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Greenhouse Gas Emissions and Climate Change

This chapter describes the potential impact of the Proposed Actions on greenhouse gas (GHG) emissions and considers whether the Proposed Actions are consistent with the citywide GHG emissions reduction goals.

Introduction

The Applicants, 760 12th, LLC and 801 11th Ave, LLC, are seeking zoning map amendments, zoning text amendments, and zoning special permits (collectively, the Proposed Actions) to facilitate the development of two buildings (collectively, the Proposed Projects)—a 44-story, mixed-use residential and commercial building at 629 West 54th Street (Manhattan Block 1102, Lot 11) (Development Site 1) and a 38-story, mixed-use residential and commercial building at 801 Eleventh Avenue (Manhattan Block 1103, Lot 36) (Development Site 2).

The building at 629 West 54th Street would contain up to approximately 617 dwelling units (DUs) and 113,990 gross square feet (gsf) of commercial auto dealership space. The building at 801 Eleventh Avenue would contain 477 DUs and 85,760 gsf of commercial auto dealership space. The Proposed Projects would contain a total of approximately 1,179,321 gsf (892,442 zoning square feet [zsf]) including approximately 939,934 gsf (743,701 zsf) of residential floor area and 199,750 gsf (148,741 zsf) of commercial floor area across the two development sites.

The Proposed Actions include zoning changes and special permits to facilitate a transfer of floor area from Chelsea Piers, Piers 81/83, and Pier 98 (the Granting Sites) within Hudson River Park to the development sites. In addition to the Proposed Actions, the board of directors of Hudson River Park Trust must approve the sale of the floor area from the Granting Sites. These approvals each require a Signification Action process, as required by the Hudson River Park Act.

As described in **Chapter 1, Project Description**, two reasonable worst-case development scenarios (RWCDSs) were analyzed to provide a conservative baseline in analyzing the Proposed Actions' potential impacts. One scenario is the Maximum Commercial Scenario, which assumes that the commercial space of the Proposed Projects would be developed as office and retail uses instead of auto dealership use. The second scenario is the Maximum Residential Scenario, which would maximize the residential floor area that could be developed on each Development Site. Absent the Proposed Actions (the No-Action condition), it is assumed that Development Site 1 would continue to operate as an auto dealership, and the existing auto dealership space on Development Site 2 would be leased to new tenants (152,375 gsf for Development Site 1 and 57,805 gsf for Development Site 2).

As discussed in the *2021 City Environmental Quality Review (CEQR) Technical Manual*, increased concentrations of GHGs change the global climate and result 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. New York City's sustainable development policy, starting with PlaNYC and continued and enhanced in OneNYC, established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change in the city. In 2014, the City Council passed a bill to reduce citywide GHG emissions by 80 percent by 2050 (Local Law 66 of 2014). The New York Climate Mobilization Act, Local Law 97 of 2019, the most recent legislation, is the most aggressive climate legislation to date. It requires buildings larger than 25,000 square feet to meet strict GHG emission limits starting in 2024. Buildings are the largest source of GHG emissions, representing nearly 70 percent of New York City's total emissions. Focusing on the city's largest buildings will promote energy efficiency and renewable energy and discourage reliance on fossil fuels. The GHG emission reduction goal for New York City buildings is 40 percent by 2030 and 80 percent by 2050, compared to 2005.

The contribution of a proposed project's GHG emissions to global GHG emissions is likely to be considered insignificant when measured against the scale and magnitude of global climate change. However, certain Proposed Projects' contribution of GHG emissions still should be analyzed to determine their consistency with the City's GHG reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR. The GHG consistency assessment focuses on those projects that have the greatest potential to produce GHG emissions and evaluates their potential to result in significant inconsistencies with the GHG reduction goal.

A portion of Development Site 1 is located within the existing floodplain and the projected floodplain with the likely effects of climate change. Therefore, an assessment of the potential effect of climate change on Development Site 1 is included in this chapter, along with a description of measures that would be incorporated to make the future development at Development Site 1 more resilient to the anticipated effects related to climate change.

Principal Conclusions

The Proposed Actions would be consistent with the applicable City GHG emissions reduction and climate change goals, and there would be no significant adverse GHG emission or climate change impacts as a result of the Proposed Actions.

Following the methodology provided in the *CEQR Technical Manual*, it is estimated that the Proposed Actions would result in approximately 4,346 metric tons of carbon dioxide equivalent (CO_2e) emissions from its annual operations under the Maximum Residential Scenario and 4,186 metric tons under the Maximum Commercial Scenario. The Proposed Actions would result in 2,930 metric tons a year of CO_2e

emissions from mobile sources under the worst-case traffic scenario. This represents less than 0.02 percent of the city's overall 2022 GHG emissions of 53.7 million metric tons.

Future development at the development sites under With-Action conditions will comply with the 2020 Energy Conservation Construction Code of New York State and 2020 New York City Energy Conservation Code, which govern performance requirements of heating, ventilation, and air conditioning systems, as well as the exterior building envelope of new buildings. As a result, future development at the development sites will comply with the Local Law 97 requirements and will contribute towards the NYC GHG reduction goals.

Since Development Site 1 is located within the 1 percent annual chance floodplain by the 2050s, the potential effects of global climate change have been considered and are presented in **Appendix A: Waterfront Revitalization Program Consistency Assessment**. The assessment considers the effects of climate change on rising sea levels, storm surge, and coastal flooding resulting from the Proposed Actions. As detailed in **Appendix A**, it was determined that the Proposed Actions would be supportive of Policy 6.2 of the New York City Waterfront Revitalization Program (WRP). Therefore, adverse impacts to climate change are not anticipated as a result of the Proposed Actions.

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." Some GHGs, such as carbon dioxide (CO_2), occur both naturally and are emitted into the atmosphere through human activities. The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of an environmental impact assessment: CO_2, nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

GHGs differ in their ability to trap heat. To compare emissions of GHGs, compilers use a weighting factor called a global warming potential (GWP), where the heat-trapping ability of 1 metric ton (1,000 kilograms) of CO_2 is taken as the standard, and emissions are expressed in terms of CO_2 equivalents (CO_2e) but can also be expressed in terms of carbon equivalents. The GHGs, which are emitted as a result of human activities and their GWPs, are presented in **Table 12-1**.

Table 12-1 Global Warming Potential for Primary Greenhouse Gases (GHGs)

GHG	Common Sources	Global Warming Potential
CO_2 - Carbon Dioxide	Fossil fuel combustion, forest clearing, cement production	1
CH_4 - Methane	Landfills, production and distribution of natural gas and petroleum, anaerobic digestion, rice cultivation, fossil fuel combustion	21
N_2O - Nitrous Oxide	Fossil fuel combustion, fertilizers, nylon production, manure	310
HFCs - Hydrofluorocarbons	Refrigeration gases, aluminum smelting, semiconductor manufacturing	140–11,700
PFCs - Perfluorocarbons	Aluminum production, semiconductor manufacturing	6,500–9,200
SF_6 - Sulfur Hexafluoride	Electrical transmissions and distribution systems, circuit breakers, magnesium production	23,900

Source: *CEQR Technical Manual*

- **Carbon Dioxide (CO_2).** CO_2 enters the atmosphere via the combustion of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most influential GHG.
- **Methane (CH_4).** CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, as well as by the decay of organic waste in municipal solid waste landfills. CH_4, in addition to nitrous oxide (noted below), plays an important role in GHG emissions 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 as reflected in their high global warming potential.
- **Nitrous Oxide (N_2O).** N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste.
- **Fluorinated Gases.** Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are powerful, synthetic GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons [CFCs], hydrochlorofluorocarbons [HCFCs], and halons). These gases are typically emitted in smaller quantities. However, because they are potent GHGs, they are sometimes referred to as high global warming potential gases (high GWP gases).

This analysis focuses on CO_2, N_2O, and CH_4 (collectively as CO_2e) as there are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Actions.

Because of the growing consensus that GHG emissions resulting from human activity have 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 that address energy consumption and production, land use, and other areas. Although the United States has not ratified the international agreements that set emissions targets for GHGs, in December 2015, the United States

signed the United Nation's Paris Agreement,[1] which pledged deep cuts in emissions and has a stated goal of reducing annual emissions to a level that, by 2025, would be between 26 and 28 percent lower than 2005 emissions.[2] As of January 2025, the United States has rescinded its entrance into the Paris Agreement.

The U.S. Environmental Protection Agency (EPA) is required to regulate GHGs under the Clean Air Act. The EPA regulates GHG emissions from newly manufactured on-road vehicles in conjunction with the National Highway Traffic Safety Administration (NHTSA). The EPA also regulates transportation fuels via the Renewable Fuel Standard program. The Renewable Fuel Standard program requires a volume of renewable fuels to be used to replace or reduce the quantity of fossil fuel used in transportation fuel, home heating oil, or jet fuel. The Clean Power Plan was implemented by the EPA in 2015. It established guidelines and limits on emissions from power plants, as well as facility performance standards. Following legal challenges beginning in 2016, the Federal Government released the Affordable Clean Energy Rule in 2019 to update the government's approach to limiting emissions from power plants. The Affordable Clean Energy (ACE) Rule establishes emission guidelines for states to use when developing plans to limit carbon dioxide at coal-fired units.

In 2022, New York State Governor Kathy Hochul issued Executive Order No. 22, which directed State agencies (i.e., the affected entities subjected to the order) to lead by example and adopt a sustainability and decarbonization program. The order established the GreenNY Council, which comprises representatives from several New York State agencies to implement the rulings of the order. Section VII of the order requires affected entities to reduce GHG emissions by implementing the following measures:

- Sourcing 100 percent electricity (with exceptions) from 2030 onward for all agency-owned operations from energy systems that are eligible under the CES (Eligible Systems) as part of an all-of-government approach to meet the goals of the Climate Act in a cost-effective manner.
- Avoiding the combustion of fossil fuels for new infrastructure, building systems or equipment (with exceptions) to the extent feasible.
- Achieving 11 trillion British thermal units (Btus) of energy savings at agency facilities by 2025 as outlined in the BuildSmart 2025 program.
- Reducing embodied carbon emissions from common construction materials in all new construction or construction projects consisting of adaptive reuse or significant renovations that cost greater than 50 percent of the cost of new construction starting in 2023.
- Having 100 percent of the agency's light-duty non-emergency vehicle fleets be zero-emissions vehicles (ZEVs) by 2035 and 100 percent of the agency's medium- and heavy-duty vehicle fleet be ZEVs by 2040.
- Evaluating the inclusion of distributed energy resources and energy storage to the maximum extent practicable.
- Utilizing the Department of Environmental Conservation (DEC) Value of Carbon Guidance, where appropriate, to aid agencies in decision making on GHG emission reductions.

The New York State Energy Plan outlines the State's energy goals and provides strategies and recommendations for meeting them. The latest version of the plan was published in June 2015 and updated in 2020 to align with the 2019 Climate Leadership & Community Protection Act (CLCPA). The

[1] Conference of the Parties, 21st Session. *Adoption of The Paris Agreement, decision -/CP.21*. Paris, December 12, 2015.

[2] Unites States of America. *Intended Nationally Determined Contributions (INDCs)* as submitted. March 31, 2015.

plan outlines a vision for transforming the State's energy sector that would result in increased energy efficiency, increased carbon-free power production, and cleaner. The 2015 plan establishes the following clean energy goals:

- Reducing GHG emissions in New York State by 40 percent, compared with 1990 levels, by 2030;
- Providing 50 percent of electricity generation in the State from renewable sources by 2030; and
- Increasing building energy efficiency by 600 trillion Btus by 2030 from 2012 levels.

To meet its commitment to the Regional Greenhouse Gas Initiative (RGGI), New York State has developed regulations to cap and reduce CO_2 emissions from power plants. Under the RGGI agreement, the governors of nine northeastern and mid-Atlantic states have committed to regulate the amount of CO_2 that power plants are allowed to emit, gradually reducing annual emissions to half the 2009 levels by 2020. The RGGI states have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

The New York State CLCPA was established in June 2019 to "adopt measures to put the state on a path to reduce statewide greenhouse gas emissions by eighty-five percent by [2050] and net zero emissions in all sectors of the economy."[3] The CLCPA sets new goals for reducing statewide GHG emissions and ultimately aims to achieve net zero GHG emissions by setting emission reduction targets and promoting clean energy.[4] The CLCPA also establishes the Climate Action Council (CAC) to develop strategies to achieve these goals.

The CLCPA directs the New York State Department of Environmental Conservation (NYSDEC) to establish rules and regulations to ensure compliance with statewide emissions reduction limits (40 percent reduction from 1990 emissions levels by 2030, and 85 percent reduction from 1990 emissions levels by 2050). These regulations must include:

> *…legally enforceable emissions limits, performance standards, or measures or other requirements to control emissions from greenhouse gas emissions sources and measures to reduce emissions from greenhouse gas emission sources that have a cumulatively significant impact on statewide greenhouse gas emissions, such as internal combustion vehicles that burn gasoline or diesel fuel and boilers or furnaces that burn oil or natural gas.*

On December 19, 2022, the CAC approved a Scoping Plan[5] for the CLCPA. The document sets forth a series of policies and recommendations that cover six sectors: transportation, buildings, electricity, industry, agriculture and forestry, and waste. The Scoping Plan encourages transitioning to ZEV and equipment. For buildings, the Scoping Plan encourages efficient operation of buildings, capital investments in high-performance building envelopes, and efficient HVAC systems.

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 comprehensive plan for a sustainable and resilient New York City, which began as PlaNYC 2030 in 2007, and continues to evolve today as OneNYC, includes GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and

[3] The New York State Senate. Senate Bill S6599. Available at: https://www.nysenate.gov/legislation/bills/2019/s6599.

[4] The Natural Resources Defense Council. *Unpacking New York's Big New Climate Bill: A Primer.* Available at: https://www.nrdc.org/experts/miles-farmer/unpacking-new-yorks-big-new-climate-bill-primer-0.

[5] New York Climate Act Scoping Plan https://climate.ny.gov/resources/scoping-plan/

initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 ("30 by 30") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the GHG reduction goal).[6] The City also has announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 ("80 by 50"), which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. More recently, as part of OneNYC, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in large 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 and retro-commissioning 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 also will 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 Conservation Code, which along with the Energy Conservation Construction Code of New York State (as updated in 2020), requires equipment installed during a renovation to meet current efficiency standards.

To achieve the 80 by 50 goal, the City is convening Technical Working Groups to analyze the GHG reduction pathways from the building, power, transportation, and solid waste sectors to develop action plans for these sectors. The members of the Technical Working Groups will develop and recommend data analysis, interim metrics and indicators, voluntary actions, and potential mandates to effectively achieve the City's emissions reduction goal. In 2016, the City published the building sector *Technical Working Group* report, which included commitments by the City to change building energy codes and take other measures aimed at substantially reducing GHG emissions.

New York City's Local Law 97 (LL97), enacted as part of the Climate Mobilization Act in 2019, is one of the most ambitious building emissions laws in the United States. It requires most buildings over 25,000 square feet to significantly reduce their GHG emissions, with phased limits starting in 2024 and becoming stricter by 2030 and 2050. The law aims to help New York City achieve carbon neutrality by 2050 by mandating energy efficiency improvements, electrification, and the use of renewable energy. Non-compliance can result in substantial financial penalties, incentivizing building owners to invest in sustainable upgrades.

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 projects' contributions to GHG emissions is required to determine consistency with the City's reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR and is therefore applied in this chapter.

A number of benchmarks for energy efficiency and green building design have also been developed. For example, the Leadership in Energy and Environmental Design (LEED) system is a 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.

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

Climate Change Initiatives

There are also several local initiatives related to assessing the potential local impacts to global climate change and development strategies to make existing and proposed infrastructure and development more resilient to the effects of climate change.

One such initiative is the Climate Change Adaptation Task Force that the City launched in 2008. The task force was charged with developing strategies to secure the city's critical infrastructure against the potential threats introduced by the climate changes such as rising sea levels and temperatures and changing precipitation patterns. It is composed of 40 City, State, and federal agencies, public authorities, and private companies that are involved in the operations of maintaining and regulating critical infrastructure in New York City. At least 100 types of infrastructure were identified that would be vulnerable to the impacts of climate chance, and this inventory will help the task force develop coordinated strategies to increase the resilience of the region's infrastructure.

The City convened the New York City Panel on Climate Change (NPCC) composed of academic, policy advisers, and agencies to develop climate change projections of New York City. The 2009 *Climate Risk Information* report was prepared by the NPCC as part of PlaNYC to advise the mayor and the task force on issues related to potential impacts on infrastructure due to climate change including, temperature, precipitation, rising sea levels, and extreme weather events. The NPCC developed projections using the Intergovernmental Panel on Climate Change (IPCC)–based methods to generate model-based probabilities for temperature, precipitation, sea level rise, and extreme events including coastal flooding in the 1 percent annual chance floodplain for the 2020s to the 2080s. These projections were developed using 16 global climate model (GCM) simulations and three GHG emission scenarios. The NPCC released *Climate Change Adaptation in New York City: Building a Risk Management Response* in 2010 to serve as a basis for climate change adaptation in the city. In June 2013, the NPCC published *Climate Risk Information 2013: Observations, Climate Change Projections, and Maps,* which outlines the most recent NPCC future climate projections. The NPCC regularly assesses climate change projections and updates those projections regularly. The resulting reports serve as a guide in the City's policymaking process.

The City established an interagency group to work with the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps (FIRMs) for the city, which set the base flood elevations for development on the floodplain and triggers the City's building code flood protection requirements. Currently, the FIRMs are undergoing revision to reflect changes in coastal shorelines and elevation, but the city's building code requirements will continue to reflect the 2015 Preliminary FIRMs.

There are also several plans to prepare the city for extreme climate events outlined in the Natural Hazard Mitigation Plan, Coastal Storm Plan, Heat Emergency Plan, Debris Management Plan, Power Disruption Plan, Winter Weather Emergency Plan, and Flash Flood Emergency Plan. The Natural Hazard Mitigation Plan will be integrated with climate projections and include climate change as a hazard.

The New York City Department of Environmental Protection (DEP) also issued several plans aimed at evaluating and implementing adaptive strategies for infrastructure. These include the New York City Green Infrastructure Plan and Sustainable Stormwater Management Plan. In 2013, DEP released the NYC Wastewater Resiliency Plan that identifies wastewater treatment plants and pumping stations vulnerable to flooding, estimates potential costs of future damages, and recommends protective measures such as waterproofing or elevation critical equipment out of flood elevations to reduce the risk of damage and loss of services.

The Department of City Planning (DCP) developed the WRP, which serves as the City's principal coastal management tool and established the City's policies for development and use on the waterfront. It requires that proposed developments in the 1 percent annual change floodplain meet the goals set forth in the policies outlined in WRP, including Policy 6, where a development would need to assess current and future sea-level rise and flooding scenarios and implement flood resiliency measures.

DCP also published the Zoning for Coastal Flood Resiliency (ZCFR), a series of zoning changes for developments on the floodplain. ZCFR expands the geography where optional zoning rules apply to include the 0.2 percent annual chance floodplain, allows optional flexibility to adjust the building envelope from a reference plane, allows certain exemptions in floor area, introduces flexibility for existing non-compliant and/or non-conforming buildings to be retrofitted or reconstructed to meet or exceed flood-resistant construction standards, and permitted obstruction rules for buildings to elevate mechanical, electrical and plumbing equipment, among other modifications and provisions.

Methodology

Given the range of programs that could result from the Proposed Actions, each technical area in this EIS will assess one of two reasonable worst-case development scenarios (RWCDS) in order to ensure a conservative analysis. The Maximum Commercial Scenario will assess the Proposed Projects with a more conservative mix of commercial retail and office uses instead of auto dealership space. The Maximum Residential Scenario will be analyzed in technical areas where increased density has the potential to produce more significant effects than the Maximum Commercial Scenario.

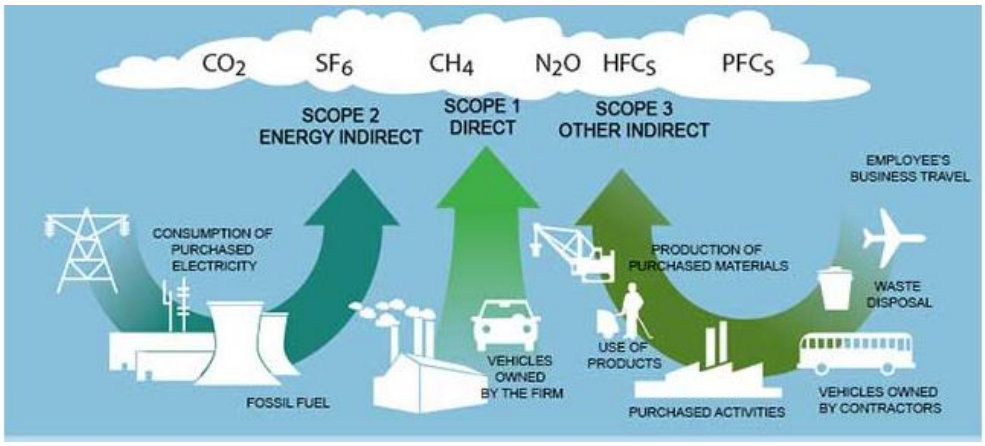
Under the Maximum Commercial Scenario, it is assumed that Development Site 1 would contain 617 DUs, 65,364 gsf of office space, and 48,626 gsf of retail space. Development Site 2 would contain 477 DUs, 47,350 gsf of office space, and 38,410 gsf of retail space. Under the Maximum Residential Scenario, it is assumed that Development Site 1 would contain 701 DUs and 50,118 gsf of auto dealership space. Development Site 2 would contain 541 DUs and 38,441 gsf of auto dealership space.

GHG Emissions Assessment

According to the *CEQR Technical Manual*, a GHG emissions assessment is typically conducted for larger projects undergoing an environmental impact statement, especially projects that would result in the development of 350,000 square feet or greater. The Proposed Actions would result in the total development of approximately 1,194,373 gsf under the Maximum Residential Scenario and 1,179,321 gsf under the Maximum Commercial Scenario from a mixture of residential, commercial, and retail uses. Operational GHG emissions were assessed for both scenarios.

GHG emissions are generally divided into three scopes, as illustrated in **Figure 12-1**.

Figure 12-1 Three Scopes of GHG Emissions



Source: http://synergyfiles.com/2017/04/scope-ghg-emissions/

Scope 1, or direct emissions, are emissions resulting from fossil fuel combustion by the proposed buildings or by vehicles owned or operated by the proposed building management. Emissions from heating, ventilation, and air-conditioning (HVAC) systems are the most typical source of GHG emissions for new building projects in New York City. Scope 2, or indirect emissions, are emissions from the generation of purchased electricity used by the buildings. Scope 3 comprises all other GHG emissions, including emissions from the vehicular trips generated by the proposed building, like employees' commute.

A project's GHG emissions under CEQR are assessed in two steps: first, GHG emissions of the proposed action are estimated, and second, the proposed action is assessed in comparison with the City goals for reducing GHG emissions. The *CEQR Technical Manual* recommends that the project's emissions be estimated with respect to the following main emissions sources: on-site operational emissions (direct and indirect); mobile source emissions (direct and indirect); and, when applicable, construction emissions and emissions from solid waste management. Pursuant to *CEQR Technical Manual* methodology, the assessment is based on the GHG emissions associated with the Proposed Actions.

Operational and mobile source emissions were quantified for this analysis. Emissions associated with construction are described qualitatively. The Proposed Actions are not expected to fundamentally change the city's solid waste management system, therefore, no estimate of emissions from solid waste management is warranted.

Climate Change Assessment

As discussed in the *CEQR Technical Manual*, rising sea levels and increases in storm surge and coastal flooding are the most immediate threats in New York City for which site-specific conditions can be assessed. If an analysis of climate change is deemed warranted for projects at sites located within the flood zone, (i) projections for the future sea level rise and, to the extent available, likely future flood zone boundaries projected for the area of the site for different years within the expected life of the development should be provided; and (ii) any city, state, or federal initiatives to improve coastal resilience should be discussed if they have the potential to affect the development sites.

Given the location of Development Site 1 within the existing floodplain, an assessment of Development Site 1's resilience to climate change is appropriate. The NPCC developed climate projections for the New York City region. This information is considered to be the best available climate data for New York

City and is referenced in the *CEQR Technical Manual*. For sea level rise (SLR), NPCC projected a likely SLR of 10 inches by the 2020s, 30 inches by 2050s, 58 inches by the 2080s, and up to 75 inches by the end of the century (for the NPCC "High" scenario for each period). The current floodplain information, NPCC projections, and measures in design to make the future development at Development Site 1 and surrounding neighborhoods more resilient to sea level rise, coastal hazards, and other climate impacts are included in the resilience assessment for Development Site 1.

The WRP discussion of Policy 6.2 also provides a detailed discussion of the consideration given to climate change and SLR in the planning and design of the future development at Development Site 1. The discussion in this chapter follows the three basic steps to determine the consistency of the Development Site 1 with the WRP Policy 6.2: (1) identify vulnerabilities and consequences; (2) identify adaptive strategies; and (3) assess policy consistency.

Assessment

Direct GHG Emissions

Direct GHG emissions would be generated by the consumption of natural gas as a result of the Proposed Actions. Natural gas consumption was estimated using average energy use intensities (EUIs) from industry surveys based on the Energy Star Portfolio Manager. EUIs for commercial and retail uses were based on average natural gas consumption data in the *2018 Commercial Buildings Energy Consumption Survey (CBECS)* from the U.S. Energy Information Administration. EUIs for residential uses were based on average natural gas consumption data in the Fannie Mae Energy and Water Use Survey Database for high-rise apartment buildings in New York City that use natural gas for heating.

Estimates of the GHG emissions from the natural gas consumption at each Development Site are presented in **Table 12-2** and **Table 12-3**. This table uses energy use estimates from existing building stock for site energy consumption. Development Site 1 would result in a total of 1,625 to 1,748 metric tons of CO_2e per year to satisfy the future With-Action building's annual natural gas consumption. Development Site 2 would result in a total of 1,264 to 1,360 metric tons of CO_2e per year.

Table 12-2 Development Site 1 - GHG Emissions from Natural Gas Consumption

	Emissions	Unit
Commercial Gas Use Intensity	23.6 (Maximum Residential)/ 20.2 (Maximum Commercial)	cf/sf
Retail Gas Use Intensity	23.6	cf/sf
Residential Gas Use Intensity	49.3	cf/sf
***CEQR Technical Manual* CO_2e Carbon Conversion Factor**	53.196	kg CO_2e/MMBtu
Maximum Residential Gas CO_2e	1,747,910	kg CO_2e
	1,748	MT CO_2e
Maximum Commercial Gas CO_2e	1,624,610	kg CO_2e
	1,625	MT CO_2e

Table 12-3 Development Site 2 - GHG Emissions from Natural Gas Consumption

	Emissions	Unit
Commercial Gas Use Intensity	23.6 (Maximum Residential) / 20.2 (Maximum Commercial)	cf/sf
Retail Gas Use Intensity	23.6	cf/sf
Residential Gas Use Intensity	49.3	cf/sf
***CEQR Technical Manual* CO_2e Carbon Conversion Factor**	53.196	kg CO_2e/MMBtu
Maximum Residential Gas CO_2e	1,360,347	kg CO_2e
	1,360	MT CO_2e
Maximum Commercial Gas CO_2e	1,264,129	kg CO_2e
	1,264	MT CO_2e

Indirect GHG Emissions

Indirect GHG emissions would be generated to produce electricity as a result of the Proposed Actions. Electricity consumption was estimated using average energy use intensities (EUIs) from industry surveys based on the Energy Star Portfolio Manager. EUIs for commercial and retail uses were based on average electricity consumption data in the 2018 Commercial Buildings Energy Consumption Survey (CBECS) from the U.S. Energy Information Administration. EUIs for residential uses were based on average electricity consumption data in the Fannie Mae Energy and Water Use Survey Database for high-rise apartment buildings in New York City that use natural gas for heating.

Estimates of the GHG emissions from the electricity use at each Development Site are presented in **Table 12-4** and **Table 12-5**. This table uses energy use estimates from existing building stock for site energy consumption. Development Site 1 would result in a total of 697 to 732 metric tons of CO_2e per year to satisfy the future With-Action building's annual electricity consumption. Development Site 2 would result in a total of 542 to 566 metric tons of CO_2e per year. This results in a total carbon emissions intensity of about 3.6 kilograms CO_2e per square foot when considering both electricity and natural gas emissions for each Development Site under all scenarios.

Table 12-4 Development Site 1 - GHG Emissions from Electricity Generation

		Unit
Commercial Electricity Use Intensity	13.5	kWh/sf
Retail Electricity Use Intensity	13.5	kWh/sf
Residential Electricity Use Intensity	8.1	kWh/sf
***CEQR Technical Manual* CO_2e Carbon Conversion Factor**	35.902	kg CO_2e/MMBtu
Maximum Residential Electricity CO_2e	696,689	kg CO_2e
	697	MT CO_2e
Maximum Commercial Electricity CO_2e	731,785	kg CO_2e
	732	MT CO_2e

Table 12-5 Development Site 2 - GHG Emissions from Electricity Generation

		Unit
Commercial Electricity Use Intensity	13.5	kWh/sf
Retail Electricity Use Intensity	13.5	kWh/sf
Residential Electricity Use Intensity	8.1	kWh/sf
***CEQR Technical Manual* CO_2e Carbon Conversion Factor**	35.902	kg CO_2e/MMBtu
Maximum Residential Electricity CO_2e	541,544	kg CO_2e
	542	MT CO_2e
Maximum Commercial Electricity CO_2e	565,696	kg CO_2e
	566	MT CO_2e

Mobile Source Emissions

The number of annual vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Actions was calculated using the transportation planning assumptions developed for the traffic analysis and presented in **Chapter 10, Transportation**. Consistent with the traffic analysis, mobile source emissions were only estimated for the Maximum Commercial Scenario, which is expected to be the RWCDS for trip generation. The number of project-generated trips by autos, taxis, and trucks was obtained from the transportation analysis. Annual vehicle miles traveled (VMT) was estimated based on the weekday trips and the average one-way distances as shown in Table 18-6 and Table 18-7 of the *CEQR Technical Manual*. The average truck trip was assumed to be 38 miles as per the *CEQR Technical Manual*. Tables 18-6 and 18-7 of the *CEQR Technical Manual* were used to determine the one-way trip distances for personal and taxi trips in Manhattan and the mobile GHG emissions calculator provided in the *CEQR Technical Manual* was used to obtain an estimate of auto, taxi, and truck CO_2e emissions attributable to the Proposed Actions. The resultant GHG emissions are presented in **Table 12-6**. The total CO_2e emissions from the mobile sources attributable to the Proposed Action would be 2,930.4 metric tons annually.

Table 12-6 GHG Emissions from Mobile Sources

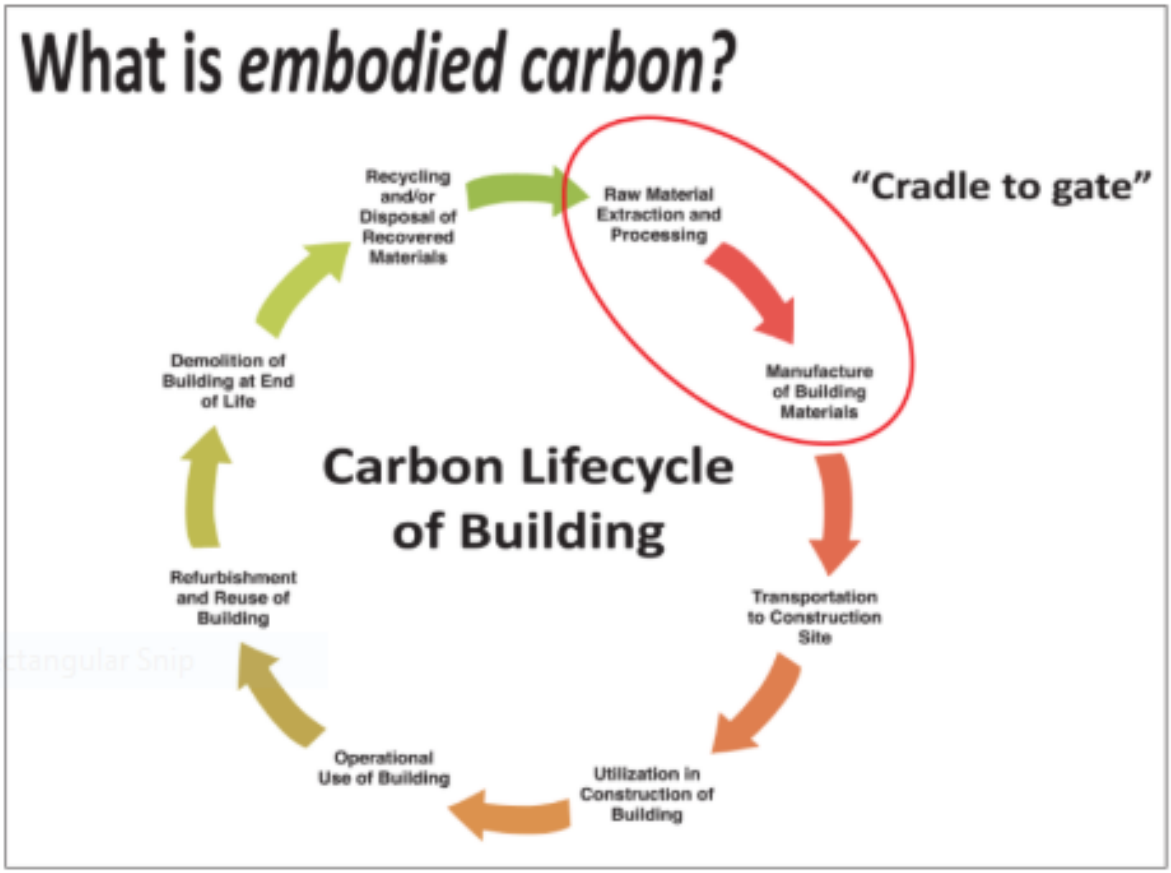
Vehicle Type	Annual VMT generated	Annual CO_2e (MT)
Auto	1,681,905	796.2
Taxi	483,171	1492.8
Truck	1,415,556	641.4
Total	3,580,632	2,930.4

Construction Emissions

Construction of the Proposed Projects would comply with the New York City Air Pollution Control Code, the latest version of which was adopted on May 12, 2020. As per *CEQR Technical Manual* guidance, emissions associated with construction of the Proposed Projects have been assessed quantitatively (see **Chapter 16, Construction**). As described in **Chapter 16, Construction**, the results

of this quantitative analysis indicate that construction of the Proposed Projects would not result in any concentrations of NO_2, PM_{10}, and CO that exceed the National Ambient Air Quality Standards (NAAQS). In addition, the maximum predicted incremental concentrations of $PM_{2.5}$ would not exceed the City's de minimis criteria. As such, no significant adverse air quality impacts are anticipated due to on- or off-site source emissions due to construction. Additionally, construction of the Proposed Projects would follow New York City regulations and codes for construction that require the use of recycled materials, reduced diesel emissions, limited idle time for vehicles and equipment on-site, and other measures to reduce carbon emissions. In addition, following these practices would contribute to the overall goal of reducing GHG emissions from construction. Thus, construction of the Proposed Projects would adhere to the City's goals to reduce GHG.

Figure 12-2 Embodied Carbon of a Building



Source: Sustainable Energy Association

Consistency with the GHG Reduction Goals

According to the *CEQR Technical Manual*, the assessment of consistency with the City GHG reduction goals should answer the following question: Is the project consistent with the goal of reducing GHG emissions, specifically the attainment of the City's established goal of reducing citywide GHG emissions by 80 percent below 2005 levels by 2050? The other more immediate goal is to meet the requirements of the Local Law 97, Climate Mobilization Act. This act requires that all newly constructed New York buildings larger than 25,000 square feet become more efficient and reduce their GHG under a certain level depending on the building size. **Table 12-7** presents the Local Law 97 carbon intensity rates by the future year that include the residential, retail, and commercial facility square footage by building type.

Table 12-7 Local Law 97 GHG Limits of the Proposed Projects

	2030-2034	
Land Use (Building Code)	**Carbon Intensity Rate Kg of CO2e/sq ft**	**Total Operational CO2e Emission Limit in MT**
Development Site 1 – Maximum Residential Scenario		
Commercial (B)	4.53	227
Residential (R-2)	4.07	2,530
	Total	**2,757**
Development Site 2 – Maximum Residential Scenario		
Commercial (B)	4.53	174
Residential (R-2)	4.07	1,970
	Total	**2,144**
Development Site 1 – Maximum Commercial Scenario		
Commercial (B)	4.53	296
Retail (M)	4.03	196
Residential (R-2)	4.07	2,240
	Total	**2,732**
Development Site 2 – Maximum Commercial Scenario		
Commercial (B)	4.53	214
Retail (M)	4.03	155
Residential (R-2)	4.07	1,747
	Total	**2,117**

Under Local Law 97, the Proposed Project buildings would be limited between 2,117 and 2,757 metric tons for the years 2030-2034, depending on the building and scenario. Note that the values in **Table 12-2** through **Table 12-5** are not directly comparable since the estimated energy use intensity is based on existing building stock not up to current energy codes and uses CEQR emission factors that are different than those used under Local Law 97. The Proposed Actions would need to comply with Local Law 97. If required, the Applicants could purchase renewable energy credits or install clean distributed energy resources to reduce development sites' energy to comply with the emissions limits. The use of "beneficial electrification," or installed heat pumps for space or water heating, may also be used to offset building annual GHG emissions to comply with the emissions limits.

The overall GHG emissions generated by the Proposed Actions constitute approximately 0.015 percent of the 2022 New York City annual GHG emissions of 53.6 million metric tons (MMT) of CO_2e. In addition, the *CEQR Technical Manual* outlines major goals toward GHG reduction:

- Construct new resource- and energy-efficient buildings (including the use of sustainable construction materials and practices) and improve the efficiency of existing buildings; and,
- Encourage sustainable transportation through improving public transit, improving the efficiency of private vehicles, and decreasing the carbon intensity of fuels.

The Proposed Actions are consistent with these goals, as follows:

- The Proposed Actions would allow increases in residential and commercial density at the development sites and would expand community amenities through the construction of the commercial space. The inclusion of local retail will likely result in internal capture that will reduce mobile source emissions.
- The future development under the Proposed Actions would be built in accordance with the latest New York State and New York City codes, including the 2020 Energy Conservation Construction Codes of New York State (ECCNYS) and 2020 New York City Energy Conservation Code (NYCECC)—both of which govern building efficiency in the choice of HVAC system and the exterior building envelope.
- The future development under the Proposed Actions would include numerous residential units in close proximity to both bus and subway transit stations. Development in a transit-rich location facilitates a lower automobile mode share and ensures that the GHG emissions per person would be lower than that of development for the same number of people on a site not well-served by transit.

Accordingly, the Proposed Actions would be consistent with New York City GHG reduction goals for large buildings and would contribute toward the goal of reducing citywide GHG emissions by 40 percent by 2030 and 80 percent by 2050 compared to 2005 levels.

Resilience to Climate Change

This section describes the potential effects of global climate change on the development sites due to SLR and coastal hazards and summarizes the resilience measures that would be implemented for future development at the development sites. As discussed in **Appendix A: Waterfront Revitalization Program Consistency Assessment**, the development sites are located within the City's Coastal Zone. Development Site 1 is currently outside of the 100-year flood area (i.e., the 1 percent annual chance floodplain) based on the 2015 FEMA FIRMs, but a small portion of the lot would be within the 1 percent annual chance floodplain by the 2050s. Development Site 2 is currently outside of the 100-year flood area and would remain outside of the 100-year flood area during its life span.

Because Development Site 1 would be constructed in the 1 percent annual chance floodplain by the 2050s, the potential effects of climate change as it relates to current and future sea-level rise scenarios are considered in this assessment. According to the *CEQR Technical Manual*, an analysis of consistency with Policy 6.2 of the WRP may provide sufficient information to assess the potential effects of sea-level rise, storm surge, and coastal flooding. Policy 6.2 identifies three basic steps to determine the consistency of a project with this policy: (1) identify vulnerabilities and consequences; (2) identify adaptive strategies; and (3) assess policy consistency. Building features are defined in one of four categories: (1) *vulnerable*—project features that have the potential to incur significant damage if flooded; (2) *critical*—project features that if damaged would have severe impacts on the project and its ability to function as designed; (3) *potentially hazardous*—project features that if damaged or made unsecure by flooding could potentially adversely affect the health and safety of the public and the environment; and (4) *other*—project features that are entirely open and unenclosed spaces, except the open storage of potentially hazardous materials, which may be damaged by flooding, but are not likely to present significant consequences and are more easily repaired. These features are assessed against sea level rise and Mean Higher High Water (MHHW) projections ranging from low to high estimates produced by the NPCC. Adaptive strategies to mitigate the impacts of sea-level rise and flooding on vulnerable and critical features and additional measures taken to protect the project from additional coastal hazards such as waves, high winds, or debris are discussed.

At Development Site 1, the cellar, which would be at an elevation of +3 feet (NAVD 88), is located within the current 1 percent annual chance floodplain under high SLR projections. The first-floor non-critical commercial space, while outside current floodplain projections, is expected to fall within the 1 percent annual chance floodplain by the 2050s under mid SLR projections. The non-critical residential lobby and bicycle storage on the first floor will be affected by the 2080s under high SLR projections and by the 2100s under high-mid SLR projections. All critical residential units, and mechanical rooms for both residential and commercial uses would be located at the second floor and above, which would remain outside of any SLR projections during the project's life span.

To address flood risks, the development is designed to a flood elevation (DFE) of +13 feet (NAVD 88). Commercial areas on the ground floor and cellar will be dry flood-proofed with essential mechanical systems for both residential and commercial areas located on the second floor, safely above projected flood levels throughout the building's life span. Non-critical features, such as auto repair and trash storage, will be housed in the cellar.

While the cellar's average elevation is below the current floodplain, residential entrances and uses are placed above it at +15 feet, effectively mitigating flood risk under mid SLR projections for the 2050s. Dry flood-proofing measures will be applied to commercial areas in the flood risk zones.

These measures align with Policy 6.2, ensuring that critical features remain safe from flooding during the building's life span. By adopting site-specific adaptive strategies, the project bolsters resilience against the expected future elevations of the Mean Higher High Water (MHHW) or the 1 percent annual chance flood events due to sea-level rise.

Green infrastructure technologies and subsurface detention will be employed to manage stormwater on-site. These measures will not only meet local stormwater management requirements but also enhance the site's resilience to increased rainfall and storm surge. Additionally, future development under the Proposed Actions would align with broader city initiatives such as OneNYC 2050, which aim to reduce GHG emissions and adapt to climate change. Furthermore, compliance with the New York City Building Code and FEMA flood protection requirements will ensure that the development meets current and future standards.

As detailed in **Appendix A**, the Proposed Actions would promote Policy 6.2. The Proposed Actions would not result in the development of any vulnerable, critical, or potentially hazardous features, within areas exposed to 1 percent annual chance flooding or MHHW by the 2050s under the 90th percentile projections. Critical features of Development Site 1 would not face flood risk during the building's life span. Vulnerable project features below the projected elevation of the future high estimate of MHHW or 1 percent chance annual flood and sea level rise would be made resilient through the implementation of site-specific adaptive strategies described above.

In summary, the resilience measures incorporated into the future development at Development Site 1 include:

- Elevated critical infrastructure
- Green infrastructure
- Subsurface detention

These strategies would collectively enhance the resilience of future development at Development Site 1 and contribute to the broader efforts to protect New York City from climate change impacts.

Based on the above review, the Proposed Actions would be consistent with New York City policies regarding adaptation to climate change. With the incorporated measures, future development at the development sites under With-Action conditions is prepared to withstand likely flooding impacts over an 80-year building life span, with opportunities for additional resilience improvements based on future climate data.