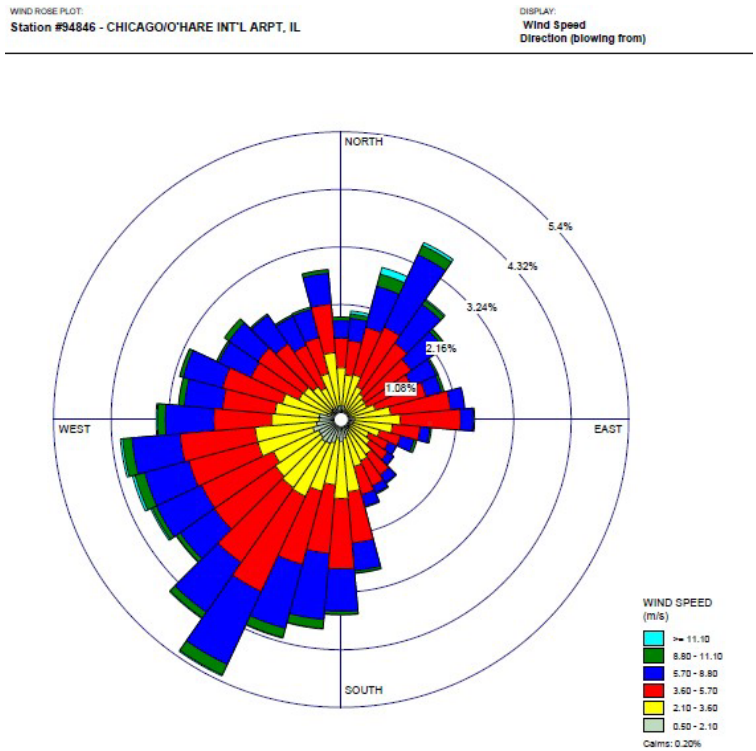
Model parameters for forklift emission calculations in Appendix B.

4.3 METEOROLOGICAL DATA

Surface and upper air meteorological data were used for modeling for the five year period starting January 1, 2018 through December 31, 2022. Surface meteorological air information was compiled from O'Hare International Airport surface air meteorological observation station. Upper air profile information was compiled from Lincoln-Logan County Airport upper air meteorological observation station.

The historical wind rose from the O'Hare International Airport surface air meteorological observation station was reviewed to determine the average hourly wind speed and direction trends for the area. Figure No. 1 presents the wind rose of the average hourly wind speed and direction for the period of January 2018 to December 2022. The Figure No. 1 wind rose indicates that during this time period the wind direction was primarily coming from the south-southwesterly direction.

Figure 1 – Historical Average Wind Speed And Direction Wind Rose



Surface and upper air profile meteorological data was obtained from the Lakes Environmental. The data were processed into model-ready format following USEPA guidance using the AERMET meteorological software, Version 22112 (USEPA, 2022). The NOAA surface data were processed utilizing 1-minute wind data from the O'Hare International Airport. Surface characteristics required as input to AERMET were calculated using the AERSURFACE software (Version 20060). This program calculates surface roughness, Bowen ratio, and albedo parameters using U.S. Geological Survey (USGS) land cover datasets.

The wind rose is extremely informative about the potential exposure in Chicago. The figure shows that the distribution of wind directions is fairly broad on an annual basis, with a slight wind predominance from the southwest. A further review of the wind rose shows that the highest percentage of light winds (0 to 4.5 miles per hour) occurs with winds from the west and southwest directions. The highest concentrations often occur during light wind conditions which are typically associated with stable atmospheric conditions which limit dispersion characteristics of the atmosphere. In general, the five-year dataset is adequate to characterize all combinations of meteorological conditions experienced in northern Cook County.

4.4 TERRAIN

The AERMOD default terrain options were assumed for modeling. NED 1-arc second (~30-meter) resolution terrain data was used. Elevations for sources, receptors, and the building were assigned in AERMOD using the AERMAP processing tool. Base elevation for sources in the Project ranged from 205.4 meters above sea level.

4.5 MODELING RECEPTORS

Nested modeling receptors were used for this project. Receptors were placed at a spacing of 50 meters out to a distance of 500 meters from the center of the project, a spacing of 100 meters out to a distance of 1,500 meters from the center of the project, a spacing of 250 meters out to a distance of 3,000 meters from the center of the project, and a spacing of 500 meters out to a distance of 5,000 meters from the center of the project. Approximately 2,961 different receptors were utilized for the AERMOD modeling.

On-site receptors were left turned on for modeling, to ensure that all publicly accessible areas are included in the modeling in case no physical barrier exists along the edge of the property boundary. This will result in conservative modeled concentrations in the event that a fence, berm or other property line boundary is built.

4.6 OPERATING SCHEDULE

Emissions from mobile sources were varied by hour of day in accordance with hourly trip generation data provided in the Traffic Study, as described above. Emissions from heating units was conservatively modeled to operate for twenty-four hours each day, every day of the week, including weekends during six months (October 15th through April 15th) per year. Heating units were assumed not operate during the typically warm months of May through September.

For emissions from mobile sources (passenger vehicles and trucks), idling areas, and paved roads, sources were assumed to operate from 5:00 AM to 8:00 PM, in accordance with data provided in the Traffic Study for hourly site-generated traffic volumes. However, to be conservative in the modeling, the maximum emission rates were applied to all hours of the day. Maximum emission rates were determined assuming using the worst-case number of site-generated vehicles during peak morning and evening times.

4.7 BUILDING DOWNWASH

Building downwash effects were not applicable because there are no emission stacks from the rooftop.

5.0 RESULTS

The potential 24-hour $PM_{2.5}$ emissions, annual $PM_{2.5}$ emissions, 24-hour PM_{10} emissions, and 1-hour NO_2 emissions from the proposed Project were modeled and evaluated for their impact on the respective NAAQS for each pollutant. NAAQS examined for each of these pollutants, including the background emissions and applicable threshold limit and design value basis, are shown in Table 8.

AERMOD runs for each of these pollutants estimated the impacts that Project emission sources will have on the surrounding area. Modeled concentrations were added to the existing background concentrations as discussed in Section 2.4. The total concentration consists of modeled concentrations plus the background concentrations. Total concentrations for each pollutant and averaging period were compared to the NAAQS threshold limit values. Table 7 shows the modeled concentrations, the background concentrations, and the total concentrations for each pollutant and averaging time, and comparison to the NAAQS. Total concentrations for each pollutant were below the applicable NAAQS threshold limit.

Contour map plots of modeled concentrations are included with this report as Appendix A for each respective pollutant and averaging period. Please keep in mind that the concentration scale on the contour map plots is difference for each of the pollutants presented.

The highest modeled concentrations for 24-hour $PM_{2.5}$ emissions and annual $PM_{2.5}$ emissions were on-site within the proposed building boundary, and located along West George Street to the intersection with North Elston Avenue. The source of these 24-hour $PM_{2.5}$ emissions and annual $PM_{2.5}$ emissions are most likely from comfort heating emissions and vehicle traffic exhaust emissions. All truck traffic must enter and exit the development area from the North Campbell Avenue route. Sources of higher concentrations of 24-hour $PM_{2.5}$ emissions and annual $PM_{2.5}$ emissions are from on-site truck idling within the dock areas adjacent to North Campbell Avenue. In addition, sources of higher concentrations of 24-hour $PM_{2.5}$ emissions and annual $PM_{2.5}$ emissions are from on-site passenger vehicle traffic to and from designated parking areas along West George Street.

The highest modeled concentrations for 24-hour PM_{10} emissions were on-site within the proposed building boundary, and located along West George Street to the intersection with North Elston Avenue. The source of these 24-hour PM_{10} emissions is most likely from comfort heating emissions.

The highest modeled concentrations for 1-hour NO_2 emissions were widely distributed and located generally over the parking lot areas of the site property. The most likely source of these 1-hour NO_2 emissions is from the comfort heating units.

The highest modeled concentrations for 24-hour $PM_{2.5}$ were located within the site property and proposed building boundary.

The highest modeled concentrations for Annual $PM_{2.5}$ were located within the site property and proposed building boundary.

The highest modeled concentrations for 24-hour PM_{10} were located within the site property and proposed building boundary.

The highest modeled concentrations for 1-hour NO_2 were located within the site property and proposed building boundary.

6.0 CONCLUSIONS

The AQIE reviewed the modeled concentrations of $PM_{2.5}$, PM_{10}, and NO_2 from Project generated emissions. The evaluation looked at potential air pollution from several distinct types of emission sources, including passenger car and truck vehicle traffic exhaust and fugitive emissions both on-site and off-site on nearby roadways, and combustion emissions from the natural gas fired building comfort heating systems from the proposed development of the light industrial facility and warehouse facility buildings.

When added to background concentrations of each pollutant in the ambient air, total concentrations are below the application NAAQS thresholds for all pollutants. The proposed Project is not expected to cause or contribute to an exceedance of any NAAQS for $PM_{2.5}$, PM_{10}, or NO_2.

Figure 2 - Project Modeled Impacts Plus Background Concentrations Summary

Pollutant	Averaging Period	Modeled Impact Concentration (µg/m³)	Ambient Background (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	Exceed NAAQS?
$PM_{2.5}$	24-Hour	1.86	22.00	23.86	35	No
	Annual	0.55	9.00	9.55	12	No
PM_{10}	24-Hour	3.58	102.00	105.58	150	No
NO_2	1-Hour	24.80	31.00	55.80	188	No

7.0 REFERENCES

- Chicago DPH 2021. *AIR QUALITY IMPACT EVALUATION Interim Guidance* and accompanying Excel Tables, Chicago Department of Public Health, September 2021.
- KLOA 2022. *Traffic Impact Study, 1700 Old Deerfield Road Proposed Development, Highland Park, Illinois*, Kenig, Lindgren, O'Hara, Aboona, Inc., November 29, 2022.
- USEPA 1998. *AP-42: Compilation of Air Emissions Factors, Fifth Edition, Volume I, Chapter 1, Section 1.4: External Combustion Sources - Natural Gas Combustion*, US Environmental Protection Agency, July 1998. Available at:
  https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf.
- USEPA 2017. *Guideline on Air Quality Models*, "Appendix W" to 40 CFR Part 51, US Environmental Protection Agency, January 17, 2017. Available at: https://www.epa.gov/scram/clean-air-act-permit-modeling-guidance.

TABLES

AIR QUALITY IMPACT EVALUATION
2900 NORTH WESTERN AVENUE

Table 1: Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Monitor ID	Monitor Name	Latitude	Longitude
$PM_{2.5}$	24-Hour	22	17-031-0057	Springfield Pump Station	41.913	-87.723
$PM_{2.5}$	Annual	9	17-031-0057	Springfield Pump Station	41.913	-87.723
PM_{10}	24-Hour	102	17-031-1016	Village Hall (2018-2020)	41.801	-87.832
NO_2	1-Hour	31	17-031-0219 and 17-031-0063	Kennedy Near Road 2 (2019-2020) and CTA Building (2017)	41.920009, (Kennedy); 41.7514 (CTA Bldg)	-87.672995 (Kennedy); -87.635027 (CTA Bldg)

Table 2: Emission Factors - Building Comfort Heating - Natural Gas-Fired

Pollutant	Emission Factor	Units	Emission Factor Source
NO_X	94	lbm/10^6 scf	AP-42 Table 1.4-1, for residential furnaces <0.3 MMBTU/hour, uncontrolled
	0.092	lbm/MMBTU	Converted assuming 1,020 BTU/scf per note (a) to Table 1.4-1
NO_X	100	lbm/10^6 scf	AP-42 Table 1.4-1, for small boilers <100 MMBTU/hour, uncontrolled
	0.098	lbm/MMBTU	Converted assuming 1,020 BTU/scf per note (a) to Table 1.4-1
PM_{10}	7.6	lbm/10^6 scf	AP-42 Table 1.4-2, PM-Total
	0.007	lbm/MMBTU	Converted assuming 1,020 BTU/scf per note (a) to Table 1.4-2
$PM_{2.5}$	7.6	lbm/10^6 scf	AP-42 Table 1.4-2, PM-Total
	0.007	lbm/MMBTU	Converted assuming 1,020 BTU/scf per note (a) to Table 1.4-2

Unit conversions: 1,020 BTU/scf

Table 3: Emission Factors - Forklifts

Pollutant	Emission Factor	Units	Emission Factor Source
NO_X	15	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers
PM_{10}	0.8	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers, PM Total
$PM_{2.5}$	0.8	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers, PM Total

Table 4: Emission Factors - On-Site and Off-Site Vehicles

Emission Source Type	Vehicle Type	Speed Bin	NO_X EF (g/mile)	PM_{10} EF (g/mile)	$PM_{2.5}$ EF (g/mile)
On-Site Travel	Passenger Car	2.5 <= speed < 7.5 mph	0.074	0.004	0.004
	Combination Short-Haul Truck	2.5 <= speed < 7.5 mph	25.2466	0.540	0.497
Off-Site Travel	Passenger Car	27.5 <= speed < 32.5 mph	0.053	0.002	0.001
		17.5 <= speed < 22.5 mph	0.061	0.002	0.002
		27.5 <= speed < 32.5 mph	0.053	0.002	0.001
		27.5 <= speed < 32.5 mph	0.053	0.002	0.001
	Combination Short-Haul Truck	27.5 <= speed < 32.5 mph	8.216	0.241	0.222
		17.5 <= speed < 22.5 mph	10.035	0.273	0.252
		27.5 <= speed < 32.5 mph	8.216	0.241	0.222

Emission Source Type	Vehicle Type	Speed Bin	NO_X EF (g/hour)	PM_{10} EF (g/hour)	$PM_{2.5}$ EF (g/hour)
Idling	Passenger Car	speed = 0 (idle) (g/hr)	0.193	0.018	0.016
	Combination Short-haul Truck	speed = 0 (idle) (g/hr)	45.317	3.721	3.424

Table 5: Emission Factors - Paved Roads

Source ID	Description	PM_{10} EF (lbm/VMT)	$PM_{2.5}$ EF (lbm/VMT)
ROAD1	Western Ave. south of Diversey-Elston Ave.	0.001	0.000
ROAD2	Western Ave. btw Diversey-Elston Ave. & George St.	0.003	0.001
ROAD3	Western Ave. north of George Street	0.006	0.002
ROAD4	George St. west of Campbell Ave.	0.005	0.001
ROAD5	George St. btw Campbell Ave. & Site Access	0.012	0.003
ROAD6	George St. btw Site Access & Western Ave.	0.008	0.002
ROAD7	Campbell Ave. btw Diversey & George St.	0.001	0.000
ROAD8	Campbell Ave. to Elston Ave.	0.015	0.004
ROAD9	Campbell Ave. btw George-Elston Ave. & Site Access	0.005	0.001
ROAD10	Campbell Ave. North to Truck Site Access.	0.005	0.001
ROAD11	Diversey Ave. btw Campbell Ave. & Elston	0.001	0.000
ROAD12	Diversey Ave. going East of Western Ave.	0.001	0.000
ROAD13	Elston Ave. btw Diversey & Western Ave.	0.001	0.000

Table 6: AERMOD Model Source Parameters

Source ID	Description	Source Type	Stack Height (m)	Stack Temp	Exit Velocity (m/s)	Stack Diameter (ft)	Discharge Orientation	Plume Height (m)	Release Height (m)	σ_z (m)	Plume Width (m)	Max Hourly Emission Rate		
												NO_x (g/s)	PM_{10} (g/s)	$PM_{2.5}$ (g/s)
IDLE1	Idle - Western Ave. Diversey-Elston Intersection	Area			N/A			3.60	1.80	1.67	N/A	5.32E-04	4.37E-05	4.02E-05
IDLE2	Idle - Western Ave. & George St. Intersection	Area			N/A			3.02	1.51	1.41	N/A	2.03E-04	1.68E-05	1.54E-05
IDLE3	Idle - George St. Site Access Intersection	Area			N/A			2.95	1.48	1.37	N/A	4.94E-05	4.08E-06	3.75E-06
IDLE4	Idle -George St. Elston Ave. & Campbell Ave. Intersection	Area			N/A			3.94	1.97	1.83	N/A	7.41E-04	6.09E-05	5.60E-05
IDLE5	Idle - Campbell Ave. & Car Site Access Intersection	Area			N/A			4.23	2.12	1.97	N/A	7.30E-07	6.81E-08	6.02E-08
IDLE6	Idle - Campbell Ave. & Truck Site Access Intersection	Area			N/A			6.80	3.40	3.16	N/A	1.20E-04	9.85E-06	9.06E-06
IDLE7	Idle - Loading Docks	Area			N/A			6.80	3.40	0.00	N/A	7.34E-03	6.03E-04	5.55E-04
FORKLIFT-TOTAL	Propane Fueled Forklifts Total	Area			N/A			3.90	1.95	1.81	N/A	1.89E-03	1.01E-04	9.32E-08
RTU-TOTAL	Roof Top Unit (RTU) Total	Volume			N/A			7.16	3.58	3.33	N/A	3.75E-02	3.03E-03	3.03E-03
MAU-TOTAL	Makeup Air Unit (MAU) Total	Volume			N/A			7.16	3.58	3.33	N/A	4.05E-02	3.08E-03	3.08E-03
ROAD1	Western Ave. south of Diversey-Elston Ave.	Line Volume			N/A			3.53	1.77	1.64	26.00	6.00E-04	1.77E-04	5.52E-05
ROAD2	Western Ave. btw Diversey-Elston Ave. & George St.	Line Volume			N/A			2.60	1.30	1.21	26.00	2.96E-05	9.93E-04	2.44E-04
ROAD3	Western Ave. north of George Street	Line Volume			N/A			3.65	1.83	1.70	26.00	8.97E-04	1.22E-03	3.17E-04
ROAD4	George St. west of Campbell Ave.	Line Volume			N/A			2.60	1.30	1.21	7.98	5.51E-06	2.03E-04	4.99E-05
ROAD5	George St. btw Campbell Ave. & Site Access	Line Volume			N/A			3.02	1.51	1.41	8.04	2.77E-04	1.38E-03	3.44E-04
ROAD6	George St. btw Site Access & Western Ave.	Line Volume			N/A			2.77	1.38	1.29	8.01	9.68E-05	7.27E-04	1.80E-04
ROAD7	Campbell Ave. btw Diversey & George St.	Line Volume			N/A			2.60	1.30	1.21	7.98	1.49E-05	1.78E-04	4.40E-05
ROAD8	Campbell Ave. to Elston Ave.	Line Volume			N/A			2.60	1.30	1.21	7.98	1.96E-03	1.84E-04	8.40E-05
ROAD9	Campbell Ave. btw George-Elston Ave. & Site Access	Line Volume			N/A			5.02	2.51	2.34	8.33	3.20E-06	1.35E-04	3.32E-05
ROAD10	Campbell Ave. North to Truck Site Access.	Line Volume			N/A			5.00	2.50	2.33	8.33	9.58E-07	4.04E-05	9.93E-06
ROAD11	Diversey Ave. btw Campbell Ave. & Elston	Line Volume			N/A			2.60	1.30	1.21	7.98	7.01E-06	8.39E-05	2.07E-05
ROAD12	Diversey Ave. going East of Western Ave.	Line Volume			N/A			2.60	1.30	1.21	7.98	5.63E-06	6.74E-05	1.66E-05
ROAD13	Elston Ave. btw Diversey & Western Ave.	Line Volume			N/A			4.93	2.47	2.29	8.32	1.01E-05	1.21E-04	3.00E-05
ONSITETRAFF	Traffic Traveling Around On-Site (trucks/cars)	Area			N/A			3.35	1.68	1.56031	N/A	5.63E-06	6.74E-05	1.66E-05

Table 7: NAAQS Threshold Limits and Design Value Basis

Pollutant	Averaging Time	Threshold Limit ($\mu g/m^3$)	Design Value Basis
$PM_{2.5}$	24-Hour	35	98^{th} percentile (H8H) 5-year average
	Annual	12	Annual average (H1H) 5-year average
PM_{10}	24-Hour	150	H6H 5-year average
NO_2	1-Hour	188	98^{th} percentile (H8H) 1-hour daily maximum 5-year average

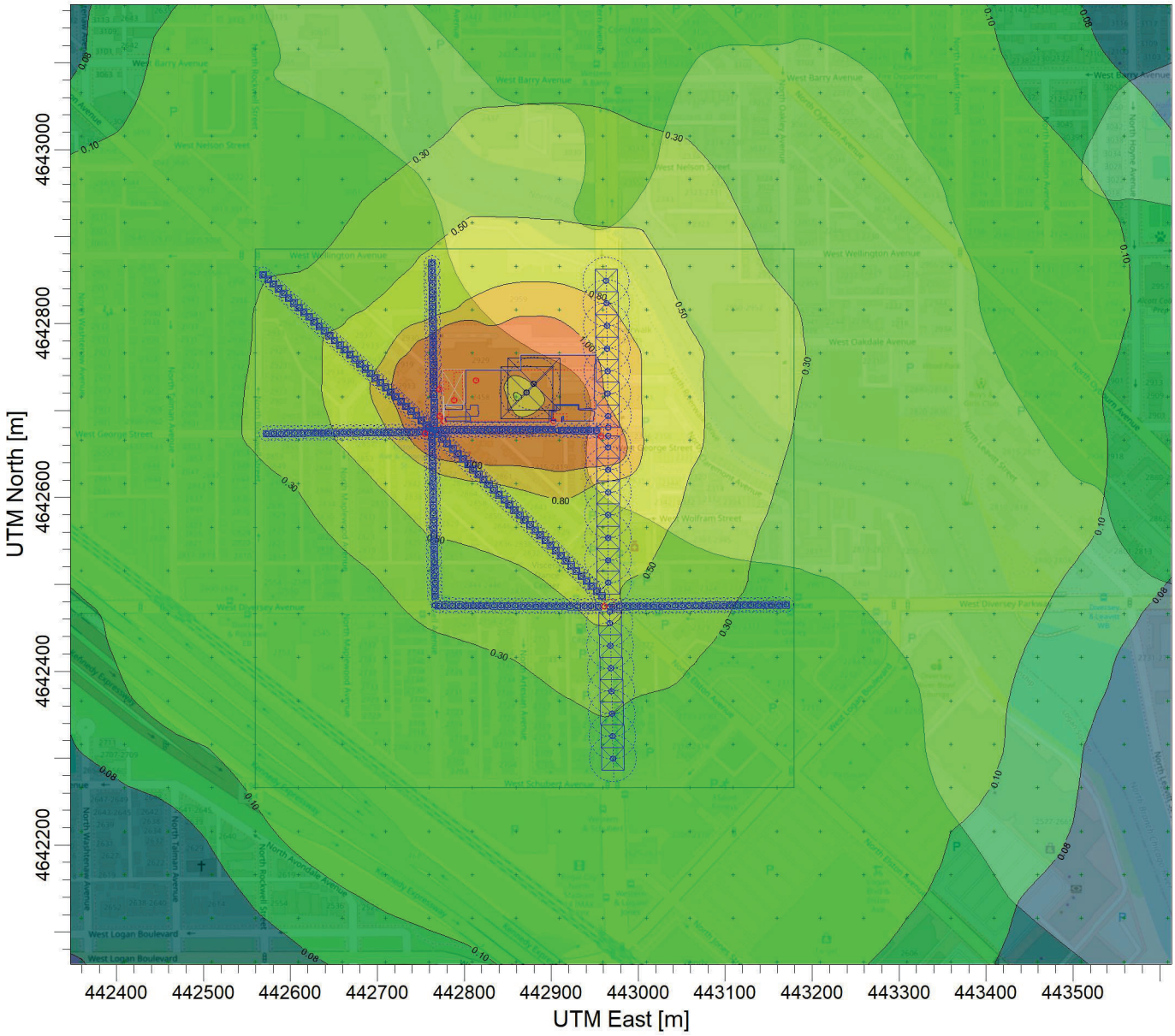
Table 8: Project Modeled Impacts Plus Background Concentrations Summary

Pollutant	Averaging Period	Modeled Impact Concentration ($\mu g/m^3$)	Ambient Background ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Exceed NAAQS?
$PM_{2.5}$	24-Hour	1.86	22.00	23.86	35	No
	Annual	0.55	9.00	9.55	12	No
PM_{10}	24-Hour	3.58	102.00	105.58	150	No
NO_2	1-Hour	24.80	31.00	55.80	188	No

APPENDIX A
AERMOD MODELING CONCENTRATIONS CONTOUR MAP PLOTS

PROJECT TITLE:

Interior of Stone Midwest, Inc.
PM2.5 24-Hour Concentrations Contour Map



PLOT FILE OF 1ST-HIGHEST MAX DAILY 24-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

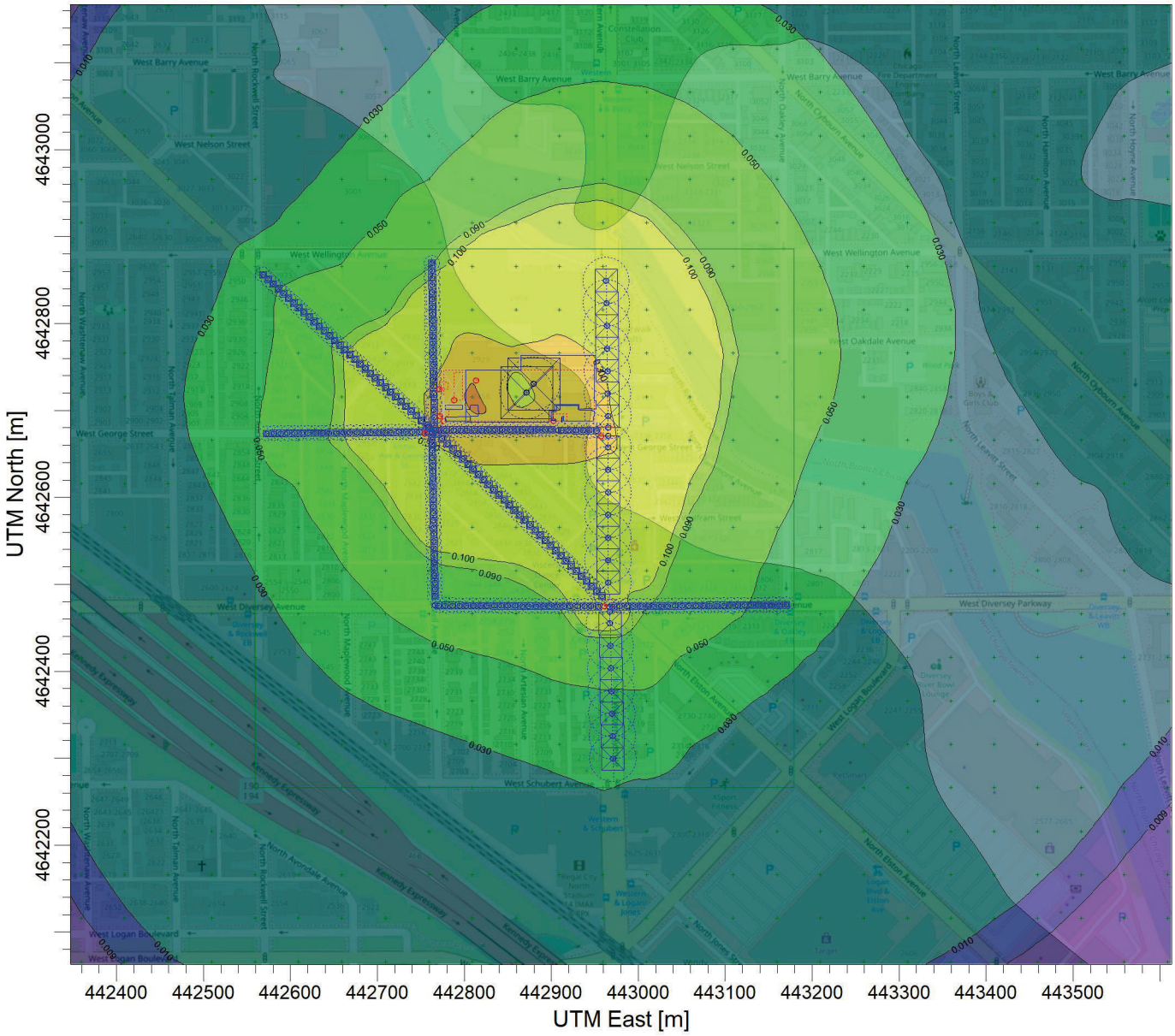
Max: 1.86 [ug/m^3] at (442809.32, 4642715.80)

0.02 0.03 0.05 0.08 0.10 0.30 0.50 0.80 1.00 1.86

COMMENTS:	SOURCES: **24**	COMPANY NAME: **Civil & Environmental Consultants, Inc.**	
	RECEPTORS: **2961**	MODELER: **Christine Pietrzyk**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:7,447 (0 — 0.2 km)	
	MAX: **1.86 ug/m^3**	DATE: **02/13/2024**	PROJECT NO.: **335-907**

PROJECT TITLE:

Interior of Stone Midwest, Inc.
PM2.5 Annual Concentrations Contour Map



PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL ug/m^3

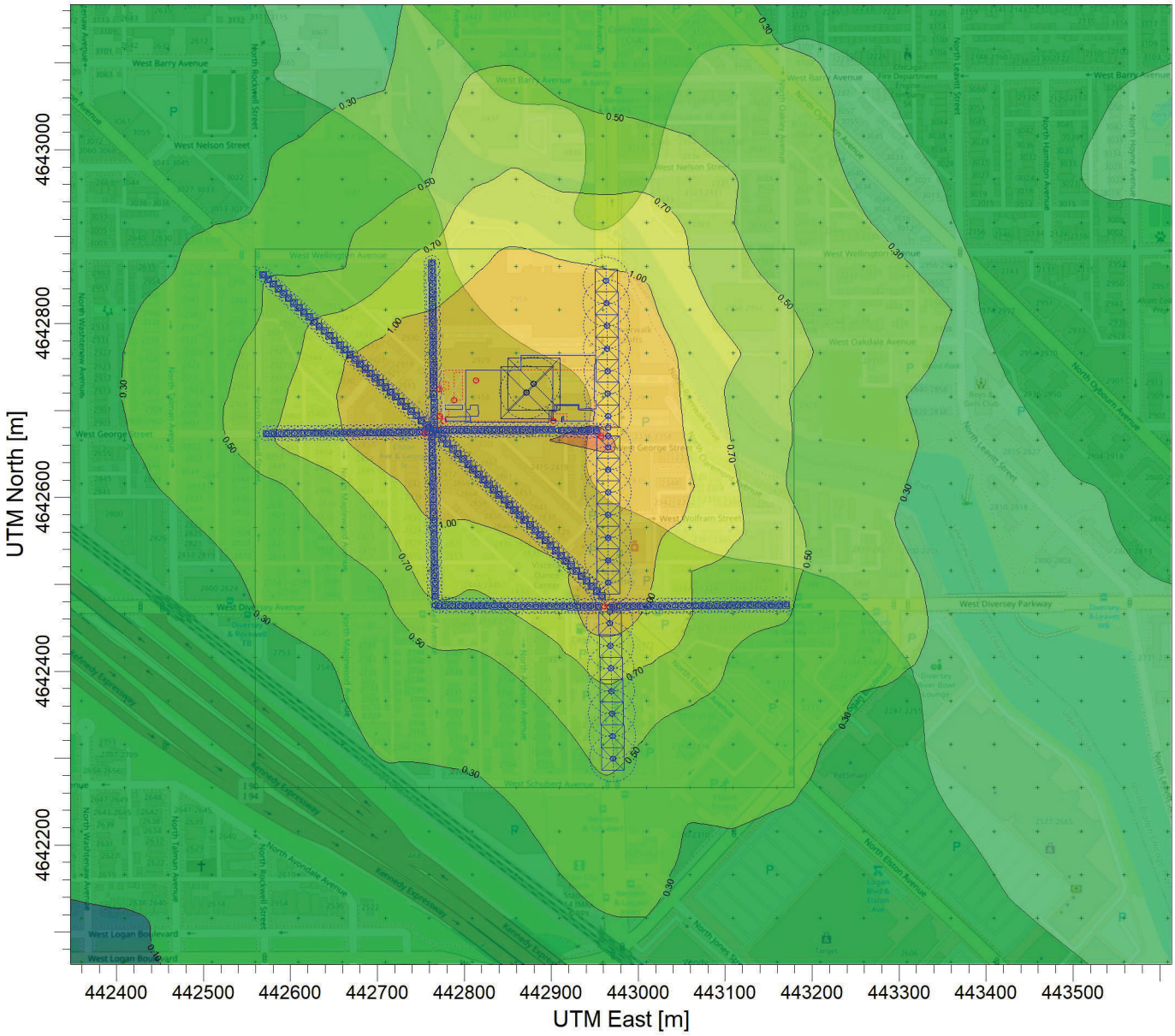
Max: 0.550 [ug/m^3] at (442809.32, 4642715.80)

0.005 0.009 0.010 0.030 0.050 0.090 0.100 0.300 0.500 0.550

COMMENTS:	SOURCES: **24**	COMPANY NAME: **Civil & Environmental Consultants, Inc.**	
	RECEPTORS: **2961**	MODELER: **Christine Pietrzyk**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:7,446 (0 — 0.2 km)	
	MAX: **0.550 ug/m^3**	DATE: **02/13/2024**	PROJECT NO.: **335-907**

PROJECT TITLE:

Interior of Stone Midwest, Inc.
PM10 24-Hour Concentrations Contour Map



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

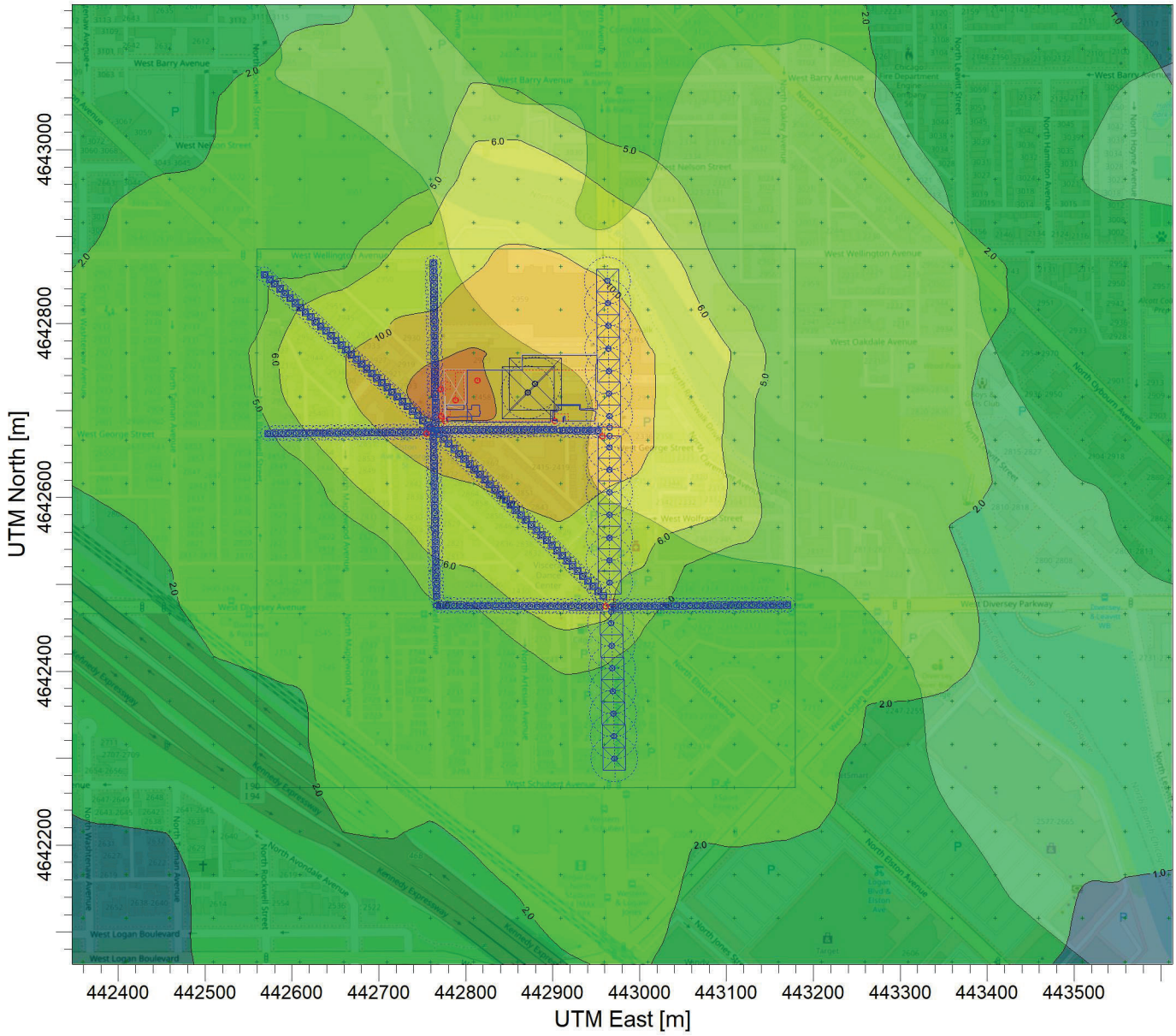
Max: 3.58 [ug/m^3] at (442959.32, 4642665.80)

0.04 0.05 0.07 0.10 0.30 0.50 0.70 1.00 3.00 3.58

COMMENTS:	SOURCES: **24**	COMPANY NAME: **Civil & Environmental Consultants, Inc.**	
	RECEPTORS: **2961**	MODELER: **Christine Pietrzyk**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:7,447 (0 — 0.2 km)	
	MAX: **3.58 ug/m^3**	DATE: **02/13/2024**	PROJECT NO.: **335-907**

PROJECT TITLE:

Interior of Stone Midwest, Inc.
NO2 1-Hour Concentrations Contour Map



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL ug/m^3

Max: 27.2 [ug/m^3] at (442809.32, 4642715.80)

0.3 0.5 0.6 1.0 2.0 5.0 6.0 10.0 20.0 27.2

COMMENTS:	SOURCES: **24**	COMPANY NAME: **Civil & Environmental Consultants, Inc.**	
	RECEPTORS: **2961**	MODELER: **Christine Pietrzyk**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:7,447 (0 — 0.2 km)	
	MAX: **27.2 ug/m^3**	DATE: **02/13/2024**	PROJECT NO.: **335-907**

APPENDIX B
AERMOD MODELING EMISSION CALCULATIONS

Appendix B1
Emission Calculations
Mobile Emissions - Off-Site Travel

Emission Source: Mobile Emissions - Off-Site Travel

Vehicle Type: Passenger Cars

Source Information				Traffic Information				MOVES Emission Factor Parameters						Emission Factors [4]			Emission Rates					
Source ID	Roadway Section Description	Roadway Section Length [2] (feet)	Roadway Section Length [2] (m)	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	Miles per Peak Hour (miles)	Year	Vehicle Type [1]	Fuel [5]	Road Type	Speed Limit (mph)	Speed Bin [3]	NOx EF (g/mi)	PM10 EF (g/mi)	PM2.5 EF (g/mi)	Hourly NOx Rate (g/hr)	Hourly PM10 Rate (g/hr)	Hourly PM2.5 Rate (g/hr)	Model NOx Emission Rate (g/s)	Model PM10 Emission Rate (g/s)	Model PM2.5 Emission Rate (g/s)
ROAD1	Western Ave. south of Diversey-Elston Ave.	679	207.0	1	7	7	0.90	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.048	0.001	0.001	1.33E-05	3.90E-07	3.45E-07
ROAD2	Western Ave. btw Diversey-Elston Ave. & George St.	661	201.5	16	13	16	2.00	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.107	0.003	0.003	2.96E-05	8.68E-07	7.68E-07
ROAD3	Western Ave. north of George Street	1018	310.3	6	2	6	1.16	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.062	0.002	0.002	1.71E-05	5.01E-07	4.44E-07
ROAD4	George St. west of Campbell Ave.	343	104.5	2	5	5	0.32	2023	Passenger Car	Gasoline	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	0.061	0.002	0.002	0.020	0.001	0.001	5.51E-06	1.90E-07	1.68E-07
ROAD5	George St. btw Campbell Ave. & Site Access	497	151.5	9	8	9	0.85	2023	Passenger Car	Gasoline	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	0.061	0.002	0.002	0.052	0.002	0.002	1.44E-05	4.95E-07	4.38E-07
ROAD6	George St. btw Site Access & Western Ave.	160	48.8	19	24	24	0.73	2023	Passenger Car	Gasoline	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	0.061	0.002	0.002	0.044	0.002	0.001	1.23E-05	4.25E-07	3.76E-07
ROAD7	Campbell Ave. btw Diversey & George St.	665	202.7	8	2	8	1.01	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.054	0.002	0.001	1.49E-05	4.37E-07	3.86E-07
ROAD8	Campbell Ave. to Elston Ave.	50	15.2	2	2	2	0.02	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.001	0.000	0.000	2.80E-07	8.21E-09	7.26E-09
ROAD9	Campbell Ave. btw George-Elston Ave. & Site Access	104	31.7	10	11	11	0.22	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.012	0.000	0.000	3.20E-06	9.39E-08	8.31E-08
ROAD10	Campbell Ave. North to Truck Site Access.	114	34.7	3	1	3	0.06	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.003	0.000	0.000	9.58E-07	2.81E-08	2.48E-08
ROAD11	Diversey Ave. btw Campbell Ave. & Elston	626	190.8	4	1	4	0.47	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.025	0.001	0.001	7.01E-06	2.06E-07	1.82E-07
ROAD12	Diversey Ave. going East of Western Ave.	670	204.2	1	3	3	0.38	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.020	0.001	0.001	5.63E-06	1.65E-07	1.46E-07
ROAD13	Elston Ave. btw Diversey & Western Ave.	906	276.1	4	3	4	0.69	2023	Passenger Car	Gasoline	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	0.053	0.002	0.001	0.037	0.001	0.001	1.01E-05	2.98E-07	2.63E-07

Notes

[1] Information from Figure 8 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour. Passenger vehicles are assumed to be passenger cars.

[2] Distances estimated using Google Earth and AERMOD View.

[3] Vehicle speeds based on speed limits as determined using Google Street View or assumed as follows, based on road type: 30MPH for Western, Diversey, Campbell, , and Elston; 20MPH for George; 15MPH for Site Access Drive.

[4] Emission Factors from MOVES Table provided by CDPH (On-Network 2021-2030).

[5] Fuel type based on defaults given in CDPH guidance document "Air Quality Impact Evaluation Interim Guidance" dated September 2021

Appendix B1
Emission Calculations
Mobile Emissions - Off-Site Travel

Emission Source: Mobile Emissions - Off-Site Travel

Vehicle Type: Trucks

Source Information				Traffic Information				MOVES Emission Factor Parameters						Emission Factors [4]			Emission Rates					
Source ID	Roadway Section Description	Distance [2] (feet)	Distance (m)	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	Miles per Peak Hour (miles)	Year	Vehicle Type [1]	Fuel [5]	Road Type	Speed Limit (mph)	Speed Bin [3]	NOx EF (g/mi)	PM10 EF (g/mi)	PM2.5 EF (g/mi)	Hourly NOx Rate (g/hr)	Hourly PM10 Rate (g/hr)	Hourly PM2.5 Rate (g/hr)	Hourly NOx Rate (g/s)	Hourly PM10 Rate (g/s)	Hourly PM2.5 Rate (g/s)
ROAD1	Western Ave. south of Diversey-Elston Ave.	679	207.0	2	2	2	0.26	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	2.113	0.062	0.057	5.87E-04	1.73E-05	1.59E-05
ROAD2	Western Ave. btw Diversey-Elston Ave. & George St.	661	201.5	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD3	Western Ave. north of George Street	1018	310.3	2	2	2	0.39	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	3.168	0.093	0.086	8.80E-04	2.59E-05	2.38E-05
ROAD4	George St. west of Campbell Ave.	343	104.5	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	10.035	0.273	0.252	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD5	George St. btw Campbell Ave. & Site Access	497	151.5	1	1	1	0.09	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	10.035	0.273	0.252	0.945	0.026	0.024	2.62E-04	7.15E-06	6.58E-06
ROAD6	George St. btw Site Access & Western Ave.	160	48.8	1	1	1	0.03	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	20	17.5 <= speed < 22.5 mph	10.035	0.273	0.252	0.304	0.008	0.008	8.45E-05	2.30E-06	2.12E-06
ROAD7	Campbell Ave. btw Diversey & George St.	665	202.7	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD8	Campbell Ave. to Elston Ave.	50	15.2	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD9	Campbell Ave. btw George-Elston Ave. & Site Access	104	31.7	15	13	15	0.30	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	2.427	0.071	0.066	6.74E-04	1.98E-05	1.82E-05
ROAD10	Campbell Ave. North to Truck Site Access.	114	34.7	4	3	4	0.09	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.710	0.021	0.019	1.97E-04	5.79E-06	5.33E-06
ROAD11	Diversey Ave. btw Campbell Ave. & Elston	626	190.8	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD12	Diversey Ave. going East of Western Ave.	670	204.2	0	0	0	0.00	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
ROAD13	Elston Ave. btw Diversey & Western Ave.	906	276.1	5	4	5	0.86	2023	Combination Short-Haul Truck	Diesel Fuel	Urban Unrestricted	30	27.5 <= speed < 32.5 mph	8.216	0.241	0.222	7.049	0.207	0.191	1.96E-03	5.76E-05	5.29E-05

Notes

[1] Information from Figure 9 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour. Trucks are assumed to be combination short-haul trucks.

[2] Distances estimated using Google Earth and AERMOD View.

[3] Vehicle speeds based on speed limits as determined using Google Street View or assumed as follows, based on road type: 30MPH for Western, Diversey, Campbell, , and Elston; 20MPH for George; 15MPH for Site Access Drive.

[4] Emission Factors from MOVES Table provided by CDPH (On-Network 2021-2030)

[5] Fuel type based on defaults given in CDPH guidance document "Air Quality Impact Evaluation Interim Guidance" dated September 2021

Appendix B2
Emission Calculations
Mobile Emissions - On-Site Travel

Emission Source: Mobile Emissions - On-Site Travel

All Vehicles

Source Information				Traffic Information				MOVES Emission Factor Parameters					Emission Factors [4]			Emission Rates					
Source ID	Source Description	Distance [2] (feet)	Distance [2] (m)	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	Miles per Peak Hour (miles)	Year	Vehicle Type	Fuel [5]	Road Type	Speed Bin [3]	NOx EF (g/mi)	PM10 EF (g/mi)	PM2.5 EF (g/mi)	Hourly NOx Rate (g/hr)	Hourly PM10 Rate (g/hr)	Hourly PM2.5 Rate (g/hr)	Model NOx Emission Rate (g/s)	Model PM10 Emission Rate (g/s)	Model PM2.5 Emission Rate (g/s)
ONSITETRAFF	Vehicle traffic traveling around site (Passenger Cars)	1059.7	323	32	32	32	6.42	2023	Passenger Car	Gasoline	Urban Unrestricted	2.5 <= speed < 7.5 mph	0.074	0.004	0.004	0.476	0.028	0.025	1.32E-04	7.90E-06	6.99E-06
ONSITETRAFF	Vehicle traffic traveling around site (Trucks)	787.4	240	7	6	7	1.04	2023	Combination Short-Haul Truck	Diesel	Urban Unrestricted	2.5 <= speed < 7.5 mph	25.247	0.540	0.497	26.355	0.564	0.519	7.32E-03	1.57E-04	1.44E-04

Notes

[1] Vehicle volume information from Figures 8 and 9 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour divided by 4 to show 25% of vehicle traffic per hour). Vehicles traveling onsite assumed to be equal to the number of vehicles entering and exiting the site during either the AM or PM peak hour.

[2] Distance estimated to nearest meter using Google Earth. Assumed that trucks travel from site entrance on Campbell Ave. directly to the docks & back. Assumed that cars travel to the end of each proposed parking area (2) and back to the site entrance & divided to get an average.

[3] Assume onsite speed of ~ 10 mph for both passenger cars and trucks.

[4] Emission Factors from MOVES Table provided by CDPH (On-Network 2021-2030)

[5] Fuel type based on defaults given in CDPH guidance document "Air Quality Impact Evaluation Interim Guidance" dated September 2021

Appendix B3
Emission Calculations
Mobile Emissions - Idling Areas

Idling Areas - Intersections & Loading Docs

Iding - Passenger Cars

Source ID	Intersection Description	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	Idle Time [2] (Minutes/ hr/Vehicle)	Total Idle Time (Minutes/Hr)	Year	Vehicle Type	Fuel	Road Type	Speed Bin	NOx EF (g/hr)	PM10 EF (g/hr)	PM2.5 EF (g/hr)	Hourly NOx Rate (g/hr)	Hourly PM10 Rate (g/hr)	Hourly PM2.5 Rate (g/hr)	Model NOx Emission Rate (g/s)	Model PM10 Emission Rate (g/s)	Model PM2.5 Emission Rate (g/s)
IDLE1	Idle - Western Ave. Diversey-Elston Intersection	16	16	16	0.50	8.00	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.026	0.002	0.002	7.16E-06	6.68E-07	5.91E-07
IDLE2	Idle - Western Ave. & George St. Intersection	17	18	18	0.47	8.39	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.027	0.003	0.002	7.51E-06	7.00E-07	6.20E-07
IDLE3	Idle - George St. Site Access Intersection	22	11	22	0.11	2.48	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.008	0.001	0.001	2.21E-06	2.07E-07	1.83E-07
IDLE4	Idle -George St. Elston Ave. & Campbell Ave. Intersection	15	14	15	0.50	7.50	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.024	0.002	0.002	6.71E-06	6.26E-07	5.54E-07
IDLE5	Idle - Campbell Ave. & Car Site Access Intersection	10	11	11	0.07	0.82	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.003	0.000	0.000	7.30E-07	6.81E-08	6.02E-08
IDLE6	Idle - Campbell Ave. & Truck Site Access Intersection	0	0	0	0.08	0.00	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00
IDLE7	Idle - Loading Docks	0	0	0	5.00	0.00	2023	Passenger Car	Gasoline	Off-Network Idle	speed = 0 (idle) (g/hr)	0.193	0.018	0.016	0.000	0.000	0.000	0.00E+00	0.00E+00	0.00E+00

Notes

[1] Vehicle volume information from Figure 8 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour.

[2] Idle time based on information in tables above and on Table 5 of KLOA Traffic Study. Used LOS delay for 2029 Projected Conditions.

[3] Emission Factors from MOVES Table provided by CDPH (Off-Network Idle 2021-2030)

Appendix B3
Emission Calculations
Mobile Emissions - Idling Areas

Iding - Trucks

Source ID	Intersection/Area Description	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	Idle Time [2] (Minutes/hr/Vehicle)	Total Idle Time (Minutes/Hr)	Year	Vehicle Type	Fuel	Road Type	Speed Bin	NOx EF (g/hr)	PM10 EF (g/hr)	PM2.5 EF (g/hr)	Hourly NOx Rate (g/hr)	Hourly PM10 Rate (g/hr)	Hourly PM2.5 Rate (g/hr)	Hourly NOx Rate (g/s)	Hourly PM10 Rate (g/s)	Hourly PM2.5 Rate (g/s)
IDLE1	Idle - Western Ave. Diversey-Elston Intersection	5	4	5	0.50	2.50	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	1.888	0.155	0.143	5.25E-04	4.31E-05	3.96E-05
IDLE2	Idle - Western Ave. & George St. Intersection	2	2	2	0.47	0.93	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	0.704	0.058	0.053	1.96E-04	1.61E-05	1.48E-05
IDLE3	Idle - George St. Site Access Intersection	2	2	2	0.11	0.23	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	0.170	0.014	0.013	4.72E-05	3.88E-06	3.57E-06
IDLE4	Idle -George St. Elston Ave. & Campbell Ave. Intersection	7	6	7	0.50	3.50	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	2.643	0.217	0.200	7.34E-04	6.03E-05	5.55E-05
IDLE5	Idle - Campbell Ave. & Car Site Access Intersection	7	6	7	0.07	0.52	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	0.392	0.032	0.030	1.09E-04	8.94E-06	8.23E-06
IDLE6	Idle - Campbell Ave. & Truck Site Access Intersection	7	6	7	0.08	0.57	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	0.432	0.035	0.033	1.20E-04	9.85E-06	9.06E-06
IDLE7	Idle - Loading Docks	7	6	7	5.00	35.00	2023	Combination Short-haul Truck	Diesel Fuel	Off-Network Idle	speed = 0 (idle) (g/hr)	45.317	3.721	3.424	26.435	2.171	1.997	7.34E-03	6.03E-04	5.55E-04

Notes

[1] Vehicle volume information from Figure 9 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour.

[2] Idle time based on information in tables above and on Table 5 of KLOA Traffic Study. Used LOS delay for 2029 Projected Conditions.

[3] Emission Factors from MOVES Table provided by CDPH (Off-Network Idle 2021-2030)

Appendix B3
Emission Calculations
Mobile Emissions - Idling Areas

Idling times

Use LOS delay for 2029 Projected Conditions from Tables 5 of KLOA Traffic Study ; Missing Busy Western & Divesey Intersection(IDLE 1) - Assume 30 sec delay; Missing George Elston/Campbell Intersection(IDLE 4) - Assume 30 sec delay

IDLE1 - Idle - Western Ave. Diversey-Elston Intersection

Traffic Time/Direction	Idle Time (seconds)
Average	**30.0**

IDLE2 - Idle - Western Ave. & George St. Intersection

Traffic Time/Direction	Idle Time (seconds)
AM Eastbound	42.7
PM Eastbound	39.5
AM Northbound	14.9
PM Northbound	14.8
Average	**28.0**

IDLE3 - Idle - George St. Site Access Intersection

Traffic Time/Direction	Idle Time (seconds)
AM Eastbound	9.6
PM Eastbound	7.5
AM Southbound	9.8
PM Southbound	0.1
Average	**6.8**

IDLE4 - Idle -George St. Elston Ave. & Campbell Ave. Intersection

Traffic Time/Direction	Idle Time (seconds)
Average	**30.0**

IDLE5 - Idle - Campbell Ave. & Car Site Access Intersection

Traffic Time/Direction	Idle Time (seconds)
AM Westbound	8.8
PM Westbound	8.8
AM Southbound	0.1
PM Southbound	0.1
Average	**4.5**

IDLE6 - Idle - Campbell Ave. & Truck Site Access Intersection

Traffic Time/Direction	Idle Time (seconds)
AM Westbound	9.7
PM Westbound	0.1
AM Southbound	9.7
PM Southbound	0.1
Average	**4.9**

Appendix B4
Emission Calculations
Paved Roads - Off-Site and On-Site

Emission Source: Paved Roads

					Site-Generated Traffic Volumes								Total Projected Traffic Volumes									
					Passenger Vehicles			Trucks														
Source ID	Roadway Section Description	Distance [2] (feet)	Distance [2] (m)	Distance (miles)	AM Peak Hour Volume [1] (# of Vehicles)	PM Peak Hour Volume [1] (# of Vehicles)	Volume Peak Hour [1] (# of Vehicles)	AM Peak Hour Volume [1] (# of Trucks)	PM Peak Hour Volume [1] (# of Trucks)	Volume Peak Hour [1] (# of Trucks)	Mean Vehicle Weight for Roadway Section [W] (tons)	Vehicle Miles Traveled per Peak Hour (miles/hr)	AM Peak Hour Volume [3] (# of Vehicles)	PM Peak Hour Volume [3] (# of Vehicles)	Total # of Vehicles per Day [3] (# of Vehicles)	Silt Loading [6] [sL] (g/m^2)	PM10 Emission Factor [6] [E] (lb/VMT)	PM2.5 Emission Factor [6] [E] (lb/VMT)	Hourly PM10 Rate (lb/hr)	Hourly PM2.5 Rate (lb/hr)	Model PM10 Emission Rate (g/s)	Model PM2.5 Emission Rate (g/s)
ROAD1	Western Ave. south of Diversey-Elston Ave.	679.0	207.0	0.13	1	7	7	0	0	0	2.05	0.90	2219	2023	4242	0.30	0.001	0.000	0.001	0.000	1.59E-04	3.90E-05
ROAD2	Western Ave. btw Diversey-Elston Ave. & George St.	661.0	201.5	0.13	16	13	16	2	2	2	5.01	2.25	1234	1190	2424	0.30	0.003	0.001	0.008	0.002	9.92E-04	2.43E-04
ROAD3	Western Ave. north of George Street	1018.0	310.3	0.19	6	2	6	2	2	2	8.72	1.54	1424	1225	2649	0.30	0.006	0.002	0.009	0.002	1.19E-03	2.93E-04
ROAD4	George St. west of Campbell Ave.	343.0	104.5	0.06	2	5	5	0	0	0	2.05	0.32	123	190	313	1.20	0.005	0.001	0.002	0.000	2.02E-04	4.97E-05
ROAD5	George St. btw Campbell Ave. & Site Access	497.0	151.5	0.09	9	8	9	1	1	1	4.72	0.94	5	3	8	1.20	0.012	0.003	0.011	0.003	1.37E-03	3.37E-04
ROAD6	George St. btw Site Access & Western Ave.	160.0	48.8	0.03	19	24	24	1	1	1	3.12	0.76	192	237	429	1.20	0.008	0.002	0.006	0.001	7.25E-04	1.78E-04
ROAD7	Campbell Ave. btw Diversey & George St.	665.0	202.7	0.13	8	2	8	0	0	0	2.05	1.01	541	747	1288	0.30	0.001	0.000	0.001	0.000	1.78E-04	4.36E-05
ROAD8	Campbell Ave. to Elston Ave.	50.0	15.2	0.01	2	2	2	5	4	5	21.12	0.07	619	769	1388	0.30	0.015	0.004	0.001	0.000	1.26E-04	3.10E-05
ROAD9	Campbell Ave. btw George-Elston Ave. & Site Access	104.0	31.7	0.02	10	11	11	0	0	0	2.05	0.22	84	71	155	1.20	0.005	0.001	0.001	0.000	1.35E-04	3.31E-05
ROAD10	Campbell Ave. North to Truck Site Access.	114.0	34.7	0.02	3	1	3	0	0	0	2.05	0.06	23	26	49	1.20	0.005	0.001	0.000	0.000	4.04E-05	9.91E-06
ROAD11	Diversey Ave. btw Campbell Ave. & Elston	626.0	190.8	0.12	4	1	4	0	0	0	2.05	0.47	532	489	1021	0.30	0.001	0.000	0.001	0.000	8.37E-05	2.05E-05
ROAD12	Diversey Ave. going East of Western Ave.	670.0	204.2	0.13	1	3	3	0	0	0	2.05	0.38	530	663	1193	0.30	0.001	0.000	0.001	0.000	6.72E-05	1.65E-05
ROAD13	& Western Ave.	906.0	276.1	0.17	4	3	4	0	0	0	2.05	0.69	686	612	1298	0.30	0.001	0.000	0.001	0.000	1.21E-04	2.97E-05
ONSITETRAFF	Vehicle traffic traveling around site (Passenger Cars)	1059.7	323.0	0.20	32	32	32	0	0	0	2.05	6.42	32	32	64	1.20	0.005	0.001	0.032	0.008	0.00E+00	0.00E+00
ONSITETRAFF	Vehicle traffic traveling around site (Trucks)	787.4	240.0	0.15	0	0	0	7	6	7	28.75	1.04	7	6	13	1.20	0.073	0.018	0.076	0.019	0.00E+00	0.00E+00

Appendix B4
Emission Calculations
Paved Roads - Off-Site and On-Site

Emission Source: Paved Roads

Notes

[1] Information from Figures 8 and 9 of KLOA Traffic Study. Volume Peak Hour is the maximum # of vehicles from either the AM Peak Hour or the PM Peak Hour. Trucks are assumed to be combination short-haul trucks.

[2] Distances estimated using Google Earth and AERMOD View.

[3] Information from Figure 10 of KLOA Traffic Study - Year 2029 Total Traffic Volumes. Total traffic volumes used solely for selection of silt loading content for each roadway section.
Conservatively assumed total daily traffic volumes are equivalent to AM Weekday Peak Hour + PM Weekday Peak Hour, for the purposes of determining Average Daily Traffic for each roadway section and silt loading values in accordance with AP-42 Table 13.2.1-2.

[4] Emission Factors calculated in accordance with AP-42 Chapter 13.2.1 for Paved Roads (1/2011), using equation (2) and parameters as described below.

$$E_{ext} = [k(sL)^{0.91} \times (W)^{1.02}]\left(1 - \frac{P}{4N}\right)$$

Where:

E= annual or other long term emission factor (lb/vehicle mile traveled (VMT))
k= Particle Size Multiplier (lb/VMT)
sL= road surface silt loading (g/m^2)
W= mean vehicle weight (tons) of all vehicles traveling the road
P= number of "wet" days with at least 0.01 inches of precipitation during the averaging period
N= number of days in the averaging period (e.g., 365 for annual)

k=	0.0022	lb/VMT	for PM10	From AP-42 Table 13.2.1-1, Particle Size Multipliers for Paved Road Equation
	0.00054	lb/VMT	for PM2.5	

sL is calculated according to AP-42 Table 13.2.1-2, Silt Loading Default Values for Public Roads

ADT Category (# vehicles /day)	Baseline Value from Table 2 (g/m^2)	Winter Baseline Multiplier from Table 2	Months per Year with Frozen Precip	sL (g/m^2)
<500	0.6	4	6	1.2
500-5,000	0.2	3	6	0.3
5,000-10,000	0.06	2	6	0.06

ADT (Average Daily Traffic) based on Year 2029 Total Traffic Volumes (rather than only Site Generated Traffic Volumes) as provided in Figure 11 of KLOA Traffic Study
Assumed winter precipitation occurs from ~November-April

W is calculated as the weighted average of all site-generated vehicles traveling on each roadway section.

Average Passenger Vehicle Weight=	2.05	tons	4094	lbs	Source:	Average Weight Of A Car (jdpower.com)
Average Truck Weight Weight=	28.75	tons	35,000	lbs (empty)	Source:	How Much Does a Semi Truck Weigh? (jdpower.com)
			80,000	lbs (full)		
			57,500	lbs (average)		

P=	121	days	Approximated from AP-42, Figure 13.2.1-2
N (# of days)=	365	days	For annual averaging period

Constants:		
	453.59	g/lb
	3600	s/hr
	5280	ft/mile

Appendix B5
Emission Calculations
Combined Mobile Emissions And Model Parameters

Mobile Emissions Combined for Source IDs

Source ID	Source Category	Source Description	Vehicle Type(s)	Source Type in Model	Model NOx Emission Rate (g/s)	Model PM10 Emission Rate (g/s)	Model PM2.5 Emission Rate (g/s)	# Passenger Vehicles Peak Hour	# Trucks Peak Hour	Avg. Vehicle Width (m)	Avg. Vehicle Height (m)	Plume Height (m)	Release Height (m)	Initial Vertical Dimension [σzo] (m)	# of Lanes in Each Direction	Road Width (m)	Plume Width (m)
ROAD1	Roadway Section	Western Ave. south of Diversey-Elston Ave.	Cars & Trucks	Line Volume	6.00E-04	1.77E-04	5.52E-05	7	2	2.12	2.08	3.53	1.77	1.64	2	20	26.00
ROAD2	Roadway Section	Western Ave. btw Diversey-Elston Ave. & George St.	Cars & Trucks	Line Volume	2.96E-05	9.93E-04	2.44E-04	16	0	1.98	1.53	2.60	1.30	1.21	2	20	26.00
ROAD3	Roadway Section	Western Ave. north of George Street	Cars & Trucks	Line Volume	8.97E-04	1.22E-03	3.17E-04	6	2	2.13	2.15	3.65	1.83	1.70	2	20	26.00
ROAD4	Roadway Section	George St. west of Campbell Ave.	Cars & Trucks	Line Volume	5.51E-06	2.03E-04	4.99E-05	5	0	1.98	1.53	2.60	1.30	1.21	1	8	7.98
ROAD5	Roadway Section	George St. btw Campbell Ave. & Site Access	Cars & Trucks	Line Volume	2.77E-04	1.38E-03	3.44E-04	9	1	2.04	1.78	3.02	1.51	1.41	1	8	8.04
ROAD6	Roadway Section	George St. btw Site Access & Western Ave.	Cars & Trucks	Line Volume	9.68E-05	7.27E-04	1.80E-04	24	1	2.01	1.63	2.77	1.38	1.29	1	8	8.01
ROAD7	Roadway Section	Campbell Ave. btw Diversey & George St.	Cars & Trucks	Line Volume	1.49E-05	1.78E-04	4.40E-05	8	0	1.98	1.53	2.60	1.30	1.21	1	9	7.98
ROAD8	Roadway Section	Campbell Ave. to Elston Ave.	Cars & Trucks	Line Volume	1.96E-03	1.84E-04	8.40E-05	2	0	1.98	1.53	2.60	1.30	1.21	1	9	7.98
ROAD9	Roadway Section	Campbell Ave. btw George-Elston Ave. & Site Access	Cars & Trucks	Line Volume	3.20E-06	1.35E-04	3.32E-05	11	15	2.33	2.96	5.02	2.51	2.34	1	9	8.33
ROAD10	Roadway Section	Campbell Ave. North to Truck Site Access.	Cars & Trucks	Line Volume	9.58E-07	4.04E-05	9.93E-06	3	4	2.33	2.94	5.00	2.50	2.33	1	9	8.33
ROAD11	Roadway Section	Diversey Ave. btw Campbell Ave. & Elston	Cars & Trucks	Line Volume	7.01E-06	8.39E-05	2.07E-05	4	0	1.98	1.53	2.60	1.30	1.21	1	11	7.98
ROAD12	Roadway Section	Diversey Ave. going East of Western Ave.	Cars & Trucks	Line Volume	5.63E-06	6.74E-05	1.66E-05	3	0	1.98	1.53	2.60	1.30	1.21	1	11	7.98
ROAD13	Roadway Section	Elston Ave. btw Diversey & Western Ave.	Cars & Trucks	Line Volume	1.01E-05	1.21E-04	3.00E-05	4	5	2.32	2.90	4.93	2.47	2.29	1	10	8.32
ONSITETRAFF	Parking Lots	Traffic Traveling Around On-Site (trucks/cars)	Cars & Trucks	Area	7.45E-03	1.65E-04	1.51E-04	32	7	2.09	1.97	3.35	1.68	1.56	N/A	N/A	N/A
IDLE1	Idling Area - Intersection	Idle - Western Ave. Diversey-Elston Intersection	Cars & Trucks	Area	5.32E-04	4.37E-05	4.02E-05	16	5	2.13	2.12	3.60	1.80	1.67	N/A	N/A	N/A
IDLE2	Idling Area - Intersection	Idle - Western Ave. & George St. Intersection	Cars & Trucks	Area	2.03E-04	1.68E-05	1.54E-05	18	2	2.04	1.78	3.02	1.51	1.41	N/A	N/A	N/A
IDLE3	Idling Area - Intersection	Idle - George St. Site Access Intersection	Cars & Trucks	Area	4.94E-05	4.08E-06	3.75E-06	22	2	2.03	1.74	2.95	1.48	1.37	N/A	N/A	N/A
IDLE4	Idling Area - Intersection	Idle -George St. Elston Ave. & Campbell Ave. Intersection	Cars & Trucks	Area	7.41E-04	6.09E-05	5.60E-05	15	7	2.18	2.32	3.94	1.97	1.83	N/A	N/A	N/A
IDLE5	Idling Area - Intersection	Idle - Campbell Ave. & Car Site Access Intersection	Cars Only	Area	7.30E-07	6.81E-08	6.02E-08	11	7	2.22	2.49	4.23	2.12	1.97	N/A	N/A	N/A
IDLE6	Idling Area - Intersection	Idle - Campbell Ave. & Truck Site Access Intersection	Trucks Only	Area	1.20E-04	9.85E-06	9.06E-06	0	7	2.59	4.00	6.80	3.40	3.16	N/A	N/A	N/A
IDLE7	Idling Area - Intersection	Idle - Loading Docks	Trucks Only	Area	7.34E-03	6.03E-04	5.55E-04	0	7	2.59	4.00	6.80	3.40	3.16	N/A	N/A	N/A

Notes

[1] Vehicle height assumed as follows:

Passenger Car=	1.53	m
Truck=	4	m

Vehicle width assumed as follows:

Passenger Car=	6.5	ft	1.98	m
Truck=	8.5	ft	2.59	m

[2] Model parameters, including plume height, release height, and initial vertical dimension calculated according to CDPH guidance document:

Top of plume height = 1.7 x (vehicle height)
Release height = 0.5 x (top of plume height)
Plume width = (vehicle width) + (6 meters for single lane) or (road width + 6 meters for two lane)
Road width estimated to nearest meter using Google Earth
Initial horizontal dimension = (width of plume)/2.15
Initial vertical dimension = (top of plume height)/2.15

Appendix B6
Emission Calculations
Forklifts

Emission Source: Forklift

Equipment Type	Manufacturer	Model	Fuel Type	Fuel Usage (gal/hr)	# of Identical Units
Forklift	TBD	TBD	Propane	1	2

Notes
[1] Propane usage based a typical 8 gallon tank of propane lasting 8 hours, or a fuel usage rate of 1 gal/hr.
[2] Conservatively assumed annual operating of 8,760 hrs/yr.

Emission Factors:

Pollutant	Emission Factor	Units	EF Source
NOx:	15	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers
PM_{10}:	0.8	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers, PM Total
$PM_{2.5}$:	0.8	lbm/10^3 gallon	AP-42 Table 1.5-1, LPG Combustion, for commercial boilers, PM Total

Emission Calculations:

Source ID	Emission Unit	Hours of Operation	Fuel Usage	Potential Emissions								
				NOx			PM10			PM2.5		
		(hr/yr)	(10^3 gal/hr)	(lb/hr)	(ton/yr)	(g/s)	(lb/hr)	(ton/yr)	(g/s)	(lb/hr)	(ton/yr)	(g/s)
FORKLIFT-TOTAL	Propane Fueled Forklifts Total	4,380	2.00E-03	3.00E-02	6.57E-02	3.79E-03	1.60E-03	3.50E-03	2.02E-04	1.60E-03	3.50E-03	2.02E-04

Unit conversions:		
	454.59	g/lb
	60	min/hr
	60	s/min
	2000	lb/ton

Model parameters:

Typical Forklift Height	2.30	meters	Based on specs for CAT GP40N3 LPG Forklift
Plume Height	3.90	meters	1.7 x vehicle height
Release Height	1.95	meters	Half of the plume height
Initial Vertical Dimension	1.81	meters	Plume Height / 2.15

Appendix B7
Emission Calculations
Comfort Heating Systems

Emission Source: Natural Gas Combustion (Comfort Heating)

Combustion Units:

Equipment Type	Manufacturer	Model	Max Heat Input Rating (BTU/hour)	Max Heat Input Rating (MMBTU/hour)	# of Identical Units
Roof Top Unit (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	Carrier	48FCFM24A3A6-6U0A0	400,000	0.400	1
Roof Top Unit (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	Carrier	48FCFM16A3A6-0A0A0	350,000	0.350	2
Roof Top Unit (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	Carrier	48FCEM12A3A6-0A0A0	224,000	0.224	8
Roof Top Unit (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	Carrier	48FCEA06A2A6-0A0A0	110,000	0.110	1
Roof Top Unit (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	Carrier	48FCEA06A2A6-0A0A0	110,000	0.110	2
Makeup Air Unit (MAU) - Natural Gas Heating	Cambridge	M136	3,270,000	3.270	1

Notes:
[1] Assume 1,020 BTU/scf based on footnote (1) to AP-42 Table 1.4-1
[2] Conservatively assumed annual operation of 24 hours/day x 182.5 days/year = 4,380 hours/year

Emission Factors:

Equipment Type	NOx EF (lbm/10^6 scf)	NOx EF (lbm/MMBTU)	Source	PM10 EF (lbm/10^6 scf)	PM10 EF (lbm/MMBTU)	Source	PM2.5 EF (lbm/10^6 scf)	PM2.5 EF (lbm/MMBTU)	Source
Roof Top Units (RTU) - Direct Expansion (DX) Cooling And Natural Gas Heating	94	0.0922	AP-42 Table 1.4-1, for residential furnaces <0.3 MMBTU/hour, uncontrolled	7.6	0.01	AP-42 Table 1.4-2, PM-Total	7.6	0.01	AP-42 Table 1.4-2, PM-Total
Makeup Air Units (MAU) - Natural Gas Heating	100	0.0980	AP-42 Table 1.4-1, for small boilers <100 MMBTU/hour, uncontrolled	7.6	0.01	AP-42 Table 1.4-2, PM-Total	7.6	0.01	AP-42 Table 1.4-2, PM-Total

Source ID	Emission Unit	Hours of Operation	Heat Input Rating	Potential Emissions								
				NO_X			PM_{10}			$PM_{2.5}$		
		(hour/year)	(MMBTU/hour)	(lbm/hour)	(ton/year)	(g/s)	(lbm/hour)	(ton/year)	(g/s)	(lbm/hour)	(ton/year)	(g/s)
RTU-1[1]	Roof Top Unit (RTU)	4,380	0.400	0.04	0.08	4.65E-03	0.00	0.01	3.76E-04	0.00	0.01	3.76E-04
RTU-2[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-3[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-4[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-5[1]	Roof Top Unit (RTU)	4,380	0.110	0.01	0.02	1.28E-03	0.00	0.00	1.03E-04	0.00	0.00	1.03E-04
RTU-6[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-7[1]	Roof Top Unit (RTU)	4,380	0.110	0.01	0.02	1.28E-03	0.00	0.00	1.03E-04	0.00	0.00	1.03E-04
RTU-8[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-9[1]	Roof Top Unit (RTU)	4,380	0.350	0.03	0.07	4.07E-03	0.00	0.01	3.29E-04	0.00	0.01	3.29E-04
RTU-10[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-11[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-12[1]	Roof Top Unit (RTU)	4,380	0.224	0.02	0.05	2.61E-03	0.00	0.00	2.11E-04	0.00	0.00	2.11E-04
RTU-13[1]	Roof Top Unit (RTU)	4,380	0.110	0.01	0.02	1.28E-03	0.00	0.00	1.03E-04	0.00	0.00	1.03E-04
RTU-14[1]	Roof Top Unit (RTU)	4,380	0.350	0.03	0.07	4.07E-03	0.00	0.01	3.29E-04	0.00	0.01	3.29E-04
	RTU-TOTAL:		**3.222**	**0.30**	**0.65**	**3.75E-02**	**0.02**	**0.05**	**3.03E-03**	**0.02**	**0.05**	**3.03E-03**
MAU-1[2]	Makeup Air Unit (MAU)	4,380	3.270	0.32	0.70	4.05E-02	0.02	0.05	3.08E-03	0.02	0.05	3.08E-03
	MAU-TOTAL:		**3.270**	**0.32**	**0.70**	**4.05E-02**	**0.02**	**0.05**	**3.08E-03**	**0.02**	**0.05**	**3.08E-03**

[1]Modeled collectively as one volume source: RTU-TOTAL
[2]Modeled collectively as one volume source: MAU-TOTAL

Unit Conversions:
1,020 BTU/scf
454.59 grams/lbm
60 minutes/hour
60 seconds/minute

APPENDIX C
AERMOD MODELING FILES

Appendix C consists of modeling files contained on the enclosed USB drive.