# 960 FRANKLIN AVENUE REZONING EIS
# Chapter 16: Greenhouse Gas Emissions and Climate Change

## A. INTRODUCTION

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. 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"). In September 2014, New York City committed itself to an 80 percent reduction in GHGs by the year 2050 ("80 by 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). 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.

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 are expected to facilitate the construction of approximately 1,369,314 gross square feet (gsf) (1,151,671 zoning square feet (zsf)) mixed-use development (the "Proposed Development").[1] The Proposed Development would comprise 1,263,039 gsf of residential uses, introducing a total of 1,578 dwelling units, of which 50 percent or 789 dwelling units would be affordable units and 50 percent or 789 dwelling units would be market-rate units. Of the 50 percent affordable apartments, 60 percent would accommodate families at or below 80 percent AMI, (473 units, consistent with and exceeding MIH option 2), 20 percent would accommodate families at or below 100 percent AMI (158 units) and 20 percent of the units would accommodate families at or below 120 percent AMI (158 units). The proposed affordable

[1] Pursuant to CEQR, the GHG assessment is based on the total GHG emissions associated with a project, rather than the relative increment of a project's GHG emissions as compared to a No-Action scenario.

housing would help to address affordable housing goals set forth by the City in Housing New York: A Five-Borough, Ten-Year Plan. In addition to the proposed residential component, approximately 21,183 gsf of local retail space and approximately 9,678 gsf of community facility space would be provided. 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.

## B. PRINCIPAL CONCLUSIONS

An assessment that evaluates the GHG emissions that would be generated as a result of the Proposed Actions and their consistency with the citywide GHG reduction goals has been included in this Draft EIS. It is estimated that the reasonable worst case development scenario (RWCDS) associated with the Proposed Actions would result in approximately 8,634 total metric tons carbon dioxide equivalent ($CO_2e$) of annual emissions from building operations and approximately 3,819.6 metric tons of $CO_2e$ emissions from mobile sources annually, for an annual total of approximately 12,453.6 metric tons of $CO_2e$ emissions. As summarized below, the Proposed Development would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

The *CEQR Technical Manual* defines five goals by which a project's consistency with the City's emission reduction goal is evaluated: (1) efficient buildings; (2) clean power; (3) sustainable transportation; (4) construction operation emissions; and (5) building materials carbon intensity.

Effective October 2016, New York City and New York State have updated their energy codes. The New York State Energy Conservation and Construction Code (NYSECCC), which was also adopted by New York City, to incorporate a much stricter energy efficiency requirement. As such, the Proposed Development facilitated by the Proposed Actions would be subject to the NYCECC, which governs performance requirements of heating, ventilation, and air conditioning (HVAC) systems, as well as the exterior building envelope of new buildings. In compliance with this code, new development resulting from the Proposed Actions must meet standards for energy efficiency. The Applicant is currently evaluating the specific energy efficiency measures and design elements that may be implemented. The Proposed Development is required at a minimum to achieve the energy efficiency requirements of the New York City Building Code. As described above, 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. Should the measures identified as part of that pathway or other measures not yet implemented be adopted by the City in the future, they may apply to the Proposed Development similar to any new building (if prior to building approval) or existing building (after construction) and the Proposed Development would implement any measures required under such programs. Therefore, the proposed project would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

The Proposed Development would also support the other GHG goals by virtue of its proximity to public transportation (including the Franklin Avenue station on the IRT Eastern Parkway Line (2, 3, 4, and 5 trains), the Botanic Garden station on the BMT Franklin Avenue Shuttle, the Prospect Park station on the BMT Brighton Line (B and Q trains), the B48 (Lefferts Gardens - Greenpoint) bus line, and a CitiBike station), commitment to construction air quality controls, and the fact that as a matter of course, construction in New York City uses recycled steel and includes cement replacements. All of these factors demonstrate that the proposed development supports the GHG reduction goal. Therefore, 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.

## C. RECOGNIZED GREENHOUSE GASES

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. Water vapor, carbon dioxide (CO2), nitrous oxide (N2O), methane, and ozone are the primary GHGs in the Earth's atmosphere.

There are also a number of entirely anthropogenic GHGs in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (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 15, "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.

The principal GHGs emitted as a result of human activities are described below.

### Carbon Dioxide ($CO_2$)

$CO_2$ 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. Although not the GHG with the strongest effect per molecule, $CO_2$ is by far the most abundant and, therefore, the most influential GHG.

### Methane ($CH_4$)

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 $CO_2$. However, 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 16-1**.

**TABLE 16-1**
**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.

# D. 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 President of the United States announced that "the United States will withdraw from the Paris Climate Accord."[4]

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 sets 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.

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 new 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. The 2015 plan also establishes new targets: (1) reducing GHG emissions in New York State by 40 percent, compared with 1990 levels, by 2030; (2) providing 50 percent of electricity generation in the State from renewable

[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 can officially withdraw on November 4, 2020. However, given the voluntary nature of the agreement, any action in the U.S. may or may not occur regardless of this status.
[5] New York State Climate Action Council. New York State Climate Action Plan Interim Report. November 2010.

sources by 2030; and (3) increasing building energy efficiency gains by 600 trillion British thermal units (BTUs) by 2030.

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 CO2 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 2030 ("30 by 30") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[6] The City 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 creates 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.

To achieve the 80 by 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, the City published the building sector TWG report, which included commitments by the City to change to building energy code and take other measures aimed at substantially reducing GHG emissions.

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

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

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

A number of benchmarks for energy efficiency and green building design have also been developed (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.

# E. METHODOLOGY

## Greenhouse Gas Emissions

New York City determined that consideration of GHG emissions is appropriate under CEQR for at least certain projects for several reasons: (a) GHG emission levels may be directly affected by a project's effect on energy use; (b) the U.S. Supreme Court has upheld the determination that carbon dioxide, one of the main GHGs, is an air pollutant, subject to regulation as defined by the Clean Air Act; and (c) Local Law 22 of 2008 codified PlaNYC's citywide GHG emissions reduction goal of 30 percent below 2005 levels by 2030. Moreover, the City has also adopted a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050, which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. In accordance with the *CEQR Technical Manual*, the GHG consistency assessment focuses on proposed actions that would result in development of 350,000 sf or greater and other energy-intense projects. As previously stated, the Proposed Actions are projected to result in approximately 1.37 million gsf of residential, commercial, and community facility development.

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 (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 source 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.

Operational emissions and mobile source emissions were considered for this analysis. 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. Given the construction phase is not likely to be a significant part of total emissions resulting from the Proposed Actions, emissions associated with construction of the Proposed Actions have been described qualitatively based on other similar analyses for large 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 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 traffic analysis and presented in **Chapter 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 18-6 and 18-7 of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled (VMTs) by cars and taxis. The average truck trip was assumed to be 38 miles as per the *CEQR Technical Manual*. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type.

The projected annual VMT under the RWCDS for the future with the Proposed Actions, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 16-2**. The mobile GHG emissions calculator was used to obtain an estimate of car, taxi, and truck GHG emissions attributable to the Proposed Actions.

**TABLE 16-2**
**Proposed Actions' Annual Vehicle Miles Traveled (miles per year)**

| Use | Passenger Vehicles | Taxis | Trucks | Total |
|---|---|---|---|---|
| Residential | 3,925,472 | 1,249,729 | 1,068,674 | 6,243,875 |
| Local Retail | 274,236 | 0 | 73,377 | 347,613 |
| Medical Office | 2,054,647 | 5,105,894 | 29,754 | 7,190,295 |
| **Total Increase in VMT** | **6,254,355** | **6,355,623** | **1,171,805** | **13,781,783** |

### *Construction Emissions*

A description of construction activities associated with the Proposed Development is provided in **Chapter 19, "Construction."** Consistent with common CEQR practice, emissions associated with construction under the RWCDS 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

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

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 three to 7.6 percent of the overall annual emissions for such projects.

### *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.

## Climate Change

According to the *CEQR Technical Manual*, depending on a project's sensitivity, location, and useful life, it may be appropriate to provide a qualitative discussion of the potential effects of climate change on a proposed project in environmental review. Rising sea levels and increases in storm surge and coastal flooding are the most immediate threats in New York City for which site-specific conditions can be assessed, and an analysis of climate change may be deemed warranted for projects at sites located within the 100- or 500-year flood zone. According to Table 18-2 in the *CEQR Technical Manual,* New York City Panel on Climate Change (NPCC) projects that sea levels are likely to increase in the range of 11 to 24 inches, with a higher end estimate of up to 31 inches, by the 2050s. Based on the FEMA Preliminary Flood Insurance Rate Maps (FIRMs) dated January 30, 2015, no parts of the Project Area are located within the 100- and 500-year flood zones, and no parts of the Project Area would be located within the NPCC 100- and 500-year projections for the 2020s and 2050s. As such, the area would not be susceptible to storm surge or coastal flooding and the potential effects of climate change on development facilitated by the Proposed Actions have been considered.

Standards for analysis of the effects of climate change on a proposed project are still being developed and have not yet been defined in CEQR. However, the Waterfront Revitalization Program (WRP)[8] addresses climate change and sea level rise. The WRP requires consideration of climate change and sea level rise in planning and design of waterfront development within the defined Coastal Zone Boundary (the Project Area is not located within this boundary).

While strategies and guidelines for addressing the effects of climate change are being developed on all levels of government, there are currently no specific requirements or accepted recommendations for development projects in New York City. However, the recently approved revisions to the WRP require consideration of climate change and sea level rise in planning and design of waterfront development. As set forth in more detail in the City's *CEQR Technical Manual*, the provisions of the WRP are applied by City agencies when conducting environmental review, and are typically described in detail in the Land Use, Zoning, and Public Policy chapter, as applicable. However, as the Project Area is not located within the Coastal Zone Boundary, no WRP analysis is required.

[8] City of New York Department of City Planning. *The New York City Waterfront Revitalization Program*. October 30, 2013. Approved by NY State Department of State, February 3, 2016.

The WRP requires developments to:

- Consider potential risks related to coastal flooding to features specific to the project, including but not limited to critical electrical and mechanical systems, residential living areas, and public access areas;
- Integrate consideration of the latest New York City projections of climate change and sea level rise (as published by the NPCC, or any successor thereof) into the planning and design of projects in the city's Coastal Zone;
- Incorporate design techniques in projects that address the potential risks identified and/or which enhance the capacity to incorporate adaptive techniques in the future. Climate resilience techniques should aim to protect lives, minimize damage to systems and natural resources, prevent loss of property, and, if practicable, promote economic growth and provide additional benefits such as provision of public space and intertidal habitat.

Climate change considerations and measures that would be implemented to increase climate resilience are discussed below, addressing the above WRP measures as applicable. Additional climate change considerations may be incorporated into state and/or local laws prior to any future development facilitated by the Proposed Actions, and any development would be constructed to meet or exceed the codes in effect at the time of construction.

Pursuant to *CEQR Technical Manual* guidance, if an analysis of climate change is deemed warranted for projects at sites located within the 100- or 500-year flood zone, (i) projections for the future sea level rise and, to the extent available, likely future flood zone boundaries projected for the area of the site for different years within the expected life of the development should be provided (e.g., the 2020s 100-year and 2020s 500-year floodplain, and the 2050s 100-year and 2050s 500-year floodplain); and (ii) any City, state, or federal initiatives to improve coastal resilience, such as those set forth in the Special Initiative for Rebuilding and Resiliency (SIRR) Report, "A Stronger, More Resilient New York," should be discussed if they have the potential to affect the project site.

# F. PROJECTED GHG EMISSIONS FROM THE PROPOSED ACTIONS

## Operational Emissions

**Table 16-3** displays the estimated GHG emissions associated with the operation emissions of the Development Site resulting from the Proposed Actions under the RWCDS. As shown in the table, operational GHG emissions are estimated to be approximately 8,634 metric tons of carbon dioxide equivalents. This represents approximately 0.017 percent of the City's overall 2015 GHG emissions of approximately 52.0 million metric tons.[9] 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.

[9] *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.

**TABLE 16-3**
**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 | 21,183 | 199,756 | 200 |
| Industrial | 23.18 | 0 | 0 | 0 |
| Institutional | 11.42 | 9,678 | 110,523 | 111 |
| Large Residential (> 4 family) | 6.59 | 1,263,039 | 8,323,427 | 8,323 |
| Small Residential (1-4 family) | 4.52 | 0 | 0 | 0 |
| ***Total Operational GHG Emissions*** | | **1,293,900** | **8,633,705** | **8,634** |

**Notes:**
Commercial = Local Retail
Institutional = Medical Office
1 metric ton = 1,000 kg

## Mobile Source Emissions

The number of annual motorized vehicle trips by mode (cars, taxis and trucks) that would be generated by the Development Site under the Proposed Actions was calculated using the transportation planning assumptions developed for the traffic analysis and presented in **Chapter 13, "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 16-2** above, it is estimated that the vehicle trips generated by the Development Site under the Proposed Actions would travel a total of 13,781,783 miles annually; annual passenger vehicle miles would total 6,254,355, annual taxi vehicle miles would total 6,355,623, and annual truck trip miles would total 1,171,805.

The 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 16-4**, annual mobile source emissions related to the Proposed Actions would result in approximately 3,820 metric tons of carbon dioxide equivalents.

**TABLE 16-4**
**Annual Mobile Source Emissions for 2024 – RWCDS Development Site**

| Carbon Dioxide Equivalent ($CO_2e$) Emissions (metric tons/year) | | | | |
|---|---|---|---|---|
| **Road Type** | **Passenger Vehicles** | **Taxis** | **Trucks** | **Total** |
| Local | 405 | 112 | 463 | 979 |
| Arterial | 723 | 198 | 790 | 1,711 |
| Interstate/Expressway | 486 | 131 | 512 | 1,129 |
| ***Total*** | ***1,613*** | ***441*** | ***1,765*** | ***3,820*** |

## Summary

The total projected GHG emissions from the Development Site under the Proposed Actions are shown in **Table 16-5** below. The estimated total of 12,454 metric tons of GHG emissions is approximately 0.02 percent of New York City's 2015 annual total of 52.0 million metric tons. As noted above, the estimated operational GHG emissions for the Proposed Actions conservatively do not include any additional energy efficiency measures that may be implemented by individual developments on projected development sites. 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 16-5**
**Summary of Total Annual GHG Emissions from Projected Developments Under the Proposed Actions**

| Emissions Source | $CO_2e$ Emissions (metric tons) |
|---|---|
| Operations | 8,634 |
| Mobile Sources | 3,820 |
| ***Total*** | ***12,454*** |

## 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.

The Proposed Actions show consistency with these goals in that:

- The Project Area is located in an area supported by several transit options, including the Franklin Avenue station on the IRT Eastern Parkway Line (2, 3, 4, and 5 trains), the Botanic Garden station on

the BMT Franklin Avenue Shuttle, the Prospect Park station on the BMT Brighton Line (B and Q trains), the B48 (Lefferts Gardens - Greenpoint) bus line, and a CitiBike station. These transit options are located in close proximity to the Project Area. The Proposed Actions would allow increased density along Franklin Avenue to expand opportunities for housing, including approximately 789 affordable units, along with local retail and community facility uses, resulting in higher densities in an area that can accommodate future growth, such as this area that is located within close proximity to subway lines. The Proposed Actions would also map a new commercial overlay to allow for the extension of local retail along Franklin Avenue south of Montgomery Street. This would help to facilitate an active streetscape through the development of new retail space to support existing residences in the area, the known No-Action developments that are planned for the area by the 2024 analysis year, and the Proposed Development. By revitalizing the Project Area, which is well-served by transit facilities and services, the Proposed Actions support transit-oriented development in New York City.

- The new buildings facilitated by the Proposed Actions, which would replace existing structures or vacant lots, would be subject to the New York City Energy Conservation Code (NYCECC), which comprises the 2010 Energy Conservation Construction Codes of New York State (ECCCNYS) in addition to a series of local laws, including the New York City Building Code. The NYCECC governs performance requirements of HVAC systems, as well as the exterior building envelope of new buildings. In compliance with this code, new development resulting from the Proposed Actions must meet standards for energy efficiency.

# G. CLIMATE CHANGE

## Development of Policy to Improve Climate Change Resilience

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 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

[10] New York State Sea Level Rise Task Force. *Report to the Legislature*. December 2010.
[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.

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 over 35 New York City and State agencies, public authorities, and companies that operate, regulate, or maintain critical infrastructure in New York City. The approaches suggested for the City to create a 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 includes temperature, precipitation, sea level, and extreme event frequency predictions for the 2081 to 2100 time period. 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. NPCC projected that sea level will rise by 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.[15] 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 flood zone.

[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] New York City Green Codes Task Force. *Recommendations to New York City Building Code*. February 2010.

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,*[16] and a *Sustainable Stormwater Management Plan.*[17] Many of the strategies discussed in these plans would improve the City's resilience to climate change.

## Methodology

While strategies and guidelines for addressing the effects of climate change are rapidly being developed on all levels of government, there are currently no specific requirements or accepted recommendations for development projects in New York City. However, the recently approved revisions to the WRP require consideration of climate change and sea level rise in planning and design of waterfront development. As set forth in more detail in the City's *CEQR Technical Manual*, the provisions of the WRP are applied by City agencies when conducting environmental review for site-specific projects. As the Proposed Actions would not be located within the City's Coastal Zone, the WRP policies are not applicable.

In addition, in consultation with the lead agency, the Deputy Mayor for Housing and Economic Development (ODMHED), an additional assessment of the Proposed Actions' heat vulnerability and drought preparedness have been incorporated into the general methodology outlined above.

## Proposed Actions' Consistency with Adaptation to Climate Change

### *Step 1: Identify Vulnerabilities and Consequences*

*ASSESS THE PROJECT AREA'S EXPOSURE TO CURRENT AND FUTURE FLOOD RISK*

If a project area or affected geography is outside the 2050s one percent annual chance floodplain, no further analysis is needed. As the Project Area is located outside of the 2050s one percent annual chance floodplain, it is not considered susceptible to rising sea levels resulting from climate change.

*IDENTIFY IF THE ACTION WOULD FACILITATE THE DEVELOPMENT OF ANY VULNERABLE, CRITICAL, OR POTENTIALLY HAZARDOUS FEATURES WTIHIN AREAS EXPOSED TO MEAN HIGHER HIGH WATER OR ONE PERCENT ANNUAL CHANCE FLOOD BY THE 2050S UNDER THE 90$^{TH}$ PERCENTILE OF SEA LEVEL RISE PROJECTIONS.*

As presented in **Chapter 1, "Project Description,"** under the RWCDS, the Project Area would be developed with residential, local retail, and community facility uses. As described above, the Project Area is not located within the City's Coastal Zone or within an area prone to flooding. As such, vulnerable and critical features in the Project Area would not be exposed to current or future flood hazards.

[16] New York City. *New York City Green Infrastructure Plan*. September 2010.
[17] New York City. *Sustainable Stormwater Management Plan*. December 2008.

*ASSESS THE PROJECT AREA'S HEAT VULNERABILITY AND DROUGHT PREPAREDNESSS*

According to 2015 NPCC report, projections for the New York metropolitan region from the current generation of global climate models indicate large climate changes and thus the potential for large impacts. In the coming decades, the NPCC projects that climate change is extremely likely to bring warmer temperatures to New York City and the surrounding region. Heat waves are very likely to increase. Total annual precipitation is likely to increase, and brief, intense rainstorms are very likely to increase. It is more likely than not that short-duration, end-of-summer droughts will become more severe. Although there remain significant uncertainties regarding long-term climate change, these projections would move the city's climate outside what has been experienced historically.

Certain areas of New York City already experience higher temperatures relative to other parts of the City, and these hot spots will be exacerbated by climate change. The NYC Department of Health and Mental Hygiene developed a Heat Vulnerability Index (HVI), which highlights parts of the City where more residents face an increased risk of heat-related mortality as compared to other neighborhoods in the City. The HVI uses social and environmental factors to determine the relative risk of New York City neighborhoods for heat-related death during and immediately following extreme heat events. The Project Area and the greater South Crown Heights and Lefferts Gardens (Brooklyn Community District 9) area has been identified as Category 4, a moderate vulnerability HVI area, out of a scale from 1 to 5, with Category 5 being the most at-risk. According to the City's HVI, the Project Area is not considered to be a high risk area for heat vulnerability.

### *Step 2: Identify Adaptive Strategies*

Building code requirements for flood-resistant construction, including freeboard, would be required for sites located within the current one percent annual chance floodplain. Specifically, the finished floor elevations for all vulnerable uses and any mechanical/electrical/plumbing spaces would be located three feet above the currently applicable 100-year floodplain elevations. In addition, any basement structures would need to comply with the flood proofing requirements of Appendix G of the Building Code, which is designed to protect against current flood elevations. As described above, the Project Area is not located within the 100-year floodplain. As such, this would not apply to the Project Area.

### *Step 3: Assess Policy Consistency*

The Proposed Actions would advance Policy 6.2. No new vulnerable, critical, or potentially hazardous features would be facilitated in areas that would flood from future MHHW as the Project Area is not located within the 100-year floodplain. Therefore, the Proposed Actions would be consistent with New York City policies regarding adaptation to climate change.