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 the proposed Willets Point Redevelopment Plan. In accordance with the approach outlined in Chapter 2, "Procedural and Analytical Framework," this chapter analyzes the cumulative impact of both the Willets Point Development Plan and the anticipated development on Lots B and D. 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 Plan.

The analysis finds no significant adverse public health impacts related to air, noise, or hazardous materials would result during construction or operation of the proposed Plan or anticipated development on Lots B and D.

B. PRINCIPAL CONCLUSIONS

The proposed Plan and anticipated development on Lots B and D would not result in any significant adverse public health impacts related to air quality, noise, or hazardous materials.

An emissions reduction program would be implemented during construction of the proposed Plan. With this program in place, the proposed Plan would not be expected to result in significant adverse impacts on air quality or public health during construction. During project operation, $PM_{2.5}$ concentration increments from mobile sources associated with the proposed Plan and Lots B and D would be well below the DEP interim guidance criterion of $0.1\mu g/m^3$ for neighborhood scale impacts, and localized incremental impacts from mobile sources would also be less than the applicable 24-hour interim guidance criterion of $2\mu g/m^3$. In addition, restrictions imposed on the placement of stacks and fuel type within the District would ensure that there would be no potential for significant adverse air quality impacts from heating, ventilation, and air conditioning (HVAC) system emissions.

A noise reduction program would be implemented during project construction to minimize construction noise and reduce the potential for noise impacts. At times, noise levels due to construction could be noisy and intrusive. However they would not be of a magnitude and duration that would result in significant adverse health impacts. Traffic generated by the proposed Plan and anticipated development on Lots B and D would be expected to produce significant increases in noise levels only at the World's Fair Marina Park north of the District, and only during the Saturday midday time period. Based upon the magnitude and location of this noise level, a significant adverse impact on public health is not expected.

To prevent exposure to hazardous materials, the proposed Plan would include appropriate health and safety and investigative/remedial measures that would precede or govern both demolition and soil disturbance activities. If necessary to prevent future exposure to hazardous materials,

new buildings would incorporate engineering controls, which could include vapor barriers and passive or active venting systems, and institutional controls, such as a restriction on a change of uses. With the implementation of these measures, no significant adverse impacts related to hazardous materials or public health would be expected to occur as a result of construction of the proposed Plan.

C. METHODOLOGY

For determining whether a public health assessment is appropriate, the 2001 *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 on 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.

Based on this guidance, this chapter assesses the potential health concerns during the construction and operation of the proposed Plan, including assessments of air quality, noise, hazardous materials, and rodent control.

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 Plan 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. Also presented is an overview of the prevalence of asthma in New York City, and current asthma hospitalization data for neighborhoods representing the potentially affected population surrounding the Willets Point Development District.

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

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

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 are 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 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 for the proposed Plan, 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 the proposed Plan 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 Plan are expected to be impact equipment, such as jackhammers, impact wrenches, and paving breakers, as well as the movements of trucks and cranes.

PROJECT OPERATIONS

AIR QUALITY

The primary source of mobile source pollutant emissions during project operations would be from project-generated vehicles using nearby intersections in the study area. The proposed Plan and anticipated future development on Lots B and D would increase traffic in the vicinity of the District and along feeder streets to and from the District, potentially increasing pollutant emissions.

Potential stationary source emissions associated with operation of the proposed Plan would primarily be from on-site fuel combustion for heat and hot water systems.

NOISE

The primary source of noise during project operations would be attributable to increased traffic in the District generated by the proposed Plan and anticipated future development on Lots B and D.

E. POLLUTANTS OF CONCERN

As mentioned above, the primary source of air quality pollutant emissions from the proposed Plan 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 Plan. The potential air quality impacts of $PM_{2.5}$ and other pollutants of concern from the proposed Plan are analyzed in Chapter 19, "Air Quality."

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 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.[3]

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 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, 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 on crops, soil, water, vegetation, wildlife, weather, visibility, and climate.

Beginning in 1994, 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 EPA's Criteria Document for Particulates, Chapters 10–13 (1996); EPA's Staff Papers on Particulates, in particular Chapter V[4]; and EPA's proposed NAAQS for particulates, found in

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[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

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

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

the December 13, 1996, Federal Register on page 65638. Based on this extensive analysis, in June 1997, 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 $\mu g/m^3$.[1]

In establishing the NAAQS for $PM_{2.5}$ in 1997, 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 $PM_{2.5}$, 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."[2]

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 20, "Noise," and Chapter 21, "Construction," noise levels associated with the construction and operation of the proposed Plan would be subject to the noise source provisions of the New York City Noise Control Code and attenuation guidelines of CEQR. 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 due to the proposed Plan are based on the results of the air quality and noise impact assessments in Chapters 19, 20, and 21. 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.

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

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

AIR QUALITY

To maintain concentrations lower than the 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, the New York State Department of Environmental Conservation (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

As mentioned above, DEP is currently recommending as an interim guidance for $PM_{2.5}$ threshold values that are used for comparison when determining potential significance of air quality impacts. A neighborhood analysis is warranted, given that $PM_{2.5}$ is a regional pollutant, with monitored annual background concentrations that are near or above the applicable annual average standard in the New York City metropolitan area. In the neighborhood analysis, an area of 1 km^2, centered at the maximum predicted ground-level concentration, is considered. According to the interim guidance, actions should not exceed an average annual $PM_{2.5}$ concentration increment of 0.1 $\mu g/m^3$ within the 1 km^2 area considered. To put this value in perspective: 0.1 $\mu g/m^3$ constitutes less than 1 percent of the annual NAAQS for $PM_{2.5}$. A concentration increment that is lower than the incremental neighborhood guidance concentration would not be registered by the ambient air monitors.

In addition, DEP is currently recommending interim guidance criteria for evaluating the potential $PM_{2.5}$ impacts for projects subject to CEQR. The updated interim guidance criteria currently employed by DEP for determination of potential significant adverse $PM_{2.5}$ impacts under CEQR are as follows:

- 24-hour 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);
- 24-hour average $PM_{2.5}$ concentration increments which are predicted to be greater than 2 $\mu g/m^3$ but no greater than 5 $\mu g/m^3$ 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;
- 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 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

- Predicted annual average $PM_{2.5}$ concentration increments greater than 0.3 $\mu g/m^3$ at a discrete or ground level receptor location.

DEC has also published a policy to provide interim direction for evaluating $PM_{2.5}$ impacts. This policy would apply only to facilities applying for permits or major permit modification under SEQRA that emit 15 tons of PM_{10} or more annually. The 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. (These thresholds have also been referenced by DEP in its interim guidance policy.) The proposed Plan's annual emissions of PM_{10} are estimated to be well below the 15-ton-per-year threshold under DEC's $PM_{2.5}$ guidance. The DEP community-based annual threshold of 0.1 $\mu g/m^3$ is considered more relevant and appropriate when determining potential public health impacts than the above-mentioned DEC thresholds, since it represents maximum ground-level concentrations averaged over a wider "neighborhood-scale" area.

As presented in Chapter 19, both the DEC and DEP interim guidance criteria have been used to evaluate the potential significance of predicted air quality impacts of the proposed Plan on $PM_{2.5}$ concentrations, and to determine the need to minimize PM emissions from the proposed Plan. Therefore, the public health analysis considers both the DEC and DEP thresholds in the determination of the public health impacts from the proposed Plan.

Actions under CEQR that would increase $PM_{2.5}$ concentrations by more than the DEP or DEC interim guidance criteria above will be considered to have potential significant adverse impacts. DEP recommends that its actions subject to CEQR that fail the interim guidance criteria prepare an EIS and examine potential measures to reduce or eliminate such potential significant adverse impacts.

NOISE

As described in Chapter 20, 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. HEALTH EFFECTS RELATED TO ASTHMA

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.[1] 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.

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

[1] 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.

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.[1,2,3] About 75 percent of people suffering from asthma have allergic asthma.[4] 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.[5] 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, and various factors will dominate in 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.

ASTHMA AND TRAFFIC AND CONSTRUCTION EQUIPMENT SOURCES OF AIR POLLUTION

Most of the particles emitted by diesel engines are small enough to be counted as $PM_{2.5}$. Their small size makes them highly respirable and able to reach deep within the lung.

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[1] 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.

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

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

[4] 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).

[5] McFadden, 2005.

Certain experimental studies have evaluated the respiratory and systemic effect of diesel particles on laboratory animals.[1] These studies revealed that chronic and/or prolonged continuous exposures of the animals to large concentrations cause inflammation, fibrosis, and functional changes in the respiratory system, and that very large concentrations cause premature death. The lowest observed adverse effect levels, as well as no observed adverse effect levels, occurred at concentrations that were considerably in excess of ambient concentrations. Specifically, the levels at which these effects were not observed ranged from 100 to 500 µg of diesel particulates per cubic meter, concentrations that are above allowable average daily values.

Epidemiologically, a few studies have addressed childhood asthma in relation to distance from roads and, hence, from vehicle exhaust. For example, young children in Birmingham, England, admitted to hospitals with a diagnosis of asthma were more likely to live close to busy roads than children admitted for other reasons. The apparent risk of admission for asthma was increased by almost two-fold for children who live close to busy roads. Undercutting the significance of these findings was the lack of information about their socioeconomic status, family history of asthma, and the indoor environment. Other epidemiological studies have demonstrated an increase in daily mortality, hospitalizations, and emergency department utilization attributable to air quality diminution from increased levels of sulfur dioxide, ozone, and PM. [2,3,4]

In a study conducted in the Netherlands, researchers found that living near busy streets was associated, in children but not adults, with a one-and-a-half-fold increase in wheezing symptoms in the past, with a 4.8-fold higher use of asthma medications among children after controlling for various socioeconomic and indoor environmental exposures.[5] Other studies have not found an association between asthma symptoms or hospitalizations and residence near heavy traffic.[6]

Most studies found associations between some indicator of traffic (distance to roads, traffic volumes, or truck traffic volumes) near a residence or school and some indicator of respiratory disease (allergic rhinitis, wheezing, or cough), while a few found no evidence of an association.[7] Experiments in which non-asthmatic adults were exposed for an hour to diesel engine exhaust containing particles and gases found increased airways resistance[8] and some cellular indicators of inflammatory response;[9] however, these subjects did not experience asthma. Diesel particulates and ozone have been shown to increase the synthesis of the allergic antibody IgE in animals and humans, which would increase sensitization to common allergens. By interacting

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[1] EPA (2002, 2003a) IRIS record for diesel engine exhaust, available at www.epa.gov/iris/subst/0642.htm.

[2] Kunzli, et al., Public health impact of outdoor and traffic-related air pollution: a European assessment, Lancet 2000 2:356 (9232); 795-801

[3] Schwela, D. Air Pollution and Health in Urban Areas. Rev Environ Health. 2000 Jan-Jun; 15(1-2): 13-42

[4] Edwards et al., (1994). Hospital Admissions for Asthma in Preschool Children; Relationshiop to Major Roads in Birmingham, United Kingdom. Arch. Environ. Health 49 (4); 223-227

[5] Oosterlee, A. et al., (1996). Chronic Respiratory Symptoms in Children and Adults Living Along Streets with High Traffic Density. Occup. Environ. Med. 53:241-247.

[6] Wilkinson, P. et al., (1999). Case-control Study of Hospital Admission with Asthma in Children Aged 5-14 Years: Relations with Road Traffic in North West London. Thorax. 54(12); 1070-1074.

[7] Brunekreef et al 1997, English et al (1999), Livingstone et al (1996).

[8] Rudell et al, Occup. Environ. Med. 53, 6480652, 1996.

[9] Slavi et al, Am. J. Respir. Crit. Care. Med. 159: 702-709, 1999.

together and with other environmental factors, particulates and gaseous air pollutants can have an effect on allergic individuals.[1]

PREVALENCE, MORBIDITY, AND MORTALITY

In the United States, approximately 6.8 million children (9 percent of children under age 18) have asthma.[2] In 2005, asthma prevalence in New York State was estimated at approximately 9.9 percent.[3]

Asthma morbidity and mortality rates have been rising throughout the U.S. over the last few decades,[4] with New York City experiencing a disproportionate increase in the early 1990s[5]. However, hospitalization rates in New York City have been gradually declining since the peak rates in the mid-1990s.

The borough of Queens as a whole has experienced a 37.5 percent decrease in child hospitalization rates between 1997 and 2005.[6] A comparison of asthma hospitalization rates in 1997 and 2005 among children aged 0 to 14 years is presented in Table 22-1 for zip codes surrounding the District, and for Queens and New York City as a whole.

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

Location	1997	2005
Western Queens** (includes zip codes 11368, 11369, 11370, 11372, 11373, 11377, and 11378)	6.8	3.2
Flushing** (includes zip codes 11354, 11355, 11356, 11357, 11358, 11359, and 11360)	3.3	2.8
Borough of Queens	6.4	4.0
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 Web site http://www.nyc.gov/html/doh/html/asthma/asthma.shtml. Site accessed December, 2007.
** The District is included in this neighborhood as defined by New York City Department of Health and Mental Hygiene

[1] Fujieda et al Am J. Respir Cell Mol Biol, 19, 507-12, 1998; Nel et al.

[2] 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(234). 2007.

[3] American Lung Association, November 2007. "Trends in Asthma Morbidity and Mortality."

[4] CDC, 2002.

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

[6] 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.

I. PROBABLE IMPACTS OF THE PROPOSED PLAN

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 Plan.

AIR QUALITY

As presented in Chapter 21, an emissions reduction program during construction would be implemented to the extent feasible to ensure that construction activities would result in minimal diesel particulate matter emissions. With these measures in place, the construction of the proposed Plan would not be expected to result in significant adverse impacts on air quality or public health.

The potential for impacts on air quality during the operation of the proposed Plan and anticipated development on Lots B and D was examined in detail and is described in Chapter 19. DEP and DEC draft interim guidance criteria were used to evaluate the significance of predicted impacts of the proposed Plan on $PM_{2.5}$ concentrations.

The air quality analysis found that $PM_{2.5}$ concentration increments from mobile sources associated with the proposed Plan and Lots B and D would be well below the DEP interim guidance criterion of $0.1\mu g/m^3$ for neighborhood scale impacts. Localized incremental impacts from mobile sources would also be less than the applicable 24-hour interim guidance criterion of $2\mu g/m^3$. Therefore, no significant impacts from mobile sources associated with the proposed Plan are expected.

The air quality analysis also determined that with restrictions imposed on the placement of stacks and fuel type within the District (see Chapter 19), there would be no potential for significant adverse air quality impacts from heating, ventilation, and air conditioning (HVAC) system emissions.

Therefore, no significant air quality or public health impacts are expected from the construction and operation of the proposed Plan and anticipated development on Lots B and D.

NOISE

As noted in the noise analysis section of Chapter 21, the proposed Plan could result in increased noise levels from the operation of construction equipment, and construction and delivery vehicles. A wide variety of measures would be implemented to minimize construction noise and reduce the potential for noise impacts. While, at times, noise levels due to construction could be noisy and intrusive, they would not be of a magnitude and duration that would result in significant adverse health impacts. Consequently, they would not constitute a significant public health impact.

As discussed in Chapter 20, the traffic generated by the proposed Plan and anticipated development on Lots B and D would be expected to produce significant increases in noise levels only at the World's Fair Marina Park north of the District, and only during the Saturday midday time period. While this noise level increase would exceed the CEQR threshold for a significant impact, the projected noise levels at the park are not expected to be higher than typical for parks in New York City. Based upon the magnitude and location of this noise level, a significant adverse impact on public health is not expected.

Therefore, no significant adverse health impacts from noise are expected from construction and operation of the proposed Plan and anticipated development on Lots B and D.

HAZARDOUS MATERIALS

Construction of the proposed Plan would involve both demolition of all existing structures (some of which are believed to contain lead-based paint, asbestos-containing materials, and may contain polychlorinated biphenyl (PCB)-containing electrical components); and a variety of earthmoving/excavating activities that would encounter subsurface contamination (e.g., petroleum, solvents, etc.). As described in Chapter 12, "Hazardous Materials," all privately-owned lots in the District would have E-designations and/or subsequent Restrictive Declarations placed on them. All remedial plans would be required to be submitted to DEP for review and approval. As is standard City practice, it is anticipated that any potential use of Lots B and D would be subject to DEP oversight with respect to hazardous materials.

The presence of hazardous materials threatens human health only when exposure to those materials occurs; even then, a health risk requires both an exposure pathway to the contaminants and sufficient exposure to produce adverse health effects. To prevent such exposure and exposure pathways, the proposed Plan would include appropriate health and safety and investigative/remedial measures that would precede or govern both demolition and soil disturbance activities (see Chapter 12, "Hazardous Materials"). These measures would be conducted in compliance with all applicable laws and regulations and would conform to appropriate engineering practices. Given that some subsurface contamination would likely remain after completion of construction (e.g., in deeper soils and groundwater), if necessary to prevent future exposure to hazardous materials, new buildings would incorporate engineering controls, which could include vapor barriers and passive or active venting systems. Institutional controls, such as a restriction on a change of uses, to prevent future exposure during intrusive work and subsurface utility repairs may also be necessary.

With the implementation of these measures, no significant adverse impacts related to hazardous materials or public health would be expected to occur as a result of construction of the proposed Plan.

J. CONCLUSION

This analysis finds that the proposed Plan and anticipated development on Lots B and D would not result in any significant adverse public health impacts related to air quality, noise, or hazardous materials. ✷