Chapter 16: Greenhouse Gas Emissions and Climate Change

A. INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the construction and operation of the development facilitated by the Proposed Actions and its consistency with the city-wide GHG reduction goals. This chapter also evaluates the resilience of the development facilitated by the Proposed Actions to climate conditions throughout the lifetime of the project.

Climate change is projected to have 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 experienced at the local level. New York City's sustainable development policy, as described in the City's PlaNYC and OneNYC climate planning documents, established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change in the City.

As discussed in the 2021 *City Environmental Quality Review (CEQR) Technical Manual*, the city-wide GHG reduction goal is currently the most appropriate standard by which to analyze a project in an environmental review, and the guidance recommends that a GHG consistency assessment be undertaken for any project preparing an environmental impact statement expected to result in 350,000 square feet or more of development, and other energy-intensive projects. As described in detail in Chapter 1, "Project Description," the Applicant is seeking discretionary approvals (the "Proposed Actions") to facilitate the development of the Western Rail Yard site (Block 676, Lots 1 and 5) in the Hudson Yards neighborhood of Manhattan (the "WRY Site" or the "Development Site") with approximately 6.2 million gross square feet (gsf) of new mixed use development including residential, commercial, and community facility space, a hotel resort with gaming, and new public open space (the "Proposed Project"). There is a state process underway to designate locations for downstate gaming licenses; therefore, the Applicant is also presenting for environmental analysis purposes an Alternative Scenario that reflects a similar density and the same open space configuration as the Proposed Project but includes residential, commercial, and hotel buildings without gaming. Therefore, the Proposed Actions meet the threshold for a GHG consistency assessment. The analysis provided below considers both "With Action" scenarios.

PRINCIPAL CONCLUSIONS

The building energy use and vehicle use associated with the Proposed Project would result in up to approximately 60.3 thousand metric tons of carbon dioxide equivalent (CO_2e) emissions per year in the With Action condition. Consumption of grid electricity at the proposed buildings was estimated using the existing electric grid's carbon intensity and represents approximately 20.9 thousand metric tons of CO_2e per year. These

emissions are expected to decrease or be eliminated as New York State and New York City target 100 percent renewable electricity. Additionally, approximately 39.4 thousand metric tons of CO_2e per year are associated with vehicle emissions based on projected vehicle fleets for future years; however, these estimates conservatively do not include increased percentage of electric vehicles due to market behavior, and thus the GHG emissions from mobile sources in the Proposed Project are expected to be lower.

In the Alternative Scenario, building energy use and vehicle use would result in 56.4 thousand metric tons of CO_2e emissions per year, with 19.0 thousand metric tons associated with grid electricity and 37.4 thousand tons associated with vehicle emissions. Similar to the Proposed Project, the emissions associated with the Alternative Scenario's consumption of grid electricity and vehicles are expected to be less than these estimates. Additionally, the design of the Proposed Project and Alternative Scenario would target energy efficiency measures and carbon emission reductions in line with the City and State's emission reduction goals.

While total GHG emissions associated with construction (including on-site emissions and upstream emissions associated with construction materials) were not directly estimated for either the Proposed Project or the Alternative Scenario, analyses of similar projects have shown that construction emissions are typically equivalent to the total operational emissions up to approximately 5 to 10 years.

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.

The Applicant is currently evaluating the specific energy efficiency measures and design elements that may be implemented for the Proposed Actions. Furthermore, the Proposed Actions would be designed to comply with New York City's carbon intensity limits for the 2030–2035 period specified by New York City Department of Buildings (DOB) and be required at a minimum to achieve the energy efficiency requirements of the New York City Building Code under the New York City Energy Conservation Code (NYCECC), consistent with the NYStretch Energy Code within the 2020 Energy Conservation Code of New York State (2020 ECCNYS). The Proposed Actions would implement any measures required under such programs for either the Proposed Project or the Alternative Scenario, as legally applicable. Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

The Proposed Actions would also support other GHG goals by virtue of the Development Site's proximity to public transportation and the inclusion of carbon-free/low-carbon transportation infrastructure such as bicycle, e-mobility support, and electric vehicle charging infrastructure; minimizing the usage of fossil fuels through the commitment to utilize fully electric heat, residential cooking, and hot water systems for residential, retail, and hotel spaces; commitment to construction equipment emission controls; and the fact that as a matter of course, construction in New York City uses recycled steel. Furthermore, construction of either the Proposed Project or the Alternative Scenario would consider steel sources that utilize electric arc furnaces for processing scrap metal into recycled steel (lowering the emission associated with processing and avoiding emissions associated with transporting newly produced steel) and would include low-

carbon cement targets that would exceed standard practice. All of these factors demonstrate that the Proposed Actions supports the GHG reduction goal.

B. METHODOLOGY

As described in Chapter 18 of the *CEQR Technical Manual*, the focus of a GHG emissions assessment under CEQR is not to ascribe environmental significance to a specified level of GHG emissions, but instead to consider GHG emission sources and practicable means to reduce their output in the context of the project's location, consistent with the City's GHG reduction goal.

This chapter evaluates the GHG emissions that would be generated by the construction and operation of either the Proposed Project or the Alternative Scenario and the overall consistency of the Proposed Actions with GHG reduction goals for New York City and New York State. Per the *CEQR Technical Manual,* which is currently the most appropriate standard by which to analyze the Proposed Actions, evaluation of GHG emissions serves as a proxy for evaluating the Proposed Actions' impact on climate change. However, this assessment also considers the state-wide GHG reduction goals established by New York State in the Climate Leadership and Community Protection Act (CLCPA). This chapter also evaluates the resilience of the Proposed Actions to climate conditions throughout the lifetime of the project.

REGIONAL GHG EMISSIONS

Consistent with the *CEQR Technical Manual*, this chapter considers the GHG emission sources, emission reduction measures, and resiliency measures that are explicitly included as part of the Proposed Actions. The Proposed Actions are expected to result in low-carbon intensive, energy efficient development (either the Proposed Project or the Alternative Scenario) with emissions that are lower than the conservative projections outlined in this chapter and are anticipated to be reduced further as New York City achieves its goal of a renewable energy grid.

To accurately assess the Proposed Actions' full impact on regional GHG emissions, the emissions associated with the Proposed Actions (either the Proposed Project or the Alternative Scenario) would be compared against regional GHG emissions in a No Action scenario to arrive at an estimate of the Proposed Actions' incremental contribution to regional GHG emissions. As noted in the *CEQR Technical Manual*, the global nature of GHG emissions and the current absence of similarly established numeric standards for these emissions support the emerging consensus that a numerical threshold for determining significance should not be established for the purposes of environmental review. Therefore, this chapter presents the total GHG emissions directly associated with the Proposed Actions (either the Proposed Project or the Alternative Scenario), identifies measures that would be implemented and measures that are still under consideration to limit emissions, and assesses the Proposed Actions' consistency with New York City and New York State's climate policies to reduce regional GHG emissions.

C. GREENHOUSE GAS EMISSIONS

POLLUTANTS OF CONCERN

Greenhouse gases (GHGs) are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The general warming of the Earth's atmosphere caused by this phenomenon is known as the "greenhouse effect." Water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), 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 (an international agreement), significant emissions of these substances are not anticipated and 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 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 *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of a GHG analysis: CO_2, N_2O, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). This analysis focuses primarily on CO_2, N_2O, and methane. There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the Proposed Actions.

CO_2 is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most influential GHG. CO_2 is emitted from any combustion process (both natural and anthropogenic); from some industrial processes such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products; from volcanic eruptions; and from the decay of organic matter. CO_2 is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CO_2 is included in any analysis of GHG emissions, consistent with *CEQR Technical Manual* guidelines.

Methane and N_2O also play an important role in the greenhouse effect since the removal processes for these compounds are limited and because they have a relatively high impact on global climate change as compared with an equal quantity of CO_2. Emissions of these compounds are therefore included in GHG emissions analyses when the potential for substantial emission of these gases exists.

To present a complete inventory of all GHGs, component emissions are added together and presented as carbon dioxide equivalent (CO_2e) emissions—a unit representing the quantity of each GHG weighted by its effectiveness using CO_2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global

warming potential (GWP). GWPs account for the lifetime and the radiative forcing[1] of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). Consistent with the *CEQR Technical Manual,* CO_2e emissions are estimated using the effect GWP over a 100-year horizon (GWP-100). While New York State GHG emission reduction goals use a 20-year horizon (GWP-20), the emissions of GHGs other than CO_2 represent a very minor component of the emissions associated with the Proposed Actions and the difference between the two GWPs would be negligible. The GWPs for the main GHGs discussed here are presented in **Table 16-1**.

Table 16-1
Global Warming Potential (GWP) for Major GHGs

Greenhouse Gas	100-year Horizon GWP[(1)]	20-year Horizon GWP [(2)]
Carbon Dioxide (CO_2)	1	1
Methane (CH_4)	21	84
Nitrous Oxide (N_2O)	310	264
Hydrofluorocarbons (HFCs)	140 to 11,700	427 to 10,800
Perfluorocarbons (PFCs)	6,500 to 9,200	4,880 to 8,210
Sulfur Hexafluoride (SF_6)	23,900	17,500

Notes:
(1) The 100-year GWPs presented above are based on the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report (SAR) to maintain consistency in GHG reporting. The IPCC has since published updated GWP values that reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. In some instances, if combined emission factors were used from updated modeling tools, some slightly different GWP may have been used for this study. Since the emissions of GHGs other than CO_2 represent a very minor component of the emissions, these differences are negligible.
(2) The 20-year GWPs presented above are consistent with New York State's approach to GHG emission estimates as described in the Climate Leadership and Community Protection Act.
Source: 2021 *CEQR Technical Manual; 2023 Statewide GHG Emissions Report*

POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS FOR REDUCING GHG EMISSIONS

FEDERAL POLICIES

Because of the growing consensus that human activity resulting in GHG emissions has 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 pledged deep cuts in emissions, with a stated goal of reducing annual emissions to levels

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

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

that would be between 26 and 28 percent lower than 2005 levels by 2025.[3] On January 20, 2021, President Biden signed an executive order to bring the United States back into the Paris Agreement after the United States officially withdrew from the agreement in November 2020.

Regardless of the Paris Agreement, the United States 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 (RFS) program, which phased in requirements for the inclusion of renewable fuels that increased annually up to a total of 36.0 billion gallons by 2022. On December 1, 2022, EPA announced a proposed rule to establish the required fuel volumes and percentage standards for 2023, 2024, and 2025, as well as important modifications to strengthen and expand the RFS program. EPA issued the Affordable Clean Energy rule on June 19, 2019; the rule establishes emissions reduction measures accepted as best technology for power plants and focuses on energy efficiency improvements in place of direct emissions reduction measures.

NEW YORK STATE POLICIES

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.

The New York State Energy Plan (last amended in April 2020) outlines the State's energy goals and provides strategies and recommendations for meeting those goals. The plan outlines a vision for transforming the state's energy sector that would result in increased energy efficiency (both demand and supply), increased carbon-free power production, and cleaner transportation, in addition to achieving other goals not related to GHG emissions.

In 2019, New York State enacted the CLCPA to achieve the GHG reductions goals established in the New York State Energy Plan and expand on them by: 1) establishing state-wide GHG emission limits to achieve new long-term goals to reduce state-wide GHG by 100 percent (compared with 1990 levels) by 2050; and 2) providing 100 percent of electricity generation in the state from renewable sources by 2040. The legislation charges the New York State Climate Action Council with recommending agency regulations to reduce emissions, increasing investments in renewable energy sources, and ensuring that significant portions of investments are made in disadvantaged communities. Pursuant to these requirements, the New York State Climate Action Council prepared and approved a scoping plan on December 19, 2022.

As part of this effort, New York State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener

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

Communities and Climate Smart Communities programs. On December 29, 2022, New York State also announced the adoption of California's GHG vehicle standards, the Advanced Clean Cars II Rule, which are at least as strict as the federal standards and would require all new passenger cars and trucks sold in New York State to be zero-emissions by 2035.

New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of nine northeastern and Mid-Atlantic states have committed to regulate the amount of CO_2 that power plants are allowed to emit, gradually reducing annual emissions to half the 2009 levels by 2020 and reducing an additional 30 percent from 2020 to 2030. 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.

NEW YORK CITY POLICIES

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 began as PlaNYC 2030 in 2007 and continued to evolve as *OneNYC*, with the inclusion of more ambitious GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and initiatives aimed at adapting to future climate change impacts. In April 2023, New York City published *PlaNYC: Getting Sustainability Done*—the latest outline of the City's strategies to achieve its sustainability goals. The goal to reduce city-wide 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").[4] 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, under the *OneNYC 2050* report and continued in *PlaNYC*, the City announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025 and achieving net-zero city-wide GHG emissions by 2050.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in large new and existing buildings, in accordance with *PlaNYC*. The laws require owners of existing buildings larger than 50,000 square feet to conduct energy efficiency audits and retro-commissioning every 10 years, to optimize building energy efficiency, and to "benchmark" the building energy and water consumption annually, using an EPA online tool. By 2025, commercial buildings over 50,000 square feet 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 NYCECC, which along with the Energy Conservation Construction Code of New York

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

State (as updated in 2020), requires equipment installed during a renovation to meet current efficiency standards.

To achieve the GHG reduction goals, the City continues to convene technical working groups to analyze the GHG reduction pathways from the building sector, power, transportation, and solid waste sectors to develop action plans for these sectors and achieve its GHG reduction goals. The members of the technical working groups develop and recommend data analysis, interim metrics and indicators, voluntary actions, and potential mandates to effectively achieve these goals. In 2016, the City published the building sector technical working group report, which included commitments by the City to change to building energy code and take other measures aimed at substantially reducing GHG emissions.

In May 2019, the New York City Council enacted the Climate Mobilization Act (CMA)—including Local Law 97 of 2019 (LL97), targeting GHG emissions associated with building energy consumption. For most buildings that exceed 25,000 gsf (excluding electricity/steam generation facilities, rent-regulated accommodations, places of public worship, and City-owned properties), the City has established annual building emission limits beginning in 2024 and would require the owner of a covered building to submit annual reports demonstrating the building complies 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. In 2023, DOB adopted maximum carbon intensity factors for buildings through 2050 by Energy Star Portfolio Manager (ESPM) property type.[5] Under the 2023 rule, a building's emissions limit would be estimated using the appropriate carbon intensity factor for each property type and the floor area of that property type. Maximum carbon intensity factors would decrease over time until 2050, when all covered buildings are required to demonstrate that the systems would have no direct GHG emissions.

As part of the CMA, Local Laws 92 and 94 of 2019 (LL92 and LL94) would include requirements for all new construction and any building that would undergo major modification of the rooftop requiring a permit to utilize available roofing space for the installation of either a green roof or a solar photovoltaic system generating at least 4kW, or a combination of the two.

In addition, Local Law 154 of 2021 (LL154) established GHG emission limits that would prohibit fossil fuel systems in new buildings and major renovations where an application for approval of construction documents would be required (DOB threshold for alterations) emitting 25 kilograms or more of CO_2 per million Btu of energy.

A number of benchmarks for energy efficiency and green building design have also been developed. For example, the LEED system is a benchmark for the design, construction, and operation of high-performance green buildings that includes energy efficiency components. EPA's Energy Star is a voluntary labeling program designed to identify and promote the construction of new energy efficient buildings, facilities, and homes and the

[5] Rule of the City of New York, 1 RCNY §103-14. Requirements for Reporting Annual Greenhouse Gas Emissions for Covered Buildings.

purchase of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

METHODOLOGY

Climate change is driven by the collective contributions of diverse individual sources of emissions to global atmospheric GHG concentrations. Identifying potential GHG emissions from a proposed action can help decision makers identify practicable opportunities to reduce GHG emissions and ensure consistency with policies aimed at reducing overall emissions. While the increments of criteria pollutants and toxic air emissions are assessed in the context of health-based standards and local impacts, there are no established thresholds for assessing the significance of a project's contribution to climate change.

As detailed above, this chapter presents the total GHG emissions potentially associated with the Proposed Actions (either the Proposed Project or the Alternative Scenario) and identifies measures that would be implemented and measures that are still under consideration to limit emissions. (Note that this differs from most other technical areas in that it does not account for only the increment between the condition with and without the Proposed Actions.) Consistent with the *CEQR Technical Manual*, the focus of this analysis is on the total emissions associated with the Proposed Actions and on the effect of measures to reduce those emissions.

Estimates of potential GHG emissions associated with the Proposed Actions are based on the methodology presented in the *CEQR Technical Manual*. Estimates of emissions of GHGs from the Proposed Project and the Alternative Scenario have been quantified, including off-site emissions associated with use of electricity to power on-site heat and hot water systems and other building operations, and emissions from project-generated vehicle use.

Analysis of the GHG emissions associated with building energy usage is conservatively based on the current carbon intensity of electricity as specified by DOB. Emissions from transportation conservatively applies the emission factors for the 2030 analysis year in both the Proposed Project and Alternative Scenario. Since vehicular emission factors will also continue to decrease in future years as vehicle engine efficiency increases and emissions standards continue to decrease, the Proposed Actions would result in lower emissions in future years. Since the *CEQR Technical Manual* methodology does not account for future years and other changes described above, it also does not explicitly address potential changes in future consumption associated with climate change, such as increased electricity for cooling, or decreased on-site fuel for heating. Therefore, this analysis results in overall conservatively high estimates of potential GHG emissions.

As described above, CO_2 is the primary pollutant of concern from anthropogenic emission sources and is accounted for in the analysis of emissions from all development projects (see "Pollutants of Concern," above). GHG emissions for gases other than CO_2 are included where practicable or in cases where they comprise a substantial portion of overall emissions. The various GHG emissions are added together and presented as metric tons of carbon dioxide equivalent (CO_2e) emissions per year.

BUILDING OPERATIONAL EMISSIONS

The Proposed Project and the Alternative Scenario are currently anticipated to utilize electric-powered equipment (air source heat pumps) to provide heating and cooling to the proposed buildings and comply with LL154. GHG emissions are assumed to be designed to meet the City's carbon intensity limits at the time their construction is completed as specified in the Rules of the City of New York[6]. Therefore, GHG emissions for the Proposed Project and the Alternative Scenario were estimated using the carbon intensity limits for the 2030–2034 time period. Future emissions are expected to be lower than these projections as the City and State achieve a zero-emission electrical grid by 2040 as well as the City's stricter carbon intensity limits for buildings beyond the 2030 build year.

ON-SITE ELECTRICITY GENERATION

Under either the Proposed Project or the Alternative Scenario, diesel generators would be installed to provide emergency back-up power for each of the proposed buildings. The generators would potentially be enrolled in a utility-sponsored demand response program and therefore would be Tier 4 compliant engines with emissions controls. Since this equipment would be used for non-emergency purposes, the potential GHG emissions associated with this equipment were estimated. Based on the maximum run hours per unit, this is a conservatively high estimate. Under either the Proposed Project or the Alternative Scenario, there would be twelve (12) diesel-fired 3,000 kW generators and two (2) diesel-fired 2,500 kW generators. Each engine was assumed to operated up to 200 hours within a single year and would consume up to 115 thousand gallons of diesel per year.

The quantity of fuel was then multiplied by a unit-specific CO_2 emission factor of 10.21 kilogram per gallon of diesel—taken from EPA's Emission Factors for Greenhouse Gas Inventories. In order to develop CO_2e emission factors, emission factors of N_2O and CH_4 for diesel construction equipment (1.01 gram/gallon and 0.94 gram/gallon, respectively) were also taken from EPA's Emission Factors Hub.

MOBILE SOURCE EMISSIONS

The numbers of annual weekday and Saturday vehicle trips by mode (cars, taxis, and trucks) that would be generated by the Proposed Project or the Alternative Scenario were calculated using the transportation planning assumptions developed for the analysis and presented in Chapter 14, "Transportation." The assumptions used in the calculation include average daily person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances shown in Table 18-5 and 18-6 and associated text of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars, taxis, and trucks. 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 all trips attributable to the Proposed Project or the Alternative Scenario. Since the mobile GHG emissions calculator does not assume

[6] Rules of the City of New York. 1 RCNY §103-14.

an increased percentage of electric vehicles in the regional vehicle fleet, the GHG vehicle emissions are expected to be less as New York State implements new zero emission vehicle sale and lease requirements beginning in 2035.

Based on the latest fuel lifecycle model from Argonne National Laboratory,[7] emissions from producing and delivering fuel ("well-to-pump") are estimated to add an additional 26 percent to the GHG emissions from gasoline and 27 percent from diesel. Although upstream emissions (emissions associated with production, processing, and transportation) of all fuels can be substantial and are important to consider when comparing the emissions associated with the consumption of different fuels, fuel alternatives are not being considered for the proposed development, and as per the *CEQR Technical Manual* guidance, the well-to-pump emissions are not considered in the analysis. The assessment of tailpipe emissions only is in accordance with the *CEQR Technical Manual* guidance on assessing GHG emissions and the methodology used in developing the New York City GHG inventory, which is the basis of the GHG reduction goal.

The projected total annual vehicle miles traveled by roadway type, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 16-2**.

Table 16-2
Vehicle Miles Traveled per Year Future with the Proposed Actions

Roadway Type	Passenger Vehicle	Taxi	Tour Bus	Truck
Proposed Project				
Local	1,988,071	1,561,718	32,306	3,283,658
Arterial	4,337,610	3,407,385	70,485	7,164,345
Interstate/Expressway	2,711,006	2,129,616	44,053	4,477,716
Total	**9,036,687**	**7,098,719**	**146,844**	**14,925,720**
Alternative Scenario				
Local	1,651,271	456,811	0	3,443,213
Arterial	3,602,773	996,679	0	7,512,464
Interstate/Expressway	2,251,733	622,924	0	4,695,290
Total	**7,505,777**	**2,076,415**	**0**	**15,650,966**

CONSTRUCTION EMISSIONS

In addition, total GHG emissions associated with construction are considered as part of the total emissions generated by either the Proposed Project or the Alternative Scenario. Because detailed architectural drawings of the proposed buildings have not yet been prepared, emissions associated with construction of the Proposed Project or the Alternative Scenario have not been estimated explicitly. However, analyses of similar projects have shown that construction emissions are typically equivalent to the total operational emissions up to approximately 5 to 10 years.

EMISSIONS FROM SOLID WASTE MANAGEMENT

As detailed in Chapter 12, "Solid Waste and Sanitation Services," the Proposed Actions would not fundamentally change the City's solid waste management system. Therefore,

[7] Based on GREET1_2022 model from Argonne National Laboratory.

as per the *CEQR Technical Manual*, the GHG emissions from the Proposed Actions' solid waste generation, transportation, treatment, and disposal are not quantified and no further assessment is warranted.

PROJECTED GHG EMISSIONS

BUILDING OPERATIONAL EMISSIONS

The building floor area, emission intensity, and resulting GHG emissions from each of the uses for the Proposed Project and Alternative Scenario are presented in detail in **Tables 16-3** and **16-4**. The analysis presents the total emissions after construction.

Table 16-3
Annual Building Operational Emissions—Proposed Project

Source Use	Building Area (gsf)	Carbon Intensity Limit[1] (kg CO_2e / gsf - year)	Annual GHG Emissions (metric tons CO_2e)
Residential	1,208,623	0.0033	4,045
Local Retail	24,638	0.0021	52
Office	2,179,899	0.0027	5,866
Cultural Institute	16,000	0.0054	86
Daycare	10,000	0.0024	24
School	120,000	0.0022	268
Hotel	1,627,866	0.0039	6.268
Gaming	1,039,534	0.0030	3,074
Demand Response	N/A	N/A	1,213
		TOTAL:	**20,895**

Notes: Totals may not sum due to rounding.
[1] GHG emissions for the Proposed Project were estimated using the carbon intensity limits for the 2030–2034 time period.

Table 16-4
Annual Building Operational Emissions—Alternative Scenario

Source Use	Building Area (gsf)	Carbon Intensity Limit[1] (kg CO_2e / gsf - year)	Annual GHG Emissions (metric tons CO_2e)
Residential	1,858,209	0.0033	6,219
Local Retail	134,785	0.0021	284
Office	4,040,879	0.0027	10,873
Cultural Institute	16,000	0.0054	86
Daycare	10,000	0.0024	24
School	120,000	0.0022	268
Demand Response	N/A	N/A	1,213
		TOTAL:	**18,967**

Notes: Totals may not sum due to rounding.
[1] GHG emissions for the Alternative Scenario were estimated using the carbon intensity limits for the 2030–2034 time period.

MOBILE SOURCE EMISSIONS

The mobile-source-related GHG emissions from the Proposed Actions are presented in detail in **Tables 16-5 and 16-6**.

Table 16-5
Annual Mobile Source Emissions—Proposed Project
(metric tons CO_2e)

Source Use	Passenger Vehicle	Taxi	Tour Bus	Truck	Total
Residential	596	175	0	2,107	2,878
Local Retail	160	28	0	185	373
Office	1,029	262	0	14,527	15,818
Cultural Institute	12	8	0	16	37
Daycare	5	3	0	14	22
School	19	1	0	463	483
Hotel	469	1,725	0	2,303	4,497
Gaming	2,473	1,156	326	11,339	15,294
Total	**4,764**	**3,357**	**326**	**30,956**	**39,402**

Table 16-6
Annual Mobile Source Emissions—Alternative Scenario
(metric tons CO_2e)

Source Use	Passenger Vehicle	Taxi	Tour Bus	Truck	Total
Residential	1,138	333	0	4,022	5,493
Local Retail	875	1452	0	1,015	2,041
Office	1,907	485	0	26,929	29,322
Cultural Institute	12	8	0	16	37
Daycare	5	3	0	14	22
School	19	1	0	463	483
Total	**3,957**	**982**	**0**	**32,460**	**37,399**

In addition to the direct emissions included in the analysis, an additional approximately 25 percent would be emitted upstream (associated with fuel extraction, production, and delivery).

SUMMARY

A summary of GHG emissions for the Proposed Project and the Alternative Scenario is presented in **Table 16-7**. Emissions associated with mobile sources represent approximately 65-66 percent of the total emissions; conversely, building energy emissions represent approximately 34-35 percent of total emissions. Note that if new buildings were to be constructed elsewhere to accommodate the same number of units and space for other 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 Actions, depending on location, access to transit, building type, and energy efficiency measures.

Table 16-7
Summary of Annual GHG Emissions Future with the Proposed Actions
(metric tons CO_2e)

Scenario	Building Operations	Mobile	Total
Proposed Project	20,895	39,402	**60,297**
Alternative Scenario	18,967	37,399	**56,365**
Note: Totals may not sum due to rounding.			

In addition, total GHG emissions associated with construction were considered as part of the Proposed Actions' total emissions. Because detailed architectural drawings of the proposed buildings have not yet been prepared, emissions associated with construction of the Proposed Actions have not been estimated explicitly. However, analyses of similar projects have shown that construction emissions are typically equivalent to the total operational emissions up to approximately 5 to 10 years.

ELEMENTS THAT WOULD REDUCE GHG EMISSIONS

The Proposed Actions would include a number of sustainable design features under either the Proposed Project or the Alternative Scenario which would, among other benefits, result in lower GHG emissions. The Applicant intends to pursue LEED Silver certification for the Proposed Actions which will require the use of less energy than if built only to meet the energy code. Furthermore, compliance with the City's carbon intensity limits would also result in energy efficient building designs that exceed energy code requirements. Moreover, development with access to transit and existing roadways is, in general, consistent with sustainable land use planning and smart growth strategies to reduce the carbon footprint of new development. These features and other measures currently under consideration are discussed in this section, addressing the PlaNYC/OneNYC goals as outlined in the *CEQR Technical Manual* as well as New York State GHG reduction goals stated in the CLCPA. The implementation of the various design measures and features described would result in development that is consistent with the City's emissions reduction goal, as defined in the *CEQR Technical Manual*.

BUILD EFFICIENT BUILDINGS

The Applicant has identified several measures under consideration that may be implemented in the final design of either the Proposed Project or the Alternative Scenario and would reduce GHG emissions (directly or indirectly). These measures include the following (this list represents measures currently under consideration that are likely to be implemented, but other measures may be included once building-specific design advances):

- HVAC systems would be designed to be fully electrified, utilizing high efficiency heat pumps to provide space heating and cooling;
- Exhaust systems and spill air systems would be designed with energy recovery technology;
- Heat pumps would produce domestic hot water along with high-efficiency plumbing fixtures and appliances;
- Windows would be located such that designs would limit total glazing area, incorporate thermal breaks, and utilize high-performance coatings;
- Incorporation of efficient, directed exterior lighting as well as maximizing interior daylighting;
- Incorporation of motion sensors for lighting control for back-of-house and support spaces;
- Use efficient lighting and elevators, exceeding requirements;
- Incorporation of either green roofing systems to reduced heating/cooling loads or rooftop photovoltaic systems to generate renewable energy on-site;

- Sub-metering of electricity and water allowing tenants to track and optimize their use;
- Water conserving fixtures, meeting New York City's stringent building code requirements;
- High performance, continuously insulated envelope assemblies;
- High-albedo roofing materials; and
- Third-party building commissioning would be undertaken upon completion of construction to ensure energy performance.

The estimated GHG emissions associated with building energy use for either the Proposed Project or the Alternative Scenario would fall below the immediate carbon intensity limits established by the City through the use of fully electrified systems. With implementation of the measures above, the Proposed Project and the Alternative Scenario would be in line with the City's energy efficiency measures, renewable energy, and carbon emission reduction goals. Furthermore, both scenarios would be subject to the City's future carbon intensity limits and are likely to achieve them as the carbon intensity associated with grid electricity is expected to decrease as New York State and New York City target 100 percent renewable electricity by 2040.

Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

USE CLEAN POWER

Under the carbon intensity limits for most buildings in New York City established under the Rules of the City of New York,[8] the Proposed Project and the Alternative Scenario would be required to report its GHG emissions each year and compare its emissions to the applicable carbon intensity limits. Stricter GHG emission limits would also be phased into developments in later years with a requirement that buildings show zero emissions beginning in 2050. While the use of fossil fuels would not be specifically prohibited by the City, the Proposed Project and the Alternative Scenario would utilize electric-powered systems for the normal operation of the heat and hot water systems, and residential cooking appliances at all proposed buildings.

In either With Action scenario, the proposed buildings also would be subject to the requirements to utilize available roofing space for the installation of either a green roof or a solar photovoltaic system generating at least 4kW, or a combination of the two. Therefore, it is also possible that local on-site renewable power production (e.g., geothermal, solar, wind) would be considered while reviewing options for LEED credits, EPA Energy Star, and achieving the above efficient building goal.

Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of using clean power.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The Development Site is located adjacent to the 34 St-Hudson Yards subway station and is also supported by the nearby M11, M12, M20, M23, and M34 bus routes. The Proposed

[8] Section 103-14

Project and the Alternative Scenario would include newly constructed infrastructure for low-emission mobility options such as bike storage, e-mobility options, and EV charging. Therefore, the Proposed Actions would support the goal identified in the *CEQR Technical Manual* of supporting transit-orient development and sustainable transportation.

REDUCE CONSTRUCTION OPERATION EMISSIONS

As described in detail in Chapter 20, "Construction," construction specifications would include an extensive diesel emissions reduction program, including diesel particulate filters for large construction engines, use of electric equipment in lieu of fossil-fuel powered where feasible, limiting idle times on site, and other measures. These measures would reduce particulate matter emissions; while particulate matter is not included in the list of standard GHGs ("Kyoto gases"), recent studies have shown that black carbon—a constituent of particulate matter—may play an important role in climate change.

USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

Recycled steel may be used for most structural steel, since the steel available in the region is mostly recycled and would result in reduced upstream emissions. Upstream emissions for recycled steel are associated with both the production of steel using scrap metal (compared to iron ore) and with transportation of steel to the construction site. However, the Proposed Project and the Alternative Scenario also would consider further reductions in embodied carbon associated with its commitment to use recycled steel by considering procurement of recycled steel produced utilizing electric arc furnaces to process scrap metals as opposed to traditional fossil fuel fired blast furnaces used to process raw iron ore. Low-carbon cement replacements such as fly ash, slag, or other pozzolans would also be used, and concrete content would be optimized to the extent feasible.

D. RESILIENCE TO CLIMATE CHANGE

The New York City Waterfront Revitalization Program (WRP)[9] addresses climate change and sea-level rise. The WRP requires consideration of climate change and sea-level rise in planning and design of developments within the defined Coastal Zone Boundary. The Development Site is within the Coastal Zone Boundary. As set forth in more detail in the *CEQR Technical Manual*, the provisions of the WRP are also applied by the New York City Department of City Planning (DCP) and other city agencies when conducting environmental review. The Proposed Project's and Alternative Scenario's consistency with WRP policies are described in Chapter 2, "Land Use, Zoning, and Public Policy," and **Appendix B.**

The potential effects of global climate change have been considered and resiliency measures that would be implemented as part of the Proposed Project or Alternative Scenario have been identified.

[9] City of New York Department of City Planning. *The New York City Waterfront Revitalization Program*. October 30, 2013. Revisions approved by NY State Department of State, February 2016 and November 2018.

Climate change considerations and measures to increase climate resilience are discussed below. Additional climate change considerations may be incorporated into state and/or local laws prior to the 2030 analysis year; any development of the Development Site would be constructed to meet or exceed the codes in effect at the time of approval.

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: 1) provide more protective standards for coastal development, wetlands protection, shoreline armoring, and post-storm recovery; 2) implement adaptive measures for habitats; 3) integrate climate change adaptation strategies into state environmental plans; and 4) amend local and state regulations or statutes to respond to climate change. The Task Force also recommended the formal adoption of sea-level rise projections.

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 for certain State programs demonstrate that they have taken into account future physical risks from storm surges, sea-level rise and flooding, and required the New York State Department of Environmental Conservation (DEC) to establish official State sea-level rise projections. In February 2017, DEC adopted a rule (6 NYCRR Part 490) defining the sea-level rise projections. These projections provide the basis for State adaptation decisions and are available for use by all decision makers. CRRA applies to specific State permitting, funding and regulatory decisions, including: smart growth assessments; funding for wastewater treatment plants; siting of hazardous waste facilities; design and construction of petroleum and chemical bulk storage facilities; oil and gas drilling; and State acquisition of open space. As required under the CRRA, DEC published implementation guidance and reference to climate change projections specific to New York State in August 2021.

In New York City, the Climate Change Adaptation Task Force is tasked with fostering collaboration and cooperation between public and private organizations working to build the resilience of the city's critical infrastructure against rising seas, higher temperatures, and changing precipitation patterns. The Task Force is composed of over 57 New York City and State agencies, public authorities, and companies that operate, regulate, or maintain critical infrastructure in New York City. Led by the Mayor's Office of Climate and Environmental Justice, the Task Force works to assess risks, prioritize strategies, and

[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.

examine how standards and regulations may need to be adjusted in response to a changing climate.

To assist the Task Force, the New York City Panel on Climate Change (NPCC) prepared climate change projections for the New York City region[13] (subsequently updated),[14,15] adopted by NYSDEC (under 6 NYCRR Part 490), and has 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 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. The NYC WRP relies on the NPCC projections of sea level rise as published in a 2015 report to evaluate the effects of climate change and sea level rise.

While strategies and guidelines for addressing the effects of climate change are being developed at all levels of government, there are currently no specific requirements or accepted recommendations for development projects in New York City. However, the WRP and accompanying guidance[16] 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 described in detail in Chapter 2, "Land Use, Zoning, and Public Policy," and **Appendix B**. The following describes the main NPCC findings.

TEMPERATURE AND URBAN HEAT ISLAND

The probability that New York City would experience an increase in air temperatures and relative humidity (characterized as the heat index of a given location) is considered by NPCC to be "very likely." NPCC projected that temperatures are likely to increase by up to 7.1 degrees Fahrenheit by the 2050s and that New York City would experience up to 9 heat waves per year with an average duration up to 6 days. By the end of the century, temperatures are likely to increase by up to 13.5 degrees Fahrenheit with up to 10 heat waves per year with an average duration of 10 days.

PRECIPITATION

NPCC projected that precipitation levels are likely to increase 4 to 11 percent compared to the 1981–2010 base period by the 2050s and up to 30 percent by the end of the

[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 Panel on Climate Change. *New York City Panel on Climate Change 2015 Report*. Ann. N.Y. Acad. Sci. 1336. 2015.

[16] NYC Planning. The New York City Waterfront Revitalization Program: Climate Change Adaptation Guidance. March 2017.

century, with up to 6 rainfall events projected per year to result in 2 inches or more of precipitation.

As part of the New York City Green Infrastructure Program's goal to reduce combined sewer overflows during rainfall events, the City has established design standards and specifications to address the impact that stormwater would have on the City's combined sewer systems. The Program includes retrofits to streets, sidewalks, and other public properties with standard green infrastructure practices such as bioswales, rain gardens, greenstrips, stormwater seepage basins, and infiltration basins. The Program also incentivizes both private property and permitting projects that are triggered by stormwater regulations to install green infrastructure. While the primary goal of the Program is to alleviate surcharge and flooding conditions, green infrastructure projects can result in several co-benefits that may include reduced localized stormwater flooding and the reduction in the impact of the urban heat island effect.

SEA LEVEL RISE

The 2015 NPCC projections predict sea level rise for a variety of probabilities (median and about one and two standard deviations above and below) over a number of years. NPCC has projected that sea levels are anticipated to increase up to 16 inches by the 2050s and up to 36 inches by the end of the century, under the middle range estimate (50th percentile). However, under the NPCC's high-end estimate (90th percentile), sea levels could increase by up to 30 inches by 2050 and up to 75 inches by the end of the century. In general, the probability of increased sea levels is characterized by NPCC as "extremely likely," but there is uncertainty regarding the magnitude and timescale of the rise. Intense hurricanes are characterized by NPCC 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 by NPCC as "unknown." Therefore, the projections for future 1 percent annual chance of exceedance flooding include only sea-level rise, and do not account for changes in storm frequency or intensity.

The New York City Green Code Task Force also has recommended strategies for addressing climate change resilience in buildings and for improving stormwater management.[17] 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 1 percent annual chance of exceedance ("100-year") floodplain (the area that would potentially be flooded in a severe storm as identified by the New York City Department of City Planning[18]) to meet the same standards as buildings in the current FEMA 1 percent annual chance of exceedance flood hazard zone.

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

[18] New York City Department of City Planning. *NYC Flood Hazard Mapper*. https://dcp.maps.arcgis.com/apps/webappviewer/index.html?id=1c37d271fba14163bbb520517153d6d5

RESILIENCE OF THE PROPOSED PROJECT AND ALTERNATIVE SCENARIO TO CLIMATE CHANGE

TEMPERATURE AND URBAN HEAT ISLAND

The neighborhoods immediately surrounding the Development Site were identified as being vulnerable to extreme heat by the New York City Department of Health and Mental Hygiene (DOH), with a moderate level of risk.[19] The Development Site currently is fully developed primarily as a rail yard, a railroad-interior cleaning facility, storage, and buildings that house other operational functions with the majority of ground coverage comprising paved surfaces and little vegetation. The Development Site also includes part of the elevated High Line park, which will remain in either the Proposed Project or the Alternative Scenario.

The design of either the Proposed Project or the Alternative Scenario would include significant open space development that would introduce vegetation to the Development Site and provide reduced heating/cooling loads within the neighborhood. As a result, the Proposed Actions would require less energy to meet the future cooling demand. On-site vegetation (within green roof space or on-street locations) would provide a localized cooling effect from the evapotranspiration processes and mitigating potential increases in surface temperatures. Where green roof space is not feasible, the use of high albedo roofing material would minimize daytime heating.

The design elements incorporated into either the Proposed Project or the Alternative Scenario, alongside the creation of additional open space, would ensure resilience to potential heat increases and limit the impact of the urban heat island effect at proposed and potential buildings within the Development Site.

PRECIPITATION

As described in Chapter 11, “Water and Sewer Infrastructure,” there would be an increase in impervious rooftop area and a decrease in paved area throughout the Development Site as compared to the existing condition. There would also be an increase in pervious planted softscape area. In particular, any proposed development would include publicly accessible open space with pervious plantings, and there would be an incremental decrease in the overall stormwater runoff. Where required, the Proposed Project or Alternative Scenario developments would provide stormwater detention facilities as a part of the DEP site connection approval process, and the Applicant is committed to following the standards and guidelines under the DEP Green Infrastructure Program. This would allow the development to discharge stormwater at a rate that would not negatively impact the condition of the downstream storm sewers, in accordance with DEP regulations.

The floodplain area within the Development Site is affected by coastal flooding, which is controlled by astronomic tides and meteorological forces (storms) and is unaffected by occupancy of the floodplain. As such, development under the Proposed Actions would not affect the floodplain or result in increased risk of flooding of areas adjacent to the Development Site. Similarly, flood resilience measures incorporated into the design (of

[19] NYCDOH. Interactive Heat Vulnerability Index. https://a816-dohbesp.nyc.gov/IndicatorPublic/beta/key-topics/climatehealth/hvi/

either the Proposed Project or the Alternative Scenario) to address flood risk from sea level rise through the development's design life would not have the potential to increase flood risk to adjacent properties.

SEA LEVEL RISE

The following is a summary of sea level rise impacts and mitigation approaches for design and construction at the Development Site under either the Proposed Project or Alternative Scenario. For a detailed discussion, see **Appendix B**.

As shown on current Federal Emergency Management Agency (FEMA) flood hazard projections,[20] the current effective 1 percent annual chance of exceedance (100-year) floodplain could reach elevations of 12 feet NAVD88 in the southwestern portion of the Development Site (Site A) and 11 feet NAVD88 at locations throughout the rest of the Development Site (Sites B and C).

Sea level rise would be accounted for throughout the lifetime of the uses being evaluated. The design of both the Proposed Project and the Alternative Scenario considers the median (or "Mid scenario") 2015 NPCC sea level projection and Year 2100 (i.e., a 70+ year design life for all structures) where a specific scenario is required, and the Year 2100 projections where a range of scenarios are required by the NYC WRP Policies. The Year 2100 adjusted 1 percent annual chance base flood elevation ("adjusted BFE") is projected to increase to elevation +14 feet NAVD88 for Sites B and C, and to elevation +15 NAVD88 for Site A under the Mid scenario.

Consistent with New York City's design guidelines for resilient buildings,[21] development under the Proposed Actions would consider anticipated future sea level rise projections under the NPCC's Mid scenario estimates (50th percentile). However, the *CEQR Technical Manual* considers potential sea level rise up to the high estimate (90th percentile). The 75th percentile (Mid-high scenario) Year 2100 sea level rise adjusted BFE at Building A is +15.16 feet NAVD88 and at Building B is +16.16 feet NAVD88; the 90th percentile (High scenario) Year 2100 sea level rise adjusted BFE at Building A is +18.25 feet NAVD88 and at Building B is +17.25 feet NAVD88.

Note that the current effective flood elevations may be revised in the future. On October 17, 2016, FEMA and New York City Mayor de Blasio announced plans to revise the FEMA flood maps following a 2015 New York City appeal of FEMA's flood risk calculations for New York City and the region. Therefore, FEMA could revise the current flood elevations to be lower, and the resulting future flood elevations, including sea-level rise, would also lower accordingly. The revised elevations are not expected to change significantly and would not affect the approach or conclusions presented herein.

Development under the Proposed Actions would be designed in accordance with Appendix G of the NYC Building Code ("Flood Resistant Construction"), to provide resilience to the estimated flood elevation through the end of the century. To that end, Buildings A and B would be constructed and designed to resist hydrostatic,

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[20] FEMA. *Preliminary Flood Insurance Rate Map*. Panel 3604970069G. Release Date: 12/05/2013.

[21] New York City Mayor's Office of Climate & Environmental Justice. *Climate Resiliency Design Guidelines.* Version 4.1. May 2022.

hydrodynamic, and other flood-related loads, including the effects of buoyancy. Residential units in Building A would begin on the 5th floor at an elevation of about +108 feet NAVD88 and would remain above all future projected floodplain elevations.

Most critical mechanical equipment in Buildings A and B would also be elevated above all future projected floodplain elevations. Some mechanical equipment may need to be located on the ground floors of Buildings A and B and would therefore be below the current and future 1 percent annual chance floodplain elevations.

Under both the Proposed Project and Alternative Scenario, Site C (hotel resort with gaming, or office, hotel, and residential space, respectively) would be located atop a platform to be built over the LIRR train yard. The platform would be built at an elevation of +33.66 feet NAVD88. Therefore, all features at Site C in either scenario would be well above the current 1 percent annual chance flood elevation, and any projected Year 2100 adjusted 1 percent annual chance flood elevation.

The majority of the new open space would be created on the platform and thus well above the current 1 percent annual chance flood elevation and any projected Year 2100 adjusted 1 percent annual flood elevation. The proposed sport courts and open space at the southwest corner of the Development Site would be designed to be higher than the sidewalk to be more resilient to flooding; however, the raised area would remain below the current BFE and any sea level rise adjusted BFE and would therefore be subject to flooding during such an event. Given the proposed use, the area would not be substantially damaged as a result of flooding, but the potential for flooding would be considered during design.

Consistent with Appendix G and New York City climate resiliency design guidelines, the Proposed Project and the Alternative Scenario would be designed to protect commercial, parking, lobby, and other non-critical non-residential spaces up to anticipated design flood elevations of 17 feet NAVD88 at Site A and 16 feet NAVD88 at Sites B and C. The design flood elevations represent the middle range (50th percentile) sea level rise projections through the end of the century added to the current base flood levels plus an additional two feet of freeboard. Consequently, the Proposed Project and the Alternative Scenario would be resilient to anticipated future flood elevations for the building's lifetime under the Mid scenario, and would be resilient to projected flood increases under the NPCC high-end estimate (90th percentile) through about the 2080s. ✴