Chapter 6: Air Quality

6.0 Introduction

This section examines the potential for air quality impacts from the proposed project. According to the *2014 CEQR Technical Manual*, an air quality analysis determines whether a proposed action would result in stationary or mobile sources of pollutant emissions that could have a significant adverse impact on ambient air quality, and also considers the potential of existing sources of air pollution to impact the proposed uses. Air quality impacts can be characterized as either direct or indirect impacts. Direct impacts stem from emissions generated by stationary sources, such as stack emissions from fuel burned for heating, ventilation, and air conditioning (HVAC) systems. Indirect effects include emissions from motor vehicles ("mobile sources") traveling to and from a project site. For this air quality analysis, emissions from motor vehicles is of concern, as no stationary sources would be associated with the proposed project. This section also analyses emissions from the garage and potential impacts.

Pollutants of Concern

Air pollution is of concern because of its demonstrated effects on human health. The pollutants of special concern associated with the mobile sources, including carbon monoxide and particulate matter, are described below.

Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas that is a product of incomplete combustion. CO is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches, nausea, and at sustained high concentration levels, can lead to coma and death.

Particulate Matter

Particulate matter is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers or less. Particulates can enter the body through the respiratory system. Particulates over 10 micrometers in size are generally captured in the nose and throat and are readily expelled from the body. Particles smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs. Particulates are associated with increased incidence of respiratory diseases, cardiopulmonary disease, and cancer.

Regulatory Criteria

National Ambient Air Quality Standards

The National Ambient Air Quality Standards (NAAQS) were implemented as a result of the Clean Air Act (CAA), amended in 1990. The CAA requires the EPA to set standards on the pollutants that are considered harmful to public health and the environment. The NAAQS applies to six principal ("criteria") pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter 10 (PM_{10}) and particulate matter 2.5 ($PM_{2.5}$), sulfur dioxide (SO_2), lead, and ozone[1]. The NAAQS for the pollutants included in this air quality analysis are shown in Table 6.1.

Table 6.1 National and New York State Ambient Air Quality Standards

Pollutant	Averaging Time	Standard
Carbon Monoxide (CO)	1-Hour	35 ppm
	8-Hour	9 ppm
Particulate Matter (PM_{10})	24-Hour	150 µg/m^3
Particulate Matter ($PM_{2.5}$)	Annual	12.0 µg/m^3
	24-Hour	35.0 µg/m^3

Source: *2014 CEQR Technical Manual* & USEPA National Ambient Air Quality Standards

CEQR "De Minimis" Criteria

The project is subject to criteria set forth for general conformity in the *2014 CEQR Technical Manual.* These "De Minimis" criteria are used to assess air quality impact for $PM_{2.5}$ for both the 24-hour and annual averaging periods, and for 8-hour average CO concentration. All other pollutants are subject to the above NAAQS criteria.

$PM_{2.5}$ "De Minimis" Criteria

The 24-hour maximum $PM_{2.5}$ increase is limited to less than or equal to "half the difference between the 24-hour background concentration and the 24-hour standard [NAAQS]." This increase criteria will be used to assess the potential for impact due to project-contributions and local roadway contributions.

The annual average $PM_{2.5}$ concentration allowable increase is set to a maximum 0.3 µg/m^3 to preclude significant adverse impacts. The cumulative concentration of project-contributions and local roadway contributions will need to be below 0.3 µg/m^3 to comply with this De Minimis criteria.

CO "De Minimis" Criteria

Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum eight-hour average CO concentration at a location where the predicted No-Action eight-hour concentration is equal to or between 8.0 and 9.0 ppm; or (2) an increase of more than half the difference between baseline (i.e., No-Action) concentrations and the eight-hour standard, when No-Action concentrations are below 8.0 ppm.

[1] Environmental Protection Agency (EPA). (2010, 16 April). *National Ambient Air Quality Standards*. Retrieved from http://www.epa.gov/air/criteria.html

6.1 Assessment

Existing Conditions

The total concentrations that receptor locations would experience include background concentrations from existing surrounding emission sources as well as project-related emissions. Background concentrations are ambient pollution levels from existing stationary, mobile, and other area sources. The New York State Department of Environmental Conservation (NYSDEC) maintains an air quality monitoring network and produces short term and annual air quality reports that include monitoring data for CO, PM_{10}, and $PM_{2.5}$. Additionally, the *2014 CEQR Technical Manual* provides a link to the most recent background concentration design values. For this study, the background concentrations from the *2014 CEQR Technical Manual* were used when data was available and supplemented with data from the NYSDEC air quality monitoring network. The background concentration values of the pollutants modeled in this air quality analysis are shown in Table 6.2.

Table 6.2: Background Concentrations

Pollutant	Averaging Time	Monitoring Location	Background Concentration
Carbon Monoxide (CO)	1-Hour[1]	Queens College	3.4 ppm
	8-Hour[1]	Queens College	1.7 ppm
Particulate Matter (PM_{10})	24-Hour[1]	Queens College	50.0 µg/m^3
Particulate Matter ($PM_{2.5}$)	Annual[2]	Queens College	9.1 µg/m^3
	24-Hour[1]	Queens College	24.0 µg/m^3

[1] *2014 CEQR Technical Manual* Air Quality Background Data
[2] NYSDEC Ambient Air Quality Monitoring Data Tables

The monitoring site located closest to the project site (Queens College) was used in this analysis to determine background concentrations. For background concentrations, NYSDEC recommends using the highest value recorded in the five most recent years available for long-term averaging times (annual). For short-term averaging times (1-hour, 3-hour, 8-hour, or 24-hour), NYSDEC recommends using the highest second-high value recorded in the five most recent years.

With the 24-hour $PM_{2.5}$ background concentration set, the De Minimis criteria can be calculated. The NAAQS standard for 24-hour $PM_{2.5}$ is 35 µg/m^3. The background value for 24-hour $PM_{2.5}$ is 24 µg/m^3. Half of the difference of these two values leads to a De Minimis criteria of 5.5 µg/m^3. This criteria will be compared against the project-related emissions increases due to parking activity and local street traffic.

No-Action Condition

Under the Future No-Action Condition, the site would continue to operate with its current uses as a hotel and a 410-space accessory parking structure (parking deck and surface parking). As described in Section 2.1 of the Environmental Assessment Statement, dated May 14, 2015, no known projects, and therefore no new sensitive receptors, are anticipated to be developed in the study area by the proposed project's build year (2018) in the No-Action Condition.

With-Action Condition

Mobile Sources

On-Street Sources

The results of the transportation analysis indicate that the number of incremental trips generated by the parking garage would be lower than the *2014 CEQR Technical Manual* carbon monoxide (CO)-based screening threshold of 170 vehicles per hour at an intersection, as well as the minimum screening threshold of 12 Heavy Duty Diesel Vehicles for fine particulate matter ($PM_{2.5}$). The maximum vehicle increment due to the project at an intersection is 111 vehicles during the evening peak period at the intersection of the proposed project's primary access point (the new curb cut closest to the hotel) and Ditmars Boulevard. No heavy vehicle trips are expected to be generated by the proposed project. Therefore, traffic from the proposed actions would not result in a significant adverse effect on air quality, and a quantified assessment of on-street mobile source emissions is not warranted.

Parking Facility

The proposed actions would facilitate a 547,687 gross square foot (gsf) naturally ventilated parking facility located on the project site with a capacity of 1,800 public spaces and 400 accessory spaces for a total of 2,200 parking spaces. Due to variations in grade, the garage structure would rise eight stories from the Ditmars Boulevard frontage and ten stories from the Grand Central Parkway frontage. As shown in Table 5.1 of Chapter 5.0, "Transportation," the proposed project is expected to generate 122 vehicle trips per hour (vph) during the weekday AM peak hour, 103 vph in the weekday midday peak hour, and 121 vph in the weekday PM peak hour (as described previously, volumes pro-rated for October are being used since they are higher). Three curb cuts would be provided on site: one for the hotel and its accessory parking, and two for the long-term public parking facility. The outlet air from the garage's open sides could contain elevated levels of carbon monoxide (CO) and particulate matter (PM) due to emissions from vehicular exhaust in the garage. The ventilating air could potentially affect ambient levels of CO and PM at locations near the facility. To determine pollutant levels from naturally ventilated parking levels, the analysis was based on a correction factor for an elevated point source using the methodology in EPA's *Workbook of Atmospheric Dispersion Estimates, AP-26*. This methodology estimates concentrations by determining the appropriate height correction factor for each level, based on the difference between pedestrian height and the respective parking level elevation. Total ambient levels at each receptor site are then calculated by adding together contributions from each level of the facility and ambient background levels (ambient background levels were not added for 8-hour CO concentration, 24-hour and annual $PM_{2.5}$ concentrations in order to compare to the "De Minimis" Criteria). Therefore, an analysis of the emissions from the facility and their potential impacts on the environment was performed, calculating pollutant levels in the surrounding area using the methodology set forth in the *2014 CEQR Technical Manual*.

The *2014 CEQR Technical Manual* provide guidelines for an air quality Multilevel Parking Facility analysis. The analysis has been adapted for calculating CO and PM emissions associated with a naturally ventilated parking garage. The calculation has been made for receptors at the near and far

sidewalk, in this case located on Ditmars Boulevard in front of the proposed project. This is consistent with the methodology described in the *2014 CEQR Technical Manual Air Quality Appendix*.

The calculation is based on the layout of the multilevel parking garage, site geometry, vehicle trips accessing the project site, and mobile source emission factors calculated with the Environmental Protection Agency's *Motor Vehicle Emission Simulator* (MOVES2014a) model. The analysis made use of local MOVES2014a input data. It was assumed that only passenger vehicles would be using the garage. Both the morning peak hour and evening peak hour were analyzed and were chosen as the 7 am and 5 pm hours to correspond to the peak traffic hours.

For CO the evening peak hour created the largest concentrations, while for PM there was no appreciable difference between the two time periods at the near sidewalk receptor. As such the evening peak hour is presented in Table 6.3. The evening peak hour causes larger emissions in general as there are more trips out of the garage, which include the start and idling emission processes. However, in all cases, the concentrations were below the respective NAAQS and De Minimis criteria for each pollutant evaluated.

The results of the modeling, summarized in Table 6.3, indicate that the highest one-hour CO concentration that would occur around the project site is 3.57 parts per million (ppm). However, the NAAQS for one-hour CO is 35 ppm. In addition, an eight-hour CO calculation was conducted, and the maximum eight-hour CO concentration was 1.82 ppm, which is below the 9 ppm standard set by the NAAQS.

The results of the modeling indicate that the highest 24-hour concentration of PM_{10} that would occur around the project is 50.65 $\mu g/m^3$. The NAAQS for 24-hour PM_{10} is 150 $\mu g/m^3$.

The modeling indicates that the highest annual concentration of $PM_{2.5}$ that would occur around the project is 9.13 micrograms per meter cubed ($\mu g/m^3$), which includes a combined project contribution and local roadway contribution of 0.03 $\mu g/m^3$. The De Minimis criteria for the increase in annual $PM_{2.5}$ is 0.3 $\mu g/m^3$. In addition, a 24-hour $PM_{2.5}$ calculation was conducted, and the maximum 24-hour $PM_{2.5}$ concentration was 24.13 $\mu g/m^3$, which includes a combined project contribution and local roadway contribution of 0.13 $\mu g/m^3$. This is below the De Minimis criteria of 5.5 $\mu g/m^3$.

Thus, because garage emissions would be below the CEQR De Minimis criteria and the NAAQS for the pollutants of concern, the parking garage would not result in a significant adverse impact on the ambient air quality of the surrounding neighborhood and no further analysis is required. Based upon the traffic analysis, the parking garage would only be at this peak activity level one-hour per day; the remainder of the time, the project emissions would be less.

Table 6.3: Evening Peak Hour Design Year Pollutant Concentrations at the Far Sidewalk

Pollutant	Averaging Time	Background Concentration	Project Contribution	On- Street Contribution	Total Concentration	NAAQS Criteria	De Minimis Criteria
Carbon Monoxide (CO)	1-Hour	3.40 ppm	0.03 ppm	0.14 ppm	3.57 ppm	35 ppm	-
	8-Hour	1.70 ppm	0.02 ppm	0.10 ppm	1.82 ppm	9 ppm	3.65 ppm
Particulate Matter (PM_{10})	24-Hour	50.00 $\mu g/m^3$	0.65 $\mu g/m^3$	0.00 $\mu g/m^3$	50.65 $\mu g/m^3$	150 $\mu g/m^3$	-
Particulate Matter ($PM_{2.5}$)	Annual	9.10 $\mu g/m^3$	0.03 $\mu g/m^3$	0.00 $\mu g/m^3$	9.13 $\mu g/m^3$	12 $\mu g/m^3$	0.3 $\mu g/m^3$
	24-Hour	24.00 $\mu g/m^3$	0.13 $\mu g/m^3$	0.00 $\mu g/m^3$	24.13 $\mu g/m^3$	35 $\mu g/m^3$	5.5 $\mu g/m^3$

6.2 Conclusion

Overall, the maximum predicted air quality pollutant concentrations and concentration increments from mobile sources associated with the proposed actions would be below the corresponding guidance thresholds and ambient air quality standards. Additionally, emissions from the multilevel parking facility associated with the proposed project would not result in any significant adverse air quality impacts. Thus, the proposed actions would not have significant adverse air quality impacts on the neighborhood.