12

Greenhouse Gas Emissions and Climate Change

This chapter discusses the greenhouse gas (GHG) emissions that would be generated by the Proposed Project, evaluates the consistency of the Proposed Project with the citywide GHG emissions reduction goals, and discusses the resilience of the Proposed Project to the projected effects of climate change.

Introduction

The New York City Economic Development Corporation (NYCEDC), the Office of the Chief Medical Examiner (OCME), and the New York City Department of Citywide Administrative Services (DCAS) (collectively, the Applicants), in affiliation with the New York City Health and Hospitals Corporation (H+H), New York City Public Schools (NYCPS), the New York City School Construction Authority (SCA), and the City University of New York (CUNY), are seeking several Uniform Land Use Review Procedure (ULURP) and discretionary actions (collectively, the Proposed Actions) to facilitate the development of approximately 2.19 million gross square feet (gsf) of new construction of academic, healthcare, Life Sciences, ~~retail space, and public realm improvements (the Proposed Project). The Proposed Project would construct multiple new buildings (illustratively shown as Buildings A, B1, and B2) (see **Figure 1-2**) consisting of up to approximately 1,782,000 zsf (2.19 million gsf)[1]. The Eastern Parcel would create an integrated educational campus within Building A, as described below, bringing together the Hunter College School of Nursing and departments of Physical Therapy, Speech-Language Pathology & Audiology (including the community clinic), and Medical Laboratory Sciences, Borough of Manhattan Community College (BMCC) Health Sciences, Health Studies, and Nursing Programs, and the CUNY Graduate School of Public Health & Health Policy , along with a~~

[1] ~~As design progresses for the Proposed Development, it is likely that the building on the eastern portion of the Development Site (i.e., Building A) would be designed as two buildings with independent utility systems to accommodate separation between the high school and CUNY facilities.~~

~~NYCPS high school focused on health care and sciences education. The Western Parcel would include two Life Sciences buildings, Building B1 and Building B2, and the one-story SPARC Square Pavilion within the open space. Building B1 would front on First Avenue, and include space dedicated to H+H. Building B2 would be located to the east of Building B1 and would include space for OCME.~~and retail space and public realm improvements (the Proposed Project).

~~Building A located on the Eastern Parcel would be comprised of approximately 698,570 gsf (561,500 zsf), containing approximately 606,450 gsf (559,185 zsf) of community facilities (UG III(B)) space and 2,600 gsf (2,300 zsf) of commercial retail (UG VI) space.~~

~~Building B1 would contain a total of approximately 810,980 gsf (667,700 zsf), including approximately 184,000 gsf (174,550 zsf) of community facility (UG III(B)), approximately 5,600 gsf (5,060 zsf) of local retail (UG VI), and approximately 530,900 gsf (488,060 zsf) of office and laboratories (UG VII).~~

~~Building B2 would contain a total of approximately 682,470 gsf (551,800 zsf), including approximately 217,300 gsf (200,340 zsf) of community facility (UG III(B)), approximately 3,000 gsf (2,760 zsf) of local retail (UG VI), and approximately 379,400 gsf (348,680 zsf) of office and laboratories (UG VII).~~

~~The square footages described above for community facility, office and laboratories, and local retail include each programmatic element anticipated to be included on the site.~~

The public realm improvements would take the form of a new publicly accessible open space, a replacement bridge over Franklin D. Roosevelt (FDR) Drive at East 25th Street to make it ADA accessible, a tie-in to the East Midtown Coastal Resiliency (EMCR) project's planned flood protection to the northeast along FDR Drive and protection along East 25th Street,[2] and a widening of the demapped portion of the former East 26th Street located between FDR Drive and First Avenue to accommodate two-way traffic flow.

As discussed in the *2021 CEQR Technical Manual*, increased concentrations of GHGs are changing the global climate and resulting in wide-ranging effects on the environment, such as rising sea levels, increases in temperatures, and changes in precipitation levels. Although the contribution of a proposed project's GHG emissions to global GHG emissions is small when compared to the scale and magnitude of global climate change, certain projects' contribution of GHG emissions still should be analyzed to determine their consistency with the City's Citywide GHG reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR.

According to the *CEQR Technical Manual*, a GHG emissions assessment is typically conducted for larger projects undergoing an environmental impact statement, especially projects that would result in development of 350,000 ~~sq~~gsf or greater. The Proposed Project would result in the total development of approximately 2.19 million gsf. Therefore, a GHG emissions assessment is appropriate.

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

[2] Absent the EMCR project, the Proposed Project would incorporate standalone flood protections with independent utility into the design. For conservative analysis purposes, a hypothetical scenario in which there is no EMCR was referenced in the DEIS. However, that outcome is unlikely, and there are no plans to discontinue the EMCR project.

Principal Conclusions

Following the methodology provided in the *CEQR Technical Manual*, the Proposed Project would emit an estimated ~~36,012~~40,694 metric tons of carbon dioxide equivalent (CO_2e) per year, with approximately ~~64~~68 percent of those emissions resulting from the Proposed Project buildings and ~~36~~32 percent of the emissions resulting from mobile sources. The Proposed Project would include sustainability measures that would be consistent with the applicable GHG reduction goals, as defined in the *CEQR Technical Manual*.

Given the Proposed Project location near multiple transit options, improvements to existing biking, and walking network, the intent to use electricity and steam for the proposed building energy needs, and other measures that would be included as part of the Proposed Project operational design and construction, the Proposed Project would be consistent with the City's goals to reduce GHG emissions. The Proposed Project would tie in to existing and planned flood protection infrastructure, incorporate on-site design measures for flood protection, and include best-practices for on-site stormwater management. As such, the Proposed Project would improve the resilience of the Development Site and contribute to the larger flood protection measures under development on the East Side of Manhattan. Therefore, the Proposed Project would be consistent with the City's climate change initiatives.

Portions of the Development Site are within the existing 1 percent annual chance floodplain and absent the proposed resilience measures the Proposed Project would be vulnerable to flooding that is projected to increase with the likely effects of climate change. The implementation of flood protection and sustainable stormwater management design would increase the resilience of the Proposed Project and neighborhood to the projected likely effects of climate change.

Background and Methodology

Pollutants of Concern

GHGs are those gaseous constituents of the atmosphere that absorb infrared radiation (heat) emitted by the Earth's surface, the atmosphere, and clouds. This property causes the general warming of the Earth's atmosphere, or the "greenhouse effect." Some GHGs, such as carbon dioxide (CO_2), occur both naturally and are emitted into the atmosphere through human activities (anthropogenic).

The *CEQR Technical Manual* lists six GHGs that may warrant analysis: CO_2, nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). To present a sum of all emitted GHGs, emissions of each gas are expressed in metric tons of carbon dioxide equivalent (CO_2e) and added together. CO_2e is a unit representing the quantity of each GHG weighted by its Global Warming Potential (GWP), a measure of a GHG's effectiveness as a climate change driver, using CO_2 as a reference.

The GHGs which are emitted as a result of human activities and their GWPs are presented in **Table 12-1**.

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

Greenhouse Gas	Common Source	100-Year GWP
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	6,500-9,200*
PFCs - Perfluorocarbons	Aluminum production, semiconductor manufacturing	6,500 – 9,200*
SF_6 – Sulfur Hexafluoride	Electrical transmission and distribution systems, circuit breakers, magnesium production	23,900

Note: The GWPs above are based on the Intergovernmental Panel for Climate Change (IPCC) Second Assessment Report (SAR). The IPCC has since published updated GWP values that reflect new information. However, GWP values from the SAR are still used, in accordance with the *CEQR Technical Manual* to maintain consistency in GHG reporting. It should be noted that New York State, per the Climate Act (CLCPA) calculates GHG emissions using the 20-year global warming potentials (GWPs).

*The GWPs of HFCs and PFCs vary depending on the specific compound emitted.

- **Carbon Dioxide (CO_2).** CO_2 results from the combustion of fossil fuels (oil, natural gas, and coal), solid waste, trees, and wood products, and from other chemical reactions (e.g., manufacture of cement). CO_2 is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore typically included in GHG assessment.
- **Methane (CH_4).** CH_4 is emitted during the production, transport, and combustion of fossil fuels, such as 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 and wastewater treatment facilities.
- **Nitrous Oxide (N_2O).** N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste.
- **Fluorinated Gases.** Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are powerful synthetic GHGs that are emitted from a variety of industrial processes. Fluorinated gases that are GHGs are used as substitutes for ozone-depleting substances (e.g., chlorofluorocarbons [CFCs], hydrochlorofluorocarbons [HCFCs], and halons).

The assessment for the Proposed Project focuses on emissions of CO_2, N_2O, and CH_4 (expressed in metric tons of CO_2e), as the Proposed Project would not include major sources of HFCs, PFCs, or SF_6.

Policy and Regulations on GHG Emissions and Climate Resilience

The following provides the climate requirements and policies at the federal, state, and local levels to provide context of the information provided herein.

Federal

The U.S. Environmental Protection Agency (USEPA) enforces the Clean Air Act, which regulates air emissions, including GHG emissions. The USEPA issued an endangerment finding in 2009 under Section 202(a) of the Clean Air Act, which stated that GHGs threaten public health and welfare, providing the basis for regulating these emissions.

The U.S. Department of Energy (USDOE) is responsible for the country's energy policy and research, including efforts to reduce GHG emissions through energy efficiency and renewable energy technologies. The USDOE also regulates energy production and consumption, including the standards for energy efficiency in buildings.

In addition to these agencies, the federal government also has planning and policy tools to address energy use and GHG emissions. The Council on Environmental Quality's (CEQ's) s *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* serves as guidance for addressing GHG emissions and climate change in Federal environmental review documents.[3]

Recent federal policy and investment has been established to support energy modernization, reduce dependency on fossil fuels, and reduce GHG emissions. This includes the *Inflation Reduction Act*, which expands tax credits for initiatives such as clean energy, electric vehicles (EVs), and energy efficiency; and the *Infrastructure Investment and Jobs Act* (2021), which provides investments in energy modernization, transportation, and building decarbonization. Executive Orders 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*,[4] and 14008, *Tackling the Climate Crisis at Home and Abroad*,[5] seek to lower GHG emissions and strengthen the climate resilience of infrastructure against the impacts of climate change.

State

In 2019, New York State enacted the Climate Leadership and Community Protection Act (CLCPA) per which the New York State Department of Environmental Conservation (NYSDEC) adopted 6 NYCRR Part 496, *Statewide Greenhouse Gas Emission Limits*,[6] which contains limits on the emission of GHGs in 2030 and 2050 as a percentage of 1990 emissions. The rule established 410 million metric tons of carbon dioxide equivalent emissions (million metric tons CO_2e) as the 1990 baseline and, per the CLCPA, the State committed to the following requirements:

[3] Council on Environmental Quality, *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, January 9, 2023, https://www.regulations.gov/document/CEQ-2022-0005-0023

[4] Executive Order 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, 86 Fed. Reg. 7,037, January 20, 2021.

[5] Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7,619, January 27, 2021.

[6] Title 6 of the New York Codes, Rules and Regulations, Chapter IV: Quality Services, Subchapter I: Climate Change, Part 486, *Statewide Greenhouse Gas Emissions Limits*, as established in the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (Environmental Conservation Law Article 75-0107).

- 40 percent GHG emissions reduction from 1990 baseline level by 2030 (60 percent of 1990 emission levels, which equates to 246 million metric tons CO_2e);
- 85 percent GHG emissions reduction from 1990 baseline level by 2050 (15 percent of 1990 emission levels, which equates to 61 million metric tons CO_2e); and

The CLCPA also established a goal of net-zero GHG emissions across all sectors of the economy by 2050 (the remaining 15 percent achieved through GHG emissions offset projects).

Part 496 applies to all emission sources in the State, although it does not itself impose compliance obligations. Other relevant State policies and guidelines include the following:

- Guide for Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements
- Energy Conservation Construction Code
- Climate Action Council Scoping Plan. The Scoping Plan is the framework for how New York will reduce greenhouse gas emissions and achieve net-zero emissions, increase renewable energy use, and ensure all communities equitably benefit in the clean energy transition.[7]
- Part 490 Projected Sea-Level Rise

New York State is also developing an economywide Cap-and-Invest Program to meet the requirements set forth in the CLCPA. It is anticipated that large-scale GHG emissions sources and distributors of heating and transportation fuels will be required to purchase or obtain allowances for the emissions associated with their activities. Proceeds from the Cap-and-Invest auctions will be invested to bolster carbon reductions and help ensure the Cap-and-Invest Program is affordable for all New Yorkers and delivers benefits to disadvantaged communities. Proceeds will support critical investments in climate mitigation, energy efficiency, clean transportation, and other projects, in addition to funding an annual Consumer Climate Action Account that will be distributed to New Yorkers to mitigate any potential consumer costs associated with the Program.[8]

Local

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"). The City also has announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 ("80 by 50"), which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. More recently, as part of OneNYC, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025.

In May 2019, the New York City Council enacted Local Law 97 of 2019—the Climate Mobilization Act. For most buildings that exceed 25,000 gsf (excluding electricity/steam generation facilities, rent-regulated accommodations, places of public worship, and city-owned properties), the City has established annual building emission limits beginning in 2024 and would require the owner of a

[7] New York State, Climate Act, New York's Scoping Plan, https://climate.ny.gov/resources/scoping-plan/

[8] New York State, Cap-and-Invest, https://capandinvest.ny.gov/

covered building to submit annual reports demonstrating the building is in compliance with the current GHG emission limits. For buildings not covered under the GHG emissions limits, owners may either demonstrate compliance with the current limits or implement specified energy conservation measures where applicable. Additionally, New York City's Local Law 154 of 2021 prohibits the onsite combustion of fuels that emit more than 25 kg CO_2/ MMBTU.

Executive Order 23 of 2022, Clean Construction, is aimed at using lower embodied carbon construction materials and reducing construction waste, recognizing that the embodied carbon from cement manufacturing is responsible for an estimated 8 percent of global GHG emissions and the embodied carbon from iron and steel production accounts for approximately 7 percent of global GHG emissions.

There are also local initiatives related to assessing the potential local impacts of global climate change and development strategies to make existing and proposed infrastructure and development more resilient to the effects of climate change. The initiatives include the work of the Climate Change Adaptation Task Force that the City launched in 2008 and the work of the New York City Panel on Climate Change (NPCC) composed of academic, policy advisors, and agencies to develop climate change projections of New York City. The 2009 *Climate Risk Information* report was prepared by the NPCC as part of PlaNYC to advice the Mayor and the Task Force on issue related to potential impacts on infrastructure due to climate change including, temperature, precipitation, rising sea levels, and extreme weather events. The NPCC developed projections using the Intergovernmental Panel on Climate Change (IPCC)-based methods to generate model-based probabilities for temperature, precipitation, sea level rise, and extreme events including coastal flooding in the 1 percent annual chance floodplain for the 2020s to the 2080s. These projections were developed using 16 global climate model (GCM) simulations and three GHGH emission scenarios. The NPCC released *Climate Change Adaptation in New York City: Building a Risk Management Response* in 2010 to serve as a basis for climate change adaptation in the city. In June 2013, the NPCC published *Climate Risk Information 2013: Observations, Climate Change Projections, and Maps* which outlines the most recent NPCC future climate projections. The NPCC regularly assesses climate change projections and updates those projections regularly. The resulting reports serve as a guide in the City's policymaking process.

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

The City has started preparing for extreme climate events, as outlined in the: Natural Hazard Mitigation Plan, Coastal Storm Plan, Heat Emergency Plan, Debris Management Plan, Power Disruption Plan, Winter Weather Emergency Plan, and Flash Flood Emergency Plan. Additionally, The New York City Department of Environmental Protection (DEP) issued several plans aimed at evaluating and implementing adaptive strategies for infrastructure, and the Department of City Planning (DCP) developed the Waterfront Revitalization Program (WRP), which serves as the City's principal coastal management tool and established the City's policies for development and use on the waterfront. DCP also published the Zoning for Coastal Flood Resiliency (ZCFR), a series of zoning changes for developments on the floodplain.

Methodology for Quantifying GHG Emissions

According to the *CEQR Technical Manual*, a GHG emissions assessment is typically conducted for larger projects undergoing an environmental impact statement, especially projects that would result in development of 350,000 sf or greater. The Proposed Project would result in the construction of up to 2.19 million gsf of academic, health care, Life Sciences, and retail space, as well as public realm improvements. Therefore, a GHG assessment is warranted.

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

Operational and mobile source emissions were quantified for this analysis. Emissions associated with construction are described qualitatively. Construction emissions would include emissions from construction equipment, construction worker and delivery vehicle trips, and emissions associated with the production and transport of construction material, such as concrete and steel (embodied carbon emissions). Typical construction emissions and emissions associated with embodied carbon can account for about 10 years of building operational GHG emissions. The actual emissions of CO_2e could vary depending on the efficiency of building operations and efficiency and use of sustainable practices during construction. The Proposed Project is not expected to fundamentally change the City's solid waste management system, therefore, no estimate of emissions from solid waste management is warranted. Management of construction waste that would result from the Proposed Project is discussed qualitatively.

Building Operational Emissions

Estimates of emissions associated with building energy use were prepared using building carbon intensity by use type as detailed in Table 18-4 of the *CEQR Technical Manual*. The carbon intensity data used represent 2008 citywide averages by use type and not projections for the future build year (2031). Future emissions are expected to be lower, as building energy efficiency improves and as the electric grid transitions to generating power from renewable energy sources.

Mobile Source Emissions

The number of annual weekday and weekend vehicle trips by mode (cars, taxis, trucks, ambulettes, and school buses) that would be generated by the Proposed Project was calculated using the transportation demand assumptions developed for the analysis presented in **Chapter 10, Transportation**. The assumptions used in the calculation include average daily weekday and weekend person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances for Manhattan shown in Table 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, in accordance with 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 and the mobile GHG emissions calculator provided with the manual was used to estimate GHG emissions from the car, taxi, and truck trips associated with the Proposed Project. Emissions that would result from ambulettes and school buses associated with the Proposed

Projects were calculated based on information developed for similar projects and U.S. Environmental Protection Agency (EPA) emission factors.

Methodology for Evaluating Resilience to Climate Change

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

Given the location of the Development Site within the existing floodplain, an assessment of the Proposed Project resilience to climate change is appropriate. The NPCC developed climate projections for the New York City region. This information is considered to be the best available climate data for New York City and is referenced in the *CEQR Technical Manual*. For sea level rise (SLR), NPCC projected a likely SLR of 10 inches by the 2020s, 30 inches by 2050s, 58 inches by the 2080s, and up to 75 inches by the end of the century (for the NPCC "High" scenario for each period). The current floodplain information, NPCC projections, and measures in design to make the Proposed Project and surrounding neighborhoods more resilient to sea level rise, coastal hazards, and other climate impacts are included in the resilience assessment for the Proposed Project.

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

Assessment

Projected GHG Emissions

Building Operational Emissions

The Proposed Project would use electricity and/or steam for its heating, hot water, ventilation, lighting, and other energy needs. Therefore, (except for emergency equipment that would potentially be needed), no direct GHG emissions are associated with the operation of the Proposed Project buildings. The emissions associated with steam and electricity use would occur off-site (indirect emissions). Those indirect emissions are the result of the current use of non-zero carbon fuels to produce electricity and steam. In the future, it is anticipated that with the State and City goals, the electric grid and co-generated steam production would become increasingly decarbonized. The indirect emissions that would result from steam and electricity use in academic and local retail uses were conservatively estimated using the GHG intensity factors in Table 18-4 of the *CEQR Technical Manual*. For the OCME, ambulatory care, and commercial life sciences uses, the GHG emission intensity was based on Local Law 97 of 2019 emission factors for the 2029 to 2034 compliance

period.[9] The building floor area, emission intensity, and the resulting GHG emissions from each of the uses are presented in detail in **Table 12-2**.

Table 12-2 Building Operational Emissions

Proposed Use	Building Floor Area (GSF)	GHG Intensity (kg CO_2e/GSF/year)	Annual GHG Emissions (metric tons of CO_2e)
Academic – Higher Education (CUNY)	605,163	11.42	6,911
Academic – High School (NYCPS)	193,358	11.42	2,208
OCME	156,270	13.30	2,078
Health Care – Ambulatory Care (H+H)	185,010	13.30	2,461
Commercial Life Sciences	1,040,880	13.30	13,844
Commercial – Local Retail	15,000	9.43	141
Total	**2,195,681**	**N/A**	**27,643**

Mobile Source Emissions

The number of annual vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Project was calculated using the transportation planning assumptions developed for the transportation demand analysis and represented in **Chapter 10, Transportation**. The number of project-generated weekday and weekend trips by autos, taxis, trucks, ambulettes, and school buses, calculated using the assumptions from the transportation analysis, was used to calculate annual vehicle miles travelled (VMT). **Table 12-3** shows the projected VMT, as the basis for the GHG emissions calculations from mobile sources.

[9] https://www.nyc.gov/assets/buildings/apps/pdf_viewer/viewer.html?file=2022GAP_Chapter3_MaintenanceWBwm.pdf&section=conscode_2022#page=31

Table 12-3 Annual Vehicle Miles Traveled (Miles Per Year)

Proposed Use	Car	Taxi	Truck[1]	Total
Academic – Higher Education (CUNY)	897,817	75,161	839,361	1,812,339
Academic – High School (NYCPS)	146,575	1,150	456,000	603,726
Health Care – OCME	185,576	3,721	249,216	438,513
Health Care – Ambulatory Care (H+H)[1]	419,853	36,901	486,400	943,154
Commercial Life Sciences	1,823,506	217,519	3,209,762	5,250,786
Commercial – Local Retail	67,320	15,339	52,497	135,156
Publicly Accessible Open Space	1,172	105	104	1,381
Total	**3,541,820**	**410,038**	**5,293,340**	**9,185,056**

Notes:
[1] The annual VMT for the ambulettes was included and calculated to be 6,390, based on an estimated trip distance for ambulettes of 1.5 miles. Saint Vincents Campus Redevelopment, https://a002-ceqraccess.nyc.gov/ceqr/Details?data=MTBEQ1AwMDNN0&signature=cc8ec1e55d2d9aa114754ec41959f63e5c00ad24

In addition, annual emissions from ~~the average of 2.3~~approximately 9 daily school bus trips that would be generated by the proposed high school were estimated by assuming 8 metric tons of CO_2e per year per bus.[10]

The VMT by car, taxi, and truck for each proposed use was attributed to freeway, arterial, and local road travel, using the percentages by road type for Manhattan provided in Table 18-7 of the *CEQR Technical Manual*. The mobile GHG emissions calculator provided with the manual was then used to calculate projected GHG emissions from the car, taxi, and truck trips associated with each Proposed Project use. The resultant GHG emissions are presented in **Table 12-4**.

Table 12-4 Annual Mobile Source GHG Emissions (metric tons CO_2e)

Proposed Use	Car	Taxi	Truck[1,2]	Total
Academic – Higher Education (CUNY)	468	35	1,736	2,240
Academic – High School (NYCPS)[1]	76	0.5	1,016	1,093
Health Care – OCME	97	1.7	516	614
Health Care – Ambulatory Care (H+H)[2]	219	17	1,002	1,259
Commercial Life Sciences	951	102	6,639	7,693
Commercial – Local Retail	35	7	109	151
Publicly Accessible Open Space	0.6	0.05	0.2	0.9
Total	**1,848**	**164**	**11,039**	**13,051**

Notes:
[1] Includes mobile source emissions from school buses.
[2] Includes mobile source emissions from ambulettes.

[10] Atlantic Yards Arena and Redevelopment Project DSEIS, https://cdn.esd.ny.gov/subsidiaries_projects/ayp/AtlanticYards/AdditionalResources/SEIS/4F_GreenhouseGasEmissions.pdf

Summary of Annual GHG Emissions

Table 12-5 provides a summary of estimated annual operational GHG emissions that would result from the Proposed Project.

Table 12-5 Summary of Annual GHG Emissions (Metric Tons of CO_2e)

Proposed Use	Building Operational Emissions	Mobile Source Emissions	Total Emissions
Academic – Higher Education (CUNY)	6,911	2,240	9,151
Academic – High School (NYCPS)[1]	2,208	1,046	3,254
OCME	2,078	614	2,692
Health Care – Ambulatory Care (H+H) [2]	2,461	1,248	3,720
Commercial Life Sciences	13,844	7,693	21,537
Commercial – Local Retail	141	151	292
Publicly Accessible Open Space	0	0.9	0.9
Total	**27,643**	**13,051**	**40,694**

Note that the building GHG intensity factors in Table 18-4 of the *CEQR Technical Manual*, (used in the analysis summarized in **Table 12-2**) are based on total GHG emissions from all energy sources (including oil and gas) for each building sector in 2008, as reported in the inventory of New York City Greenhouse Gas Emissions (September 2009), divided by the total gsf of building area for each building sector in 2008. The use of these intensities for the Proposed Project is highly conservative, as the Proposed Project would use electricity and steam to meet its daily energy needs and since the Proposed Project would be built in compliance with newer, more stringent energy codes. Moreover, if the proposed buildings were to be constructed elsewhere to accommodate the same space for the proposed uses, the emissions from the use of electricity, energy for heating and hot water, and vehicle use could equal or exceed those estimated for the Proposed Project, depending on their location, access to transit, building type, fuel used for energy, and energy efficiency measures.

As discussed, construction emissions were not modeled explicitly, but are estimated to be equivalent to approximately 10 years of operational emissions, including both direct energy and emissions embedded in materials (extraction, production, and transport). The Proposed Project is not expected to fundamentally change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Evaluation of the Proposed Project Consistency with GHG Reduction Goals

According to the *CEQR Technical Manual*, to determine the consistency with the City's overall GHG reduction goals, an applicant should assess consistency with the following goals, as relevant to the project:

› Construct new resource- and energy-efficient buildings (including the use of sustainable construction materials and practices) and improve the efficiency of existing buildings (Build Efficient Buildings, Reduce Construction Operation Emissions, and Use Building Materials with Low Carbon Intensity)

- Generate clean, renewable power through replacement of inefficient power plants with state-of-the-art technology and expanding the use of clean distributed generation (Generate Clean Power);
- Pursue transit-oriented development (Transit-Oriented Development and Sustainable Transportation);
- Encourage sustainable transportation through improving public transit, improving the efficiency of private vehicles, and decreasing the carbon intensity of fuels (Transit-Oriented Development and Sustainable Transportation).

Build Efficient Buildings

The Proposed Project would be built in accordance with the latest NYS and NYC codes, including the 2020 Energy Conservation Construction Codes of New York State (ECCNYS) and 2020 New York City Energy Conservation Code (NYCECC)—both of which govern building efficiency in the choice of HVAC system and the exterior building envelope.

Further, the planned vegetated open spaces and green roofs would mitigate the urban heat island effect. The Proposed Project buildings would be oriented to take advantage of the benefits of sunlight in winter and shoulder seasons while shielding users from harsh sun in the summer. The Proposed Project would incorporate the following measures that would have the potential to reduce energy use:

- Passive means of ventilation, supplemental to mechanical means
- Daylighting considerations to reduce need for artificial lights (orientation to reduce heat gain and maximize daylight)
- Energy Efficient Lighting (LED)
- Construct green roofs

Additionally, as part of the ongoing design, the following would be considered:

- Design an energy efficient building envelope to reduce cooling/heating requirements.
- Install high-efficiency HVAC systems.
- Eliminate or reduce the use of refrigerants in HVAC systems.
- Use high-albedo roofing materials.
- Reduce energy demand using peak shaving or load shifting strategies.
- Incorporate window glazing to optimize daylighting, heat loss and solar heat gain.
- Incorporate super insulation to minimize heat loss.
- Incorporate motion sensors and lighting and climate control.
- Use efficient, directed exterior lighting.
- Use water conserving fixtures that exceed building code requirements.
- Re-use gray water and/or collect and re-use rainwater.
- Provide space for storage and collection of recyclables (including paper, corrugated cardboard, glass, plastic and metals) in building design.

~~Generate~~Use Clean Power

~~The Proposed Project would not generate power. As such, this GHG reduction goal is not applicable. However, reliance of~~ The Proposed Project buildings ~~on~~would use grid power and utility steam, which would facilitate future emission reductions, as these centralized energy systems incorporate more renewable energy sources.

Transit-Oriented Development and Sustainable Transportation

The project site is served by the Lexington Avenue No. 6 subway line at the 23rd Street and 28th Street subway stations, with closest entrances within approximately half-mile or a 12-minute walk from the Development Site. Both stations are also served by local 4 train service during late nights. In addition, Phase 3 of the Second Avenue Subway is planned to extend from 72nd Street south to Houston Street, with a new station stop at 23rd Street. This would cut walk time to the project site from the subway roughly in half. The area is also well served by buses, including: M1, M2, M3, M9, M14, M15, M23, M34A, and M101. In addition, several express bus routes have stops along East 23rd and East 34th Streets. Two NYC Ferry landings are also located within approximately half-mile from the project site (the East 34th Street landing and the Stuyvesant Cove landing).

The project site is close to two Citi bike stations. The closest station is located on the project site's block near the northeast corner of East 25th Street and First Avenue and houses 30 bicycles. A second Citi Bike station has 35 bicycle docks and is located near the southwest corner of East 27th Street and First Avenue. Furthermore, the project site is accessible via several bicycle lanes. First and Second Avenues are protected bicycle lanes in the northbound and southbound directions, respectively. East 26th Street has a protected bicycle lane for a majority of the length west of Second Avenue and is a conventional shared bicycle lane between First and Second Avenues. North of the project site, East 29th Street is a designated bicycle lane in the westbound direction and is protected for much of the length of 29th Street.

The Proposed Project would transform the existing fenced-off private block into a connected series of buildings, arranged to create a sizable open space that is accessible to all. It will support a connected network of public and private parks and other open spaces, forming a link between Bellevue South Park, Bellevue Sobriety Garden, and Asser Levy Playground. It will enhance a connected bicycle and pedestrian network, with new accessible routes to sidewalks, a tie-in to the ~~Kips Bay~~East Midtown Coastal Resiliency (~~KBCR~~EMCR) project's planned flood protection to the northeast along FDR Drive and protection along East 25th Street~~,~~[11] ~~including a connection to the existing floodwall at the U.S. Department of Veterans Affairs New York Harbor Healthcare System's Manhattan campus (U.S. Corbin VA Facility).~~[12] Raised crosswalks and other traffic calming measures will make the surrounding streets safer and more welcoming to those on foot or bicycle. The Proposed Project would also include the construction of a new ADA-accessible pedestrian bridge over FDR Drive to Waterside Plaza. It will improve circulation in and around the site, including widening and making former East 26th Street a two-way street. The Proposed Project will include bike storage.

~~[11] Absent the KBCR project, the Proposed Project would incorporate standalone flood protections with independent utility into the design.~~

[12] Absent the EMCR project, the Proposed Project would incorporate standalone flood protections with independent utility into the design. For conservative analysis purposes, a hypothetical scenario in which there is no EMCR was referenced in the DEIS. However, that outcome is unlikely, and there are no plans to discontinue the EMCR project.

Reduce Construction Operation Emissions

Effort to reduce construction operation emissions is one of the five goals considered in the assessment of consistency of a project with the City's GHG reduction goals. Some of the measures identified in the *CEQR Technical Manual*, such as the use of diesel particulate filters, reduce particulate matter, rather than GHGs. While particulate matter is not included in the list of standard GHG, black carbon—a constituent of particulate matter—may play an important role in climate change. Construction of the Proposed Project would comply with the New York City Air Pollution Control Code, the latest version of which was adopted on May 12, 2020. Emissions associated with construction of the Proposed Project have been assessed qualitatively, in accordance with the *CEQR Technical Manual* guidance. Construction of the Proposed Project would include the use of recycled materials, reduced diesel emissions, limited idle time for vehicles and equipment on-site, and other measures to reduce GHG and diesel particulate emissions.

Use Building Materials with Low Carbon Intensity

The Proposed Project would reduce the GHG emissions generated during extraction, production, transport, and disposal of construction materials by using recycled steel and other materials, low-embodied carbon concrete, and diverting construction from landfills through reuse and recycle efforts. The following sustainable measures would be incorporated:

- Use of building materials with recycled content
- Use of building materials that are extracted and/or manufactured within the region
- Use of rapidly renewable building materials
- Use of wood that is locally produced and/or certified in accordance with the Sustainable Forestry Initiative or the Forestry Stewardship Council's Principles and Criteria

Where appropriate, cement replacements, cement produced using lower-GHG fuels, or concrete with optimized cement content would be specified. Recycled steel would most likely be used in construction of the Proposed Project, as 93 percent of U.S. newly produced steel beams and columns are made of recycled materials.

Resilience to Climate Change

This section describes the potential effects of global climate change on the Proposed Project due to sea-level rise (SLR) and coastal hazards and summarizes the resilience measures that would be implemented.

The location of the Development Site close to the East River, along with surrounding low grades, increases its propensity to flooding. Both sea level rise and storm surge can displace water from the East River towards the site. Superstorm Sandy flood elevation of approximately 10.7 feet referenced to the North American Vertical Datum of 1988 (NAVD88) affected the Development Site, flooding the CUNY basement where major utilities had to be repaired in place. The Development Site's low elevation, particularly along the eastern edge (5 to 6 feet NAVD88) serves as the ponding area for increased stormwater runoff beyond what the current sewer system can handle. With rainfall projections expected to rise, the Development Site would likely be subject to more frequent ponding of water that can back up into the site.

The eastern portions of the Development Site are within the FEMA 1 percent annual-chance floodplain (100-year floodplain) and subject to sea level rise, coastal flooding, and pluvial inundation. The 2015 Preliminary FRIM shows the existing 1 percent annual chance floodplain at elevation at 12 feet NAVD88. The site is within Zone AE (an area of high flood risk subject to inundation by the 1 percent annual-chance flood event).[13] The Proposed Project is located outside of wave action hazard zone (Zone VE) and outside of the Limit of Moderate Wave Action (LiMWA).[14] The western portion of the Development Site is within the current 0.2 percent annual chance floodplain (500-year floodplain).

The New York Building Code requires that all site improvements, building restorations, or new construction use the PFIRM maps as a basis for design related to flood protection. The level of protection required per FEMA PFIRM is 13 feet NAVD88 (Zone AE elevation of 12 feet plus 1 foot of freeboard).

The current conditions are projected to be exacerbated by climate change driven SLR and storm surge, with the entire Development Site projected to be within the 1 percent annual chance floodplain within this decade. The New York City Mayor's Office of Resiliency (MOR) and the NPCC established projections for SLR with climate change.[15] When added to the current flood elevations, future floodplain elevations with climate change are projected to be 16.8 feet NAVD88 by 2080s, under NPCC's high estimate (90th percentile). By 2100s, the projected flood elevation under NPCC's high estimate would be 18.4 feet NAVD88.

To account for the current and most likely projected flood conditions, the proposed buildings are planned to a Design Flood Elevation (DFE) of ~~16.7~~19 feet NAVD88. It is anticipated that this design would make the Proposed Project resilient to the high estimate flood conditions through ~~2080s – through~~2100s – beyond the assumed 50-year lifespan of critical building equipment~~. The design would also make the Proposed Project resilient to the middle range (25th to 70th percentile) projected climate conditions through 2100s, or~~ and to near ~~the end of~~ the assumed 80-year lifespan of the proposed buildings. Over those 80 years, additional measures to increase resilience to more extreme climate change could be implemented, if warranted based on climate data and conditions that would be collected in the future.

All proposed new critical infrastructure (i.e., electrical, plumbing, mechanical equipment) would be elevated above the projected future flood levels in each building, and basement uses would be limited to storage and parking only. Elevators would also be flood-proofed.

Notably, the Proposed Project would play a role in improving the resilience of the neighborhood by ~~connecting~~continuing the East Side Coastal Resiliency (ESCR) project to the south of the Development Site (by Asser Levy Playground) ~~and the KBCR~~through the construction of EMCR beginning at East 25th Street and continuing to the north of the Development Site. ESCR has accounted for SLR and wave action and established flood protection ~~at 16.5 feet NAVD88.~~for the area south of East 25th Street. The newly constructed ESCR flood wall at Asser Levy Playground is 15.5 feet high, turns to face 25th Street and continues along the southern street edge as a tall brick wall along the U.S Corbin VA Facility. ~~KBCR~~EMCR has established a flood protection elevation of 19 feet

[13] It should be noted that the Federal Emergency Management Agency (FEMA) and New York City had announced plans in 2016 to revise the FEMA flood maps based on a 2015 New York City appeal of FEMA's flood risk calculations for New York City and the region. The revised flood maps have not yet been produced.

[14] Inland limit of the area expected to receive 1.5-foot or greater breaking waves during the 1-percent-annual-chance flood event.

[15] New York City Panel on Climate Change 2019 Report Chapter 3: Sea Level Rise, https://nyaspubs.onlinelibrary.wiley.com/doi/10.1111/nyas.14006

NAVD88. The ~~KBCR~~EMCR flood wall ~~would~~will be ~~incorporated~~designed to be integrated into SPARC Square. While the ~~Proposed Project building along 25th~~ open space design has not yet been finalized, it will be designed to be elevated from the street and ~~wrap around the north side~~partially floodable in an effort to make the flood wall less conspicuous to pedestrians and the design will incorporate elements of ~~25th Street, from FDR Drive to First Avenue. The protection across 25th Street would consist of flip-up gates, minimizing impact outside of flooding conditions.~~

the flood wall into the open space. These design strategies and infrastructure elements would make the Proposed Project resilient to flooding with the most likely projected effects of climate change. The Proposed Project resilience measures would also form a critical segment in a continuous barrier against flooding along the east side of Manhattan and the City's larger strategy to protect the area from storm surge and coastal flooding.

Furthermore, the Proposed Project would leverage open space, green roofs (to detain water while accommodating programmable spaces and uses), and green infrastructure practices to manage on-site stormwater to meet local requirements. The proposed open space design would incorporate grading up to ~~16.3~~19 feet NAVD88. This space would provide a variety of passive stormwater treatment solutions (floodable spaces, permeable pavement) and stormwater storage, as well as create a vegetated buffer from the road with ample shade trees. The Proposed Project would minimize the footprint of below grade tanks at the basement level.

In summary, the following resilience measures would be included as part of the Proposed Project~~.~~:

- Green Roofs
- Bioswale / Rain Garden Areas
- Pervious Pavement
- Floodable Area
- Stormwater Detention Tank
- Floodwall
- ~~A Deployable Flood Gate Across 25th Street (design and location have yet to be finalized).~~

In summary, the Proposed Project operations (energy use and project-generated traffic) would result in ~~36,012~~40,694 CO_2e per year of GHG emissions. The Proposed Project would include measures that are consistent with the City's efforts to decrease GHG emissions. Specifically, the project would have a low reliance on fossil fuels as the City and State transition to electricity produced from renewables. Additionally, the Development Site offers excellent access to sustainable mobility (walkable area, bike infrastructure and storage, and multiple transit routes).

The Development Site is within the existing floodplain. The projected changes with climate change have been considered as part of the Proposed Project design. With the resiliency measures incorporated in the Proposed Project design, in conjunction with the ESCR and ~~KBCR~~EMCR projects, the Proposed Project would be resilient to the likely effects of flooding with climate change through the assumed 80-year lifespan of the proposed buildings. Over those 80 years, additional measures to increase resilience to more extreme climate change could be implemented, if warranted based on climate data and conditions that would be collected in the future.