Chapter 11: Air Quality

A. INTRODUCTION

As described in Chapter 1, "Project Description," based on projections issued by the national Centers for Disease Control, Memorial Sloan Kettering Cancer Center (MSKCC) expects that new cancer cases in New York City will increase from the current rate of 40,000 annually to 60,000 annually by 2050. While this increase is a projection among all age groups, this rise is being driven by two populations: older patients, whose cases are more acute and require more complex treatment, and younger patients who are being diagnosed with prostate, colon, and breast cancer at alarming rates. To meet this increase in patient volume and the new interventions that are needed to treat the growing number of acute cases, MSKCC will need to supplement its existing capacity with a purpose-built structure with 28 operating rooms (with four dedicated to interventional radiology procedures) and up to 206 patient beds including intensive care unit (ICU) and single rooms for immunocompromised patients, as well as medical support areas.

To fulfill this need, MSKCC is requesting a series of zoning actions to establish a zoning envelope to facilitate the development of a new 31-story (up to 598.3 feet including mechanical bulkhead), approximately 903,065 gross square foot (gsf) inpatient hospital building (the Proposed Project), also referred to as the "MSK Pavilion." It would be located on York Avenue between East 66th and East 67th Streets and would consist of 28 operating rooms, including recovery and intensive care facilities, 206 single-bedded patient rooms, clinical support, a double-height lobby, and 5 mechanical floors to house intensive technologies and air exchange systems. A two-story patient bridge across East 67th Street (Patient Bridge) connecting floors 5 and 6 of the Proposed Project with floors 8 and 9 of the Memorial Hospital building would serve as the primary connector for patients in either building to access medical services in the other building.

This chapter considers the potential for the Proposed Project to result in significant adverse air quality impacts. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heating and hot water systems. Indirect impacts are caused by off-site emissions associated with a project such as emissions from nearby existing stationary sources or by emissions from on-road vehicle trips (mobile sources) generated by the Proposed Project or other changes to future traffic conditions due to a project.

The Proposed Project is not expected to significantly alter traffic conditions. The maximum hourly incremental traffic volumes generated by the Proposed Project would not exceed the 2021 *City Environmental Quality Review* (*CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at intersections in the traffic study area, nor would they exceed the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the *CEQR Technical Manual*.

It is anticipated that the Proposed Project would utilize electric ~~or Con Edison steam~~ for heating, ventilation and air conditioning and other services. Therefore, an analysis of fossil-fired systems was not performed.

A review was performed to identify facilities defined as a large or major source as per the *CEQR Technical Manual* within 1,000 feet of the Development Site. In addition, a review was performed to determine whether there are any permitted industrial sources of emissions within the 400-foot study area.

An analysis was performed to examine the effects of hazardous materials on the Proposed Project from nearby existing laboratories in the event of a chemical spill.

PRINCIPAL CONCLUSIONS

An analysis of air quality determined that the Proposed Project would not result in significant adverse impacts related to mobile source or stationary source air quality. As discussed below, the maximum pollutant concentrations and concentration increments from mobile sources with the Proposed Project are projected to be lower than the corresponding CEQR de minimis criteria, and therefore would not warrant further analysis.

In terms of industrial sources, no businesses were found to have a New York State Department of Environmental Conservation (NYSDEC) air permit or New York City Department of Environmental Protection (DEP) certificate of operation within the study area, and no other potential sources of concern were identified. Therefore, no potential significant adverse air quality impacts would occur on the Proposed Project from industrial sources.

The analysis of the existing major and large source of emissions determined there would be no significant adverse air quality impact on the Proposed Project. An (E) Designation (E-760) would be applied to ensure that the Proposed Project would not result in any significant adverse air quality impacts from existing major and large sources of emissions.

An analysis of nearby existing laboratory exhaust systems determined there would be no significant adverse air quality impacts on the Proposed Project in the event of a chemical spill in a laboratory. An (E) Designation (E-760) would be applied to ensure that the Proposed Project would not result in any significant adverse air quality impacts from existing laboratory exhaust sources of emissions.

B. POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide [NO] and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2,

SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA), and are referred to as criteria pollutants; emissions of VOCs, NO_x, and other precursors to criteria pollutants from certain source categories are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The projected number of project-generated vehicle trips is not expected to exceed the *CEQR Technical Manual* CO analysis screening threshold of 170 trips at an intersection. Therefore, no analysis of CO emissions at any intersection is required.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The Proposed Project would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of Proposed Project-related emissions of these pollutants from mobile sources was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern further downwind from large stationary sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2 associated with the Proposed Project would be relatively small, due to the very small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways.

The Proposed Project would not involve the addition of any new significant stationary emission sources. Therefore, an analysis of potential local impacts on NO_2 concentrations was not warranted. However, NO_2 emissions from nearby major and large sources of emissions were analyzed to evaluate their potential effects on the Proposed Project.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Proposed Project. Therefore, an analysis of this pollutant was not warranted.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include: the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways.

The Proposed Project would not involve the addition of any new significant stationary emission sources. Therefore, an analysis of potential local impacts on concentrations of PM_{10} and $PM_{2.5}$ was not warranted. However, PM emissions from nearby major and large sources of emissions were analyzed to evaluate their potential effects on the Proposed Project.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and therefore analysis of SO_2 from mobile sources was not warranted.

The Proposed Project would not involve the addition of any new significant stationary emission sources. Therefore, an analysis of potential local impacts on concentrations of PM_{10} and $PM_{2.5}$ was not warranted. However, SO_2 emissions from nearby major or large sources of emissions were analyzed to evaluate their potential effects on the Proposed Project.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary National Ambient Air Quality Standards (NAAQS) have been established[1] for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 11-1**. The NAAQS for 3-hour SO_2 has also been adopted as the ambient air quality standard for New York State, but is defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended particles, settleable particles and 24-hour and annual SO_2, which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants fluoride and hydrogen sulfide.

Effective December 2015, EPA lowered the 2008 ozone NAAQS from 0.075 ppm to 0.070 ppm. EPA issued final area designations for the revised standard on April 30, 2018. EPA has revised the NAAQS for $PM_{2.5}$, effective March 6, 2024. The revision included lowering the level of the annual $PM_{2.5}$ primary standard from the current level of 12 micrograms per cubic meter ($\mu g/m^3$) to 9 $\mu g/m^3$ and retaining the level of the 24-hr primary and secondary standard at 35 $\mu g/m^3$. In addition, the PM_{10} 24-hour average primary and secondary standard was retained.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as previously mentioned, NYSDEC has issued standards for two noncriteria compounds.

[1] EPA. National Ambient Air Quality Standards. 40 CFR Part 50.

Table 11-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m3	ppm	µg/m3
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(1)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(4)	NA	9	NA	15
24-Hour Average(5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	0.075	196	NA	NA
Maximum 3-Hour Average(1)	NA	NA	0.50	1,300

Notes: ppm – parts per million (unit of measure for gases only)
µg/m^3 – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m^3 are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
(3) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(4) 3-year average of annual mean.
(5) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
(7) Not to be exceeded more than once a year on average over 3 years.
(8) EPA has lowered the NAAQS from 12 µg/m^3, effective March 6, 2024.**Source:** 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for CO. Under the resulting maintenance plans, New York is committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Manhattan had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard.

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern

New Jersey–Long Island, NY–NJ–CT NAA) since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014 and is now under a maintenance plan. EPA lowered the annual average primary standard to 12 $\mu g/m^3$ effective March 2013. EPA designated the area as in attainment for the 12 $\mu g/m^3$ NAAQS effective April 15, 2015.

As described above, EPA has revised the $PM_{2.5}$ standard. $PM_{2.5}$ attainment designations under the new standard are expected to be effective by May 2026. For areas designated as non-attainment, $PM_{2.5}$ SIPs would be due by November 2027 and would be designed to meet the $PM_{2.5}$ standard by 2032, although this may be extended in some cases.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as moderate non-attainment areas for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8-hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ('anti-backsliding'). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012, with subsequent reclassifications to "moderate" and "serious" nonattainment since compliance with the NAAQS was not achieved by the required attainment dates. On November 29, 2021, NYSDEC presented a demonstration that the New York Metro Area (NYMA) was not projected to meet the July 20, 2021 attainment deadline and therefore requested that EPA reclassify the NYMA to "severe" nonattainment. EPA reclassified the NYMA from "serious" to "severe" NAA, effective November 7, 2022, which imposes a new attainment deadline of July 20, 2027 (based on 2018–2020 monitored data). On April 30, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. EPA is currently reviewing revisions to New York's SIP plan.

New York City is currently in attainment of the annual-average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" of the 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available.

EPA established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. EPA designated the entire State of New York as in attainment for this standard, with the exception of a portion of St. Lawrence County as "nonattainment."

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 11-1**) would be deemed to have a potential significant adverse impact.

[2] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. November 2020; and SEQR Regulations. 6 NYCRR § 617.7

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

INTERSECTION SCREENING

As shown in Chapter 10, "Transportation," the maximum incremental trips generated by the Proposed Project would be 46, 11, and 67 vehicle trips during the weekday AM, midday, and PM peak hours, respectively. Accounting for the projected trip diversions resulting from the parking garage exit reconfiguration, the maximum incremental trips at an intersection would be 52 vehicle trips at the intersection of Second Avenue and 67th Street in the PM peak hour, and 51 vehicle trips at the intersection of First Avenue and 67th Street in the PM peak hour.

Therefore, projected vehicle trips generated by the Proposed Project does not exceed the CO threshold of 170 vehicles in a peak hour at any intersection. For the PM screening, the $PM_{2.5}$ screening worksheet referenced in Section 201 of the *CEQR Technical Manual* was utilized to calculate the number of heavy-duty truck equivalents. The worksheet calculates the number of project-generated vehicles based on vehicle classification and roadway classification information.

The thresholds are as follows:

- 12 or more HDDV for paved roads with average daily traffic fewer than 5,000 vehicles;
- 19 or more HDDV for collector roads;
- 23 or more HDDV for principal and minor arterials; or
- 23 or more HDDV for expressways and limited access roads.

For the PM screening, all trucks that would be generated by the Proposed Project were classified using the HDDV7 vehicle category. All other vehicles were classified as LDGT1. Roadway classifications were determined at intersections in the vicinity of the Project Site based on New York City Department of Transportation (DOT) Functional Classification Maps[3] and traffic volumes, where available.

EXISTING PARKING GARAGE

The 263-space parking garage below the Sloan and Scholars buildings and the adjacent Rockefeller Research Laboratories (RRL) building, which is owned by MSKCC, would continue in its current function for MSKCC patients and visitors The Proposed Project would not increase the number of spaces in the existing below-grade parking garage, although a new two-way garage ramp would be built on East 67th Street to provide a valet entrance for vehicles dropped off at the through block driveway and an exit for all vehicles.

Potential air quality impacts from the existing below-grade garage on the MSK Pavilion are expected to be minimal. The Proposed Project would not require any modifications to the mechanical ventilation system, and air from the below-grade garage would continue to exhaust towards ~~66~~67th Street at or above the 2nd floor level. The primary ventilation air intakes for the MSK Pavilion are anticipated to be located along York Avenue, at the 3rd, 13th, 19th, 30th, and

[3] New York State Department of Transportation Functional Classification. http://gis3.dot.ny.gov/html5viewer/?viewer=FC

31st floor levels. The minimum air intake elevation would be approximately 46 feet above grade. The nearest distance between the exhaust from the existing below-grade garage and air intakes at the Proposed Project would be approximately 175 feet. At this distance, any potential effects from the existing garage would be negligible.

Two air intakes are also proposed on the west façade of the MSK Pavilion, on the 13th and 30th floors. These would provide ventilation air to mechanical equipment rooms but may also be used to supply kitchen make-up air. The proposed air intakes would be well above the elevation of the existing parking garage and would therefore not be affected by garage exhaust emissions.

Therefore, no analysis of the existing parking garage was performed.

STATIONARY SOURCES

PROPOSED PROJECT

Utility natural gas service will be piped to the Development Site, but there are no anticipated loads to be connected. The Proposed Project would utilize air-source heat pumps for space heating and domestic hot water. Process steam for medical sterilization would be supplied by Con Edison steam or through the use of electric powered equipment. If using steam, ~~A~~adequate ~~steam~~ service would be provided from a new steam line to be installed through an existing tunnel under the Rockefeller Labs Building adjacent to the Development Site, which would provide service to both buildings. Other energy needs are anticipated to be supplied by electric-based systems, including for kitchen uses. To ensure that there are no potential significant adverse air quality impacts, these restrictions would be enforced as part of the Proposed Project through an Air Quality (E) Designation (E-~~XXX~~760). The restrictions are outlined in Section H.

Oil-fired generators would be installed to provide power in the event of a loss of utility electric power, which is a New York State requirement for hospitals. The oil-fired generators ~~may also~~would be sized to provide back-up power to the air source heat pumps in addition to other building electrical loads. However, in the event that a loss of power occurs during a period of maximum heating demand, additional heating would be available through a new hot water loop from the existing MSK boiler plant.[4] ~~Alternatively, an oil-fired boiler plant may be installed as a back-up to the air source heat pumps. The boiler plant would be designed to operate in the event of a utility electric outage to supply heating and hot water to the MSK Pavilion. In this design configuration, smaller emergency generators would still be utilized to provide electrical power to critical hospital functions. Fossil fuel-fired equipment~~The generators would only be used for very limited periods of time for testing outside of an actual emergency; therefore, no analysis of this equipment is considered to be necessary.

LARGE OR MAJOR SOURCES

A review of NYSDEC Title V and State Facility Air permits as well as EPA's Envirofacts database was performed to identify any federal or state-permitted facilities. Existing large and major sources of emissions (i.e., sources having a Title V or State Facility Air Permit) within 1,000 feet of the development sites were surveyed. One facility with a Title V permit (Rockefeller

[4] There is adequate excess heating capacity available at the MSK boiler plant. No modifications to the boiler plant or the existing NYSDEC air permit would be required to provide back-up heating for the Proposed Project.

University) and two facilities with State Facility Air Permits were identified (Memorial Sloan-Kettering Cancer Center and Weill Cornell Medical College). Therefore, an analysis of these sources was performed to assess the potential effects of the sources on the Proposed Project.

The analysis was performed using the American Meteorological Society (AMS)/Environmental Protection Agency (EPA) Regulatory Model (AERMOD) dispersion model. The AERMOD analysis of potential impacts from exhaust stacks was performed assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and elimination of calms. The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the "cavity region" (i.e., the area around a structure which, under certain conditions, may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

Emissions Rates and Stack Parameters

(MSKCC operates six gas-fired combined heat and power (CHP) engines rated at 557 kilowatts (kW) each, and 21 condensing boilers, each rated at 6 million British thermal units (MMBtu/hr), consisting of 17 gas-fired and four dual-fired boilers located in two contiguous MSKCC buildings. Short-term and annual emission rates for the CHP engines were calculated assuming the equipment operates at maximum capacity at all times throughout the year. Short-term emission rates for the boilers were calculated using seasonal operating loads obtained from the permit and annual emission rates were based on annual fuel usage limits in the permit.

Weill Cornell has three (3) 2,500 kW diesel generators located at the Belfer Research Building and one (1) 1,000 kW diesel generator at the Weill Greenberg Center operating in demand response programs. Short-term emission rates were calculated assuming equipment operates at maximum capacity and annual emission rates were calculated based on annual fuel usage limits in the air permit. The demand response engines are generally called to operate to provide capacity during the summer peak period during the hours of 11 AM to 3 PM, but could be called at other hours. For modeling purposes, the engines were conservatively assumed to be running continuously for up to 12 hours per day assuming operation between 10:00 AM and 10:00 PM throughout the year.

Rockefeller University operates six boilers firing natural gas, No. 2 oil or No. 4 oil and a steam absorption chiller firing natural gas. All boilers exhaust through a common exhaust stack. For short-term emission rates, it was assumed that the boilers operate on backup fuel during the winter months and the main fuel for the rest of the year. Annual emissions were based on maximum fuel usage from the past years.

Facility emissions were estimated using information obtained from the air permits, and applying the EPA's Compilations of Air Pollutant Emission Factors (AP-42)[5] emission factors for boilers and CHP engines. **Tables 11-2a**, **11-2b, and 11-2c** present the emission rates and stack parameters used in the AERMOD analysis for the MSK, Weil Cornell, and Rockefeller University facilities, respectively.

[5] EPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, http://www.epa.gov/ttn/chief/ap42.

Table 11-2a
Stack Parameters and Emission Rates for MSKCC Central Plant

Parameter	Main Bldg. CHPs	Zuckerman Bldg. CHPs	Zuckerman Bldg. Endura Boilers	Main Bldg. Endura Boilers	Main Building Vantage Boilers	
No. of Modeled Units	2	4	8	7	4	
Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	No. 2 Oil	Nat Gas
Heat Input (MMBtu/hr)	5.1	5.1	6.0	6.0	6.0	
Annual Heat Input (MMBty/yr)	44,676	44,676	21,375	21,375	350	21,375
Stack Height (ft)[1]	153.75	160.67	153.17	149.67	149.67	
Stack Diameter (ft)[1]	1.0	1.0	1.05	1.05	1.17	
Exhaust Flow Rate (acfm)[1]	2,044	2,044	1,720	1,720	1,688	
Exhaust Temperature (°F)[1]	248	248	194	194	243	
Short-Term Emissions (g/s)						
NO_x[2]	0.106	0.106	0.0082	0.0082	0.097	0.028
PM_{10}	0.0064	0.0064	0.0056	0.0056	0.013	0.0056
$PM_{2.5}$	0.0064	0.0064	0.0056	0.0056	0.012	0.0056
SO_2	0.00038	0.00038	0.00044	0.00044	0.0012	0.00044
Annual Emissions (g/s)						
NO_x[2]	0.106	0.106	0.0033	0.0033	0.0006	0.011
$PM_{2.5}$	0.0064	0.0064	0.0023	0.0023	0.00008	0.0023

Notes:
[1] Obtained from the NYSDEC Title V Permit.
[2] NO_x emission factors based on Title V Permit limits.

Table 11-2b
Stack Parameters and Emission Rates for Weil Cornell

Parameter	Belfer Bldg. CHP Engine	Greenberg Bldg. CHP Engine
No. of Modeled Units	3	1
Fuel Type	No. 2 Oil	No. 2 Oil
Heat Input (MMBtu/hr)	25.4	10.5
Annual Heat Input (MMBty/yr)	7,630	3,150
Stack Height (ft)[1]	303	232
Stack Diameter (ft)[1]	1.67	1.0
Exhaust Flow Rate (acfm) [1]	19,579	8,721
Exhaust Temperature (°F)[1]	915.2	805
Short-Term Emissions (g/s)		
NO_x[2]	0.50	0.21
PM_{10}	0.38	0.15
$PM_{2.5}$	0.38	0.15
SO_2	0.005	0.002
Annual Emissions (g/s)		
NO_x[2]	0.017	0.007
$PM_{2.5}$	0.014	0.006

Notes:
[1] Obtained from the NYSDEC Title V Permit.
[2] NO_x emission factors based on Title V Permit limits.

Table 11-2c
Stack Parameters and Emission Rates for Rockefeller University

Parameter	Boiler #1		Boiler #2		Boiler #3		Boiler #4		Boiler #5		Boiler #6		Absorber
Fuel Type (Primary/Backup)	No. 2 Oil	No. 4 Oil	Gas	No. 4 Oil	Gas	No. 4 Oil	Gas	No. 2 Oil	Gas	No. 2 Oil	Gas	No. 2 Oil	Gas
Heat Input (MMBtu/hr)	36.9		29.95		29.95		29.95		29.95		29.95		10.7
Overall Annual Heat Input (MMBtu/yr)	439,028 (Gas)				328 (No.2 Oil)				23,140 (No.4 Oil)				
Stack Height (ft)[1]	311												
Stack Diameter (ft)[1]	6.0												
Exhaust Flow Rate (acfm)[1]	55,085												
Exhaust Temp (°F)[1]	350												
Short-Term Emissions (g/s)													
NO_x[2]	0.372	0.620	0.302	0.503	0.302	0.503	0.302	0.302	0.302	0.302	0.302	0.302	0.108
PM_{10}	0.076	0.233	0.028	0.189	0.028	0.189	0.028	0.062	0.028	0.062	0.028	0.062	0.010
$PM_{2.5}$	0.051	0.168	0.028	0.136	0.028	0.136	0.028	0.042	0.028	0.042	0.028	0.042	0.010
SO_2	0.007	0.697	0.002	0.566	0.002	0.566	0.002	0.006	0.002	0.006	0.002	0.006	0.001
Total Annual Emissions (g/s)													
Fuel Type	**Natural Gas**				**No. 2 Oil**						**No. 4 Oil**		
NO_x[2]	0.505				0.0004						0.044		
$PM_{2.5}$	0.047				0.0001						0.012		

Notes:
[1] Obtained from the NYSDEC Title V Permit.
[2] NO_x emission factors based on Title V Permit limits.

Methodology for Estimating NO_2 Concentrations

The 1-hour average NO_2 concentration increments from the identified large and major sources were estimated using the AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the NYSDEC IS 52 monitoring station that is the nearest ozone monitoring station and has complete five years of hourly data available. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed for boilers and 20 percent for engines, which is considered representative for these source types.

Meteorological Data

NYSDEC-supplied meteorological data processed with the AERMET Version 19191[6] processor was used for the modeling analysis. The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at LaGuardia Airport (2015–2019),[7] and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide

[6] NYSDEC staff communicated in an email to AKRF that it does not have plans to update meteorological data using AERMET Version 22112) and the meteorological data provided by NYSDEC and processed with earlier versions is acceptable for use with AERMOD release (Version 22112).

[7] The 2020 and 2021 meteorological years were not used to avoid using ozone background data for these years because of uncertainties in the representativeness of background concentrations due to effects of COVID-19.

hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period.

Background Concentrations

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model (see **Table 11-3**). To develop background levels, concentrations measured at the most representative ambient monitoring station operated by NYSDEC over a three-year period (2017–2019) was used (consistent with NYSDEC guidance). The 2020 and 2021 data were not used due to uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19.

Table 11-3
Background Pollutant Concentrations for Stationary Source Analysis

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	Annual[1]	IS 52	32.8	100
	1-hour[2]		110.6	188
SO_2	1-hour[3]	IS 52	14.6	196
PM_{10}	24-hour	IS 52	36.0	150
$PM_{2.5}$	24-hour	IS 45	18.3	35
	Annual		7.6	9[4]

Notes:
[1] Annual average NO_2 background concentration is based on the three-year highest value from 2017–2019.
[2] The one-hour NO_2 background concentration is based on the maximum 98th percentile one-hour NO_2 concentration averaged over three years of data, from 2017–2019.
[3] The one-hour SO_2 background concentration is based on the maximum 99th percentile concentration averaged over three years of data, from 2017–2019.
[4] EPA has lowered the NAAQS from 12 µg/m^3, effective March 6, 2024.
Source: New York State Air Quality Report Ambient Air Monitoring System, NYSDEC, 2017–2019.

Receptor Placement

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the façades of the proposed MSK Pavilion to represent potentially sensitive locations such as intake vents and outdoor accessible spaces. Rows of receptors at spaced intervals were analyzed at multiple elevations. Generally, receptors were spaced at a three-meter interval vertically, while horizontally, receptor spacing was a minimum of three meters and a maximum of five meters. Receptors were also placed at publicly accessible ground-level locations on the Project Site (e.g., along the through-block driveway).

LABORATORY EXHAUSTS

Existing Laboratories

The *CEQR Technical Manual* requires an assessment of potential air quality impacts associated with proposed uses near existing medical, chemical or research laboratories. Consequently, existing medical and research facilities with laboratories were surveyed. A study area of 400 feet around the Development Site was used, based on guidance provided by DCP. Aerial maps were initially used to identify the nearest distances to institutions. The minimum distances from exhaust stacks to the Development Site were measured using aerial photography.

Of the nearby medical and research institutions within 400 feet of the Development Site, two MSKCC facilities were identified: the RRL building and a small portion of the Mortimer B. Zuckerman Research Center (ZRC). For the latter MSKCC facility, a small area of the low-rise (eastern) portion of the ZRC is within 400 feet of the planned air intakes on the east façade of the MSK Pavilion (no laboratory exhausts are located within 400 feet of the proposed air intake locations on the west façade of the MSK Pavilion). However, as per MSKCC these exhausts are not associated with any laboratories which handle liquid chemicals within a fume hood. Therefore, a chemical spill analysis of the ZRC is not considered to be necessary.

The RRL laboratory exhaust stacks are located on the roof of the RRL building. As previously mentioned, there are two air intakes proposed on the west façade of the MSK Pavilion, which would be located on the 13th and 30th floors. These are designed to provide ventilation air to mechanical equipment rooms. Since these locations would not be accessible to the patients or public, and would not be continuously occupied, they would not be considered to be sensitive receptors for the purpose of this analysis. However, the west façade air intakes may also provide make-up air to kitchen spaces in the proposed building. Therefore, an analysis of the potential air quality effects of the RRL exhaust fans on the Proposed Project was performed, as discussed further below.

The primary ventilation air intakes for the MSK Pavilion are anticipated to be located along York Avenue, at the 3rd, 13th, 19th, 30th, and 31st floor levels. These air intakes are therefore situated on the opposite side of the building from the RRL. Any emissions from the laboratory exhaust stacks would be impeded by the bulk of the proposed building, which would be taller in height compared to the RRL. Therefore, since the bulk of the proposed building would greatly attenuate any potential effects from the RRL laboratory exhaust stack plumes, no analysis of the exhausts on the proposed east facade air intakes is necessary.

Laboratory Fume Hood Exhausts

The RRL laboratories in which hazardous chemicals are used are equipped with fume hoods. Fume hoods are workstation enclosures that are maintained under negative pressure and continuously vented to the outside when work is taking place. Their function is to protect staff from potentially harmful fumes. By providing a continuous exhaust from laboratory rooms, they also prevent any fumes released within the laboratory from escaping into other areas of the building, or through windows to the outside.

Design information was used to evaluate the effects of existing RRL laboratory exhausts on the Proposed Project. The fume hood exhausts are combined to mix and dilute the air, which is then vented through four stacks located on the RRL building roof. **Table 11-4** summarizes the exhaust parameters used in the analysis.

Table 11-4
Stack Parameters for RRL Laboratory Exhausts

Parameter	Value
No. of Stacks	4
Stack Height (ft)[1]	295
Stack Diameter (ft)[1]	4
Exhaust Flow Rate (acfm) [1]	82,500
Exhaust Temperature (°F)[1]	70

Note:
[1] Flowrate for each of the four exhaust fans.

Chemicals for Analysis

An inventory of chemicals which are used in the RRL building laboratories was examined. From the chemical inventory, nine chemicals were selected for further examination based on their toxicity and potential for air quality impacts. Common buffers, salts, enzymes, nucleotides, peptides, and other bio-chemicals were not considered in the analysis since they are not typically categorized as air pollutants. Nonvolatile chemicals (with a vapor pressure of less than 10 mm Hg) were excluded as well since they would largely not be released in a spill.

The hazardous chemicals selected are presented in **Table 11-5**. The vapor pressure shown for each chemical is a measure of its volatility—its tendency to evaporate, or to form vapors, which is a critical parameter in determining potential impacts from chemical spills. Exposure standards are safety- and health-based standards indicative of the chemical's toxicity—substances with higher toxicity have lower exposure standards. These include OSHA's permissible exposure limit (PEL), National Institute for Occupational Safety and Health (NIOSH) and/or OSHA's STEL, ceiling, and immediately dangerous to life or health (IDLH) values.

Table 11-5
Selected Hazardous Materials in the Existing RRL Laboratories

Chemical [CAS #]	Vapor Pressure mm Hg	PEL PPM	STEL PPM	IDLH PPM	Ceiling PPM
Benzene [71-43-2]	75	1	5	500	--
Chloroform [67-66-3]	160	50	2	500	--
1,4-Dioxane [123-91-1]	29	100	--	500	1
Ethaneniol [75-08-1]	442	--	--	500	10
Glutaraldehyde [111-30-8]	17	--	--	--	0.2
Methyl Iodide* [74-88-4]	400	5	--	100	--
Nitric Acid [7697-37-2]	48	2	4	25	--
Phosphorus Trichloride [7719-12-2]	100	0.5	0.5	25	--
Thionyl Chloride [7719-09-7]	100	--	--	--	1

Notes:
PEL—Permissible Exposure Limit; Time Weighted Average (TWA) for up to a 10-hour workday during a 40-hour workweek.
STEL—Short-Term Exposure Limit is a 15-minute TWA exposure that should not be exceeded at any time during a workday.
IDLH—Immediately Dangerous to Life or Health.
Ceiling—Level set by NIOSH or OSHA not to be exceeded in any working exposure.
PPM = parts per million.
* No STEL or Ceiling values published. The listed OSHA Permissible Exposure Limit will be applied (time weighted average for up to a 10-hour workday during a 40-hour workweek.)
Where a hyphen (--) appears, there is no recommended corresponding guideline value.

Estimates of Worst-Case Emission Rates

The dispersion of hazardous chemicals from a chemical spill within the RRL building's laboratories was analyzed to assess the potential for exposure of the Proposed Project to hazardous fumes in the event of an accident. Evaporation rates for volatile hazardous chemicals used in the RRL building's laboratories were estimated using the model developed by the Shell Development Company.[8] The Shell model, which was developed specifically to assess air quality impacts from chemical spills, calculates evaporation rates based on physical properties of the material,

[8] Fleischer, M.T., An Evaporation/Air Dispersion Model for Chemical Spills on Land, Shell Development Company, December 1980.

temperature and rate of air flow over the spill surface. Room temperature conditions (20° C) and an air-flow rate of 0.5 meters/second were assumed for calculating evaporation rates.

Based on relative STELs and the vapor pressures of the chemicals listed in **Table 11-6**, a subset of the most potentially hazardous chemicals (also shown in **Table 11-6**) were selected for the "worst-case" spill analysis. Besides the relative toxicities, other factors such as molecular weight, container size, and frequency of use were also considered. Chemicals with high vapor pressures evaporate most rapidly. The chemicals selected also have the lowest STEL. Since the chemicals selected for detailed analysis are most likely to have the highest emissions rates and the lowest exposure standards, if the analysis of these chemicals resulted in no significant impacts, it would indicate that the other chemicals listed in the table would also not present any significant potential impacts.

The analysis conservatively assumes that a full container of each chemical would be spilled in a fume hood. For a spill area of approximately 1.1 square meters, the emission rates were determined using the evaporation rates. For modeling purposes, the emission rates shown in **Table 11-6** are calculated for a 15-minute time period. The vapors from the spill are drawn into the fume hood exhaust system and released into the atmosphere via the RRL roof exhaust fans. The high volume of air drawn through this system provides a high degree of dilution for hazardous fumes before they are released above the roof.

Table 11-6
Chemicals Selected for Worst-Case Spill Analysis

Chemical	Spill Quantity (liters)	Evaporation Rate (gram/meter^2-sec)	Emission Rate[(1)] (gram/sec)
Benzene	0.42	0.36	0.41
Chloroform	0.80	1.19	1.33
1,4-Dioxane	0.18	0.18	0.20
Ethaneniol [(2)]	0.10	2.12	0.096
Glutaraldehyde[(2)]	0.12	0.13	0.14
Methyl Iodide [(2)]	0.02	3.31	0.051
Nitric Acid	0.18	0.27	0.30
Phosphorus Trichloride	0.61	0.95	1.059
Thionyl Chloride[(2)]	0.10	0.87	0.18

Notes:
(1) Average emission rate.
(2) Since than the calculated spill quantity exceeds the container volume used in the laboratory, the container volume was used instead.

Dispersion Modeling

The AERMOD dispersion model was used in the analysis, with the same set of meteorological data as for the large and major source analysis. Concentrations were evaluated on the Proposed Project. This included locations along the façades and roof of the building, intake vents, and otherwise accessible locations. Multiple elevations were analyzed at spaced intervals on the Proposed Project.

The power law relationship was used to convert the calculated 1-hour average maximum concentrations to short-term 15-minute averages. The 15-minute average concentrations were then compared to the STELs or to the ceiling levels for the chemicals examined.

Proposed Laboratories

There is currently no detailed design information regarding the exhaust systems for handling of chemicals within the MSK Pavilion. The Proposed Project does not include any spaces for research laboratories; any fume hoods would be used in support of basic hospital functions (e.g., pathology). MSK Pavilion laboratory exhaust systems would be designed to ensure the safety of the building occupants and the surrounding community in the event of an accidental laboratory chemical spill. Any new laboratory safety systems would be designed to meet current codes and guidelines to ensure that chemicals used in these laboratories would not pose a hazard to staff and the public. Any new laboratory exhausts would be located on the roof of the MSK Pavilion and would utilize high velocity cannon fans to disperse emissions away from receptors, minimizing any potential air quality effects from laboratory emissions. No air intakes are proposed above the roof of the proposed building; therefore, potential air quality effects due to recirculation would be negligible. With respect to potential for air quality effects on off-site receptors, the proposed building would be taller in height than any other buildings within 400 feet. Therefore, potential air quality effects from any proposed laboratory exhausts would be negligible.

INDUSTRIAL SOURCES

The potential impacts of existing industrial operations on pollutant concentrations at the Development Site were evaluated. Potential industrial air pollutant emission sources within 400 feet of the proposed Development Site were surveyed for inclusion in the analysis, as recommended in the *CEQR Technical Manual*.

Land use maps were reviewed to identify potential sources of emissions from manufacturing/industrial operations. A search of federal- and state-permitted facilities within the study area was conducted using the NYSDEC Title V and State Facility Permit websites. DEP's online permit database was also searched to identify any permitted industrial uses in the study area.[9]

No currently permitted manufacturing or processing activities were identified within the 400-foot study area around the Development Site, and no other sources of emissions associated with industrial uses were identified in the land use survey. Therefore, no analysis of industrial sources of emissions on the Proposed Project is required, and no potential for significant impacts on the Proposed Project are anticipated from industrial sources of emissions.

E. EXISTING CONDITIONS

The most recent concentrations of all criteria pollutants at NYSDEC air quality monitoring stations nearest to the Project Area are presented in **Table 11-7**. As shown, the recently monitored levels did not exceed the NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the analyses, since these are the most recent monitored values, rather than the more conservative values used for dispersion modeling. There were no monitored violations of NAAQS at these monitoring sites in 2022.

[9] DEP. *NYC DEP CATS Information.* https://a826-web01.nyc.gov/dep.boilerinformationext. New York City Open Data https://data.cityofnewyork.us/Environment/CATS-Permits/f4rp-2kvy.

Table 11-7
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY	ppm	1-hour	1.6	35
			8-hour	1.2	9
SO_2	IS 52[(1)]	µg/m^3	1-hour	10.5	196
PM_{10}	IS 52	µg/m^3	24-hour	25	150
$PM_{2.5}$	IS 45[(2,3)]	µg/m^3	Annual	7.1	9 [(7)]
			24-hour	17.6	35
NO_2	IS 52[(2,4)]	µg/m^3	Annual	29.8	100
			1-hour	100.4	188
Lead	IS 52[(5)]	µg/m^3	3-month	0.0036	0.15
Ozone	IS 52[(6)]	ppm	8-hour	0.067	0.075

Notes:
[(1)] The 1-hour value is based on a three-year average (2020–2022) of the 99th percentile of daily maximum 1-hour average concentrations.
[(2)] Annual value is based on of the 2022 annual average concentration.
[(3)] The 24-hour value is based on the three-year average of the 98th percentile of 24-hour average concentrations.
[(4)] The 1-hour value is based on a three-year average (2020–2022) of the 98th percentile of daily maximum 1-hour average concentrations.
[(5)] Based on the highest quarterly average concentration measured during 2020 to 2022.
[(6)] Based on the three-year average (2020–2022) of the 4th highest daily maximum 8-hour average concentrations.
[(7)] EPA has lowered the NAAQS from 12 µg/m^3, effective March 6, 2024.
Source: NYSDEC, New York State Ambient Air Quality Data.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT (NO ACTION CONDITION)

Under the No Action condition, the Sloan and Scholars buildings would remain on the Development Site and would continue to operate 355 contract housing units for medical students, interns, and professional staff for their terms of service or academic affiliation with MSKCC. The units would be fully occupied under the No Action condition. Since the buildings' heating and hot water needs are currently served by Con Edison steam, no on-site emissions would occur under the No Action condition.

G. PROBABLE IMPACTS OF THE PROPOSED PROJECT (WITH ACTION CONDITION)

MOBILE SOURCES

The intersections with the greatest number of project-generated trips, at First Avenue and East 67th Street and at Second Avenue and East 67th Street, were found to be below the equivalent truck screening threshold for $PM_{2.5}$. Therefore, no significant adverse air quality impact at intersections is anticipated due to the Proposed Project.

STATIONARY SOURCES

LARGE OR MAJOR SOURCES

Potential stationary source impacts on the Development Site from the existing major and large sources were determined using the AERMOD model. The maximum estimated concentrations of NO_2, SO_2, $PM_{2.5}$, and PM_{10} from the modeling were added to the background concentrations to estimate total air quality concentrations on the Proposed Project. The results of the AERMOD analysis are presented in **Table 11-8**.

Table 11-8
Maximum Modeled Pollutant Concentrations on the Proposed Project (µg/m³)—Existing Major and Large Sources

Pollutant	Averaging Period	Maximum Modeled Impact[2]	Background	Total Concentration	NAAQS
NO_2	Annual	3.27	32.8	35.5	100
	1-hour[1]	N/A	N/A	176.3	188
SO_2	1-hour	147.7	14.6	162.3	196
PM_{10}	24-hour	17.0	36	53.0	150
$PM_{2.5}$	24-hour	10.6	18.3	28.9	35
	Annual	0.37	7.6	7.97	9

Note:
[1] Reported concentration is the maximum total 98th percentile concentration at any receptor using seasonal-hourly background concentrations.
[2] The concentrations presented are the results with restrictions.
[3] EPA has lowered the NAAQS from 12 µg/m³, effective March 6, 2024.

As shown in **Table 11-8**, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, there would be no significant adverse air quality impacts on the Proposed Project from existing major or large emission sources.

To ensure that there are no potential significant adverse air quality impacts, certain restrictions would be required as part of the Proposed Project through an Air Quality (E) Designation (E-~~XXX~~760). These restrictions were assumed in the analysis results presented in **Table 11-8** and would avoid the potential for significant air quality impacts on the Proposed Project from existing stationary sources based on the conservative assumptions used in the analysis. The restrictions are outlined in Section H.

CHEMICAL SPILL ANALYSIS

The results of the analysis of potential emissions from the existing RRL fume hood exhaust system on the Proposed Project are shown in **Table 11-9**. As shown in the table, the maximum predicted concentrations at elevated receptors downwind of the fume hood exhausts were determined to be below the STEL/OSHA levels. The results of the dispersion analysis demonstrate that there would be no significant adverse impacts from the RRL exhaust system on the Proposed Project.

Table 11-9
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Benzene	1	0.32
Chloroform	2	0.68
1,4-Dioxane	1	0.14
Ethanethiol	10	0.094
Glutaraldehyde	0.2	0.085
Methyl Iodide	5	0.022
Nitric Acid	2	0.29
Phosphorus Trichloride	0.5	0.47
Thionyl Chloride	1	0.093

Note:
[1] The concentrations presented are the results with restrictions.

To ensure that there are no potential significant adverse air quality impacts, certain restrictions would be required as part of the Proposed Project through an Air Quality (E) Designation (E-760). These restrictions were assumed in the analysis results presented in **Table 11-9** and would avoid the potential for significant air quality impacts on the Proposed Project from existing laboratory fume hood exhausts based on the conservative assumptions used in the analysis. The restrictions are outlined in Section H.

H. PROPOSED AIR QUALITY (E) DESIGNATIONS

BLOCK 1461, LOT 21 AND A PORTION OF LOT 13

Any new development on the above-referenced property must utilize only electric and/or utility steam-powered process, heating, ventilation, and air conditioning systems, except for systems designed to power such equipment in the event of a utility electric outage, and a hot water loop providing service from the existing MSK boilers to be used only during limited periods if supplemental heating is needed.

To preclude the potential for significant adverse air quality impacts from the boilers and engines at the MSKCC Central Plant, no operable windows or air intakes on the northern, western, southern, and eastern façades of the MSK Pavilion (Block 1461, Lot 21 and on a portion of Lot 13) would be permitted between a height of 145 feet and 205 feet above grade.

To preclude the potential for significant adverse air quality impacts from the laboratory fume hood exhaust system at the MSKCC RRL building (Block 1461, Lot 13 and a portion of Lot 21), no operable windows or air intakes on the western façade of the MSK Pavilion would be permitted between a height of 295 feet and 335 feet above grade, on the northern façade between a height of 295 feet and 305 feet above grade and on the southern façade between a height of 295 feet and 315 feet above grade. ✷