Chapter 22: Public Health

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 Actions. This chapter also provides an overview of health effects related to asthma, including a general discussion of particulate matter (PM) emissions, and a discussion of causes and triggers of asthma, its prevalence in New York City, and the area most likely affected by the Proposed Actions.

PRINCIPAL CONCLUSIONS

This analysis finds that the Proposed Actions would not result in any significant adverse public health impacts.

B. METHODOLOGY

For determining whether a public health assessment is appropriate, the 2001 *City Environmental Quality Review (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 19, "Air Quality and Greenhouse Gas Emissions," Chapter 20, "Noise," and Chapter 21, "Construction Impacts," the Proposed Actions would not result in a significant adverse air quality or noise impact. The Proposed Actions would not result in any unusual solid

waste management practices that could attract vermin and result in an increase in pest populations. Hazardous materials remediation is ongoing at the Development Site and at the Ninth Avenue Site pursuant to New York State Department of Environmental Conservation (DEC) orders. With the ongoing remediation and implementation of health and safety measures during construction of development resulting from the Proposed Actions, no significant adverse impact related to hazardous materials would result from the Proposed Actions.

While, based on the above guidance, the Proposed Actions would not meet any of the thresholds warranting further assessment of public health impacts, this chapter addresses the potential health concerns during the construction and operation of the Proposed Actions, including assessments of air quality, noise, and hazardous materials.

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 Actions 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 Actions is then presented, and the potential for public health impacts due to the Proposed Actions is determined. Summaries of potential impacts from hazardous materials are also presented.

C. SUMMARY OF AIR AND NOISE POLLUTION SOURCES FROM THE PROPOSED ACTIONS

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 development resulting from the Proposed Actions 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 Development Site, as detailed in Chapter 21, “Construction Impacts.” These include dust control measures (watering and dust covers), truck idling restrictions, Ultra Low Sulfur Diesel (ULSD), electric engines in lieu of diesel engines, 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.

NOISE

Community noise levels during construction of development resulting from the Proposed Actions 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 Actions are expected to be impact equipment, such as jackhammers, impact wrenches, and paving breakers, as well as the movements of trucks and cranes. As detailed in Chapter 21, "Construction Impacts," the Developer is committed to implementing a noise reduction program for construction at the Development 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 Actions would increase traffic in the vicinity of the project sites and along feeder streets to and from the project sites, potentially increasing pollutant emissions.

Potential stationary source emissions associated with operation of the Proposed Actions would primarily be from fuel burned on-site for HVAC systems.

NOISE

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

D. AIR QUALITY POLLUTANTS OF CONCERN AND RELATED HEALTH EFFECTS

As mentioned above, the primary source of air quality pollutant emissions from the Proposed Actions would be from diesel engines during construction, and emissions from project-generated vehicles and fuel-burning heating systems 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 Actions. The potential air quality impacts of $PM_{2.5}$ and other pollutants of concern from the Proposed Actions are analyzed in Chapter 19, "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, $\mu g/m^3$). Thus, PM_{10} refers to suspended particles with diameters less than 10 μm, and $PM_{2.5}$ to suspended particles with diameters less than 2.5 μm.

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. $PM_{2.5}$ 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 $PM_{2.5}$ and perhaps as many forms of man-made $PM_{2.5}$, 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 $PM_{2.5}$ is one determinant of ambient air quality and is extremely difficult to model.

The major constituents of $PM_{2.5}$ 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, SO_2, and 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 $PM_{2.5}$ are typically more evenly distributed than their related class of pollutants PM_{10}, which is more highly influenced by local sources.[1,2]

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 the State, downwind from other states. These data show

[1] 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.

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

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.

HEALTH EFFECTS RELATED TO 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.[3,4,5] About 75 percent of people suffering from asthma have allergic asthma.[6] For people with 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.[7] 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

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[1] New York State Department of Environmental Conservation (DEC), 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] 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.

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

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

[6] 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).

[7] McFadden, 2005.

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.[1] In 2003, current asthma prevalence in children in New York State was estimated at approximately 9.9 percent.[2]

Asthma morbidity and mortality rates have been rising throughout the U.S. over the last few decades,[3] with New York City experiencing a disproportionate increase in the early 1990s.[4] However, hospitalization rates in New York City have been gradually declining since the peak rates in the mid-1990s.

The borough of Manhattan as a whole has experienced a 55 percent decrease in child hospitalization rates between 1997 and 2005.[5] A comparison of asthma hospitalization rates in 1997 and 2005 among children aged 0 to 14 years is presented in Table 22-1 for the neighborhoods of the project sites, and for Manhattan and New York City as a whole.

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[1] 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.

[2] American Lung Association, January 2009. "Trends in Asthma Morbidity and Mortality."

[3] CDC, 2002.

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

[5] 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.

Table 22-1
1997 and 2005 Hospitalization Rates per 1,000 Persons (Aged 0 to 14 Years)*

Location	1997	2005
Chelsea-Clinton**	14.4	4.3
Borough of Manhattan	12.3	5.5
New York City	9.5	5.4

Notes:
* New York City Department of Health and Mental hygiene. *Updated Asthma Hospitalization Data by NYC Neighborhood* from website http://www.nyc.gov/html/doh/html/asthma/asthma.shtml. Site accessed March 2009.
** The project sites are included in this neighborhood as defined by New York City Department of Health and Mental Hygiene

E. 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 National Ambient Air Quality Standards (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 V[1]; 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, 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 $\mu g/m^3$ and a short-term (24-hour) limit of 65 $\mu g/m^3$.[2]

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 15$\mu g/m^3$ 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 15$\mu g/m^3$ "would provide an adequate margin of safety against the effects observed in the epidemiological studies."[3]

[1] Many of the studies are found on EPA's website at http://www.epa.gov/ttn/oarpg/t1sp.html.

[2] 62 Federal Register 38652 (July 18, 1997).

[3] 62 Federal Register 28652, 38676 (July 18, 1997).

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 $\mu g/m^3$ to 35 $\mu g/m^3$, and retaining the level of the annual $PM_{2.5}$ standard at 15 $\mu g/m^3$.

NOISE

As discussed in Chapter 21, "Construction Impacts," noise levels associated with the construction and operation of development resulting from the Proposed Actions 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.

F. 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 Actions are based on the results of the air quality and noise impact assessments in Chapters 19, "Air Quality," 20, "Noise," and 21, "Construction Impacts." 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.

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. New York County has been designated a non-attainment area for $PM_{2.5}$. To determine the potential significance of impacts from $PM_{2.5}$ emissions for individual projects, DEC and the New York City Department of Environmental Protection (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 thresholds 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

Because New York City's existing concentrations of $PM_{2.5}$ currently exceed both the annual and 24-hour NAAQS, both DEP and DEC have developed interim criteria for assessing the potential impacts of individual projects under CEQR and SEQRA. DEP is currently recommending the following interim guidance criteria for determining the potential for significant adverse $PM_{2.5}$ impacts for projects subject to CEQR:

- 24-hour (daily) average $PM_{2.5}$ concentration increments, which are predicted to be greater than 5 $\mu g/m^3$ 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; or
- 24-hour average $PM_{2.5}$ concentration increments, which are predicted to be greater than between 2 and 5 $\mu g/m^3$, could be considered a significant adverse impact on air quality based on the magnitude, frequency, and duration of the predicted concentrations as well as the sensitivity and size of the affected area(s);
- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.1 $\mu g/m^3$ 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 impact is predicted for stationary sources; or fifteen meters from roadways for the mobile sources); or
- For stationary sources, predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 $\mu g/m^3$ at discrete receptor locations.

Similar interim guidance for evaluating $PM_{2.5}$ impacts has been adopted by DEC. The DEC policy, however, applies only to facilities applying for permits or major permit modification under SEQRA that emit 15 tons of PM_{10} or more annually. The interim guidance policy states that such 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 $\mu g/m^3$ averaged annually or more than 5 $\mu g/m^3$ on a 24-hour basis.

Actions under CEQR that would increase $PM_{2.5}$ concentrations in excess of DEP or DEC interim guidance criteria are considered to have potential significant adverse impacts. The DEC recommends that for actions subject to CEQR that fail the interim guidance criteria an Environmental Impact Statement (EIS) must be prepared and potential measures to reduce or eliminate such potential significant adverse impacts examined.

The above DEC/DEP guidance criteria have been used to evaluate the significance of the predicted impacts of the Proposed Actions on $PM_{2.5}$ concentrations and determine the need to mitigate the potential impacts of particulate matter emissions.

NOISE

As described in Chapter 20, "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.

G. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

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

AIR QUALITY

DURING CONSTRUCTION

As presented in Chapter 21, "Construction," construction under the Proposed Actions would not result in a significant adverse impact on air quality. To ensure that the construction of the Development Site would result in the lowest practicable diesel PM emissions, the Developer has committed to implementing a state-of-the-art emissions reduction program for all of its construction activities at the Development Site.

The analysis of both on-site and off-site construction activities determined that the Proposed Actions would not result in any significant adverse impacts with respect to $PM_{2.5}$ emissions at any sensitive receptor location. Following the DEP interim guidance, the maximum $PM_{2.5}$ project increments were compared to the CEQR Significant Threshold Values (STV) for $PM_{2.5}$ and were found to be below those values.

Therefore, the construction of the Proposed Actions 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 Actions was examined in detail and is described in Chapter 19, "Air Quality and Greenhouse Gas Emissions." DEP and DEC draft interim guidance criteria were used to evaluate the significance of predicted impacts of the Proposed Actions on $PM_{2.5}$ concentrations.

The air quality analysis found that emissions from increased traffic or changed traffic patterns as a result of the Proposed Actions would not cause increases greater than the 24-hour or annual $PM_{2.5}$ STVs, and would therefore not result in a significant adverse impact. The parking facilities included as part of the Proposed Actions would also not cause an exceedance of the $PM_{2.5}$ STVs.

Based on evaluations of emissions from the HVAC systems of the proposed buildings and specified numbers, heights and locations of exhaust stacks, and air intake duct restrictions, the Proposed Actions would not cause an exceedance of the applicable $PM_{2.5}$ STVs—either from the impacts of the HVAC emissions of the buildings to be constructed as part of the Proposed Actions on other Proposed Actions buildings (building-on-building impacts) or on existing and future No Build developments. In addition, the HVAC emissions of existing and future No Build developments, as well as "major" existing emissions sources, will not significantly impact the Proposed Actions' buildings.

An analysis was also conducted to determine the potential impacts from diesel locomotive emissions. Locomotives entering and leaving Penn Station would continue to operate under the Development Site, and deisel-fueled delivery, maintenance, and garbage trucks would also continue to operate in the yard. The emissions related to these sources would be exhausted through stacks located on the roofs of the low-rise sections of two of the proposed development buildings. In addition, emissions from deisel locomotives traveling under the Tenth Avenue Site

would be exhasted through stacks located on the roof of the proposed building along with emission from the HVAC systems. The analysis of potential impacts from these sources determined that these emissions would not cause an exceedance of the $PM_{2.5}$ STVs, at nearby sensitive receptor sites (i.e, operable windows, open space, etc.) and would therefore not result in significant adverse air quality impacts.

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

NOISE

DURING CONSTRUCTION

As noted in the noise analysis section of Chapter 21, "Construction Impacts," the Proposed Actions could result in increased noise levels from the operation of construction equipment, and construction and delivery vehicles. Potential worst-case construction noise conditions were analyzed to evaluate the potential loudest hour during each month of work during the 102-month duration of construction. The worst-case predicted noise levels are expected not to exceed the CEQR impact criteria, and therefore are not expected to result in a significant adverse noise impact.

Construction noise associated with the Additional Housing Sites is expected to be temporary, typical of other similar construction projects in the City. While there may be short periods of time when noise may be greater than others, no significant adverse impact would be expected in accordance with DEP/DCP policy.

While these noise levels would be noisy and intrusive, they would not be of a magnitude and duration that would result in significant adverse health effects. Consequently, they would not constitute a significant public health impact. With respect to vibration, no significant adverse impact was predicted from the construction activities.

DURING PROJECT OPERATIONS

As discussed in Chapter 20, "Noise," the Proposed Actions would not result in a significant adverse exterior noise impact from increased traffic, proposed playgrounds, or building mechanical equipment. However, the analysis identified interior noise levels that would be above CEQR acceptable limits at all of the proposed buildings. As part of the Proposed Actions, these buildings would include noise attenuation measures as part of the building design to meet interior noise standards, and therefore avoid significant adverse noise impacts. These measures will be included in the Restrictive Declaration for the Development Site. For the Additional Housing Sites, various façades would also require window wall building attenuation, which will be included in a Memorandum of Understanding (MOU) between the New York City Department of City Planning (DCP), the New York City Department of Housing Preservation and Development (HPD), and DEP.

In addition, noise levels within the Proposed Actions' new open space areas would be above the CEQR noise exposure guideline of 55 dBA $L_{10(1)}$ for outdoor areas requiring serenity and quiet. Although noise levels in the new open space areas would be above the CEQR guideline, they would be comparable to noise levels in several other New York City open space areas and parks, including Hudson River Park, Riverside Park, Central Park, Bryant Park, and Paley Park, and would not result in a significant adverse noise impact.

Therefore, no significant adverse health impact from noise is expected from construction and operation of the Proposed Actions.

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 12, "Hazardous Materials," construction of development resulting from the Proposed Actions would involve both the demolition or disturbance of existing structures and a variety of earthmoving or excavating activities with the potential of encountering subsurface soil contamination. Groundwater depth at the three project sites are relatively shallow (i.e., 3 to 15 feet below grade surface) and therefore may be encountered during earthmoving or excavation activities.

The presence of hazardous materials contamination only threatens human health or the environment when exposure to such contaminants occurs. Even in these situations, a health risk requires both an exposure pathway to the contaminants and a sufficient dose to cause adverse health effects. To prevent such exposure pathways and doses, the Proposed Actions would include appropriate health and safety, investigative, or remedial measures (conducted in compliance with both DEC Consent Order agreements, as well as applicable laws and regulations, and conforming to appropriate engineering practice) that would be implemented before, and remain in place after, demolition and soil disturbance. These measures would include:

- Development of a CHASP for site remediation and excavation that would include detailed procedures for managing both known contamination issues and any unexpected issues. The CHASP would include a Materials Handling Plan identifying specific protocols and procedures to be employed to manage the contaminated soil and groundwater at the Development Site and the Additional Housing Sites in accordance with applicable regulations. The CHASP would also include procedures for avoiding the generation of dust that could affect the construction workers on-site and the surrounding community as well as the monitoring necessary to ensure that no such impacts occur. For the Development Site, the requirement for a CHASP will be included in the Restrictive Declaration. For the Additional Housing Sites, the requirement for a CHASP will be included in a MOU between DCP, HPD, and DEP.
- Installation of appropriate vapor mitigation systems to protect buildings in the "terra firma" portion of the Development Site and the Ninth Avenue Site. If required, the design of new buildings at both sites would consider soil vapor mitigation measures to prevent any volatile contaminants that may remain present in the soil and groundwater from migrating into the buildings. The Restrictive Declaration for the Development Site and the MOU for the Ninth Avenue Site will include these vapor mitigation requirements. Those documents will specify that, based upon further testing and review of any additional analytical data, the Developer (for the Development Site) and HPD (for the Ninth Avenue Site) will have the opportunity to demonstrate to DEP's satisfaction which of these measures are required.
- Installation of appropriate permanent ventilation systems for areas under the platform at the Development Site in accordance with LIRR's engineering design criteria for yard ventilation. The Developer would be responsible for analyzing, designing, and installing a complete ventilation system for the enclosed area created by the overbuild. The purpose of this ventilation system would be to maintain environmental quality in the Western Rail Yard

by dissipating the heat generated by the enclosure and the operational and site emissions below. The ventilation system would be designed to maintain the interior space at a maximum of 10 degrees Fahrenheit above the ambient temperature and provide continuous air exchange throughout the day (i.e., ranging from zero to eight air exchanges per hour). The system would provide a constant suitable work environment for LIRR personnel in the Western Rail Yard and comply with the emergency ventilation requirements. The system would be designed to maintain the environment when the Western Rail Yard is completely filled with trains.

- Procedures for pre-demolition or pre-disturbance removal of asbestos and appropriate management of LBP and of PCB-containing equipment would be developed if such contaminants are identified during a hazardous materials survey.

With the implementation of a variety of health and safety precautionary and/or remedial measures, no significant adverse impact related to hazardous materials is expected to occur during construction activities at each of the three project sites. Likewise, there would be no further potential for a significant adverse impact from volatile contaminants in the soil and groundwater during the operational phase of the Proposed Actions with the implementation of appropriate vapor intrusion controls that may be required.

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