

A. INTRODUCTION

This chapter reviews the potential health effects, including those related to air quality, noise, and hazardous materials during the construction and operation of development resulting from the Proposed Project. This chapter also provides an overview of health effects related to particulate matter (PM) emissions including asthma, with a general discussion of causes and triggers of asthma, its prevalence in New York City, and the area most likely affected by the Proposed Project.

PRINCIPAL CONCLUSIONS*AIR QUALITY*

This analysis finds that the Proposed Project would not result in any significant adverse public health impacts with respect to PM_{2.5} emissions from the construction or operation of the Proposed Project. Nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and PM₁₀ concentrations due to emissions from large stationary sources in the area would not be expected to have any significant adverse public health impacts at the project site. At the present time there are not sufficient data and established technical analysis techniques to determine reliably whether concentrations due to emissions from mobile sources in the project study area would be above or below the 1-hour standard in the Build condition. However, the traffic associated with the Proposed Project is not expected to change NO₂ concentrations appreciably, since the vehicular traffic associated with the Proposed Project would be a very small percentage of the total number of vehicles in the area. The NO₂ emissions associated with equipment that would be used in project construction are typical of emissions at other projects involving large-scale, long-term and intensive construction activities. Exceedances of the 1-hour NO₂ health-based standard resulting from such activities cannot be ruled out and, as discussed in Chapter 20, "Construction," certain measures would be implemented by the Proposed Project in order to minimize emissions from construction activities.

NOISE

With regard to some residential terrace locations the highest L₁₀₍₁₎ noise levels would range from approximately 73 to 79 dBA during some peak periods of construction activity. Without construction activities, noise levels at these terraces exceed the City Environmental Quality Review (CEQR) acceptable range (55 dBA L₁₀₍₁₎) for an outdoor area requiring serenity and quiet. During the weekday daytime time periods when construction activities are predicted to significantly increase noise levels, construction activities would exacerbate these exceedances and result in significant adverse noise impacts at the terraces at these identified buildings. These predicted noise levels would be of limited duration, and the predicted overall changes in noise levels would not be large enough to significantly affect public health. While construction activities

would produce noise levels of a magnitude that at times are annoying and intrusive, and would be considered undesirable, construction activities would only occur for a limited number of hours per day, and for a limited time period at any location. Based upon the limited durations of these noise levels at any location, the noise produced by construction activities would not result in a significant adverse public health impact.

HAZARDOUS MATERIALS

Because of the known and potential subsurface contamination, remedial measures would be undertaken to avoid adverse impacts during excavation for the Proposed Project. These would include conducting soil disturbance under a new New York City Mayor's Office of Environmental Remediation (OER)-approved Remedial Action Plan (RAP) and an updated Construction Health and Safety Plan (CHASP), proper handling and disposal of excavated soil, and implementing other practices to protect workers and the surrounding neighborhood. In addition, the buildings would be constructed with waterproofing which would also serve as a vapor barrier to any remaining volatile organic compounds (VOCs) or methane. With these measures, as set forth in the Restrictive Declaration that will be recorded as part of the Proposed Project, no significant adverse impacts would result during or after construction as a result of the potential disturbance of any hazardous materials.

Therefore, the Proposed Project would not result in a significant adverse impact on public health with respect to hazardous materials during or after construction.

RODENT CONTROL

Construction contracts would include provisions for a rodent (mouse and rat) control program. Before the start of construction, the contractor would survey and bait the appropriate areas and provide for proper site sanitation. During the construction the contractor would carry out a maintenance program, as necessary. Signage would be posted, and coordination would be maintained with appropriate public agencies. Only U.S. Environmental Protection Agency (EPA)- and New York State Department of Environmental Conservation (NYSDEC)-registered rodenticides would be permitted, and the contractor would be required to perform rodent control programs in a manner that avoids hazards to persons, domestic animals, and non-target wildlife. Therefore, construction of the Proposed Project would not result in any significant adverse impacts on rodent control.

B. SUMMARY OF 1992 FEIS FINDINGS

Although the 1992 Final Environmental Impact Statement (FEIS) did not present a separate public health chapter, health effects from the project were addressed specifically as they related to hazardous materials, air quality and noise within those respective chapters. The 1992 FEIS concluded that the Riverside South project would not result in any significant adverse air quality impacts during construction. No significant adverse impacts from mobile source would result during project operations, and with the implementation of the proposed mitigation, all stationary source air quality impacts would be eliminated and the project would not result in any exceedances of air quality standards during project operations.

The 1992 FEIS determined that no significant operational noise impacts would result from the Riverside South project. To mitigate the significant noise impacts generated by construction-related noise, attempts would be made to ensure that noise levels would be below the thresholds

promulgated by DEP at the time for construction noise associated with tunneling permits and, whenever possible, generally for all construction activity. The feasibility of noise control measures, such as quiet equipment and the erection of barriers, to comply with the standards above would also be explored.

With respect to hazardous materials, the 1992 FEIS stated that mitigation measures for potential significant adverse impacts resulting from the presence of hazardous materials in the soil and groundwater on the site would be implemented and all remediation plans and health and safety plans would be approved by DEP and appropriate regulatory agencies before site disturbance or construction.

C. METHODOLOGY

For determining whether a public health assessment is appropriate, the *CEQR Technical Manual* lists the following as public health concerns for which a public health assessment may be warranted:

- Increased vehicular traffic or emissions from stationary sources resulting in significant adverse air quality impacts;
- Increased exposure to heavy metals (e.g., lead) and other contaminants in soil/dust resulting in significant adverse impacts;
- The presence of contamination from historic spills or releases of substances that might have affected or might affect groundwater to be used as a source of drinking water;
- Solid waste management practices that could attract vermin and result in an increase in pest populations (e.g., rats, mice, cockroaches, and mosquitoes);
- Potentially significant adverse impacts to sensitive receptors from noise or odors;
- Vapor infiltration from contaminants within a building or underlying soil (e.g., contamination originating from gasoline stations or dry cleaners) that may result in significant adverse hazardous materials or air quality impacts;
- Actions for which the potential impact(s) result in an exceedance of accepted federal, state, or local standards; or
- Other actions that might not exceed the preceding thresholds but might, nonetheless, result in significant public health concerns.

As discussed in Chapter 18, “Air Quality and Greenhouse Gas Emissions,” Chapter 19, “Noise,” and Chapter 20, “Construction,” the Proposed Project would not result in a significant adverse operational or construction-related air quality impact, or a significant adverse operational noise impact.

As discussed in Chapter 20, “Construction,” construction activities would result in increased noise levels at certain sensitive receptor locations that would occur for two or more consecutive years and exceed the CEQR impact criteria, resulting in significant noise impacts at sensitive locations within this area. Also, during the weekday daytime time periods when construction activities are predicted to significantly increase noise levels, construction activities would exacerbate noise level exceedances at some residential terraces, and result in significant adverse noise impacts.

The Proposed Project would not result in any unusual solid waste management practices that could attract vermin and result in an increase in pest populations. As described in Chapter 11, “Hazardous Materials,” with the implementation of a new RAP/CHASP, no significant adverse impact related to hazardous materials would result from the Proposed Project.

Based on the above guidance, the Proposed Project would only meet the thresholds warranting further assessment of public health impacts with respect to construction noise. However, given public concern about asthma and other air quality-related health effects, this chapter also addresses potential air quality-related health concerns during the construction and operation of the Proposed Project. An assessment of the potential health effects from hazardous materials is also presented.

The public health assessment first identifies the pollutants of concern relating to air quality, then outlines the applicable standards and thresholds to which potential emissions from construction and operational activities associated with the Proposed Project will be compared. A description of the sources of air and noise pollutants during construction and operation are then presented, followed by a discussion of the characteristics of asthma and its causes and triggers.

A summary of the air quality and noise impact assessments during the construction and operational periods of the Proposed Project is then presented, and the potential for public health impacts due to the Proposed Project is determined. Summaries of potential impacts from hazardous materials are also presented.

D. SUMMARY OF AIR AND NOISE POLLUTION SOURCES FROM THE PROPOSED PROJECT

CONSTRUCTION

AIR QUALITY

Construction activities have the potential to impact public health as a consequence of emissions from on-site construction engines, and emissions from on-road construction-related vehicles and their impact on traffic conditions. Historically, most construction engines have been diesel-powered and have produced relatively uncontrolled emissions of PM. Construction activities also emit fugitive dust. Impacts on traffic could also increase mobile source-related emissions.

Measures would be taken to reduce pollutant emissions during construction of the Proposed Project in accordance with all applicable laws, regulations, and building codes. These include dust suppression measures and the restriction of on-road vehicle idle time to three minutes for all vehicles that are not using the engine to operate a loading, unloading, or processing device (e.g., concrete mixing trucks).

In recognition of the potential construction-related air quality and public health effects of emissions from diesel engines, an emissions reduction program would also be implemented during construction at the project site, as detailed in Chapter 20, "Construction." These include the use of dust control measures (watering and dust covers), truck idling restrictions, Ultra Low Sulfur Diesel (ULSD), electric engines in lieu of diesel engines where logistically possible, and best available tailpipe reduction technologies. In addition, large emission sources during construction would be located away from sensitive uses such as residential buildings and playgrounds, where logistically possible.

NOISE

Community noise levels during construction of the Proposed Project could be affected by noise and vibration from construction equipment operation and from construction vehicles and delivery vehicles traveling to and from a building site. Noise levels caused by construction

activities would vary widely, depending on the phase of construction and the location of the construction relative to receptor locations. The most significant construction noise sources related to the Proposed Project are expected to be impact equipment, such as jackhammers, excavators with ram hoes, drill rigs, rock drills, impact wrenches, tower cranes, and paving breakers, as well as the movements of trucks, and possible blasting.

As detailed in Chapter 20, “Construction,” the applicant is committed to implementing a noise reduction program for construction at the project site to reduce impacts on the surrounding community, which include a wide variety of measures that exceed standard construction practices. This commitment will be contained in the noise mitigation plan required as part of the New York City Noise Control Code.

PROJECT OPERATIONS

AIR QUALITY

The primary source of mobile source pollutant emissions during operations would be from project-generated vehicles using nearby intersections in the study area. The Proposed Project would increase traffic in the vicinity of the project site and along feeder streets to and from the project site, potentially increasing pollutant emissions.

Potential stationary source emissions associated with operation of the Proposed Project would primarily be from fuel burned on-site for heating, ventilation, and cooling (HVAC) systems.

As described in Chapter 18, “Air Quality and Greenhouse Gas Emissions,” it is assumed that Con Edison supplied steam would be used to provide heating and domestic hot water to the proposed buildings, therefore stationary sources of emissions from the Proposed Project are considered insignificant.

Stationary source emissions that could potentially affect the Proposed Project during project operations would primarily be from existing HVAC system emission sources, including the Consolidated Edison Power House (also known as the Con Edison 59th Street Station), which is located directly south of the project site.

NOISE

The primary source of noise during project operations would be attributable to increased traffic in the area generated by the Proposed Project.

E. AIR QUALITY POLLUTANTS OF CONCERN AND RELATED HEALTH EFFECTS

As mentioned above, the primary source of air quality pollutant emissions from the Proposed Project would be from diesel engines during construction, and emissions from project-generated vehicles during project operations. Increases in airborne PM emitted by such sources may cause potential impacts on public health. Also, given the potential effects of PM emissions on asthma, PM has been identified as the primary pollutant of concern as it relates to potential public health impacts from the Proposed Project. The potential air quality impacts of PM_{2.5} and other pollutants of concern from the Proposed Project are analyzed in Chapter 18, “Air Quality and Greenhouse Gas Emissions.”

PARTICULATE MATTER

PM is a broad class of air pollutants that exist as liquid droplets or solids, with a wide range of sizes and chemical composition. Generally, airborne concentrations of PM are expressed as the total mass of all material (often smaller than a specified aerodynamic diameter) per volume of air (in micrograms per cubic meter, $\mu\text{g}/\text{m}^3$). Thus, PM_{10} refers to suspended particles with diameters less than 10 μm , and $\text{PM}_{2.5}$ to suspended particles with diameters less than 2.5 μm .¹

PM is emitted by a variety of natural and man-made sources. Natural sources include the condensed and reacted forms of natural organic vapors; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, and bacteria; debris from live and decaying plant and animal life; particles eroded from beaches, desert, soil and rock; and particles from volcanic and geothermal eruptions, and forest fires.

Major man-made sources of PM include the combustion of fossil fuels, such as vehicular exhaust, power generation and home heating, chemical and manufacturing processes; all types of construction; agricultural activities; and wood-burning fireplaces. Since the chemical and physical properties of PM vary widely, the assessment of the public health effects of airborne pollutants in ambient air is extremely complicated.

PM_{2.5}

As mentioned above, PM is a byproduct of fossil fuel combustion. It is also derived from mechanical breakdown of coarse PM such as pollen fragments. $\text{PM}_{2.5}$ does not refer to a single pollutant, but to an array of fine inhalable materials. For example, there are thousands of forms of natural ambient $\text{PM}_{2.5}$ and perhaps as many forms of man-made $\text{PM}_{2.5}$, which include the products of fossil fuel combustion (such as diesel fuel), chemical/industrial processing, and burning of vegetation. Some PM is emitted directly to the atmosphere (i.e., primary PM), while other types of PM are formed in the atmosphere through various chemical reactions and physical transformations (i.e., secondary PM). The formation of secondary $\text{PM}_{2.5}$ is one determinant of ambient air quality and is extremely difficult to model.

The major constituents of $\text{PM}_{2.5}$ are typically sulfates, nitrates, organic carbon, elemental carbon (soot), ammonium, and metallic elements (not including sulfur). Secondary sulfates and nitrates are formed from their precursor gaseous pollutants, sulfur dioxide (SO_2) and (nitrogen oxide) NO_x , at some distance from the source due to the time needed for the chemical conversion within the atmosphere. Elemental carbon and metallic elements are components of primary PM, while organic carbon can be either emitted directly from a source or formed as a secondary pollutant in the atmosphere. Due to the influence of these “secondary” pollutants from distant or regional sources, regional ambient levels of $\text{PM}_{2.5}$ are typically more evenly distributed than their related class of pollutants PM_{10} , which is more highly influenced by local sources.^{2,3}

¹ A μm , or micron, is approximately 1/100 the width of a human hair.

² Ito K., Christensen W.F., Eatough D.J., Henry R.C., Kim E., Laden F., Lall R., Larson T.V., Neas L., Hopke P.K., Thurston G.D.. PM source apportionment and health effects: 2. An investigation of intermethod variability in associations between source-apportioned fine particle mass and daily mortality in Washington, DC. *J Expo Sci Environ Epidemiol*. 2006 Jul;16(4):300-10. Epub 2005 Nov 23.

³ Lena T.S., Ochieng V., Carter M., Holguin-Veras J., Kinney P.L.. Elemental carbon and $\text{PM}_{2.5}$ levels in an urban community heavily impacted by truck traffic. *Environ Health Perspect*. 2002 Oct;110(10):1009-15

Data from the Botanical Gardens in the Bronx and Queens College in Queens indicate that the greatest contributors to ambient PM_{2.5} concentrations in New York City are sulfates and organic carbon (approximately two-thirds of the total PM_{2.5} mass). Studies confirming the contribution of long-range transport to ambient PM_{2.5} levels compared the data from New York City monitors with monitors from a remote site within New York State, downwind from other states. These data show that high levels of sulfate and other pollutants come into New York State from areas to the west and south of New York. The data also indicate that urban sites are more likely to experience increased nitrate and carbon levels than rural sites.¹

Urban populations, such as those in New York City, generally have a higher prevalence of asthma, and higher rates of hospitalization for asthma than non-urban populations.² Exposure to particulate matter—specifically, emissions of fine particulate matter with an aerodynamic diameter less than 2.5 micrometers in diameter (PM_{2.5})—could either aggravate pre-existing asthma, or induce asthma in an individual with no prior history of the disease. The following discussion includes a review of the characteristics of asthma and a review of asthma causes and triggers.

PM_{2.5}-RELATED HEALTH EFFECTS

An important issue associated with PM_{2.5} is that it has a direct causal effect on human health. Since PM in the ambient air is composed of a combination of discrete compounds or elements, its possible public health effects could vary depending on the specific components of PM in a region. For example, acid aerosols, such as sulfuric acid, may trigger reactions in pulmonary lung function, while bioaerosols, such as mold spores, may result in allergic reactions related to increased incidences of asthma. The EPA 2004 Criteria Document acknowledges the uncertainty regarding the shapes of PM exposure-response relationships; the magnitude and variability of risk assessments for PM; the ability to attribute observed health effects to specific PM constituents; the time intervals over which PM health effects are manifested; the extent to which findings in one location can be generalized to other locations; and the nature and magnitude of the overall public health risk imposed by ambient PM exposure.

Studies have shown the importance of separating total personal exposure to PM_{2.5} into its two major components.³ Ambient (or outdoor) exposure includes the ambient PM concentrations while outdoors, usually estimated by measurements at local air monitoring stations. Non-ambient exposure is the result of indoor sources (e.g., cooking and cleaning) and personal sources (e.g., smoking and materials used for hobbies). Non-ambient exposure levels are independent of outdoor ambient PM concentrations. Among subjects of a large study of three cities, personal exposures to PM_{2.5} were significantly higher than outdoor PM_{2.5} concentrations.⁴

¹ New York State Department of Environmental Conservation (NYSDEC), Report to the Examiners on Con Edison's East River Article X Project, Case No. 99-F-1314, February 2002.

² Aligne C.A., Auinger P., Byrd R.S. 2000. Risk factors for pediatric asthma: contributions of poverty, race, and urban residence. *Am J Resp Crit Care Med* 162:873-877.

³ Wilson, W.E., Brauer M., 2006. Estimation of ambient and non-ambient components of particulate matter exposure from a personal monitoring panel study. *J Exp Sci Env Epid* 16:264-74.

⁴ Weisel, C.P., Zhang, J., Turpin, B.J., et al. 2005. Relationships of indoor, outdoor, and personal air (RIOPA), Part I. Collection methods and descriptive analyses. Health Effects Institute No. 130 Part I. Available at: <http://www.healtheffects.org/Pubs/RIOPA-I.pdf> (Accessed July 5, 2006).

The fact that personal PM exposures were higher than outdoor concentrations indicates that indoor sources of PM_{2.5} contribute to, and in some cases dominate, personal exposures.

The potential for PM_{2.5} to affect public health is dependent on the composition and the amount of PM in the atmosphere (i.e., the higher the ambient PM_{2.5} concentration, the more likely that it would have an effect). The evidence cited by EPA in establishing the National Ambient Air Quality Standards (NAAQS) for PM_{2.5} is derived from epidemiologic studies that found, at typical ambient levels, a statistical correlation of PM and increased levels of morbidity and mortality.¹ It is unclear what forms of PM and what physiological mechanisms are responsible for the observed health effects. However, the extent of any adverse public health effect related to an increase in PM concentrations is anticipated to be proportional in some way to the concentration increase. A small increase in PM concentrations can, at most, lead to a small increase in the risk of PM-related public health effects.

The principal health effects of airborne PM are on the respiratory system, although recent research investigated the possible link between PM pollution and cardiovascular disease.²

RESPIRATORY

General Respiratory Effects of PM_{2.5}

Numerous studies have correlated increased rates of hospital admissions for respiratory conditions, small decreases in lung function in children with or without asthma, and absences from school with changes in PM concentrations.³ As a result, EPA stated that these statistical associations reflect cause and effect and established the NAAQS for PM primarily on the basis of the associations.⁴ The PM_{2.5} standard was established to protect public health.

Asthma

Background

Asthma is a chronic disorder characterized by tightening of the airways of the lungs, airway irritability, and inflammation of the bronchial tubes. Asthma is an episodic disease, with acute episodes interspersed with symptom-free periods. Asthma episodes may be triggered by specific substances, environmental conditions, and stress, as discussed below.

Asthma can generally be categorized as having either an allergic or a non-allergic basis.^{5,1,2} About 75 percent of people suffering from asthma have allergic asthma.³ For people with

¹ Krewski et al (2000); Dockery et al. N. Engl. J. Med. 329, 1753-1759 (1995); Pope et al Am. J. Respir. Crit. Care Med., 151:669-674 (1995), Burnett et al, JAMA 287(9), 1132-41 (2002); Dominici et al, Am. J. Epidemiol. 157 (12), 1055-1065 (2003).

² Künzli, N., Tager I.B. 2005. Air pollution: from lung to heart. Swiss Med Wkly 135:697-702. Available at <http://www.smw.ch/docs/pdf200x/2005/47/smw-11025.pdf> (accessed July 2006).

³ CEPA/FPAC Working Group on Air Quality Objectives and Guidelines. National Ambient Air Quality Objectives for Particulate Matter. Part 1: Science Assessment Document.

⁴ EPA (2004) Air Quality Criteria for Particulate Matter (Vols. I and II); EPA/600/P-99/002af. Washington, DC: Office of Research and Development (1997); National Ambient Air Quality Standards for Particulate Matter, Final Rule, Federal Registry: July 18, EPA 2003.

⁵ Scadding, J.G. 1985. "Chapter 1: Definition and clinical categorization." In *Bronchial Asthma: Mechanisms and Therapeutics*, Second Edition (Eds: Weiss, E.B, M.S. Segal, and M. Stein), Little, Brown, and Company, Boston, MA, pp. 3-13.

allergic asthma, exposure to allergens (substances that induce allergies) may be most important for eliciting asthma symptoms; in contrast, people with non-allergic asthma experience symptoms when confronted with exercise, breathing cold air, or respiratory infections.⁴ Exercise, cold air, and respiratory infections also may exacerbate asthma in people with allergic asthma.

Causes and Triggers

The causes of asthma and its increase over the last two decades are not certain, and the triggers for its exacerbation are only partially understood. Scientists and clinicians have researched the causes and risk factors for the disease. Factors that have been investigated include indoor air pollution, outdoor air pollution, behaviors, food and food additives, medical practices, and illness in infancy. Current hypotheses tend to focus on three areas: (1) increases in individual sensitivity (possibly due to reduced respiratory infection); (2) increases in exposures to allergens and other environmental triggers; and (3) increases in airway inflammation of sensitized individuals. No single factor is likely to explain increased rates of asthma; however, various factors dominate specific areas, homes, and individuals.

Some researchers have suggested that outdoor air pollution is not likely to contribute significantly to asthma because air pollution has decreased on the whole while asthma rates have increased. Yet, on a local scale, air pollution may be important, and on a larger scale, it is possible that specific pollutants, such as ozone or diesel exhaust, enhance the effects of other factors, such as allergens, even if the pollutants themselves are not triggers of asthma. In addition, weather conditions, and cold air in particular, can elicit asthmatic symptoms independent of air pollution.

The relationship between diesel exhaust and asthma has been studied experimentally and epidemiologically with inconclusive results.

Prevalence, Morbidity, and Mortality

In the United States, approximately 6.8 million children (9 percent of children under age 18) have asthma.⁵ In 2003, current asthma prevalence in children in New York state was estimated at approximately 9.9 percent.⁶

Asthma morbidity and mortality rates have been rising throughout the U.S. over the last few decades,⁷ with New York City experiencing a disproportionate increase in the early 1990s.⁸ However, hospitalization rates in New York City have been gradually declining since the peak rates in the mid-1990s.

¹ McFadden, Jr., E.R. 2005. Asthma. In *Harrison's Principles of Internal Medicine*, 16th ed. McGraw-Hill, New York, NY, pp. 1508-1516.

² Sears, M.R. 1997. "Epidemiology of childhood asthma." *Lancet* 350:1015-1020.

³ Centers for Disease Control (CDC). 2002. "Surveillance for Asthma - United States, 1980-1999." *Morbidity and Mortality Weekly Report* 51(SS01): 1-13. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5101a1.htm> (accessed July 2006).

⁴ McFadden, 2005.

⁵ Bloom B, Cohen RA. Summary Health Statistics for U.S. Children: National Health Interview Survey, 2006. National Center for Health Statistics. *Vital Health Stat* 10(239). 2007.

⁶ American Lung Association, January 2009. "Trends in Asthma Morbidity and Mortality."

⁷ CDC, 2002.

⁸ Garg, R., Karpati, A., Leighton, J., Perrin, M., Shah, M., 2003. *Asthma Facts, Second Edition*. New York City Department of Health and Mental Hygiene.

The borough of Manhattan as a whole has experienced a 55 percent decrease in child hospitalization rates between 1997 and 2005.¹ A comparison of asthma hospitalization rates in 1997 and 2005 among children aged 0 to 14 years is presented in **Table 21-1** for the neighborhoods of the project site, and for Manhattan and New York City as a whole.

Table 21-1
1997 and 2005 Hospitalization Rates per 1,000 Persons (Aged 0-14 Years)*

Location	1997	2005
Upper West Side** (includes zip codes 10023, 10024, 10025)	6.4	3.8
Chelsea-Clinton*** (includes zip codes 10001, 10011, 10018, 10019, 10020, 10036)	14.4	4.3
Borough of Manhattan	12.3	5.5
New York City	9.5	5.4
<p>* New York City Department of Health and Mental Hygiene. <i>Updated Asthma Hospitalization Data by NYC Neighborhood</i> from website http://www.nyc.gov/html/doh/downloads/pdf/asthma/asthma-hospit06-table1.pdf. Site accessed November, 2009.</p> <p>** The project site is included in this neighborhood as defined by New York City Department of Health and Mental Hygiene</p> <p>***The project site borders this neighborhood as defined by New York City Department of Health and Mental Hygiene</p>		

Other Health Effects, Including Cardiovascular, Lung Cancer, and Premature Mortality

People with heart disease, such as coronary artery disease and congestive heart failure, are at risk of serious cardiac effects.² In people with heart disease, very short-term exposures of one hour to elevated fine PM concentrations have been linked to irregular heartbeats and heart attacks.³

New epidemiological re-analyses of studies of long-term ambient PM exposure also show substantial evidence for increased lung cancer risk being associated with such PM exposures, especially exposure to fine PM or specific fine particles subcomponents.⁴

¹ Under the direction of the New York City Department of Health and Mental Hygiene (DOHMH), an aggressive Asthma Initiative was begun in 1997, with goals of reducing illness and death from childhood asthma. Since its inception, major childhood asthma initiatives have been implemented in several low income neighborhoods with high hospitalization rates. Between 1997 and 2005, many of these neighborhoods have experienced substantial decreases in hospitalization rates, which may be an indication of success from extensive efforts by medical providers and community organizations participating in such initiatives.

² Goldberg MS, Bailar JC 3rd, Burnett RT, Brook JR, Tamblin R, Bonvalot Y, Ernst P, Flegel KM, Singh RK, Valois MF. Identifying subgroups of the general population that may be susceptible to short-term increases in particulate air pollution: a time-series study in Montreal, Quebec. *Res Rep Health Eff Inst* 2000 Oct;(97): 7-113; discussion 115-20; and Zanobetti A, Schwartz J. Cardiovascular damage by airborne particles: are diabetics more susceptible? *Epidemiology* 2002 Sep; 13(5):588-92.

³ Peters A, Liu E, Verrier RL, Schwartz J, Gold DR, Mittleman M, Baliff J, Oh JA, Allen G, Monahan K, and Dockery DW. Air pollution and incidence of cardiac arrhythmia. *Epidemiology* 2000 Jan; 11(1):11-7; and Peters A, Dockery DW, Muller JE, and Mittleman MA. Increased particulate air pollution and the triggering of myocardial infarction. *Circulation* 2001 Jun 12; 103(23):2810-5.

⁴ EPA Air Quality Criteria for Particulate Matter (Vols II); October 2004, EPA/600/P-99/002bf.

The elderly are at increased risk from fine PM air pollution. Numerous community health studies have shown that when particle levels are high, senior citizens are more likely to be hospitalized for heart and lung problems, and some may die prematurely.¹

Inhaling fine PM has been attributed to increased hospital admissions, emergency room visits, and premature death among sensitive populations with pre-existing heart or lung disease. Studies estimate that tens of thousands of elderly people die prematurely each year from exposure to ambient levels of fine particles.

In summary, studies conducted in individual cities and using data pooled from multiple cities have demonstrated that increases in PM, SO₂, and ozone exposures are associated with increases in daily mortality, and hospitalizations and emergency department utilization for asthma with increases in PM. While the epidemiologic literature demonstrates that variation in air quality is associated with these morbidity and mortality events, it does not, in general, demonstrate that air quality differences account for the large increases seen in the prevalence of asthma through the 1980s and 1990s, or the wide variability in the prevalence of asthma and heart disease across and within cities.

F. AIR QUALITY AND NOISE REGULATIONS AND STANDARDS

AIR QUALITY

THE NATIONAL AMBIENT AIR QUALITY STANDARD FOR PM_{2.5}

Section 108 of the Clean Air Act (CAA) directs the U.S. Environmental Protection Agency (EPA) to identify criteria pollutants that may reasonably be anticipated to endanger public health and welfare. Section 109 of the CAA requires the EPA to establish NAAQS and periodically revise them for such criteria pollutants. Primary NAAQS are mandated to protect public health with an adequate margin of safety. In setting the NAAQS, the EPA must account for uncertainties associated with inconclusive scientific and technical information, and potential hazards not yet identified. The standard must also be adequate to protect the health of any sensitive group of the population. Secondary NAAQS are defined as standards that are necessary to prevent adverse impacts on public welfare, such as impacts to crops, soil, water, vegetation, wildlife, weather, visibility, and climate.

Beginning in 1994, the EPA conducted a five-year review of the NAAQS for PM, which included an in-depth examination of epidemiologic and toxicological studies. The studies are summarized in the EPA's Criteria Document for Particulates, Chapters 10–13 (1996); the EPA's Staff Papers on Particulates, in particular Chapter V²; and the EPA's proposed NAAQS for particulates, found in the December 13, 1996 Federal Register on page 65638. Based on this extensive analysis, in 1997

¹ Pope CA 3rd. Epidemiology of fine particulate air pollution and human health: biologic mechanisms and who's at risk? *Environ Health Perspect* 2000 Aug; 108 Suppl 4:713-23; and Samet JM, Zeger SL, Dominici F, Curriero F, Coursac I, Dockery DW, Schwartz J, and Zanobetti A. The National Morbidity, Mortality, and Air Pollution Study. Part II: Morbidity, Mortality and Air Pollution in the United States. Health Effects Institute Research Report 94, Part II, June 2000.

² Many of the studies are found on EPA's website at <http://www.epa.gov/ttn/oarpg/t1sp.html>.

the EPA revised the NAAQS for PM and proposed a new standard for PM_{2.5} consisting of both a long-term (annual) limit of 15 µg/m³ and a short-term (24-hour) limit of 65 µg/m³.¹

In establishing the NAAQS for PM_{2.5} in 1997, the EPA conservatively assumed that moderate levels of airborne PM of any chemical, physical, or biological form might harm health. In setting the value of the annual average NAAQS for PM_{2.5}, the EPA found that an annual average PM_{2.5} concentration of 15µg/m³ is below the range of data most strongly associated with both short- and long-term exposure effects. The EPA Administrator concluded that an annual NAAQS of 15µg/m³ “would provide an adequate margin of safety against the effects observed in the epidemiological studies.”²

The EPA has revised the NAAQS for PM, effective December 18, 2006. The revision included lowering the level of the 24-hour PM_{2.5} standard from 65 µg/m³ to 35 µg/m³, and retaining the level of the annual PM_{2.5} standard at 15 µg/m³. EPA is currently considering whether to lower the concentration level of the annual standard for PM_{2.5}.

NOISE

As discussed in Chapter 20, “Construction,” noise levels associated with the construction and operation of development resulting from the Proposed Project would be subject to the emission source provisions of the New York City Noise Control Code and evaluated in accordance with Noise Standards set for the CEQR process. Construction equipment is regulated by the Noise Control Act of 1972 and the New York City Noise Control Code.

G. DETERMINING THE SIGNIFICANCE OF PUBLIC HEALTH IMPACTS

The New York State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a likely consequence (i.e., whether it is material, substantial, large, or important) should be assessed in connection with:

- 1) Its setting (e.g., urban or rural);
- 2) Its probability of occurrence;
- 3) Its duration;
- 4) Its irreversibility;
- 5) Its geographic scope;
- 6) Its magnitude; and
- 7) The number of people affected.

The potential public health impacts of PM_{2.5} emissions and noise levels as a result of the Proposed Project are based on the results of the air quality and noise impact assessments in Chapters 18, “Air Quality and Greenhouse Gas Emissions,” 19, “Noise,” and 20, “Construction.” The following section presents the applicable standards and thresholds with which the results of the air quality and noise modeling are compared in determining the potential significance of public health impacts in consideration of the factors set forth above.

¹ 62 Federal Register 38652 (July 18, 1997).

² 62 Federal Register 28652, 38676 (July 18, 1997).

AIR QUALITY

To maintain concentrations lower than NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants. EPA finalized the designation of the New York City Metropolitan Area as nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS, effective in November 2009. To determine the potential significance of impacts from $PM_{2.5}$ emissions for individual projects, NYSDEC and DEP have provided interim guidance criteria, or threshold levels. Actions predicted to increase the concentrations of $PM_{2.5}$ above threshold levels in non-attainment areas require a detailed analysis to determine the potential for significant impacts. For actions with predicted exceedances of the threshold levels, the significance of impacts is further determined in consideration of the various factors listed in the previous section.

INTERIM GUIDANCE CRITERIA (THRESHOLD LEVELS) REGARDING $PM_{2.5}$ IMPACTS

NYSDEC has published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts.¹ This policy would apply only to facilities applying for permits or major permit modifications under SEQRA that emit 15 tons of PM_{10} or more annually. Projects with emissions below this threshold are deemed by NYSDEC to be insignificant with respect to $PM_{2.5}$ and do not require further assessment under the policy. The policy states that a project will be deemed to have a potentially significant adverse impact if the project's maximum impacts are predicted to increase $PM_{2.5}$ concentrations by more than $0.3 \mu\text{g}/\text{m}^3$ averaged annually or more than $5 \mu\text{g}/\text{m}^3$ on a 24-hour basis. Projects that exceed either the annual or 24-hour threshold will be required to prepare an EIS to assess the severity of the impacts, to evaluate alternatives, and to employ reasonable and necessary mitigation measures to minimize the $PM_{2.5}$ impacts of the source to the maximum extent practicable.

For projects subject to CEQR, the interim guidance criteria currently employed for determination of potential significant adverse $PM_{2.5}$ impacts are as follows:

- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than $5 \mu\text{g}/\text{m}^3$ at a discrete receptor location would be considered a significant adverse impact on air quality under operational conditions (i.e., a permanent condition predicted to exist for many years regardless of the frequency of occurrence);
- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than $2 \mu\text{g}/\text{m}^3$ but no greater than $5 \mu\text{g}/\text{m}^3$ would be considered a significant adverse impact on air quality based on the magnitude, frequency, duration, location, and size of the area of the predicted concentrations;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than $0.1 \mu\text{g}/\text{m}^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than $0.3 \mu\text{g}/\text{m}^3$ at a discrete receptor location (elevated or ground level).

¹ CP33/Assessing and Mitigating Impacts of Fine Particulate Emissions, NYSDEC 12/29/2003.

Actions under CEQR predicted to increase PM_{2.5} concentrations by more than the CEQR or NYSDEC interim guidance criteria above will be considered to have a potential significant adverse impact. Actions subject to CEQR that fail the interim guidance criteria should prepare an EIS and examine potential measures to reduce or eliminate such potential significant adverse impacts.

NOISE

As described in Chapter 19, “Noise,” in terms of CEQR, a significant noise impact occurs when there is an increase in the one-hour equivalent noise level ($L_{eq(1)}$) of between 3 and 5 dBA, depending upon the noise level without the proposed action. In terms of public health, significance is not determined based upon the incremental change in noise level, but is based principally upon the magnitude of the noise level and time frame of exposure.

H. THE FUTURE WITH THE PROPOSED PROJECT

The following section summarizes the potential public health impacts related to air quality, noise, and hazardous materials during the construction and operation of the Proposed Project.

AIR QUALITY

DURING CONSTRUCTION

As presented in Chapter 20, “Construction,” construction under the Proposed Project would not result in a significant adverse impact on air quality. To ensure that the construction of the project site would result in the lowest practicable diesel PM emissions, the applicant has committed to implementing a state-of-the-art emissions reduction program for all of its construction activities at the project site. With the implementation of the emissions control program, the on-site emissions levels during construction are expected to be very low when compared with typical construction activity. With control measures in place, it was determined that the maximum predicted incremental concentrations of particulate matter with an aerodynamic diameter of less than or equal to 2.5 micrometers (PM_{2.5}) (using a worst-case emissions scenario) would exceed the applicable DEP interim guidance criteria at a few non-residential discrete receptor locations immediately adjacent to the construction site fence, where the likelihood of exposure is very low. The occurrences of elevated 24-hour average concentrations for PM_{2.5} at non-residential receptors are very limited in duration and are only slightly above the interim guidance thresholds. Therefore, after taking into the account the temporary nature of construction, the variability of PM_{2.5} emissions over time (which are often considerably less than those used in the modeling analysis), the limited frequency of 24 hour impacts, and the limited area-wide extent of the 24-hour and annual discrete location impacts (the PM_{2.5} neighborhood scale analysis concentrations were well below the city’s interim guidance criteria), it was concluded that no significant adverse air quality impacts for PM_{2.5} are expected from the on-site construction sources.

Therefore, the construction of the Proposed Project would not result in a significant adverse impact on air quality or public health.

DURING PROJECT OPERATIONS

The potential for impacts on air quality during the operation of the Proposed Project was examined in detail and is described in Chapter 18, “Air Quality and Greenhouse Gas Emissions.”

The CEQR and NYSDEC interim guidance criteria were used to evaluate the significance of predicted impacts of the Proposed Project on PM_{2.5} concentrations.

The analyses concluded that the Proposed Project would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the Proposed Project would not be adversely affected by new or existing sources of air emissions in the project area.

Overall, no significant air quality or public health impacts are expected from the operation of the Proposed Project.

NO₂

As mentioned in Chapter 18, “Air Quality and Greenhouse Gas Emissions,” the primary NAAQS represent levels that have been established by EPA to protect the public health (allowing an adequate margin of safety), including the health of “sensitive” populations such as asthmatics, children, and the elderly. EPA recently established a new 1-hour average NO₂ NAAQS of 0.100 ppm, effective April 12, 2010, in addition to the current annual standard.

Exposure to ambient concentrations of NO₂ has been linked to adverse effects on human health. According to EPA’s *Integrated Science Assessment (ISA) for Oxides of Nitrogen – Health Criteria (2008)* epidemiologic and controlled human exposure studies, supported by animal toxicology studies, have provided evidence for associations between NO₂ exposure and respiratory effects in asthmatics. The ISA also concluded that at this time, the available evidence on cardiovascular health effects following short-term exposure to NO₂ is inadequate to infer the presence or absence of a causal relationship.

EPA first established NAAQS for NO₂ in 1971, setting both a primary standard and a secondary standard at 0.053 parts per million (ppm), averaged annually. Currently there are no areas in the United States that are designated as nonattainment of the annual NO₂ standard. However, it can be expected that some areas could be classified as in nonattainment with the NO₂ 1-hour NAAQS in the future.

EPA is required to identify or “designate” areas as attaining or not attaining the new standard by January 2012. These initial designations will be based on the existing monitoring network, which consists of monitors established at community-scale locations¹. Areas with monitors recording violations of the new standards will be designated nonattainment. EPA has identified only one county in the U.S. (in Illinois) that may be classified as nonattainment based on the existing data, and anticipates initially designating all other areas of the country as “unclassifiable” to reflect the fact that there are insufficient data available to determine if those areas are meeting the revised NAAQS. Additional monitoring stations will be established by 2013, primarily near major roadways, to collect additional data for the purpose of determining whether NYC is in attainment of the 1-hour standard.

Any state with nonattainment areas will be required to develop a State Implementation Plan (SIP) that identifies and implements specific measures to reduce ambient NO₂ concentrations to attain and maintain the new 1-hour NO₂ standard, most likely by requiring further reductions of NO_x emissions from sources.

¹ Community-scale monitors are monitors that are located in areas that are generally more than 50 meters from roadways.

Due to its effect on ambient ozone and PM_{2.5} concentrations, EPA has promulgated a number of regulations to reduce emissions of NO_x from certain source categories. In addition, states (including New York) that have non-attainment areas for ozone and PM_{2.5} have developed SIPs to document how attainment with the ozone and PM_{2.5} NAAQS will be achieved by specified target dates, and have, as a result, promulgated regulations and put in place various programs at the state and regional levels to achieve additional reductions in emissions from sources of NO_x. For example, Tier 2 standards for light-duty vehicles began to be phased in during 2004, and new NO_x standards for heavy-duty engines are being phased in between 2007 and 2010 model years. Lower NO_x standards for nonroad diesel engines, locomotives, and certain marine engines will be phased in throughout the next decade. Current air quality monitoring data reflect only a few years of vehicles entering the fleet that meet these strict NO_x standards. In future decades, as these lower-NO_x vehicles and engines become an increasingly large fraction of in-use mobile sources, large NO_x emission reductions will be achieved. As a result, EPA and New York State anticipate that NO_x emissions, and the ensuing ambient NO₂ concentrations, will continue to decrease in the future.

As discussed in Chapter 18, “Air Quality and Greenhouse Gas Emissions”, NO₂ concentrations at project buildings due to emissions from large stationary sources in the area would be expected to be below the 1-hour NO₂ standard. Therefore, concentrations due to such emissions would not be expected to have any significant adverse public health impacts at the project site.

At the present time there is not sufficient data and established technical analysis techniques to determine reliably whether concentrations due to emissions from mobile sources in the project study area would be above or below the 1-hour standard in the Build condition. The traffic associated with the Proposed Project, however, is not expected to change NO₂ concentrations appreciably, since the vehicular traffic associated with the Proposed Project would be a very small percentage of the total number of vehicles in the area.

With regard to mobile source emissions, if future monitoring results in the identification and designation of non-attainment areas due to transportation sources, SIP strategies to reduce the 1-hour NO₂ concentrations would be developed. These steps may include additional regulations to further reduce emissions from sources of NO₂ that may contribute to exceedances near roadways. In addition, at the federal level, regulations have been recently promulgated that will increase fuel efficiency standards for vehicles in the future, which will reduce tailpipe emissions of NO_x and other pollutants.

Exceedances of the 1-hour NO₂ health-based standard resulting from project-related construction activities cannot be ruled out. As noted in Chapter 18, “Air Quality and Greenhouse Gas Emissions,” the NO₂ emissions associated with the combustion equipment that would be used in project construction are typical of emissions associated with construction activities involving similar equipment at other projects involving large-scale, long-term and intensive construction activities.

As discussed in Chapter 20, “Construction,” certain measures would be implemented by the Proposed Project in order to minimize emissions from construction activities. Those measures would include the use of electric engines and grid power where practicable, and other measures for generally reducing pollutant emissions. In addition, to minimize hourly emissions of NO₂ to the maximum extent practicable, non-road diesel powered vehicles and construction equipment meeting the EPA Tier 3 Non-road Diesel Engine Emission Standard would be used in

construction, and construction equipment meeting Tier 4 would be used where conforming equipment is widely available, and the use of such equipment is practicable¹.

NOISE

DURING CONSTRUCTION

The analysis presented in Chapter 20, “Construction,” shows that during the construction period, construction activities would result in increased noise levels at certain sensitive receptor locations that would exceed the CEQR impact criteria (i.e., increase by more than 3 dBA comparing the noise levels due to construction activities with existing noise levels), and these exceedances of the CEQR impact criteria may occur for two or more consecutive years, resulting in significant noise impacts at sensitive locations within this area. However, with the exception of three receptor locations, all receptor locations have double-glazed windows and have some form of alternative ventilation (i.e., central air conditioning or PTAC units), which would provide a significant amount of sound attenuation, and would result in interior noise levels during much of the time that are below 45 dBA L₁₀ (the CEQR acceptable interior noise level criteria).

With regard to some residential terrace locations the highest L₁₀₍₁₎ noise levels would range from approximately 73 to 79 dBA during some peak periods of construction activity. Without construction activities, noise levels at these terraces exceed the CEQR acceptable range (55 dBA L₁₀₍₁₎) for an outdoor area requiring serenity and quiet. During the weekday daytime time periods identified above when construction activities are predicted to significantly increase noise levels, construction activities would exacerbate these exceedances and result in significant adverse noise impacts at the terraces at these identified buildings.

These predicted noise levels would be of limited duration, and the predicted overall changes in noise levels would not be large enough to significantly affect public health. While construction activities would produce noise levels of a magnitude that at times are annoying and intrusive, and would be considered undesirable, construction activities would only occur for a limited number of hours per day, and for a limited time period at any location. Based upon the limited durations of these noise levels at any location, the noise produced by construction activities would not result in a significant adverse public health impact.

Between the Draft and Final SEIS, a more refined analysis was undertaken, which considers additional time periods. This refined analysis eliminated noise at some of the receptor locations identified in the draft SEIS because they would not occur continually for two consecutive years.

¹ The first federal regulations for new nonroad diesel engines were adopted in 1994, and signed by EPA into regulation in a 1998 Final Rulemaking. The 1998 regulation introduces Tier 1 emissions standards for all equipment 50 hp and greater and phases in the increasingly stringent Tier 2 to Tier 3 standards for equipment manufactured in 2000 through 2008. In 2004, The EPA introduced Tier 4 emissions standards with a phased-in period of 2008 to 2015. The Tier 1 through 4 standards regulate the EPA criteria pollutants, including particulate matter (PM), hydrocarbons (HC), oxides of nitrogen (NO_x) and carbon monoxide (CO). Prior to 1998, emissions from nonroad diesel engines were unregulated. These engines are typically referred to as Tier 0.

DURING PROJECT OPERATIONS

As described in Chapter 19, “Noise,” that traffic generated by the Proposed Project would not be expected to result in any significant increases in noise levels. Furthermore, to meet CEQR interior noise level requirements, the analysis prescribes building attenuation for project buildings ranging as high as 39 dBA. Noise levels in the newly created open spaces would be greater than the 55 dBA L₁₀₍₁₎ prescribed by CEQR criteria, but would be comparable to other parks around New York City.

HAZARDOUS MATERIALS

According to CEQR, a hazardous materials analysis assesses the potential of a proposed action to increase human or environmental exposure to hazardous materials.

As described in Chapter 11, “Hazardous Materials,” because of the known and potential subsurface contamination, remedial measures would be undertaken to avoid adverse impacts during excavation for the Proposed Project. These would include conducting soil disturbance under a new OER-approved RAP and an updated CHASP, proper handling and disposal of excavated soil, and implementing other practices to protect workers and the surrounding neighborhood. In addition, the buildings would be constructed with waterproofing which would also serve as a vapor barrier to any remaining VOCs or methane. With these measures, as set forth in the Restrictive Declaration that will be recorded as part of the Proposed Project, no significant adverse impacts would result during or after construction as a result of the potential disturbance of any hazardous materials.

Therefore, the Proposed Project would not result in a significant adverse impact on public health with respect to hazardous materials during or after construction.

RODENT CONTROL

Construction contracts would include provisions for a rodent (mouse and rat) control program. Before the start of construction, the contractor would survey and bait the appropriate areas and provide for proper site sanitation. During the construction the contractor would carry out a maintenance program, as necessary. Signage would be posted, and coordination would be maintained with appropriate public agencies. Only EPA- and NYSDEC-registered rodenticides would be permitted, and the contractor would be required to perform rodent control programs in a manner that avoids hazards to persons, domestic animals, and non-target wildlife. Therefore, construction of the Proposed Project would not result in any significant adverse impacts on rodent control. *