Chapter 12: Greenhouse Gas Emissions and Climate Change

A. INTRODUCTION

As discussed in the 2012 *CEQR Technical Manual*, increased concentrations of greenhouse gases (GHGs) in the atmosphere are changing the global climate, resulting in 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 (the "GHG reduction goal") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act.[1] The 2012 *CEQR Technical Manual* recommends that any project being reviewed in an EIS resulting in 350,000 square feet of development or more and other energy-intense projects quantify project related GHG emissions and assess the project's consistency with the citywide GHG reduction goal.

The proposed project would result in the development of approximately 1.1 million gross square feet (gsf) of new and converted uses on the project block. Accordingly, A GHG consistency assessment is provided. The GHG emissions that would be generated as a result of the proposed project and measures that would be implemented to limit those emissions are presented in this chapter, along with an assessment of the proposed project's consistency with the citywide GHG reduction goal. In addition, since a portion of the project is within the current floodplain, the impact of future changes in flood levels is reviewed.

This chapter was not in the 2001 *FEIS* since it was not required by the 2001 *CEQR Technical Manual.*

PRINCIPAL CONCLUSIONS

Overall, the proposed project would result in mixed use development, energy efficient buildings, utilize low-carbon power sources, and would support the use of transit and non-motorized commuting, and would, therefore, be consistent with the City's citywide GHG reduction goal.

The proposed project's design includes many features aimed at reducing energy consumption and GHG emissions: The applicant intends to implement energy efficiency measures in the mixed-use building (on projected development site 1) so as to achieve, at a minimum, 7 percent less energy consumption as compared with baseline buildings designed to code (achieving at least 10 percent energy cost reduction as compared to baseline). The development of the mini-storage conversion (projected development site 2) and community facility building (part of projected development site 1) would incorporate measures which would decrease energy consumption and the ensuing GHG emissions, including high-efficiency heating, ventilation, and cooling systems, building energy commissioning, efficient lighting and occupancy sensors, and

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

Energy Star certified appliances. The project block is also well served by many public transportation options. Overall, the building energy use and vehicle use associated with the proposed project would result in approximately 10,439 metric tons of carbon dioxide equivalent (CO_2e) emissions per year.

The proposed project's design would also accommodate likely future sea level rise of up to 2 feet, which is the level of increase projected for the end of the century by the New York City Panel on Climate Change. Residential areas and critical infrastructure would not be vulnerable to future 1-in-100 flood levels when accounting for this potential additional flood elevation.

B. SUMMARY OF 2001 FEIS FINDINGS

This chapter was not in the 2001 *FEIS* since it was not required by the 2001 *CEQR Technical Manual.*

C. POLLUTANTS OF CONCERN

GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic (resulting from human activity), 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 GHGs in the earth's atmosphere.

There are also a number of entirely anthropogenic GHGs in the atmosphere, such as 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 project-related GHG assessments for most projects. Although ground level ozone is also a major GHG, 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 11, "Air Quality").

Similarly, water vapor plays an important role in global climate, but is not directly of concern as an emitted GHG since the negligible quantities resulting 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, metal production, and 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 they have a relatively high impact on global climate change as compared to 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 2012 *CEQR Technical Manual* lists six GHGs that could potentially be analyzed in an EIS: CO_2, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

This analysis focuses on CO_2, nitrous oxide, and methane. There are no significant direct or indirect sources of other GHGs associated with the proposed project, and therefore they are not quantified in this analysis.

To present a complete inventory of all GHGs, component emissions are added together and presented as CO_2 equivalent (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 sulfur hexafluoride, and therefore has a much lower GWP). GWPs for the main GHGs discussed here are presented in **Table 12-1**, as provided in the 2012 *CEQR Technical Manual* Table 18-1. Note that in this analysis, any calculation including GWP is embedded in factors and models provided in the *CEQR Technical Manual* and not calculated from this table.

Table 12-1
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—The Science of Climate Change, Contribution of Working Group I to the Second Assessment Report, Table 4, 1996.	

D. POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS

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 (USEPA) is required to regulate GHGs under the Clean Air Act (CAA), and has already begun preparing regulations addressing newly manufactured vehicles and permitted large stationary sources. In addition, the American Recovery and Reinvestment Act of 2009 (ARRA, "economic stimulus package") funded actions and research that can lead to reduced GHG emissions, and 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 for promoting research on GHG capture and storage options.

There are also regional, state, and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New

[1] Todd Stern, U.S. Special Envoy for Climate Change, letter to Mr. Yvo de Boer, UNFCCC, January 28, 2010.

York by 80 percent, compared to 1990 levels, by 2050, and creating 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[1]). The 2009 New York State Energy Plan[2] 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. The ten 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 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, an analysis of the project's GHG emissions and an assessment of the project's consistency with the City's citywide emission reduction goal is required.

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 ten years, to optimize building energy efficiency, and to "benchmark" the building energy and water consumption annually, using a USEPA 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 sub-meters, so that tenants can be provided with information on their electricity consumption. The legislation also creates a New York City Energy Code, which requires equipment installed during a renovation to meet current efficiency standards (in addition to the State code addressing new construction only).

A number of voluntary rating systems for energy efficiency and green building design have also been developed. For example, Leadership in Energy and Environmental Design (LEED) is a benchmark for the design, construction, and operation of high performance green buildings that includes energy efficiency components. Another voluntary rating system is USEPA's *Energy Star*—a labeling program designed to identify and promote the construction of new energy

[1] http://www.nyclimatechange.us/

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

efficient buildings, facilities, and homes and the purchase of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

E. METHODOLOGY

Although the contribution of any single project to climate change may be 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. As directed by the 2012 *CEQR Technical Manual*, this chapter does not present net increments as compared to the future without the proposed project, since those would not represent the actual increment on a global scale; instead, the analysis focuses on the total GHG emissions potentially associated with the proposed project and identifies measures that would be implemented and measures that are still under consideration to limit the emissions.

The analysis of GHG emissions that would be generated by the proposed project is based on the methodology presented in the 2012 *CEQR Technical Manual*. Emissions of GHGs associated with the proposed project have been quantified, including off-site emissions associated with on-site use of electricity, on-site emissions from heat and hot water systems, and emissions from vehicle use attributable to the proposed project. GHG emissions that would result from construction and renovation associated with the proposed project are discussed as well.

CO_2 is the primary pollutant of concern from anthropogenic emission sources and is accounted for in the analysis of emissions from all development projects. 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 C, "Pollutants of Concern").

In addition to the GHG emissions analysis, described below, the impact of projected sea level rise was examined based on the most recent information available from New York City and the implications for project infrastructure design was reviewed.

BUILDING OPERATIONAL EMISSIONS

Emissions associated with electricity and fuel use for the mixed-use building were estimated using projections of energy consumption (developed as part of the project's energy modeling analysis) and emission factors of 5.32 kilograms of CO_2e per therm of natural gas used, and 314 grams (g) CO_2e per kilowatt-hour (kWh) of electricity used, referenced in the 2009 inventory of GHG emissions for New York City.[1] The data includes measures aimed at achieving at least 10 percent reduction in energy costs as compared to a baseline designed to meet the New York City energy code (this is the LEED prerequisite requirement).

The 2012 *CEQR Technical Manual* requires the use of project-specific data (preferably energy model results) if available. The energy model projections for the mixed-use building (on projected development site 1) ranged from 6,184,387 to 6,685,270 kWh of electricity and from 261,774 to 308,726 therms of natural gas. The energy modeling is performed with the objective of comparing with baseline performance for a building constructed to current energy code. However, based on experience in past projects and best engineering judgment, it is estimated

[1] Mayor's Office of Long-Term Planning and Sustainability, *Inventory of New York City Greenhouse Gas Emissions*, September 2010.

that actual performance may initially have an energy intensity of up to 40 percent higher than that projected because the analysis assumes a perfectly installed and operated system. Therefore, for the purposes of this analysis, a conservative assumption was made that both electricity and natural gas consumption would be 40 percent higher than the highest analyzed scenario—8,658,142 kWh of electricity per year and 432,216 therms of natural gas per year. Note that the fractional energy savings as compared to the baseline (10 percent in energy costs) would remain the same since the baseline analysis applies the same approach.

Emissions associated with the mini-storage conversion (on projected development site 2) and the midblock community service building (on a portion of development site 1) were estimated using the default values provided in Table 18-3 of the 2012 *CEQR Technical Manual*, because detailed design and energy modeling results were not available for these buildings. Therefore, the emissions associated with these buildings presented below are conservatively high, since the energy intensity of new buildings is generally lower than the citywide average presented in the 2012 *CEQR Technical Manual*, and because the energy savings associated with specific project efficiency measures cannot be accounted for without detailed modeling.

MOBILE SOURCE EMISSIONS

The number of annual weekday motorized vehicle trips by mode (cars, taxis, trucks) that would be generated by the proposed project was calculated using the transportation planning assumptions developed for the analysis presented in Chapter 10, "Transportation." The assumptions used in the calculation include average daily weekday person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances of the 2012 *CEQR Technical Manual* (Table 18-4) 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 one-way truck trip was assumed to be 38 miles, as per the 2012 *CEQR Technical Manual*. Table 18-6 of the 2012 *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 project.

USEPA estimates that the well-to-pump GHG emissions of gasoline and diesel are approximately 22 percent of the tailpipe emissions.[1] 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, fuel alternatives are not being considered for the proposed project. As per the 2012 *CEQR Technical Manual* guidance, the well-to-pump emissions are not considered in the analysis for the proposed project.

The projected annual vehicle trips and miles traveled, forming the basis for the GHG emissions calculations from mobile sources, are presented in **Table 12-2 and 12-3**, respectively.

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

Table 12-2
Annual Trips (vehicle-trip/year)

	Car			Taxi	Truck
	Residential	Office	Retail		
Projected Development Site 1					
Weekdays	131,859	88,373	54,408	151,746	23,927
Weekends and Holidays	69,396	8,185	34,188	68,661	4,159
Projected Development Site 2					
Weekdays	19,262	41,249	6,925	36,902	3,616
Weekends and Holidays	10,138	9,564	4,351	13,528	1,234

Table 12-3
Total Distances Traveled (VMT/year)

	Car	Taxi	Truck
Projected Development Site 1			
Local	355,534	112,496	234,799
Arterial	775,710	245,445	512,288
Expressway	484,819	153,403	320,180
Projected Development Site 2			
Local	91,216	25,739	40,551
Arterial	199,017	56,159	88,475
Expressway	124,386	35,099	55,297

CONSTRUCTION EMISSIONS

Emissions associated with construction activities have not been estimated explicitly for the proposed project, but analyses prepared for development projects in New York City[1] 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) would be equivalent to the total operational emissions from the operation of the buildings over approximately 5 to 10 years.

EMISSIONS FROM SOLID WASTE MANAGEMENT

The proposed project would not fundamentally change the City's solid waste management system. As described in the Final Scope of Work, the proposed project would generate approximately 11 tons per week of solid waste compared to the future without the proposed project. This is less than 2012 *CEQR Technical* Manual threshold of 50 tons per week of solid waste requiring further impact analysis for solid waste. Therefore, as per the 2012 *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

[1] Examples include GHG analyses prepared for the EISs for Riverside Center, Domino Sugar Rezoning, and Western Rail Yard.

F. PROBABLE IMPACTS OF THE PROPOSED PROJECT

GREENHOUSE GAS EMISSIONS

BUILDING OPERATIONAL EMISSIONS

The fuel consumption, emission factors, and resulting GHG emissions from the mixed-use building and the other buildings are presented in detail in **Tables 12-4** and **12-5**, respectively. The results for the mixed-use building represent the highest of the current design options.

Table 12-4
GHG Emissions—Mixed-Use Building (On Projected Development Site 1)

	Electricity	**Natural Gas**
Consumption	8,658,142 kWh	432,216 therms
Emission Factor (kg CO_2e per unit)	0.314	293
GHG Emissions (metric ton CO_2e / year)	2,719	2,299
Total GHG Emissions (metric ton CO_2e / year)	**5,018**	

Table 12-5
GHG Emissions—Midblock Community Facility and Mini-Storage Conversion Buildings

Building	**Building Area** (gsf)	**Carbon Intensity** (kg CO_2e / gsf)	**GHG Emissions** (metric ton CO_2e / year)
Midblock Community Facility (portion of projected development site 1)	12,800	9.43	121
Mini-Storage Conversion (projected development site 2)	89,310	6.59	589

The energy efficiency measures incorporated in the design of the mixed use building on projected development site 1, included in this analysis, would result in a savings of at least 7 percent in GHG compared with a baseline building built to code, and would result in an energy intensity at least 41 percent lower than average residential buildings in New York City. If additional measures are added and if a higher performance is ultimately achieved upon installation of the systems, emissions would be even lower.

Regarding the midblock community facility and mini-storage conversion buildings, since detailed design and energy analysis is not available at this time, the estimates are based on the citywide averages provided in the 2012 *CEQR Technical Manual*. Buildings constructed to current code would have lower energy intensity than the citywide average. Furthermore, the applicant is committed to energy efficiency measures for these buildings which would further reduce emissions from those presented here (see details below, "Assessment of Consistency with the GHG Reduction Goal").

MOBILE SOURCE EMISSIONS

The detailed mobile source related GHG emissions from each of the proposed project is presented in detail in **Table 12-6**.

Table 12-6
Mobile Source Emissions (metric tons CO_2e)

Roadway Type	Car	Taxi	Truck	Total
Projected Development Site 1				
Local	406	116	840	1,363
Arterial	540	153	1,130	1,823
Expressway	199	56	480	735
Subtotal	*1,145*	*325*	*2,451*	*3,921*
Projected Development Site 2				
Local	104	27	145	276
Arterial	138	35	195	369
Expressway	51	13	83	147
Subtotal	*294*	*74*	*423*	*791*
Total	**1,439**	**399**	**2,874**	**4,712**

CONSTRUCTION EMISSIONS

As described in Section E, "Methodology," emissions associated with construction have not been estimated explicitly for the proposed project. Based on similar analyses for other projects, direct and embedded construction emissions are estimated to be equivalent to the total emissions from the operation of the buildings over approximately 5 to 10 years.

EMISSIONS FROM SOLID WASTE MANAGEMENT

As described in the Final Scope of Work, the proposed project would not fundamentally change the City's solid waste management system. Therefore, emissions from solid waste management were not quantified.

SUMMARY

A summary of GHG emissions by source type and development site is presented in **Table 12-7**. Note that if the buildings were to be constructed elsewhere to accommodate the same uses as the proposed project, the emissions from the use of electricity, energy for heating and hot water, and vehicle use could equal or exceed those of the proposed project, depending on their location, access to transit, building type, availability of buildings for reuse, and energy efficiency measures.

Table 12-7
Summary of Annual GHG Emissions 2015
(metric tons CO_2e)

Emissions Source	Projected Development Site 1	Projected Development Site 2	Total
Building Operations	5,139	589	5,727
Mobile	3,921	791	4,712
Total	*9,059*	*1,380*	*10,439*

As described in Section E, "Methodology," construction emissions were 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. The proposed project is not expected to fundamentally change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Based on the energy modeling analysis, it is anticipated that the mixed-use building would emit at least 7 percent less GHG than it would if it was built to code and may achieve much greater energy efficiency resulting in even lower GHG emissions. The development of the mini-storage conversion and community facility building would also incorporate energy efficiency measures which would decrease GHG emissions, resulting in lower emissions than those presented here. The proposed project 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. (See more detail below.)

ASSESSMENT OF CONSISTENCY WITH THE GHG REDUCTION GOAL

The proposed project would include sustainable design features which would, among other benefits, result in lower GHG emissions. These features are discussed in this section, assessing the consistency of the proposed project with the GHG reduction goal outlined in the 2012 *CEQR Technical Manual*.

The applicant has a proven record of successfully developing and maintaining sustainable buildings, emphasizing energy efficiency and other measures that contribute to reduced GHG emissions. In 2006, EPA recognized The Durst Organization as a Top Performer in Commercial Real Estate among Energy Star leaders. The applicant has sought LEED Silver certification at a minimum for all of its developments since the certification was first available. For example, the LEED Gold certified Helena building, adjacent to the proposed project, was recognized in 2007 by the USEPA and New York City Green Building Competition for excellence in the use of good design principals and innovative green building technologies. This commitment to energy efficiency will continue with the proposed project, resulting in reduced energy consumption and associated GHG emissions and supporting the City reduction goals, as outlined below; commitments relating to the items set forth below will be included in a Restrictive Declaration.

GOAL: BUILD EFFICIENT BUILDINGS

The mixed-use building on projected development site 1 will be designed to achieve an energy efficiency level resulting in 7 percent lower energy consumption than the baseline building designed to code at a minimum. The analysis above included these minimum energy performance requirements. Even higher energy efficiency may be achieved.

The mixed-use building will include—

- High-efficiency heating, ventilation, and air conditioning (HVAC) systems.
- Design to increase interior daylighting.
- Incorporate motion sensors and lighting control in common areas.
- Install efficient directed exterior lighting.
- Use water conserving fixtures.
- Provide for storage and collection of recyclables (including paper, corrugated cardboard, glass, plastic and metals) in building design.
- Conduct 3rd party building commissioning to ensure energy performance.

- Incorporate window glazing to reduce heat loss and solar heat gain.
- Use efficient lighting and elevators, and *Energy Star* appliances, if appliances are being installed.
- Implement water-efficient landscaping.
- Install carbon monoxide sensors to control the ventilation in the parking garage.

Additional measures that may be further investigated include designing an energy efficient building envelope, peak shaving or load shifting strategies, demand-control ventilation in common areas, reuse of processed water (from The Helena building) in the cooling tower, and reuse of rainwater.

The midblock community facility and mini-storage conversion buildings would include Energy Star rated equipment, where applicable, will include high-efficiency heating, ventilation, and cooling systems, efficient lighting and occupancy sensors, and Energy Star certified appliances, and commissioning will be undertaken to ensure optimal performance of the installed energy systems.

GOAL: USE CLEAN POWER

The proposed project's buildings will produce heat and hot water using natural gas fired systems; natural gas has lower carbon content per unit of energy than other fuels, and thus reduces GHG emissions.

The incorporation of a cogeneration system may be further investigated in the future.

GOAL: TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The proposed project supports the City's transit oriented development and sustainable transportation goal. The proposed project would be supported by various bus lines and is also approximately half a mile walk from the nearest subway station. The project site would also be located one block for an entrance to the Hudson River Greenway—a major dedicated bicycle path connecting the west side of Manhattan.

The proposed project would include mixed uses, including residential and ground floor retail, and is located in an area served by retail uses within walking distance. Given the residential development expected in the area, it is likely that residential oriented retail will be more pronounced in the future.

Additional measures that may be further investigated include sizing parking capacity to meet, but not exceed, parking required by zoning or possibly to reduce parking requirements; designating on-site parking for alternative vehicles; and incorporating parking space for vehicle sharing.

GOAL: REDUCE CONSTRUCTION OPERATION EMISSIONS

Construction contracts will include an extensive diesel emissions reduction program including diesel particle filters for large construction engines and other measures (See Chapter 16, "Construction"). These measures would reduce particulate matter emissions; while particulate matter is not included in the list of standard greenhouse gasses ("Kyoto gases"), recent studies have shown that black carbon—a constituent of particulate matter—may play an important role in climate change.

GOAL: USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

The proposed project will consider using building materials with recycled content and/or materials extracted/manufactured within the region which would reduce emissions associated with production and transport of building materials. Some cement replacements such as fly ash and/or slag will be used.

Efforts will be made to divert construction waste from landfill to the extent practicable.

The proposed project may also evaluate the possibility of optimizing design to reduce the need for concrete and steel, reusing building materials or products, using rapidly renewable building and fit-out materials, and using wood that is locally produced and/or certified in accordance with the Sustainable Forestry Initiative or the Forestry Stewardship Council's Principles and Criteria.

G. PROBABLE IMPACTS OF CLIMATE CHANGE ON THE PROPOSED PROJECT

Currently, standards and a framework for analysis of the effects of climate change on a proposed project are not included in the 2012 *CEQR Technical Manual*. While qualitative guidance on addressing the effect of climate change is in the process of being developed at the national, state, and local levels, no specific requirements for development projects are available at this time. If climate change considerations are incorporated into state or local laws prior to the development of the proposed project, the proposed project will be constructed to meet or exceed the codes in effect at that time. Nonetheless, since a portion of the proposed project is located within the current 100-year floodplain, climate change considerations and measures that would be implemented to increase climate resilience are discussed.

In New York City, the Climate Change Adaptation Task Force is tasked with securing the city's critical infrastructure against rising seas, higher temperatures, and fluctuating water supplies projected to result from climate change. The Task Force is composed of over 35 New York City and State agencies, public authorities, and companies that operate, regulate, or maintain critical infrastructure in New York City. The approaches suggested for the City to create a city-wide adaptation program include ways to assess risks, prioritize strategies, and examine how standards and regulations may need to be adjusted in response to a changing climate.

To assist the task force, the New York City Panel on Climate Change (NPCC), has prepared a set of climate change projections for the New York City region and has suggested approaches to create an effective adaptation program for critical infrastructure.[1] The NPCC includes leading climatologists, sea-level rise specialists, adaptation experts, and engineers, as well as representatives from the insurance and legal sectors. The climate change projections include a summary of previously published baseline and projected climate conditions throughout the 21st century including heat waves and cold events, intense precipitation and droughts, sea level rise, and coastal storm levels and frequency. The NPCC projects that sea levels are likely to increase by 12 to 23 inches by the end of the century, with possible increase up to 55 inches in the event of rapid ice melt. In general, the probability of higher sea levels is characterized as “extremely likely,” but there is high uncertainty regarding the probability of a rapid ice melt scenario. Intense hurricanes are characterized as ‘more likely than not’ to increase in intensity and/or frequency, and the likelihood of changes in other large storms (“Nor’easters”) are characterized

[1] New York City Panel on Climate Change, *Climate Change Adaptation in New York City: Building a Risk Management Response*, Annals of the New York Academy of Sciences, May 2010.

as unknown. Therefore, the projections for future 1-in-100 coastal storm surge levels for New York City include only sea level rise at this time (excluding the rapid ice melt scenario), and do not account for changes in storm frequency.

Based on the above NPCC data, it is reasonable to assume that the 1-in-100 flood elevation on the west end of the projected development site 1 (Twelfth Avenue) would increase by up to 2 feet by the end of the century.

The design of the proposed project would not include any residential areas, critical infrastructure, or openings leading to lower-lying project areas at locations projected to be inundated in a potential future 1-in-100 flood. Areas that may be vulnerable to such rare potential flooding events would be limited to shop retail frontage on Twelfth Avenue, and up to approximately 140 feet and 70 feet inland from Twelfth Avenue on West 57th and West 58th Streets, respectively. Other than the retail doorways, there is only a single egress point to the potentially inundated area consisting of a stairway from upper floors on the western side of the southern façade of the mixed-use building (on West 57th Street); this is one of many such stairways and would not be critical in the event of a flood. Therefore, the proposed project design can accommodate future sea level rise of 2 feet. ✷