Chapter 15: Greenhouse Gas Emissions

A. INTRODUCTION

There is general consensus in the scientific community that the global climate is changing as a result of increased concentrations of greenhouse gases (GHGs) in the atmosphere. GHGs are those gaseous constituents of the atmosphere, from both natural and anthropogenic (i.e., resulting from the influence of human beings) emission sources, that absorb infrared radiation (heat) emitted from the earth's surface, the atmosphere, and clouds. This property causes the general warming of the earth's atmosphere, or the "greenhouse effect."

As discussed in the 2012 *CEQR Technical Manual*, climate change could have wide-ranging effects on the environment, including rising sea levels, increases in temperature, and changes in precipitation levels. Although this is occurring on a global scale, the environmental effects of climate change are also likely to be felt at the local level. Through PlaNYC, the city has established sustainability initiatives and goals for both greatly reducing GHG emissions and adapting to climate change in the city. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[1] Per the *CEQR Technical Manual*, the citywide GHG reduction goal is currently the most appropriate standard by which to analyze a project under CEQR. The *CEQR Technical Manual* recommends that a GHG consistency assessment be conducted for any project resulting in 350,000 gross square feet (gsf) of development or more and other energy-intense projects. As the Proposed Action would result in new development that would be in excess of 350,000 gsf, a GHG consistency assessment is provided.

PRINCIPAL CONCLUSIONS

As discussed in the following sections, the building energy use and vehicle use associated with the Proposed Action would result in approximately 39,683 metric tons of carbon dioxide equivalent (CO_2e) emissions per year. Of that amount, 18,612 metric tons of CO_2e would be generated by the Applicant's Projected Development Sites (Projected Sites 1 through 4 and Projected Enlargement Site 1). Other projected and enlargement sites would generate 17,470 metric tons of CO_2e, and potential sites and potential enlargement sites would generate 3,601 metric tons of CO_2e.

The proximity of the Rezoning Area to public transportation and energy-efficient building design are all factors that contribute to energy efficiency of the proposed development. The Proposed Action seeks to facilitate new mixed-use development and enlargement of existing buildings in a developed area with excellent access to public transit. As such, the Proposed Action is consistent with sustainable land-use planning and smart-growth strategies, which aim to reduce the carbon footprint of new development. Furthermore, the Applicant commits to designing all new development on projected development sites under the Applicant's control

[1] Administrative Code of the City of New York, §24-803.

(Projected Development Sites 1 through 4, and to the extent practicable, the Applicant's Projected Enlargement Site 1) to meet current standards for the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Silver certification. As such, specific measures would be incorporated into the design and construction of each new development to qualify for the LEED Silver rating, which would decrease the potential GHG emissions. Based on these project components and efficiency measures, the Proposed Action would be consistent with the city's emissions reduction goal, as defined in the *CEQR Technical Manual*.

B. ANALYSIS APPROACH

This chapter addresses the GHG emissions that would be generated by the Proposed Action, describes the measures that would be implemented to limit those emissions, and identifies measures that would be taken to increase the resilience of the Rezoning Area to the potential effects of climate change. The total With-Action development under the Reasonable Worst Case Development Scenario (RWCDS) is analyzed for the projected and potential development sites, while the increment between the With-Action development and existing development is analyzed for the projected and potential enlargement sites. This analysis framework ensures that GHG emissions from all new construction and conversions on both projected and potential development sites are accounted for. The emissions associated with the existing uses in buildings that would be enlarged are not considered additional or new emissions; only the emissions resulting from the projected and potential enlargements (additional floor area) are quantified.

As discussed in Chapter 1, "Project Description," there are two variations of the RWCDS—RWCDS 1, which would maximize residential development, and RWCDS 2, which would result in the development of dormitories, rather than residential buildings, on two development sites. The building energy use and vehicle trips generated by the Proposed Action are expected to be slightly greater with RWCDS 2, as discussed in Chapter 12, "Energy," and Chapter 13, "Transportation." Therefore, as emissions from building energy use and transportation are considered in GHG assessment under CEQR, RWCDS 2 is analyzed in this chapter.

C. POLLUTANTS OF CONCERN

GHGs are those gaseous constituents of the atmosphere—both natural and anthropogenic—that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the general warming of the Earth's atmosphere, or the "greenhouse effect." Water vapor, carbon dioxide (CO_2), nitrous oxide, methane, and ozone are the primary greenhouse gases in the Earth's atmosphere.

There are also a number of entirely anthropogenic (resulting from human activity) greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (contributing to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, there is no need to address them in the GHG assessment for the Proposed Action. Although ozone itself is also a major greenhouse gas, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see Chapter 14, "Air Quality").

Similarly, water vapor is of great importance to global climate change, but is not directly of concern as an emitted pollutant since the negligible quantities emitted from anthropogenic sources are inconsequential.

CO_2 is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most influential GHG. CO_2 is emitted from any combustion process (both natural and anthropogenic), from some industrial processes, such as the manufacture of cement, mineral production, or metal production; from the use of petroleum-based products; from volcanic eruptions; and from the decay of organic matter. CO_2 is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CO_2 is included in any analysis of GHG emissions.

Methane and nitrous oxide also play an important role, since the removal processes for these compounds are limited and result in a relatively high impact on global climate change compared with an equal quantity of CO_2. Emissions of these compounds, therefore, are included in GHG emissions analyses when the potential for substantial emission of these gases exists.

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of an environmental impact statement: CO_2, nitrous oxide (N_2O), methane, Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6). This analysis focuses mostly on CO_2, N_2O, and methane. There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Action.

To present a complete inventory of all GHGs, component emissions are added together and presented as CO_2e emissions—a unit representing the quantity of each GHG weighted by its effectiveness using CO_2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP). GWPs account for the lifetime and the radiative forcing of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). The GWPs for the GHGs discussed here are presented in **Table 15-1**.

Table 15-1
Global Warming Potential (GWP) for Major GHGs

Greenhouse Gas	100-year Horizon GWP
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydrofluorocarbons (HFCs)	140 to 11,700
Perfluorocarbons (PFCs)	6,500 to 9,200
Sulfur Hexafluoride (SF_6)	23,900
Source: IPCC, Climate Change 1995— Second Assessment Report.	

D. POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS FOR REDUCING GHG EMISSIONS

As a result of the growing consensus that human activity resulting in GHG emissions has the potential to profoundly impact the earth's climate, countries around the world have undertaken

efforts to reduce emissions by implementing both global and local measures addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements which set emissions targets for GHGs, in a step toward the development of national climate change regulation, the U.S. has committed to reducing emissions to 17 percent lower than 2005 levels by 2020 and to 83 percent lower than 2005 levels by 2050 (pending legislation) via the Copenhagen Accord.[1] Without legislation focused on this goal, the U.S. Environmental Protection Agency (EPA) is required to regulate greenhouse gases under the Clean Air Act (CAA), and has already begun preparing regulations. In May 2010, EPA issued a final rule (effective August 2010) to tailor the applicability criteria for stationary sources subject to permitting requirements under CAA, setting thresholds for GHG emissions that define when permits are required for new and existing industrial facilities under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs.

In addition, EPA has published regulations regarding geological sequestration of CO_2, a GHG reporting rule to collect information on GHG emissions, and has also established various voluntary programs to reduce emissions and increase energy efficiency. The American Recovery and Reinvestment Act of 2009 (ARRA, "economic stimulus package") funds actions and research that can lead to reduced GHG emissions.

The Energy Independence and Security Act of 2007 includes provisions for increasing the production of clean renewable fuels; increasing the efficiency of products, buildings, and vehicles; and promoting research on GHG capture and storage options. The most recent renewable fuel standards regulations (February 2010) require 12.95 billion gallons of renewable fuels be produced in 2010, increasing annually up to 36.0 billion gallons in 2022. The renewable fuel standards regulations also set volume standards for specific categories of renewable fuels including cellulosic, biomass-based diesel, and total advanced renewable fuels, and specify lifecycle GHG reduction thresholds ranging from 20 percent for renewable fuel to 60 percent for cellulosic biofuel (as compared with the baseline gasoline or diesel replaced).

In March 2009, the U.S. Department of Transportation (USDOT) set combined corporate average fuel economy (CAFE) standards for light-duty vehicles for the 2011 model year (MY). In June 2009, EPA granted California a previously denied waiver to regulate vehicular GHG emissions, allowing 19 other states (representing 40 percent of the light-duty vehicle market, including New York) to adopt the California mobile source GHG emissions standards. In April 2010, EPA and USDOT established the first GHG emission standards and more stringent CAFE standards for MY 2012 through 2016 light-duty vehicles. The agencies also proposed the first-ever program to reduce GHG emissions and improve fuel efficiency of medium- and heavy-duty vehicles, such as large pickup trucks and vans, semi trucks, and vocational vehicles. These regulations would all serve to reduce vehicular GHG emissions over time.

There are also regional, state, and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, which established a goal of reducing GHG emissions in New York by 80 percent compared with 1990 levels, by 2050, and created a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal (that effort is currently under way[2]). The 2009 New York State Energy Plan,[3]

[1] Todd Stern, U.S. Special Envoy for Climate Change, letter to Mr. Yvo de Boer, UNFCCC, January 28, 2010.
[2] http://www.nyclimatechange.us/

[3] New York State, *2009 New York State Energy Plan*, December 2009.

outlines the state's energy goals and provides strategies and recommendations for meeting those goals. The state's goals include:

- Implementing programs to reduce electricity use by 15 percent below 2015 forecasts;
- Updating the energy code and enacting product efficiency standards;
- Reducing vehicle miles traveled by expanding alternative transportation options; and
- Implementing programs to increase the proportion of electricity generated from renewable resources to 30 percent of electricity demand by 2015.

New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of 10 northeastern and mid-Atlantic states have committed to regulate the amount of CO_2 that power plants are allowed to emit. The regional emissions cap for power plants will be held constant through 2014, and then gradually reduced to 10 percent below the initial cap through 2018. Each power source with a generating capacity of 25 megawatts or more must purchase a tradable CO_2 emission allowance for each ton of CO_2 it emits. The 10 RGGI states and Pennsylvania have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ (CCP) campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term sustainability program, PlaNYC 2030, includes GHG emissions reduction goals, specific initiatives that can result in emission reductions and initiatives targeted at adaptation to climate change impacts. For certain projects subject to CEQR (e.g., projects with 350,000 gsf or more of development or other energy-intense projects), an analysis of the project's contribution of GHG emissions is required to determine its consistency with the citywide reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR, and is therefore applied in this chapter.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in new and existing buildings, in accordance with PlaNYC. The laws require owners of existing buildings larger than 50,000 square feet to conduct energy efficiency audits every 10 years, to optimize building energy efficiency, and to "benchmark" the building energy and water consumption annually, using an EPA online tool. By 2025, commercial buildings over 50,000 square feet will also require lighting upgrades, including the installation of sensors and controls, more efficient light fixtures, and the installation of submeters, so that tenants can be provided with information on their electricity consumption. The legislation also creates a local New York City Energy Code, which requires equipment installed during a renovation to meet current efficiency standards.

Beyond the policy, a number of benchmarks for energy efficiency and green building design have also been developed. For example, the LEED system is a privately developed benchmark for the design, construction, and operation of high-performance green buildings that includes energy efficiency components.

EPA's Energy Star is a voluntary labeling program designed to identify and promote the construction of new energy-efficient buildings, facilities, and homes, and the purchase of energy-efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

Of particular relevance to the school that would be constructed as part of the Proposed Action is the NYC Green Schools Guide and rating system. The NYC Green Schools Rating System is based on the LEED rating system and includes enhancements beyond LEED.

E. METHODOLOGY

Although the contribution of any single project to climate change is infinitesimal, the combined GHG emissions from all human activity are believed to have a severe adverse impact on global climate. While the increments of criteria pollutants and toxic air emissions are assessed in the context of health-based standards and local impacts, there are no established thresholds for assessing the significance of a project's contribution to climate change. Nonetheless, prudent planning dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them. Therefore, this chapter presents the total GHG emissions potentially associated with the Proposed Action (considering the projected and potential sites and enlargements) and identifies the measures that would be implemented and measures that are under consideration to limit the emissions.

The analysis of GHG emissions that would be generated by the Proposed Action is based on the methodology presented in the *CEQR Technical Manual*. Emissions of GHGs from the Proposed Action have been quantified, including off-site emissions associated with use of electricity on-site, on-site emissions from heat and hot water systems, and emissions from vehicle use attributable to the Proposed Action. GHG emissions that would result from construction and enlargement at the projected and potential sites and enlargements are discussed as well.

As discussed above, CO_2 is the primary pollutant of concern from anthropogenic emission sources and is accounted for in the analysis of emissions from actions resulting in new development. GHG emissions for gases other than CO_2 are included where practicable or in cases where they comprise a substantial portion of overall emissions. The various GHG emissions are added together and presented as metric tons of CO_2e emissions per year (see Section B, "Pollutants of Concern," above).

BUILDING OPERATIONAL EMISSIONS

Emissions from electricity and on-site fossil fuel use were calculated using the "carbon intensity factors" provided in the *CEQR Technical Manual* (Table 18-3) and the floor areas for the various components of the development that would occur as a result of the Proposed Action under RWCDS 2 (see **Table 15-2**).

Table 15-2
Building Floor Area for GHG Analysis

Site	Retail (gsf)	Office (gsf)	Community Facility (gsf)	Residential (gsf)
Applicant's Projected Development Sites 1 through 4	78,312	51,341	75,000	1,285,744
Applicant's Projected Enlargement Site 1	0	162,151	0	0
Other Projected Sites	118,946	43,837	254,896	1,212,958
Other Projected Enlargements	0	0	0	59,987
Potential Development Sites	32,848	0	0	304,705
Potential Enlargements	0	0	0	25,579

Notes: Floor areas are shown in gross square feet (gsf) of new development.
Existing floor area for buildings on the enlargement sites is excluded, as emissions from existing uses that would remain would not be new or additional.
The floor areas shown here were multiplied by the carbon intensity factors provided in the *CEQR Technical Manual* (Table 18-3) to calculate the GHG emissions from building operational emissions.

For retail and office uses, the carbon intensity factor for commercial buildings was used. For residential and dormitory uses (community facility use on "Other Projected Sites"), the carbon intensity factor for large residential buildings was used. For the proposed school (community facility use on "Applicant's Projected Site"), the intensity factor for institutional buildings was used.

MOBILE SOURCE EMISSIONS

The number of annual vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Action was calculated using the transportation planning assumptions developed for the analysis presented in Chapter 13, "Transportation." The assumptions used in the calculation include average daily weekday and weekend person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances shown in Table 18-4 of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars and trucks. An average one-way taxi trip of 2.32 miles, which is based on regional modeling for taxi trips with either Manhattan as the trip origin and/or destination, was provided by the Mayor's Office. The average truck trip was assumed to be 38 miles, as per the *CEQR Technical Manual*. Table 18-6 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type and the mobile GHG emissions calculator was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Action in 2022, the analysis year. In addition, the school that is proposed on the Applicant's Projected Development Site 1 would generate an estimated 316 school bus trips per year. The annual GHG emissions of 8.13 metric tons of CO_2e per bus round trip were estimated using information from the PlaNYC GHG inventory.[1]

EPA estimates that the well-to-pump GHG emissions of gasoline and diesel are approximately 22 percent of the tailpipe emissions.[2] Although upstream emissions (emissions associated with production, processing, and transportation) of all fuels can be substantial and are important to consider when comparing the emissions associated with the consumption of different fuels, as per the *CEQR Technical Manual* guidance, the well-to-pump emissions are not considered in the analysis for the Proposed Action. The assessment of tailpipe emissions only is in accordance with the *CEQR Technical Manual* guidance on assessing GHG emissions and the methodology used in developing the New York City GHG inventory, which is the basis of the GHG reduction goal.

The projected annual vehicle miles traveled, which form the basis for the GHG emissions calculations from mobile sources, are presented in **Table 15-3**.

[1] PlaNYC, Inventory of the New York City Greenhouse Gas Emissions, April 2007.

[2] Environmental Protection Agency, *MOVES2004 Energy and Emission Inputs*, Draft Report, EPA420-P-05-003, March 2005.

Table 15-3
Annual Vehicle Miles Traveled

Site	Car	Taxi	Truck
Applicant's Projected Development Sites 1 through 4	2,104,071	815,178	1,441,188
Applicant's Projected Enlargement Site 1	581,667	41,141	517,832
Other Projected Sites	2,561,032	1,077,220	1,709,967
Other Projected Enlargements	63,642	20,897	36,807
Potential Development Sites	426,909	213,197	322,868
Potential Enlargements	29,626	9,728	17,134
Total	***5,766,947***	***2,177,362***	***4,045,797***

Note: The annual vehicle miles traveled were calculated using information discussed in the Chapter 13, "Transportation," including trip generation rates, modal split, and vehicle occupancy, along with trip distances provided in the *CEQR Technical Manual* Tables 18-4 and 18-5.

CONSTRUCTION EMISSIONS

Emissions associated with construction have not been estimated explicitly for the Proposed Action, but other similar analyses have shown that construction emissions (both direct and emissions embedded in the production of materials, including on-site construction equipment; delivery trucks; and upstream emissions from the production of steel, rebar, aluminum, and cement used for construction) associated with the construction of new buildings are equivalent to the total emissions from the operation of the development over approximately 5 to 10 years. With respect to building enlargements, the emissions associated with the construction of the enlargements would be less than the 5- to 10-year estimate, due to the less intensive construction activity required to build on top of existing foundations.

EMISSIONS FROM SOLID WASTE MANAGEMENT

The Proposed Action would not fundamentally change the city's solid waste management system. Therefore, as per the *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

F. GHG EMISSIONS IN THE FUTURE WITH THE PROPOSED ACTION

BUILDING OPERATIONAL EMISSIONS

The GHG emissions from each component of the development that would occur as a result of the Proposed Action are presented in detail in **Table 15-4**.

MOBILE SOURCE EMISSIONS

The detailed mobile-source-related GHG emissions from each component of the development that would occur as a result of the Proposed Action are presented in detail in **Table 15-5**.

CONSTRUCTION EMISSIONS

Following the *CEQR Technical Manual* guidance, construction emissions are not explicitly quantified. An estimated range is presented, as described in Section D, "Methodology."

Table 15-4
Building Operational Emissions
(metric tons of CO_2e)

Site	Retail	Office	Community Facility	Residential	Total
Applicant's Projected Development Sites 1 through 4	665	436	771	7,626	9,497
Applicant's Projected Enlargement Site 1	0	1,529	0	0	1,529
Other Projected Sites	1,122	413	1,680	7,993	11,208
Other Projected Enlargements	0	0	0	395	395
Potential Development Sites	310	0	0	2,008	2,318
Potential Enlargements	0	0	0	169	169
Total	***2,096***	***2,378***	***2,451***	***18,191***	***25,116***

Note: Emissions were calculated using the proposed floor areas shown in **Table 15-2** and the carbon intensity factors provided in *CEQR Technical Manual* (Table 18-3).

EMISSIONS FROM SOLID WASTE MANAGEMENT

The Proposed Action would not fundamentally change the city's solid waste management system. Therefore, emissions from solid waste management are not quantified.

Table 15-5
Mobile Source Emissions (metric tons CO_2e)

Site	Car	Taxi	Truck and School Bus	Total
Applicant's Projected Development Sites 1 through 4	1,236	429	4,447	6,112
Applicant's Projected Enlargement Site 1	342	22	1,111	1,474
Other Projected Sites	1,504	567	3,668	5,739
Other Projected Enlargements	37	11	79	127
Potential Development Sites	251	112	693	1,056
Potential Enlargements	17	5	37	59
Total	***3,387***	***1,147***	***10,034***	***14,567***

Note: Emissions presented above were calculated using vehicle miles traveled (VMT) information from **Table 15-3**, *CEQR Technical Manual* Tables 18-4 through 18-6, and the mobile source calculator provided on page 18-9 of the *Technical Manual*.

SUMMARY

A summary of GHG emissions by emission source type, for the projected and potential development sites and enlargements is presented in **Table 15-6**. As described in Section D, "Methodology," construction emissions are not modeled explicitly, but are estimated to be equivalent to approximately 5 to 10 years of operational emissions, including both direct energy and emissions embedded in materials (extraction, production, and transport). The Proposed Action is not expected to fundamentally change the city's solid waste management system; therefore, emissions associated with solid waste are not presented.

Table 15-6
Summary of Proposed Action's Annual GHG Emissions, 2022
(metric tons CO_2e)

Site	Building Operations	Mobile	Total
Applicant's Projected Development Sites 1 through 4	9,497	6,112	15,609
Applicant's Projected Enlargement Site 1	1,529	1,474	3,003
Other Projected Sites	11,208	5,739	16,947
Other Projected Enlargements	395	127	523
Potential Development Sites	2,318	1,056	3,373
Potential Enlargements	169	59	228
TOTAL	***25,116***	***14,567***	***39,683***

Note: The emissions from building operations are the total emissions presented in **Table 15-4**, and the mobile emissions are the total emissions presented in **Table 15-5**. This table shows how the emissions from building operations and mobile sources contribute to total project emissions.

The operational emissions from building energy use include on-site emissions from fuel consumption as well as emissions associated with the production and delivery of the electricity to be used on site. The new development on sites under the Applicant's control (Projected Development Sites 1 through 4, and to the extent practicable, the Applicant's Projected Enlargement Site 1) would be designed to meet current standards for LEED Silver certification (under the current LEED for New Construction and Major Renovations Rating System), or equivalent. To attain LEED Silver certification, such development would need to meet energy efficiency requirements that exceed code. Therefore, the energy savings that would be implemented in achieving the LEED Silver rating (or equivalent) are included in the estimate of emissions from building operations for Projected Sites 1 through 4. The school proposed on the Applicant's Projected Development Site 1 would be constructed to comply with the New York City Green Schools Guide[1], and would achieve energy savings and GHG reductions similar or greater to those required by LEED. New development on the Applicant's projected development sites would limit the emissions associated with electricity consumption and heating through energy-efficient design, and reduce emissions associated with transportation because of the available alternatives to driving. In addition, by facilitating the enlargement of existing buildings, the Proposed Action would efficiently accommodate the proposed uses by increasing density in a developed area, thereby reducing the demand on undeveloped land and on the need for new building foundations.

G. ELEMENTS OF THE PROPOSED ACTION THAT WOULD REDUCE GHG EMISSIONS

The Proposed Action seeks to facilitate new mixed-use development and enlargement of existing buildings in a developed area with excellent access to public transit. As such, the Proposed Action is consistent with sustainable land-use planning and smart-growth strategies that aim to reduce the carbon footprint of new development. Furthermore, in the future with the Proposed Action, new construction on the Applicant's Projected Development Sites 1 through 4 and, to

[1] New York City Green Schools Guide, issued by the New York City School Construction Authority and New York City Department of Education, March 15, 2007.

the extent practicable on Enlargement Site 1, would be designed to meet current standards for LEED Silver certification or equivalent, focusing on reduced energy use, sustainable transportation, and use of local, renewable, and/or recycled construction materials, which would result in lower GHG emissions. LEED certification for new construction requires a minimum of 10 percent reduction in energy expenditure as compared with buildings constructed to meet code, which results in reduced GHG emissions. These features and other measures currently under consideration are discussed in this chapter, addressing the PlaNYC goals as outlined in the *CEQR Technical Manual*.

BUILD EFFICIENT BUILDINGS

As described above, new construction on the Applicant's projected development sites (Projected Development Sites 1 through 4 and, to the extent practicable on Enlargement Site 1) would be designed to meet the current standards for LEED Silver certification or equivalent. This would encourage the new development on the Applicant's sites to be designed with an energy-efficient building envelope and incorporate window glazing to optimize daylighting, heat loss, and solar heat gain. High-efficiency heating, ventilation, and air conditioning (HVAC) systems would be similarly requested. LEED-certified (or equivalent) buildings would use water conserving fixtures exceeding building code requirements. Third-party fundamental building energy systems commissioning as required by USGBC to achieve LEED certification would be conducted to ensure energy performance.

Other measures that may be incorporated include green roofs and/or high-albedo roofing, motion sensors and lighting and climate control, efficient lighting and elevators, Energy Star appliances, directed exterior lighting, and water-efficient landscaping.

The school that would be constructed on Applicant's Projected Development Site 1 would follow the New York City Green Schools Guide and would be at least as energy efficient and sustainable as a LEED-certified building.

USE CLEAN POWER

To the extent practicable, the Applicant would encourage the development and use of clean power and the purchase of renewable energy credits for sites under the Applicant's control.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The Rezoning Area is located in an area supported by many public transit options. Thus, the Proposed Action supports an important PlaNYC goal of continuing transit-oriented development. The Proposed Action is expected to result in increased density in an already developed area, and would facilitate mixed-use development including new residential and retail uses, thereby promoting walkable destinations for retail and other services. The Applicant would also encourage sustainable transportation on the Applicant's development sites and include provisions for bicycle parking.

REDUCE CONSTRUCTION OPERATION EMISSIONS

The Applicant would have no control over the construction contract terms and would therefore not be able to require the use of low-emission construction vehicles and equipment, the use of diesel particulate filters, or the use of biofuel. To the extent possible, the Applicant would support the goal of reducing construction operation emissions by disseminating information and educational material in the District about the resulting benefits.

USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

In the future with the Proposed Action, the carbon footprint of the building materials ("embedded" energy/emissions) would be reduced by the reuse and expansion of some existing buildings. Additional measures under consideration include the use of recycled and/or locally manufactured building materials, including steel and cement replacements, such as fly ash and/or slag, rapidly renewable materials, certified sustainable wood products, and the provision of construction and design guidelines to facilitate sustainable design for build-out by tenants.

CONCLUSION

The Proposed Action will include substantial energy efficiency measures and design elements which would result in energy efficient buildings, transit-oriented development and the use of sustainable transportation. Based on these project components, the Proposed Action would be consistent with the city's emissions reduction goal, as defined in the *CEQR Technical Manual*.✷