A. INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the Proposed Actions and its consistency with the City-wide GHG reduction goals, and evaluates the resilience of the buildings introduced by the Proposed Actions to climate conditions throughout the lifetime of the development.

As noted in the 2020 *City Environmental Quality Review* (CEQR) *Technical Manual*, increased concentrations of greenhouse gases (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. 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 *CEQR Technical Manual* 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.

The Proposed Actions would facilitate the construction of a new mixed-use residential, local retail, and community facility development with a total of approximately 1,374,283 gross square feet (gsf).[1] Therefore, a GHG consistency assessment is warranted. GHG emissions that would be generated as a result of the Proposed Actions are presented in this chapter, along with an assessment of the Proposed Actions' consistency with the citywide GHG reduction goal.

In addition, portions of the Project Area are located within the currently applicable 100-year and 500-year floodplains and, therefore, a qualitative discussion of the potential effects of climate change on the proposed development is discussed herein.

B. PRINCIPAL CONCLUSIONS

The Proposed Actions would not result in significant adverse impacts related to greenhouse gases as it would be consistent with the City's GHG emissions reduction goals, as defined in the *CEQR Technical*

[1] Pursuant to CEQR, the GHG assessment is based on the total GHG emissions associated with the total With-Action RWCDS, rather than Proposed Project alone or the relative increment of a project's GHG emissions as compared to a No-Action scenario. As such, this assessment includes the 1,154,987 gsf Proposed Project on Applicant-owned Lot 1 (Projected Development Site 1), as well as a 219,296-gsf development that could be developed on Projected Development Site 2 (Lot 49).

Manual. Furthermore, the Proposed Actions would be consistent with policies regarding adaptation to climate change as identified in OneNYC.

Greenhouse Gas Emissions

It is estimated that the development facilitated by the Proposed Actions would result in approximately 9,214 total metric tons carbon dioxide equivalent (CO_2e) of annual emissions from building operations and approximately 4,218 metric tons of CO_2e emissions from mobile sources annually, for an annual total of approximately 13,432 metric tons of CO_2e emissions. This represents approximately 0.026 percent of the City's overall 2017 GHG emissions of approximately 50.7 million metric tons. The proposed development would comply with the 2020 New York City Energy Conservation Construction Code, which governs performance requirements of HVAC systems and require substantial energy efficiency of new buildings.

The Proposed Actions would also advance New York City's GHG reduction goals by virtue of its nature and location. The Proposed Actions would facilitate development of a medium-density mixed-use residential, commercial, and community facility development in an area with existing urban infrastructure, including roadways, transit, sewer infrastructure, and water mains, thereby minimizing the need for extensive infrastructure development. By redeveloping sites that are located in an area supported by many transit options, including bus and subway service, as well as NYC Ferry and bicycle infrastructure, the Proposed Actions would support transit-oriented development in New York City.

Therefore, based on the adherence to the City's energy efficiency requirements and by virtue of the Proposed Actions' location and nature, the Proposed Actions would be consistent with the City's applicable emissions reduction goals of transit-oriented development and construction of new resource- and energy-efficient buildings.

Resilience to Climate Change

Portions of the Project Area are located within the currently applicable 100-year and 500-year floodplains. Although some critical and vulnerable components of the Proposed Project would be located below the elevation of these floodplains, no building features are expected to be below the elevation of the Mean Higher High Water (MHHW) at any point over the building's lifespan and it is unlikely the Project Area would be affected by tidal flooding. As noted above, the Proposed Project would be constructed to meet the codes and any related resiliency requirements in effect at the time of construction.

As such, there would be no significant adverse impacts associated with the Project Area's location in the 100-year floodplain. All new vulnerable, critical, or potentially hazardous features would be protected through flood damage reduction measures or future adaptive actions and, therefore, the Proposed Actions would be consistent with New York City policies regarding adaptation to climate change.

C. GREENHOUSE GAS EMISSIONS

Pollutants of Concern

Greenhouse gases (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, occur naturally and are emitted into the atmosphere through natural processes and human activities. The principal GHGs emitted as a result of human activities are described below.

There are also a number of entirely anthropogenic GHGs in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (and contribute to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, there is no need to address them in GHG assessments for most projects. Although ozone itself is also a major GHG, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see **Chapter 12, "Air Quality"**). Similarly, water vapor is of great importance to global climate change, but is not directly of concern as an emitted pollutant since the negligible quantities emitted from anthropogenic sources are inconsequential.

Carbon Dioxide (CO_2)

Carbon dioxide (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 enters the atmosphere from any combustion process (both natural and anthropogenic); some industrial processes, such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products; volcanic eruptions; and the decay of organic matter. CO_2 is also removed from the atmosphere (or "sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans.

Methane (CH_4)

Methane (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. Methane, in addition to nitrous oxide (noted below), play 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. Emissions of this compound is included in GHG emissions analyses when the potential for substantial emission of this gas exists.

Nitrous Oxide (N_2O)

Nitrous oxide (N_2O) is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Emissions of this compound is included in GHG emissions analyses when the potential for substantial emission of this gas exists.

Fluorinated Gases

Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) 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 GHG, they are sometimes referred to as High Global Warming Potential gases (High GWP gases).

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of a GHG analysis for an Environmental Impact Statement (EIS): CO_2, N_2O, CH_4, HFCs, PFCs, and SF_6. This analysis focused on

CO_2, N_2O, and CH_4 as there are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Actions.

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 one metric ton (1,000 kilograms (kg)) 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 GWPs for the main GHGs are presented in **Table 13-1**.

TABLE 13-1
Global Warming Potential for Primary Greenhouse Gases

Greenhouse Gas	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

Notes: Since the Second Assessment Report (SAR) was published in 1995, the International Panel on Climate Change (IPCC) has published updated GWP values in its Third Assessment Report (TAR) and Fourth Assessment Report (AR4) that reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. However, GWP values from the SAR are still used by international convention to maintain consistency in GHG reporting, including by the United States when reporting under the United Nations Framework Convention on Climate Change.

* The GWPs of HFCs and PFCs vary depending on the specific compound emitted. A full list of these GWPs is available in Table ES-1 of the U.S. Environmental Protection Agency's *Inventory of Greenhouse Gas Emissions and Sinks: 1990-2008*, available at: http://epa.gov/climatechange/emissions/usinventoryreport.html.

Source: 2020 CEQR Technical Manual

Policy, Regulations, Standards, and Benchmarks for Reducing GHG Emissions

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 addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements that set emissions targets for GHGs, in December 2015, the U.S. signed the international Paris Agreement[2] that pledges deep cuts in emissions, with a stated goal of reducing annual emissions to a level that would be between 26 and 28 percent lower than 2005 emissions by 2025.[3] On June 1, 2017, the then President of the United States announced that "the United States will withdraw from the Paris Climate Accord."[4] However, the subsequent administration did not officially withdraw and, instead, reconfirmed acceptance to the agreement on January 20, 2021.

[2] Conference of the Parties, 21st Session. Adoption of The Paris Agreement, decision /CP.21. Paris, December 12, 2015.
[3] United States of America. Intended Nationally Determined Contributions (INDCs) as submitted. March 31, 2015.
[4] Under the Agreement, countries are allowed to withdraw four years from the date the agreement entered into force — meaning the United States could have officially withdrawn on November 4, 2020.

Regardless of the Paris Agreement, the U.S. Environmental Protection Agency (EPA) is required to regulate GHGs under the Clean Air Act and has begun preparing and implementing regulations. In coordination with the National Highway Traffic Safety Administration (NHTSA), EPA currently regulates GHG emissions from newly manufactured on-road vehicles. In addition, EPA regulates transportation fuels via the Renewable Fuel Standard program, which will phase in a requirement for the inclusion of renewable fuels increasing annually up to 36.0 billion gallons in 2022. In 2015, EPA also finalized rules to address GHG emissions from both new and existing power plants that would, for the first time, set national limits on the amount of carbon pollution that power plants can emit. The Clean Power Plan set carbon pollution emission guidelines and performance standards for existing, new, and modified and reconstructed electric utility generating units. On February 9, 2016, the Supreme Court stayed implementation of the Clean Power Plan pending judicial review. The Plan was repealed and replaced on June 19, 2019 by the final Affordable Clean Energy (ACE) rule, which establishes emission guidelines for states to develop plans to address greenhouse gas emissions from existing coal-fired power plants.

There are also regional and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York State by 80 percent, compared with 1990 levels, by 2050, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal; an interim draft plan has been published.[5] The State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener Communities and Climate Smart Communities programs. The State has also adopted California's GHG vehicle standards (which are at least as strict as the federal standards).

The New York State Energy Plan outlines the State's energy goals and provides strategies and recommendations for meeting those goals. The latest version of the plan was published in June 2015. The plan outlines a vision for transforming the state's energy sector that would result in increased energy efficiency (both demand and supply), increased carbon-free power production, and cleaner transportation, in addition to achieving other goals not related to GHG emissions. In July 2019, New York State enacted the Climate Leadership and Community Protection Act (CLCPA), which requires the State to achieve a carbon free electricity system by 2040 and reduce greenhouse gas emissions 85 percent below 1990 levels by 2050.

New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of 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 and Pennsylvania have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term 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 initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by

[5] New York State Climate Action Council. New York State Climate Action Plan Interim Report. November 2010.

2030 ("30 x 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 has also 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 sf 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 sf will also require lighting upgrades, including the installation of sensors and controls, more efficient light fixtures, and the installation of submeters, so that tenants can be provided with information on their electricity consumption. The legislation also created a local New York City Energy Conservation Code, which along with the NYSECCC (as updated in 2016), requires equipment installed during a renovation to meet current efficiency standards.

In September 2014, New York City committed itself to an 80 percent reduction in GHGs by the year 2050 ("80 x 50"), with an interim target to reduce GHG emissions 40 percent by 2030 ("40 x 30"), and took immediate steps to achieve that 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). To achieve the 80 x 50 goal, the City is convening Technical Working Groups (TWGs) to analyze the GHG reduction pathways from the building sector, power, transportation, and solid waste sectors to develop action plans for these sectors. The members of the TWGs will develop and recommend the data analysis, interim metrics and indicators, voluntary actions, and potential mandates to effectively achieve the City's emissions reduction goal. 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. In 2016, the City also published a pathway to achieving the GHG reduction goals in the building sector.

In May 2019, the City enacted 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, and an 80 percent reduction goal by 2050. Buildings that do not meet the caps could face steep fines. The law applies to all buildings — whether residential, commercial, or otherwise — that exceed 25,000 square feet in size, with the first target deadline occurring in 2024. The legislation was part of a package of bills known as the Climate Mobilization Act. In addition to Local Law 97, which also establishes the Office of Building Energy and Emissions Performance, the legislative package establishes a new Property Assessed Clean Energy (PACE) program to enable retrofits through long-term financing, and requires the installation of solar PV and green roofs on new buildings and major renovations.

In March 2020, the City enacted Local Law 48 of 2020, a local law to bring the New York City Energy Conservation Code 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 ASHRAE Standard 90.1-2016, and also aligns with the New York State Energy Research and Development

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

Authority (NYSERDA) NYStretch Energy Code-2020. This new version of the Energy Conservation Code adopts the provisions of the 2020 ECCCNYS, aligns them with the Administrative provisions of the NYC Construction Codes, aligns with the provisions of 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 greenhouse gas reduction by 2050.

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. For CEQR purposes, it is assumed that any proposed development would be compliant with the latest energy reduction laws applicable at the time of development, which would be Local Law 48 of 2020.

A number of benchmarks for energy efficiency and green building design have also been developed (green building design considerations include factors such as material selection, which affects GHG emissions associated with materials extraction, production, delivery, and disposal). For example, the LEED system is a benchmark for the design, construction, and operation of high-performance green buildings that includes energy efficiency components. Similarly, Envision is a voluntary system for benchmarking performance and resiliency of physical infrastructure projects. 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.

Methodology

In accordance with the *CEQR Technical Manual*, the GHG consistency assessment is typically required for proposed actions that would result in development of 350,000 sf or greater and other energy-intense projects. As previously stated, the RWCDS for the Proposed Actions would comprise approximately 1,374,283 gsf of mixed-use residential, local retail, and community facility uses in the Project Area.

A project's GHG emissions can generally be assessed in two steps: the first would be to estimate the GHG emissions resulting from the Proposed Actions and the second would be to examine the Proposed Actions in terms of the qualitative goals for reducing GHG emissions, as defined in the *CEQR Technical Manual*. A project's emissions are estimated with respect to the following main emissions sources: on-site operational emissions; mobile source emissions; 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. As defined in the *CEQR Technical Manual*, the qualitative goals that should be assessed, as relevant to the Proposed Actions 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.

For this analysis, both operational emissions and mobile source emissions were considered. Pursuant to *CEQR Technical Manual* methodology, the assessment is based on the total GHG emissions associated with the Proposed Actions, rather than the relative increment of the Proposed Actions' GHG emissions as compared to the No-Action condition. As the construction phase is not likely to be a significant part of total emissions resulting from the Proposed Actions, a quantitative construction emissions analysis is not required pursuant to *CEQR Technical Manual* guidelines, although emissions associated with construction have been described qualitatively based on other similar analyses for building construction. Similarly,

because the Proposed Actions are not expected to fundamentally change the City's solid waste management system, an estimate of emissions from solid waste management is not warranted.

Building Operational Emissions

According to the *CEQR Technical Manual*, for projects such as the one associated with the Proposed Actions, where details such as the specific fuel type to be used are unknown at this time, annual GHG emissions should be estimated based on a project's anticipated future floor area. Table 18-5 of the *CEQR Technical Manual* provides the carbon intensities of New York City building types, which were used to calculate annual operations emissions of the Proposed Actions' RWCDS projected developments.

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 analysis presented in **Chapter 11, "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 *CEQR Technical Manual* 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 *CEQR Technical Manual*. Table 18-7 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type.

The projected annual vehicle miles traveled for the Proposed Actions, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 13-2**. The mobile GHG emissions calculator referenced in the *CEQR Technical Manual* was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Actions.

TABLE 13-2
Proposed Actions' Annual Vehicle Miles Traveled (miles per year)

Use	Passenger Vehicles	Taxis	Trucks	Total
Community Facility	863,848	191,964	97,090	1,152,902
Residential	6,159,464	249,410	1,122,216	7,531,090
Local Retail	935,568	0	63,459	999,027
Open Space	73,604	145,000	13,869	232,473
Total Increase in VMT	**7,168,636**	**394,410**	**1,199,544**	**8,762,590**

Construction Emissions

A description of construction activities associated with the Proposed Actions is provided in **Chapter 17, "Construction."** Consistent with common CEQR practice, emissions associated with construction have not been estimated explicitly for the Proposed Actions, but analyses prepared for development projects in New York City[7] have shown that construction emissions (both direct and emissions embedded in the

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

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.

Emissions from Solid Waste Management

The Proposed Actions would not change the City's solid waste management system. Therefore, pursuant to *CEQR Technical Manual* guidance, GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

Projected GHG Emissions from the Proposed Actions

Operational Emissions

Table 13-3 displays the estimated GHG emissions associated with the operation emissions of the Projected Development Sites resulting from the Proposed Actions under the RWCDS. As shown in the table, operational GHG emissions are estimated to be approximately 9,214 metric tons of carbon dioxide equivalents. This represents approximately 0.016 percent of the City's overall 2015 GHG emissions of approximately 52.0 million metric tons.[8] It should be noted that the estimated GHG emissions for the Proposed Actions conservatively do not account for any energy efficiency measures that may be implemented by individual developments on projected development sites.

TABLE 13-3
Annual Operational Emissions – RWCDS Development Site

Building Type	CTM Carbon Intensity Rates [kg Carbon Dioxide Equivalent/sq. ft]	RWCDS Floor Area (sq. ft)	GHG Emissions (kg)	GHG Emissions (metric tons)
Commercial	9.43	16,887	159,244	159
Industrial	23.18	0	0	0
Institutional	11.42	22,638	258,526	259
Large Residential (> 4 family)	6.59	1,334,758	8,796,055	8,796
Small Residential (1-4 family)	4.52	0	0	0
Total Operational GHG Emissions		**1,374,283**	**9,213,826**	**9,214**

Notes:
Commercial = Local Retail
Institutional = Community Facility (Medical Office)
1 metric ton = 1,000 kg

[8] *City of New York Inventory of New York City Greenhouse Gas Emissions, April 2017,* by Cventure LLC, Cathy Pasion, Mikael Amar and Yun Zhou, Mayor's Office of Sustainability, New York, 2017.

Mobile Source Emissions

The number of annual motorized 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 analysis presented in **Chapter 11, "Transportation."** The assumptions used in the calculation include average daily weekday and Saturday person trips and delivery trips by proposed 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. As stated in Section D, "Methodology," above, annual vehicle miles traveled by cars, taxis, and trucks were calculated in accordance with *CEQR Technical Manual* guidance. As presented in **Table 13-2** above, it is estimated that the vehicle trips generated by the Proposed Actions would travel a total of 8,762,590 miles annually; annual passenger vehicle miles would total 7,168,636, annual taxi vehicle miles would total 394,410, and annual truck trip miles would total 1,199,544.

The *CEQR Technical Manual*'s mobile GHG emissions calculator was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Actions. As shown **Table 13-4**, annual mobile source emissions related to the Proposed Actions would result in approximately 4,218 metric tons of carbon dioxide equivalents.

TABLE 13-4
Annual Mobile Source Emissions for the Proposed Actions

Carbon Dioxide Equivalent (CO_2e) Emissions (metric tons/year)				
Road Type	**Passenger Vehicles**	**Taxis**	**Trucks**	**Total**
Local	552	27	450	1,030
Arterial	1,076	53	788	1,918
Interstate/Expressway	723	35	511	1,269
Total	***2,351***	***115***	***1,750***	***4,218***

Summary of Emissions

The total projected GHG emissions from the Project Area are shown in **Table 13-5** below. The estimated total of 13,432 metric tons of GHG emissions is approximately 0.026 percent of New York City's 2017 annual total of 50.7 million metric tons. As described in Section D, "Methodology," above, 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). The Proposed Actions are not expected to change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

TABLE 13-5
Summary of Total Annual GHG Emissions for the Proposed Actions

Emissions Source	CO_2e Emissions (metric tons)
Building Operations	9,214
Mobile Sources	4,218
Total	***13,432***

Consistency with the GHG Reduction Goal

According to the *CEQR Technical Manual*, the assessment of consistency with the City 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 cited in the *CEQR Technical Manual*, 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 in the case of the Proposed Actions);
- 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.

Elements That Would Reduce GHG Emissions

In general, dense, mixed-use development with access to transit and existing roadways is consistent with sustainable land use planning and smart growth strategies to reduce the carbon footprint of new development. These features are discussed in this section, addressing the PlaNYC/OneNYC goals as outlined in the *CEQR Technical Manual*. Following the approach defined in the *CEQR Technical Manual*, the Proposed Actions would result in development that is consistent with the City's emissions reduction goal as implemented to date. The Proposed Actions, as discussed below, are consistent with the City's GHG reduction goals, as defined in the *CEQR Technical Manual*.

BUILD EFFICIENT BUILDINGS

The Proposed Actions would facilitate the development of a mixed-use residential, retail, and community facility development on previously developed urban land, thereby minimizing vegetation/forest loss. Furthermore, the Proposed Actions would facilitate development of new buildings replacing existing structures or vacant lots on sites with existing urban infrastructure, including roadways, sewer infrastructure, and water mains, thereby minimizing the need for extensive infrastructure development.

The Applicant would be required at a minimum to achieve the energy efficiency requirements of New York City's 2020 Energy Conservation Construction Code. In 2016, as part of the City's implementation of strategies aimed at achieving the OneNYC GHG reduction goals, the City adopted the 2016 New York City Energy Conservation Construction Code, which substantially increased the stringency of the building energy efficiency requirements and adopted the ASHRAE 90.1-2013 standard as a benchmark. In 2020, efficiency standards for new buildings were increased in a new version of the code, which aligns with ASHRAE 90.1-2016 and includes additional measures from the NYSERDA NYStretch Code-2020. The new code is designed to ensure meeting the City's 80 percent by 2050 GHG reduction goal. The Proposed Actions would comply with 2020 Energy Conservation Construction Code, as legally applicable, which govern performance requirements of HVAC systems and require substantial energy efficiency of new buildings. Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

USE CLEAN POWER

The development resulting from the Proposed Actions is likely to use natural gas, a lower carbon fuel, for the normal operation of the heat and hot water systems. No on-site renewable power is currently proposed. However, it should be noted that, as not all buildings associated with the RWCDS have been designed yet, it is possible that some of the proposed development associated with the Proposed Actions could potentially utilize a cogeneration system (i.e., a combination of heat and power units that would simultaneously generate electricity, heat, and hot water), which would further reduce carbon emissions.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The Project Area is located in an area supported by several transit options. One block south of the Project Area, the Q18, Q19, and Q102 New York City Transit (NYCT) bus routes run north/south, as well as east/west, providing service to eastern Queens in addition to Manhattan, Brooklyn, western Queens, and Long Island through connections to the MTA subway and regional rail. The most proximate subway station serving the Project Area is the 30th Avenue (N-W) Station, which is located approximately three-quarters of a mile southwest of the Project Area and is accessible via the Q18 and Q102 local bus routes. In addition, the Applicant is proposing a shuttle which would operate between the Projected Development Site 1 and the 30th Avenue Station. The NYC Ferry's Astoria landing, which offers connections to East 90th Street, East 34th Street, and Wall Street/Pier 11 in Manhattan, is located approximately one-third of a mile south of the Project Area. A Citi Bike share station is located at the intersection of 3rd Street and 27th Avenue, approximately 650 feet south of the Project Area, and several bike lanes, bike paths, and bike routes are present in proximity to the Project Area. Furthermore, the Applicant would also encourage sustainable transportation through the provision of on-site bicycle parking, in accordance with zoning requirements.

Taken together, these transit options provide access to the Project Area from much of the city and beyond.

REDUCE CONSTRUCTION OPERATION EMISSIONS

During construction, the development associated with the Proposed Actions will comply with the New York City Air Pollution Control Code, which includes use of ultra-low sulfur diesel (ULSD) fuel and best available technology (BAT) as described in **Chapter 17, "Construction."** These measures would reduce particulate matter emissions; while 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

Recycled steel will most likely be used for most structural steel since the steel available in the region is mostly recycled. The proposed development associated with the RWCDS would likely use some recycled materials for interiors, and may consider materials produced regionally, rapidly renewable materials, and materials that contain recycled content where appropriate. Construction waste would be diverted from landfills to the extent practicable by separating out materials for reuse and recycling.

D. RESILIENCE TO CLIMATE CHANGE

The typical lifespan of residential buildings is 80 years or more. While mechanical, electrical, and plumbing equipment located within such buildings typically have an expected lifespan of 50 years, the location of equipment and connections does not generally change over time. The New York City Panel on Climate Change (NPCC) projected that sea levels are likely to increase by up to 10 inches by the 2020s, up to 30

inches by the 2050s, up to 58 inches by the 2080s, and up to 75 inches by 2100 under the "High Scenario."[9] As discussed in Chapter 2, portions of the Project Area are located within the currently applicable 1 percent or 0.2 percent annual-chance (a.k.a. 100-year and 500-year, respectively) floodplains. (Note that these flood areas and elevations are likely conservatively high, and may be revised in the future.) Therefore, as the Project Area would be partly located within the projected potential future 100- and 500-year floodplains within the lifetime of the Proposed Project, the potential effects of global climate change on the Proposed Project are considered, and measures that could be implemented as part of the Proposed Project to improve its resilience to climate change are identified.

Policy to Improve Climate Change Resilience

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 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 *CEQR Technical Manual*, the provisions of the WRP are also applied by the New York City Department of City Planning (DCP) and other city agencies when conducting environmental review. The Proposed Actions' consistency with WRP policies is described in detail in **Chapter 2, "Land Use, Zoning, and Public Policy."** The resilience of the proposed development to future projected climate conditions is discussed below.

Projected Climate Conditions

While other climatic changes such as temperature increases and changes in precipitation are projected to occur, the primary focus of this analysis is on changes in sea level rise and its potential impact on future severe storm levels and normal high tide inundation. While changes in the frequency and/or severity of severe storms such as hurricanes and Nor'easters may occur, the best available projections of those changes are currently too uncertain for detailed application. However, damage from severe events in general may be more widespread and severe due to sea level rise, which would result in more frequent flooding in some areas, and that is considered here. Changes in temperature could affect energy consumption (discussed in the GHG analysis above), but would not have an impact requiring planning at the project level.

The New York State Sea Level Rise Task Force was created to assess potential impacts on the state's coastlines from rising seas and increased storm surge. The Task Force prepared a report of its findings and recommendations including protective and adaptive measures.[10] The recommendations are to provide more protective standards for coastal development, wetlands protection, shoreline armoring, and post-storm recovery; to implement adaptive measures for habitats; integrate climate change adaptation strategies into state environmental plans; and amend local and state regulations or statutes to respond to climate change. The Task Force also recommended the formal adoption of projections of sea level rise.

The *New York State Climate Action Plan Interim Report* identified a number of policy options and actions that could increase the climate change resilience of natural systems, the built environment, and key

[9] Note that the decadal projections represent 30-year averages, so the 2020s represents averages of 2010- 2040, 2050s represents 2040-2070, and 2080s represents 2070-2100.
[10] New York State Sea Level Rise Task Force. *Report to the Legislature*. December 2010.

economic sectors—focusing on agriculture, vulnerable coastal zones, ecosystems, water resources, energy infrastructure, public health, telecommunications and information infrastructure, and transportation.[11] New York State's Community Risk and Resiliency Act (CRRA)[12] requires that applicants to certain State programs demonstrate that they have taken into account future physical climate risks from storm surges, sea-level rise and flooding, and required the New York State Department of Environmental Conservation (NYSDEC) to establish official State sea-level rise projections by January 1, 2016. These projections provide the basis for State adaptation decisions and are available for use by all decision makers. NYSDEC published a draft on November 2, 2015, proposing to adopt existing projections for use (see discussion of NPCC below). CRRA applies to specific State permitting, funding and regulatory decisions, including smart growth assessments; funding for wastewater treatment plants; siting of hazardous waste facilities; design and construction of petroleum and chemical bulk storage facilities; oil and gas drilling, and State acquisition of open space.

In New York City, the Climate Change Adaptation Task Force is tasked with securing the city's critical infrastructure against rising seas, higher temperatures, and fluctuating water supplies projected to result from climate change. The Task Force is composed of 40 New York City and State agencies, public authorities, and companies that operate, regulate, or maintain critical infrastructure in New York City. The approaches suggested for the City to create a citywide adaptation program include ways to assess risks, prioritize strategies, and examine how standards and regulations may need to be adjusted in response to a changing climate.

To assist the task force, the NPCC prepared a set of climate change projections for the New York City region[13] that was subsequently updated,[14] and suggested approaches to create an effective adaptation program for critical infrastructure. The NPCC includes leading climatologists, sea-level rise specialists, adaptation experts, and engineers, as well as representatives from the insurance and legal sectors. The climate change projections include a summary of previously published baseline and projected climate conditions throughout the 21st century including heat waves and cold events, intense precipitation and droughts, sea level rise, and coastal storm levels and frequency. In 2013, the New York City Panel on Climate Change (NPCC) released a report (*Climate Risk Information 2013: Observations, Climate Change Projections, and Maps*) outlining New York City-specific climate change projections for the 2020s and 2050s. Subsequently, in January 2015, the Second NPCC (NPCC2) released an updated report that presented the full work of the NPCC2 from January 2013 to 2015 and included temperature, precipitation, sea level, and extreme event frequency predictions for the 2081 to 2100 time period. In January 2019, the NPCC released its third report (NPCC3 2019 Report), which reaffirmed the use of the NPCC2 2015 sea level rise projections as the basis of New York City resiliency planning.[15] While the projections will continue to be refined in the future, current projections are useful for present planning purposes and to facilitate decision-making in the present that can reduce existing and near-term risks without impeding the ability to take more informed adaptive actions in the future.

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[11] NYSERDA. *New York State Climate Action Plan Interim Report*. November, 2010.

[12] *Community Risk and Resiliency Act.* Chapter 355, NY Laws of 2014. April 9, 2013. Signed September 22, 2014.

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

[14] New York City Panel on Climate Change. *Climate Risk Information 2013: Observations, Climate Change Projections, and Maps*. June 2013.

[15] NPCC3 also developed a new Antarctic Rapid Ice Melt (ARIM) scenario for the 2080s and 2100s, which includes the possibility of Antarctic Ice Sheet destabilization, but noted that this scenario is associated with high uncertainty.

NPCC projected a mid-range (25th to 75th percentile) sea level rise of four to eight inches, 11 to 21 inches, 18 to 39 inches, and 22 to 50 inches by the 2020s, 2050s, 2080s, and 2100, respectively. In general, the probability of higher sea levels is characterized as "extremely likely," but there is uncertainty regarding the probability of the various levels projected and timescale. Intense hurricanes are characterized as "more likely than not" to increase in intensity and/or frequency, and the likelihood of changes in other large storms ("Nor'easters") are characterized as unknown. Therefore, the projections for future 1-in-100 coastal storm surge levels for New York City include only sea level rise at this time, and do not account for changes in storm frequency.

The New York City Green Code Task Force has also recommended strategies for addressing climate change resilience in buildings and for improving storm water management.[16] Some of the recommendations call for further study, while others could serve as the basis for revisions to building code requirements. Notably, one recommendation was to require new developments within the projected future 100-year floodplain to meet the same standards as buildings in the current 100-year floodplain.

The City is currently working with FEMA to revise the FIRMs using the recently acquired detailed Light Detection and Ranging (LiDAR) data.

The New York City Department of Environmental Protection (NYCDEP) is evaluating adaptive strategies for City water and wastewater infrastructure. The City has already developed a *New York City Green Infrastructure Plan,*[17] and a *Sustainable Stormwater Management Plan.*[18] Many of the strategies discussed in these plans would improve the City's resilience to climate change.

Resilience to Climate Change

The NPCC additionally recommends assessing the impacts of projected sea level rise on the lifespan of projects. While the NPCC developed a series of maps incorporating projections for sea level rise with FEMA's 2013 Preliminary Work Maps, because of limitations in the accuracy of flood projections, the NPCC recommends that these maps not be used to judge site-specific risks. However, in general, the NPCC estimates that in the New York City area, sea level will rise up to a high estimate of 10 inches by the 2020s, and up to a high estimate of 30 inches by the 2050s. As such, areas not currently within the currently applicable 100-year and 500-year floodplains will be in the future, based on the NPCC projections. Furthermore, the NPCC projects that the frequency, extent, and height of 100-year and 500-year floods will increase by the 2050s.

As discussed in **Chapter 2, "Land Use, Zoning, and Public Policy,"** the Project Area is located within the currently applicable 100-year and 500-year floodplains and some critical and vulnerable components of the Proposed Project would be located below the elevation of the current one percent annual chance floodplain, although the majority of mechanical space within the Proposed Project would be raised above the floodplain. Furthermore, the floors 2-33 would remain well above the 1 percent flood elevation through the 2100s. In addition, the lowest tenanted space (the ground floor) through the rooftop would not be susceptible to the Mean Higher High Water (MHHW) at any time through the 2080s and would not be susceptible to the 0.2 percent flood at any time through the 2100s. As such, no building features are expected to be below the elevation of the Mean Higher High Water at any point over the building's

[16] New York City Green Codes Task Force. *Recommendations to New York City Building Code*. February 2010.
[17] New York City. *New York City Green Infrastructure Plan*. September 2010.
[18] New York City. *Sustainable Stormwater Management Plan*. December 2008.

lifespan and it is unlikely the Project Area would be affected by tidal flooding. Although the Project Area is susceptible to minimal flooding risk, and would continue to be so in the future according to NPCC projections, the NPCC recommends that these projections not be used to judge site-specific risks and they are subject to change.

Based on the above review, the Proposed Actions would be consistent with New York City policies regarding adaptation to climate change. A review of the Proposed Project's consistency with WRP Policy 6.2 can be found in in **Chapter 2, "Land Use, Zoning, and Public Policy."** The Proposed Project would be constructed to meet the codes and any related resiliency requirements in effect at the time of construction.