A. INTRODUCTION

This chapter forecasts the greenhouse gas (GHG) emissions that would be generated as a result of the Proposed Project and assesses the Proposed Project's consistency with the citywide GHG reduction goal. In addition, as the Project Sites partially fall within the Federal Emergency Management Agency (FEMA)-designated 0.2 percent annual chance flood zone, also known as the 500-year floodplain, a qualitative discussion of the potential effects of climate change on the Proposed Project is provided below (furthermore, see **Chapter 05.01, "Land Use, Zoning, and Public Policy,"** for further assessment of how the Proposed Project integrates planning and design with respect to the latest New York City projections of climate change and sea level rise (as published in New York City Panel on Climate).

Increased concentrations of GHGs 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. These impacts have been confirmed by the New York City Panel on Climate Change (NPCC), whose most recent report, released in April 2024, showed increased flood risk for most City neighborhoods as compared to previous reports. Through PlaNYC, New York City's long-term sustainability program, and continued and enhanced in OneNYC, the City advances sustainability initiatives and goals to both greatly reduce GHG emissions and increase the City's resilience to climate change. 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"). On November 13, 2014, the City Council passed a bill to reduce citywide GHG emissions by 80 percent by 2050, and it was adopted on December 14, 2014 (Local Law 66 of 2014). In 2016, as part of the City's implementation of strategies aimed at achieving the OneNYC GHG reduction goals, the City adopted a more stringent building energy code which substantially increased the energy efficiency required. That same year, the City also published a pathway to achieving the GHG reduction goals in the building sector. On May 18, 2019, the City Council passed Local Law 97 of 2019, which sets emission caps for many different types of buildings, with the goal of achieving a 40 percent overall reduction of emissions by 2030. On March 29, 2020, the City Council adopted an even more stringent energy code, the 2020 New York City Energy Conservation Code (NYCECC), that would apply to the Proposed Project.

New York State also has established GHG reduction targets, which as discussed below under "Regulatory Context" include a Statewide reduction in GHG emissions from 1990 levels of 40 percent by 2030 and 85 percent by 2050 (6 NYCRR Part 496).

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 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. The 2021 *City Environmental Quality Review Technical Manual* (*CTM)* recommends that a GHG consistency assessment be conducted for any project resulting in 350,000 square feet (sf) or more of development, and other energy-intense projects.

Consistent with *CTM* guidance, the analysis presented herein conservatively assumes that the greenhouse gas (GHG) emissions associated with the Proposed Project and its effects on global climate change would represent an absolute incremental increase over the No-Action Alternative. The *CTM* also advises that, although a project's total GHG emissions should be calculated, a numerical threshold for determining significance should not be established for the purposes of environmental review. Nevertheless, the residential and non-residential populations served by the Proposed Project also would be expected to generate GHG emissions under the No-Action Alternative, which is not accounted for in the prescribed analysis methodology. In the case of residents of the existing buildings, they would continue to reside on the Project Sites in the No-Action Alternative, generating an equal amount of GHGs as they are under existing conditions on these sites. The new residents, employees, and patrons that would be introduced to the Project Sites as a result of the Proposed Project would also continue to generate GHGs at a comparable scale to existing conditions, although, absent the Proposed Project, these emissions would occur elsewhere as the proposed new buildings would not be constructed. Therefore, the introduction of a new population on the Project Sites would not have an impact on global GHG emissions. Accordingly, this chapter assesses the Proposed Project's consistency with the GHG reduction goal by calculating the total GHG emissions associated with the Proposed Project and examining the project's contribution in relation to qualitative goals for reducing GHG emissions.

Furthermore, the analysis conservatively does not account for differences in the projections of GHG emissions from newer buildings constructed as part of the Proposed Project as compared to older buildings including those that would remain on the Project Sites under the No-Action Alternative, despite the fact that, for example, all new buildings under the Proposed Project will not use fossil fuels as the existing buildings do. This is because the *CTM* does not distinguish between the rate of GHG emissions from older buildings as opposed to new buildings. As such, the analysis presented herein does not account for potential reductions in GHG emissions that would result from laws and market trends that would result in reduced GHG emissions from the new buildings constructed under the Proposed Project as compared to the continued use of the existing buildings on the Project Sites under the No-Action Alternative.

As discussed in **Chapter 02.0, "Project Alternatives,"** there are three feasible alternatives under consideration for implementation of the Proposed Project. These include: Alternative 2 – the Rezoning Alternative; Alternative 3 – the Non-Rezoning Alternative; and Alternative 4 – the Midblock Bulk Alternative. A discussion of Alternative 5 – the Rehabilitation and Infill Alternative, which has been determined to be infeasible, is presented in **Chapter 05.22, "Rehabilitation and Infill Alternative Analysis."** Refer to **Chapter 04.0, "Analysis Framework," Table 04.0-4,** for information on the analysis approach for the three feasible alternatives for each technical area.

B. PRINCIPAL CONCLUSIONS

The Proposed Project, under the Rezoning Alternative, Non-Rezoning Alternative, and Midblock Bulk Alternative, would not result in significant adverse impacts related to GHG and climate change as it would be consistent with the City's GHG emissions reduction goals and laws, as defined in the *CTM*. Furthermore, the Proposed Project would be consistent with State emissions reduction legislation as well as City and State policies and regulations regarding adaptation to climate change. Refer to **Section D, "Affected Environment"** for further information.

C. METHODOLOGY

Recognized GHGs

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. The general warming of the Earth's atmosphere caused by this phenomenon is known as the "greenhouse effect." There are six GHGs that could potentially be included in the scope of a GHG analysis for an Environmental Impact Statement (EIS): carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Project.

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 (or "sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. Methane (CH_4) and Nitrous oxide (N_2O) also play an important role since the removal processes for these compounds are limited and because they have a relatively high impact on global climate change as compared with an equal quantity of CO_2.

GHGs differ in their ability to trap heat in the atmosphere. To present a complete inventory of all GHGs, component emissions are added together and presented as carbon dioxide 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[1] 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 main GHGs discussed above are presented in **Table 05.15-1**.

[1] *Radiative forcing* is a measure of the influence a gas has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the gas as a GHG.

Table 05.15-1: Global Warming Potential for Primary Greenhouse Gases

Greenhouse Gas	Common sources	CLCPA AR5 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	84
N_2O – Nitrous Oxide	Fossil fuel combustion, fertilizers, nylon production, manure	264
HFCs – Hydrofluorocarbons	Refrigeration gases, aluminum smelting, semiconductor manufacturing	427-10,800*
PFCs – Perfluorocarbons	Aluminum production, semiconductor manufacturing	4,800-8,210*
SF_6 – Sulfur Hexafluoride	Electrical transmissions and distribution systems, circuit breakers, magnesium production	17,500

Notes:
* The GWPs of HFCs and PFCs vary depending on the specific compound emitted. A full list of these GWPs is available in Table 2 of the NYSDEC 2022 Statewide GHG Emissions Report available at: https://www.dec.ny.gov/energy/99223.html#Report.

Source: NYSDEC 2023 Statewide GHG Emissions Report

The New York State Department of Environmental Conservation (NYSDEC) has published several reports as guidance for addressing climate change impacts from GHGs. NYSDEC Guide for Assessing Energy Use and GHG Emissions in an Environmental Impact Statement[2] was established to identify the methods and boundaries for the assessment of energy use, GHG emissions, and mitigation measures for an EIS that is subject to SEQRA. This guide was used in conjunction with NYSDEC Statewide GHG Emissions Report[3] to assess direct and indirect sources of GHG emissions as a result of the Proposed Project. The assessment was conducted to determine and demonstrate adherence to statewide goals.

A project's GHG emissions can generally be assessed in two steps: the first would be to estimate the GHG emissions resulting from multiple sources as a result of the Proposed Project and the second would be to examine the Proposed Project in terms of the City's qualitative goals for reducing GHG emissions. A project's emissions are 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. After the emissions are estimated, the sources of GHG emissions are examined in terms of goals for reducing GHG emissions using qualitative considerations. The qualitative goals that should be assessed, as relevant, are: (1) pursuing transit-oriented development; (2) generating clean, renewable power; (3) constructing new resource- and energy-efficient buildings and/or improving the efficiency of existing buildings; and (4) encouraging sustainable transportation.

Operational emissions and mobile source emissions were considered for this analysis. The assessment is based on the total GHG emissions associated with the entire project, i.e., "With-Action" condition, for each of the development alternatives, rather than the relative increment of identified alternative's GHG emissions as compared to the No-Action Alternative. The Proposed

[2] Office of Air, Energy, and Climate, *Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements* (New York: Department of Environmental Conservation, 2009). https://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf

[3] Statewide Greenhouse Gas Emissions Report – NYSDEC (website), New York State. https://www.dec.ny.gov/energy/99223.html#Report

Project's construction, which would be of typical of New York City intensity given its staged schedule, is not likely to represent a significant amount of emissions at any point in time relative to the emissions resulting from the Proposed Project under operational conditions.[4] As such, a quantitative construction emissions analysis is not required pursuant to *CTM* guidance, although emissions associated with construction have been described qualitatively herein based on other similar analyses for building construction. The microscale effects of the Proposed Project's construction period air pollutant emissions are analyzed in **Chapter 05.19, "Construction."** Similarly, because the Proposed Project is not expected to fundamentally change the City's solid waste management system (**see Chapter 05.11, "Solid Waste and Sanitation Services"**), an estimate of emissions from solid waste management is not warranted**.**

Consistency with the GHG Reduction Goal

According to the *CTM*, the assessment of consistency with the City's GHG reduction goal should answer the following question: "Is the project consistent with the goal of reducing GHG emissions, specifically the attainment of the City's established GHG reduction goal of reducing citywide GHG emissions by 30 percent below 2005 levels by 2030?" To determine consistency with the City's overall GHG reduction goal, the following assesses consistency with the four major goals, as relevant to the project:

- Pursue transit-oriented development;
- Generate clean renewable power through replacement of inefficient power plants with state-of-the-art technology and expanding the use of clean distributed generation (not applicable to the Proposed Project);
- 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.

As noted above in the **Section A, "Introduction,"** New York State also has similar GHG reduction goals, specifically 85 percent reduction by 2050, and the City's goals are intended in part to ensure the City's compliance with the State's goal.

D. AFFECTED ENVIRONMENT

Regulatory Context

Various Federal, State and local agencies promulgate programs that relate to efforts to reduce GHG emissions. Those most relevant to the Proposed Project, are discussed below.

[4] As explained in more detail on **Pages 05.15-12 – 05.15-13**, analyses prepared for large development projects in New York City have shown that construction emissions are generally equivalent to the total operational emissions from the operation of the buildings over approximately five to ten years.

State Regulations

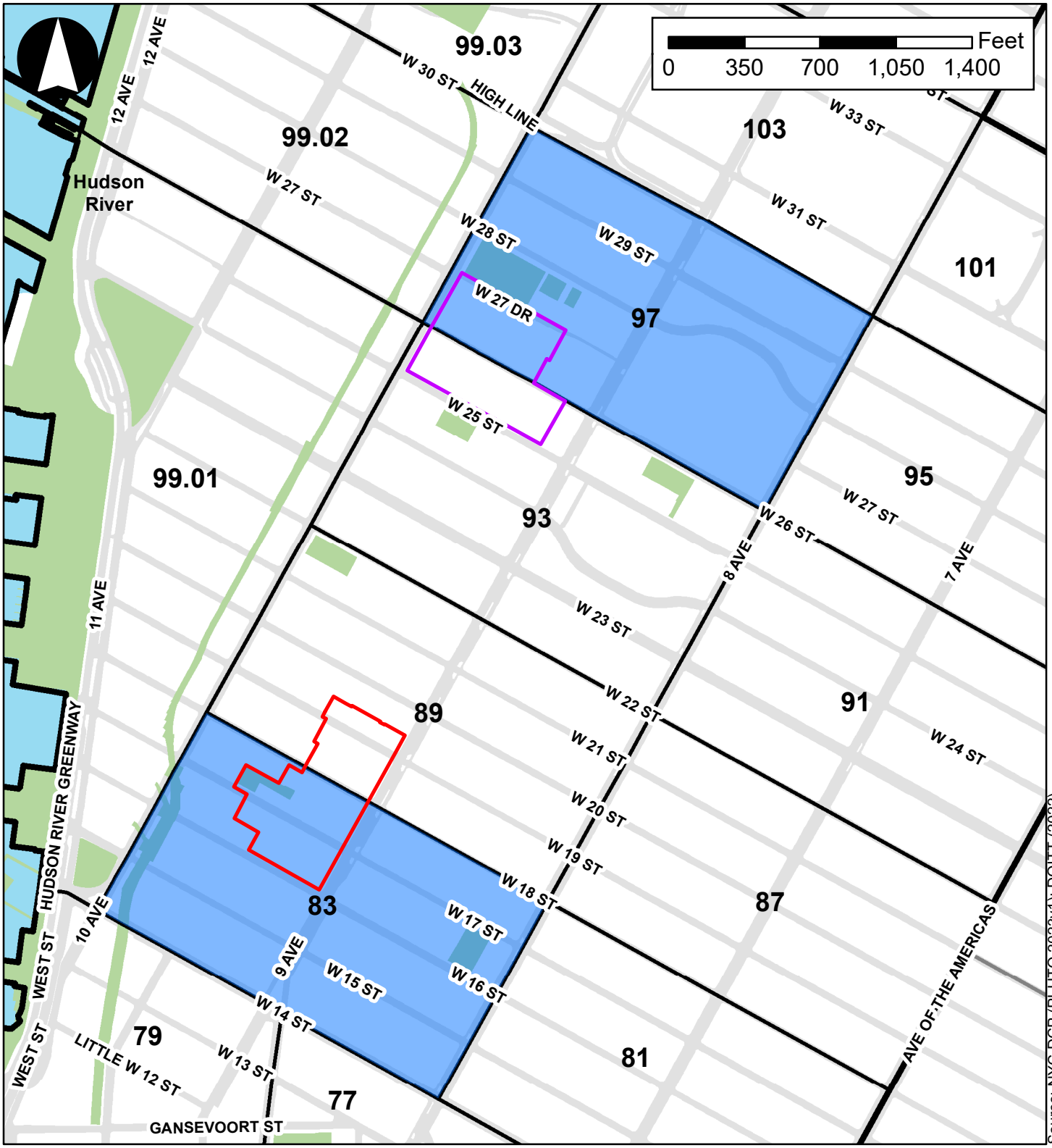
New York State Climate Leadership and Community Protection Act (CLCPA)

In 2019, New York State enacted the Climate Leadership and Community Protection Act (CLCPA), which became effective January 1, 2020. Among other requirements, the CLCPA Section 7(2) directs State agencies to determine if the decisions they make are consistent with the Statewide GHG emission limits established by the CLCPA (ECL Article 75). Pursuant to ECL Article 75, the CLCPA's Statewide GHG emission limits require a Statewide reduction in GHG emissions from 1990 levels of 40 percent by 2030 and 85 percent by 2050 (6 NYCRR Part 496). Further, the CLCPA requires that the energy generation sector be zero-emissions by 2040. The legislation also charges the New York State Climate Action Council (CAC) with making recommendations such as to establish agency regulations to reduce emissions and increase investments in renewable energy sources. The State must also ensure that significant portions of such investments are made in Disadvantaged Communities. To address Section 7(3) of CLCPA, the State is required to ensure that its actions do not disproportionately impact Disadvantaged Communities and prioritize the reduction of GHG emissions and co-pollutants in Disadvantaged Communities. The Project Sites are partly located in designated Disadvantaged Communities; the southern two blocks of the Fulton Houses Project Site are located in New York County Census Tract 83, which is a designated Disadvantaged Community, and the northern block of Elliott-Chelsea Houses Project Site is located in New York County Census Tract 97, which is also a designated Disadvantaged Community. However, the northern two blocks of the Fulton Houses Project Site and the southern block of the Elliott-Chelsea Houses Project Site are not in a designated Disadvantaged Community. For discussion of whether the Proposed Project will disproportionately burden Disadvantaged Communities, see **Chapter 05.20, "Environmental Justice."** See **Figure 05.15-1**.

On December 19, 2022, the CAC approved a Scoping Plan 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. In particular, for transportation the Scoping Plan recommends transition to zero-emission vehicles and equipment and access to low-carbon modes of transport; and for electricity the Scoping Plan recommends transformation of power generation by scaling up clean energy resources and enhancing the grid. With passage of the CLCPA, New York State has committed to develop, build, and interconnect 9 gigawatts (GW) of offshore wind energy capacity by 2035.

New York State Executive Order of 2022

In September 2022, Governor Hochul signed an Executive Order to accelerate efforts to make State operations more sustainable. Executive Order 22 builds upon progress made by the GreenNY Council to continue streamlining the administration of the State's lead-by-example sustainability and climate directives and sets new goals for the environmental performance of State agencies. Through the Executive Order, the GreenNY Council will ensure that State agencies follow best practices in green purchasing and in their operations by issuing new green purchasing specifications and operational directives. The Order will be administered by the GreenNY Council, a multi-agency working group co-chaired by NYSDEC, the Division of the Budget, the Office of



Source: NYC DCP (PLUTO 2023v1); DOITT (2022)

Legend

- Elliott-Chelsea Houses
- Fulton Houses
- DAC Area
- 83 Study Area Census Tracts
- Open Space Resources

General Services, the New York State Energy Research and Development Authority, and the New York Power Authority. Required annual reporting from agencies and authorities will help ensure that the goals of the Order are achieved.

New York State All-Electric New Buildings Law

In 2023, the New York State legislature adopted legislation known as the All-Electric New Buildings Law. It prohibits, with some exceptions, fossil fuel equipment and buildings systems, starting in 2026 for smaller buildings and for larger buildings beginning in 2029.

New York City Initiatives

NYCHA Sustainability Agenda

In September 2021, the New York City Housing Authority (NYCHA) adopted its Sustainability Agenda, which aims to create comfortable and healthy homes while promoting sustainability through green design, construction methods, and building operations. To this end, the agenda identifies 21 strategies to achieve its five overarching goals:

1. Reduce greenhouse gas emissions by 80 percent by 2050
2. Cultivate healthy and resilient communities based on design excellence
3. Empower residents through community activation and workforce development
4. Ensure efficient building operations and resource management
5. Leverage all funding and financing toward healthier and decarbonized buildings

The Sustainability Agenda was the result of extensive stakeholder engagement and will be updated every five years to reflect new technologies and the agency's evolving needs.

HPD Design Guidelines

In September 2023, HPD issued version 2.0 to the HPD Design Guidelines for New Construction (the "Guidelines"), which establish the criteria by which HPD evaluates proposed developments for multifamily new construction, supportive, and senior housing projects. HPD seeks to support projects that meet several core principles, including standards for urban design, accessible apartment design, the promotion of greater equity, active design for better health outcomes, and the minimization of climate impact and enhancement of climate resiliency.

As it relates to minimizing climate impact, the Guidelines require that new projects achieve Enterprise Green Communities certification using the NYC Overlay for new construction or LEED v4 Gold certification or above. New development must also be designed to meet NYC Local Law 97's 2050 GHG emissions limits in 2050. Additionally, projects are encouraged to meet additional energy efficiency standards, including achieving Enterprise Green Communities Plus or Passive House certification.

Local Law 97

In 2019, the New York City Council enacted a legislative package targeting GHG emissions associated with building energy consumption—the Climate Mobilization Act (Local Law 97). For most buildings that exceed 25,000 gsf (excluding electricity/steam generation facilities, rent-regulated accommodations, places of public worship, and City-owned properties), the City has established annual building emission limits beginning in 2024 and would require the owner of a covered building to submit annual reports demonstrating the building is in compliance with the current GHG emission limits. For buildings not covered under the GHG emissions limits, owners may either demonstrate compliance with the current limits or implement specified energy conservation measures where applicable.

Local Law 48

In March 2020, the City enacted Local Law 48 of 2020, to bring the NYCECC up to date with the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS), which is based on the 2018 edition of the International Energy Conversation Code and American Society of Heating, Refrigerating, Air-Conditioning, and Engineers (ASHRAE) Standard 90.1-2016, and also aligns with the New York State Energy Research and Development Authority (NYSERDA) NYStretch Energy Code-2020. The 2020 ECCCNYS: "Establishes minimum requirements for energy-efficient buildings using prescriptive and performance related provisions. […] This code is founded on principles intended to establish provisions consistent with the scope of an energy conservation code that adequately conserves energy; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction." As noted in the "Preface" to the updated NYCECC, "New York City is authorized by the New York State Energy Law to enact its own energy code, provided the City's code is more stringent than the requirements for New York State, codified in the New York State Energy Conservation Construction Code." The 2020 version of the NYCECC adopts the provisions of the 2020 ECCCNYS, aligns with administrative provisions of the NYC Construction Codes and the NYSERDA NYStretch Energy Code-2020, and adopts additional requirements. It is intended to ensure that the construction of new buildings, additions and alterations will meet the 80 percent GHG reduction by 2050.

Local Law 154

In December 2021, the New York City Council enacted Local Law 154, intended to limit the use of fossil fuels in future building construction. This law requires expansion of electric alternatives over those of natural gas and fuel oil. The law takes effect in phases; the first phase for smaller buildings takes effect in December of 2023.

City of Yes for Carbon Neutrality

In 2023, the NYC Department of City Planning advanced City of Yes for Carbon Neutrality, a zoning text amendment application, which was approved by the City Council, and the new zoning

text is intended to advance efforts to achieve New York City's 2050 GHG emissions reduction goals. Please refer to **Chapter 05.12, "Energy,"** for more information.

Building Operational Emissions

Building operational emissions are defined by the World Green Building Council as carbon emissions from energy needed to heat, cool and power buildings. For projects such as the Proposed Project, where details such as the specific energy source to be used to supply the building electricity are unknown at this time, annual GHG emissions should be estimated based on a project's anticipated future floor area. Table 18-4 of the *CTM* provides the carbon intensities of New York City building types, which were used to calculate annual operations emissions of the Proposed Project's program for the development alternatives. These carbon intensities include all GHG emissions, both on- and off-site.

As noted in **Chapter 05.14, "Air Quality,"** the Proposed Project would use electricity for heat and hot water, meaning there would be no on-site operational fossil fuel combustion, i.e., each new building would be an "all-electric building" which would eliminate on-site building-system air pollutant emissions upon project completion in 2041. As such, this chapter provides a conservative analysis of the emissions from heat and hot water, given that the emissions generated by a fully electric building is wholly dependent on Con Edison's future fuel mix. Also, as noted above, City and State legislation restricting the use of fossil fuels in new buildings will be phased in over the course of the implementation of the Proposed Project and would be in place before the 2041 completion year. The Permanently Affordable Commitment Together (PACT) Partner is also contemplating incorporating solar photovoltaic systems for generating some on-site power but the feasibility of its implementation has not been determined at this time.

Future emissions are expected to be lower as efficiency and renewable energy use continue to increase with the objective of meeting State and City GHG reduction goals. Furthermore, the Proposed Project would be required at a minimum to achieve the energy efficiency requirements of New York City's 2020 NYCECC and building code and, as applicable, energy efficiency requirements that the City, State, and/or Federal governments may adopt in the future.

Mobile Source Emissions

Per the *CTM*, mobile source emissions are defined as "Vehicular traffic, whether on a road or in a parking garage. Other moving sources, such as planes, helicopters, boats, trains, etc., may also affect air quality." In other words, these are limited to tailpipe emissions or other emissions directly from the point of the vehicle.

The number of annual vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Project was calculated using the transportation planning assumptions developed for the analysis presented in **Chapter 05.13, "Transportation."** The assumptions used in the calculation include average daily weekday and Saturday person trips and delivery trips by use, the percentage of vehicle trips by mode, and the average vehicle occupancy. To calculate annual totals, the number of trips on Sundays was assumed to be the same as on Saturdays. Average one-way trip distances as shown in Tables 18-5 and 18-6 of the *CTM* were used in the calculations of annual vehicle miles traveled by cars and taxis. The average truck trip was assumed to be 38 miles as per

the *CTM*. Table 18-7 of the *CTM* was used to determine the percentage of vehicle miles traveled by road type.

Construction Emissions

Per the *CTM*, construction emissions are defined as "Dust emissions generated by the construction of a new facility, dust emissions related to sandblasting; emissions from construction equipment (typically an issue of concern for very large, multiphase projects); or emissions from construction-generated traffic or diversion of traffic because of construction activity."

A description of construction activities associated with the Proposed Project is provided in **Chapter 05.19.** Consistent with common CEQR practice, GHG emissions associated with construction have not been estimated explicitly for the Proposed Project, but analyses prepared for large development projects in New York City 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 five to ten years. Annualized emissions associated with construction were found to represent approximately 3 to 7.6 percent of the overall annual emissions for such projects.

Emissions from Solid Waste Management

The Proposed Project would not directly change or have an impact on the City's solid waste management system based on the anticipated increases of solid waste from the development alternatives. because there would be no changes to solid waste transportation mode, distances, or disposal technologies. See **Chapter 05.11** for a full analysis and discussion**.** Therefore, GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified, per *CTM* guidance.

E. ENVIRONMENTAL EFFECTS

Alternative 1 – No-Action Alternative

GHG Emissions

The *CTM* advises that GHG emissions do not, in and of themselves, suggest the possibility of a significant adverse impact. Consequently, developing a study area, measuring the relative increment of a project's GHG emissions as compared to a No-Action scenario, and then comparing that increment to a quantitative threshold is not appropriate; rather, the lead agency should assess the project's consistency with the GHG reduction goal by calculating the total GHG emissions associated with a project and examining the project's contribution in relation to qualitative goals for reducing GHG emissions. Accordingly, a calculation of the No-Action Alternative's GHG emissions is not provided. Instead, qualitative information about No-Action Alternative GHG emissions is provided for context.

The No-Action Alternative is the 2041 future condition without the Proposed Project and conservatively assumes that GHG emissions associated with operational, mobile, and construction emissions of the Project Sites would remain unchanged from existing conditions and does not include any additional energy efficiency measures that may be implemented in the future. Under the No-Action Alternative, the residential units and community facility uses would remain and the buildings would undergo typical NYCHA maintenance work to improve the living conditions and quality of life on the Project Sites. As described in **Chapter 05.12**, Con Edison and the Zero Carbon Mile Consortium, which consists of Reshape Strategies and Related Companies (which is affiliated with the PACT Partner), are currently investigating a potential energy project which is independent of the Proposed Project but which may affect a portion of the Fulton Houses Project Sites. The Con Edison Utility Thermal Energy Network (UTEN) Chelsea Pilot Project would capture and recycle heat from a data center, located within a commercial office building at 85 10th Avenue. The heat would be used to provide heating, cooling, and domestic hot water services (DHW) to select buildings at the Fulton Houses Project Site via a thermal energy main (Primary Ambient Loop) along W. 16th Street to a clean heat pump facility (Energy Center). Water-source variable refrigerant flow (VRF) systems at each of the affected buildings will connect to a Secondary Ambient Loop to provide both heating and cooling to the residents.[5] Utilizing electricity for operational heating and hot water systems would reduce the on-site combustion of fossil fuels. The No-Action Alternative would not construct new resource- and energy-efficient buildings on the Project Sites.

As the GHG emissions are conservatively assumed to remain as existing conditions, the No-Action Alternative would not further local and regional policies towards reducing GHG emissions but nonetheless would not result in a significant adverse impact.

Climate Change

As discussed in **Chapter 05.01,** if any or parts of the Project Sites are designated within the FEMA-designated 100-year floodplain at a future date, any vulnerable and critical building elements may need to be elevated as required by FEMA and NYC regulations. Given the design of the existing buildings on the Project Sites, implementation of these retrofits would be infeasible without extensive renovation work in the No-Action Alternative. Under the No-Action Alternative, elevating any vulnerable and critical building elements would depend on there being a proposed capital project affecting these systems (such as a boiler replacement). Currently, there is no funding in place to propose any such capital projects. Therefore, there is no plan for this work to occur by the 2041 build year. As such, the No-Action Alternative would not be consistent with New York City policies regarding climate change adaptation.

[5] State of New York Public Service Commission, "Supplemental Information for Consolidated Edison Company of New York, Inc.'s Utility Thermal Energy Network Pilot Project Proposals," accessed November 20, 2024. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={50C13588-0000-CD14-ABF3-6D5DFFB6067B}

Alternative 2 – Rezoning Alternative and Alternative 4 – Midblock Bulk Alternative

GHG Emissions

Operational GHG Emissions

Table 05.15-3 displays the estimated annual GHG emissions associated with the operation emissions of the Project Sites resulting from either the Rezoning Alternative or Midblock Bulk Alternative. As shown in **Table 05.15-3**, operational GHG emissions are estimated to be approximately 34,223 metric tons of carbon dioxide equivalents. It should be noted that the estimated GHG emissions for the Rezoning Alternative and Midblock Bulk Alternative conservatively do not account for any energy efficiency measures that are expected to be implemented under both of these alternatives, consistent with *CTM* guidance. Also, the values reported are incremental increases, i.e., they do not include emission from the existing uses which would remain in the No-Action Alternative and would be replaced under these alternatives.

Mobile Source Emissions

As detailed above, the transportation planning assumptions outlined in **Chapter 05.13** in combination with the average trip length tables in the *CTM*, were utilized to calculate the total vehicle miles traveled introduced by the Proposed Project. The projected annual vehicle miles traveled for the Proposed Project's development alternatives, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 05.15-2**. The mobile GHG emissions calculator referenced in the *CTM* was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Project, which is presented in **Table 05.15-3**.

Table 05.15-2: Proposed Project's Annual Vehicle Miles Traveled (miles per year)

Alternative	Use	Passenger Vehicles	Taxis	Trucks	Total
Rezoning and Midblock Bulk Alternatives	Residential	5,853,023	1,201,323	3,714,401	**10,753,747**
Rezoning and Midblock Bulk Alternatives	Local Retail/Supermarket	483,568	93,490	168,273	**745,330**
Rezoning and Midblock Bulk Alternatives	Community Facility	221,397	297,215	121,225	**639,837**
	Total VMT	**6,542,988**	**1,592,028**	**4,003,899**	**12,138,914**
Non-Rezoning Alternative	Residential	4,522,980	928,463	2,587,947	**8,039,390**
Non-Rezoning Alternative	Local Retail/Supermarket	321,220	62,103	105,524	**488,847**
Non-Rezoning Alternative	Community Facility	237,079	357,974	122,668	**717,721**
	Total VMT	**5,081,280**	**1,348,540**	**2,816,139**	**9,245,958**

As noted above, the number of annual motorized vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Rezoning Alternative and Midblock Bulk Alternative was calculated above in **Table 05.15-2.** As presented therein, it is estimated that the total number of vehicle trips generated by the Rezoning Alternative and Midblock Bulk Alternative would travel

a total of 12,138,914 miles annually; annual passenger vehicle miles would total 6,542,988, annual taxi vehicle miles would total 1,592,028, and annual truck trip miles would total 4,003,899.

Table 05.15-3: Annual Operational Emissions for the Rezoning Alternative and Midblock Bulk Alternative

Building Type	*CTM* Carbon Intensity Rates (kg Carbon Dioxide Equivalent/sq. ft)	Project Sites Floor Area (gsf)	GHG Emissions (kg)	GHG Emissions CO_2e (metric tons)
Commercial	9.43	46,364	437,213	437
Industrial	23.18	0	0	0
Institutional	11.42	175,852	2,008,230	2,008
Large Residential (>4 families)	6.59	4,822,136	31,777,876	31,778
Small Residential (<4 families)	4.2	0	0	0
Total		5,044,352	34,223,319	34,223

Notes:
Commercial = Retail and supermarket; Institutional = all community facility uses
Carbon Intensity Rates per *CTM* Table 18-4; GHG emissions (kg) are the product of these rates and the gsf
1 metric ton = 1,000 kg

The aforementioned mobile GHG emissions calculator was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Rezoning Alternative and Midblock Bulk Alternative. As shown in **Table 05.15-4**, annual mobile source emissions associated with the Rezoning Alternative and Midblock Bulk Alternative would result in approximately 12,213 metric tons of carbon dioxide equivalents.

Table 05.15-4: Annual Mobile Source Carbon Dioxide Equivalent (CO_2e) Emissions (in metric tons/year) for the Rezoning Alternative and Midblock Bulk Alternative

Road Type	Passenger Vehicles	Taxis	Trucks	Total
Local	1,128.19	248.61	2,744.62	4,121.42
Arterial	1,498.53	326.32	3,694.13	5,518.98
Interstate/Expressway	660.82	142.52	1,768.59	2,571.92
Total	**3,287.54**	**717.44**	**8,207.34**	**12,212.32**

Notes:
Calculations made using the "Mobile GHG Emissions Calculator" provided in the *CTM.*
Some totals appear to not sum correctly due to rounding.

Summary of Emissions

The total projected GHG emissions from the Rezoning Alternative and Midblock Bulk Alternative are shown in **Table 05.15-5**. The estimated total of 46,436 metric tons of GHG emissions is approximately 0.09 percent of New York City's 2023 annual total of 51.2 million metric tons.[6] As noted above, the estimated operational GHG emissions for the Rezoning Alternative and Midblock Bulk Alternative conservatively do not include any additional energy efficiency measures that may be implemented in the future. As described in **Section D**, construction emissions were not modeled explicitly, but are estimated to be equivalent to approximately five to ten years of operational emissions, including both direct energy and emissions embedded in materials (extraction, production, and transport). This is equivalent to between approximately 171,115 and 342,230

[6] NYC Greenhouse Gas Inventories – NYC Mayor's office of Climate and Environmental Justice (website), New York City. https://climate.cityofnewyork.us/initiatives/nyc-greenhouse-gas-inventories/

metric tons of GHG emissions. The Rezoning Alternative and Midblock Bulk Alternative is not expected to change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Table 05.15-5: Summary of Total Annual GHG Emissions from the Rezoning Alternative and Midblock Bulk Alternative

Emissions Source	CO_2e Emissions (metric tons)
Operations	34,223
Mobile Sources	12,213
Total	46,436

Elements of the Rezoning Alternative and Midblock Bulk Alternative That Would Reduce GHG Emissions

In general, dense, mixed-use infill developments with access to transit and located in existing pedestrian-oriented areas are consistent with sustainable land use planning and smart growth strategies that reduce the carbon footprint of new developments. These features, which address the PlaNYC/OneNYC goals are discussed in this section. The Rezoning Alternative and Midblock Bulk Alternative would result in development that is consistent with the City and State's emissions reduction goals of 80 percent and 85 percent, respectively, by 2050,, based on the City and State's commitments to energy-efficiency and by virtue of the Project Sites' location and nature.

Build Efficient Buildings

The Rezoning Alternative and Midblock Bulk Alternative involves the development of mixed-use buildings on previously developed urban land, thereby minimizing vegetation/forest loss as it avoids the use of a greenfield location. Furthermore, the Rezoning Alternative and Midblock Bulk Alternative would facilitate the development of building on sites with existing urban infrastructure, including public sidewalks, transit, sewers, and water mains, thereby minimizing the need for extensive infrastructure development.

The Rezoning Alternative and Midblock Bulk Alternative buildings would be required at a minimum to achieve the energy efficiency requirements of New York City's 2020 NYCECC, discussed above, which is designed to ensure meeting the City and State's GHG reduction goals of 80 percent and 85 percent, respectively, by 2050. Therefore, the Rezoning Alternative and Midblock Bulk Alternative would support the City and State's goal of constructing efficient buildings.

Use Clean Power

The new buildings developed through the Rezoning Alternative and Midblock Bulk Alternative will use electricity for the normal operation of the heat and hot water systems, thereby avoiding the on-site combustion of fossil fuel for building operations. In addition, as discussed in **Chapter 05.12** and also in the sub-section **"Alternative 1 – No-Action Alternative"** above, the Con Edison UTEN Chelsea Pilot Project is being investigated and is envisioned that it would be coordinated with the Rezoning Alternative and Midblock Bulk Alternative. The PACT Partner may also

explore other potential clean power sources as plans for the Rezoning Alternative and Midblock Bulk Alternative advance.

Transit-Oriented Development and Sustainable Transportation

The Project Sites are located in an area supported by many transit options. These include multiple subway lines and bus routes with connections to the regional public transportation network including Penn Station/Moynihan Train Hall (refer to **Chapter 05.13** for details), as well as a growing bicycle lane network and bicycle share program. The Proposed Project would also encourage sustainable transportation by providing bicycle parking in accordance with zoning requirements.

By providing new mixed-income housing with local commercial and community facility uses in a transit and pedestrian oriented urban area, the Proposed Project would substantially reduce carbon emissions as compared to development in car-dependent areas, where such development may occur if the Proposed Project and other transit-oriented development are not implemented. Research indicates that low-density suburban development is more energy and GHG intensive by a factor of 2.0–2.5 than high-density urban core development on a per capita basis.[7] Likewise, while approximately 10 percent of trips by residents as a result of the Proposed Project would be made via auto or taxi, as indicated by Census data cited in **Chapter 05.13**, approximately 68 percent of workers nationally commute to work by driving alone.[8] In contrast, the Proposed Project would generate significantly fewer private vehicle trips and VMT.

Reduce Construction Operation Emissions

Construction activities resulting from the Rezoning Alternative and Midblock Bulk Alternative would comply with the New York City Air Pollution Control Code, which includes the use of ultra-low sulfur diesel (ULSD) fuel and the best available technology (BAT); see **Chapter 05.19**. These measures would reduce particulate matter emissions; while the particulate matter is not included in the list of standard GHGs ("Kyoto gases"), recent studies have shown that black carbon—a constituent of particulate matter—may play an important role in climate change**.**

Use Building Materials with Low Carbon Intensity

The building structures comprising the Rezoning Alternative and Midblock Bulk Alternative would be predominantly concrete, with some steel supports (rebar). Recycled steel will most likely be used for most structural steel rebar, since the steel available in the region is mostly recycled. Some cement replacements such as fly ash and/or slag may also be used, and concrete content would be optimized to the extent feasible. The Rezoning Alternative and Midblock Bulk Alternative would likely use some recycled materials for interiors, and may consider materials produced regionally, rapidly renewable materials, and materials that contain recycled content

[7] Jonathan Norman, Heather L. MacLean, and Christopher A. Kennedy, "Comparing High and Low Residential Density: Life-Cycle Analysis of Energy Use and Greenhouse Gas Emissions," *Journal of Urban Planning and Development* 132, no. 1 (2006).

[8] Means of Transportation to Work as a Percentage of Workers: Drove Alone, US Census Bureau. https://www2.census.gov/programs-surveys/commuting/guidance/acs-1yr/Mean-drove-alone.pdf

where appropriate. Construction waste would be diverted from landfills to the extent practicable by separating out materials for reuse and recycling.

Climate Change

As discussed in **Chapter 05.01**, currently, the Project Sites are partly located within the 500-year floodplain. Additionally, portions of the Project Sites are also projected to be located within the 1 percent annual chance flood zone (also known as the 100-year floodplain) by the 2080s. Under the Rezoning Alternative and Midblock Bulk Alternative, vulnerable and critical buildings elements, including mechanical equipment, will be elevated above design flood elevations (DFEs) established at the time of construction, as required by FEMA and NYC regulations. As discussed in **Chapter 05.01**, if all or parts of the Project Sites are designated as being within the FEMA-designated 100-year floodplain at a future date, vulnerable and critical elements, including mechanical equipment that are required to be at or above the DFE, may need to be elevated, depending on the required DFE NYC zoning and building code regulations as compared to the Federal Flood Risk Management Standard (FFRMS) required DFE. Additionally, the building facade could be retrofitted to integrate floodgates at the facade openings. However, the nature of such retrofits would depend on the specific change to the base flood elevation (BFE), possible future changes to Building Code flood regulations, City-led infrastructure measures to address such changes, and other considerations that are unknown as this time. As such, the nature of such retrofits cannot be characterized at this time.

While strategies and guidelines for addressing the effects of climate change are being developed at all levels of government, there are currently no specific requirements or accepted recommendations for development projects in New York City. The City's Waterfront Revitalization Program (WRP) requires consideration of climate change and sea-level rise in the planning and design of development within the defined Coastal Zone Boundary. As set forth in more detail in the *CTM*, the provisions of the WRP are also applied by City agencies when conducting an environmental review. The Proposed Project's consistency with WRP policies is described in detail in **Chapter 05.01** and incorporated herein by reference.

In summary, the Rezoning Alternative and Midblock Bulk Alternative would be consistent with New York City policies regarding adaptation to climate change. An assessment of the Rezoning Alternative and Midblock Bulk Alternative's consistency with WRP Policy 6.2, which provides further information related to the effects of future sea level rise related to climate change, can be found in **Chapter 05.01.**

Alternative 3 – Non-Rezoning Alternative

As discussed in **Chapter 04.0**, given that GHG emissions and climate change is a density-based technical area in which the Rezoning and Midblock Bulk Alternatives would not result in significant adverse impacts to GHG emissions and climate change, a detailed analysis for the Non-Rezoning Alternative is not warranted as its development program is smaller than the Rezoning and Midblock Bulk Alternatives. The latter two alternatives represent a higher potential for environmental impacts than the Non-Rezoning Alternative. The Non-Rezoning Alternative would similarly support the City and State's goal of reducing GHG emissions. Therefore, as the Rezoning

Alternative and Midblock Bulk Alternative would not result in significant adverse impacts to GHG emissions and climate change, there is no potential for the Non-Rezoning Alternative to result in a significant adverse impact and further analysis is not warranted.