14.0 INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the construction and operation of the Breakwaters and Shoreline Projects, and the Proposed Actions' consistency with federal, New York State, and New York City GHG reduction goals.

As discussed in the Council on Environmental Quality's (CEQ) guidance,[1] New York State Department of Environmental Conservation (NYSDEC) policy,[2] and the 2014 *City Environmental Quality Review* (*CEQR) Technical Manual*,[3] 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 felt at the local level. The United States, New York State, and New York City have all established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change.

Per the *CEQR Technical Manual*, the citywide GHG reduction goal is currently the most appropriate standard by which to analyze a project under CEQR, and is also consistent with the above mentioned New York's State Environmental Quality Review Act (SEQRA) and National Environmental Policy Act (NEPA) guidance. Per the CEQ guidance, it is recommended that agencies quantify GHG emissions where appropriate data inputs are reasonably available, with the appropriate level of review to assess the broad-scale effects of GHG emissions to inform decisions. Therefore, GHG emissions associated with the Proposed Actions will be quantified, and where practicable, the effect of various options available will be evaluated as to the potential effect they may have on GHG emissions. The guidance states that agencies should consider reasonable measures to lower the level of the potential GHG emissions. Therefore, the analysis will review potential relevant measures aimed at reducing GHG emissions associated with the Proposed Actions.

14.1 PRINCIPAL CONCLUSIONS

The GHG emissions from construction of the Proposed Actions were estimated at 18,657, 8,085, and 10,572 metric tons of carbon dioxide equivalent (CO_2e) under Alternatives 2, 3, and 4, respectively. The highest emissions would be from Alternative 2, which includes construction of both projects. Note that the embedded emissions for Alternatives 2 and 3 would be somewhat

[1] Executive Office of the President, CEQ. Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews. August 1, 2016.

[2] NYSDEC. DEC Policy: Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements. July 15, 2009.

[3] New York City Mayor's Office of Environmental Coordination. City Environmental Quality Review Technical Manual. March 2014.

higher than presented with the inclusion of the proposed Water Hub materials (if located on-shore), which were not estimated explicitly. Since Potential Location 2 involves the rehabilitation and adaptive reuse of an existing New York City Department of Parks and Recreation (NYC Parks) building rather than the construction of a new building, and Potential Location 3 involves a "floating" Water Hub, if Potential Locations 2 or 3 were selected, the overall construction emissions associated with Alternatives 2 and 3 would be somewhat lower.

Operational emissions would be associated with maintenance activity, power use such as lighting for outdoor space, and building energy emissions (fuel and electricity) for the Water Hub building if located in either Potential Locations 1 or 2, and some emissions from boat operations. If the "floating" Water Hub is selected, (Potential Location 3), there would be no additional building energy emissions, and there would be some emissions from the operation of a larger boat.

The implementation of sustainable design features that would, among other benefits, result in lower GHG emissions would ensure that the Proposed Actions would be consistent with the City and State's emissions reduction goals and other policies.

14.2 POLLUTANTS OF CONCERN

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 greenhouse gases in the Earth's atmosphere.

There are also a number of entirely anthropogenic greenhouse gases in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (and contribute to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, there is no need to address them in GHG assessments for most projects. Although ozone itself is also a major greenhouse gas, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see Chapter 13, "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.

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.

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

The CEQ guidance lists seven GHGs that could potentially be included in the scope of a GHG analysis: CO_2, N_2O, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3), and sulfur hexafluoride (SF_6). This analysis focuses mostly on CO_2, N_2O, and methane. There are no significant direct or indirect sources of HFCs, PFCs, NF_3, or SF_6 associated with the Proposed Actions.

To present a complete inventory of all GHGs, component emissions are added together and presented as 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 of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). The GWPs for the main GHGs discussed here are presented in **Table 14-1**.

Table 14-1
Global Warming Potential (GWP) for Major GHGs

Greenhouse Gas	100-year Horizon GWP
Carbon Dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Oxide (N_2O)	298
Hydrofluorocarbons (HFCs)	124 to 14,800
Perfluorocarbons (PFCs)	7,390 to 12,200
Nitrogen Trifluoride (NF_3)	17,200
Sulfur Hexafluoride (SF_6)	22,800

Note: The GWPs presented above are based on the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (SAR) of 2007, 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.
Source: USEPA. *Inventory of U.S. Climate Change and Sinks: 1990–2014.* 2016.

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

As a result of the growing consensus that human activity that results in increased 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.[4] This agreement pledges deep cuts in emissions, with a stated goal of reducing annual emissions to a level that would be between 26

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

and 28 percent lower than 2005 emissions by 2025.[5] On June 1st, 2017, it was announced that "the United States will withdraw from the Paris Climate Accord."[6]

Regardless of the Paris Agreement, the U.S. Environmental Protection Agency (USEPA) is required to regulate greenhouse gases under the Clean Air Act (CAA) and has begun preparing and implementing regulations affecting the on-road and stationary source sectors. In addition, there are various federal policies aimed at reducing GHG emissions. For example, Executive Order 13514 of October 5, 2009, establishes the policy of the United States that "*Federal agencies increase energy efficiency; measure, report, and reduce their GHG emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and stormwater management; eliminate waste, recycle, and prevent pollution; leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services; design, construct, maintain, and operate high performance sustainable buildings in sustainable locations; strengthen the vitality and livability of the communities in which Federal facilities are located… agencies shall prioritize actions based on a full accounting of both economic and social benefits and costs...*"

There are also regional and local efforts to reduce GHG emissions. In 2009, New York Governor David Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York State by 80 percent, compared with 1990 levels, by 2050, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal; an interim draft plan has been published.[7] The State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener Communities and Climate Smart Communities programs. The State has also adopted California's GHG vehicle standards (which are at least as strict as the federal standards). The State is also acting to reduce emissions from the energy sector via the New York State Energy Plan. The latest version of the plan (June 2015) also establishes a new target of reducing GHG emissions in New York State by 40 percent, compared with 1990 levels, by 2030, and a new target of providing 50 percent of electricity generation in the state from renewable sources by 2030. New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI).

The State Smart Growth Public Infrastructure Policy Act (Smart Growth Act)[8] prohibits state infrastructure agencies from approving, undertaking, supporting, or financing public infrastructure projects, including providing grants, awards, loans or assistance programs unless, to the extent practicable (where relevant), they are consistent with specific criteria, including the following criteria that directly or indirectly affect GHG emissions:

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

[6] Under the Agreement, countries are allowed to withdraw four years from the date the agreement entered into force—meaning the United States can officially withdraw on November 4, 2020. However, given the voluntary nature of the agreement, any action in the U.S. may or may not occur regardless of this status.

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

[8] State of New York. *State Smart Growth Public Infrastructure Policy Act.* New York State Environmental Conservation Law, Article 6. May 15, 2009.

- *To advance projects for the use, maintenance or improvement of existing infrastructure;*
- *To advance projects located in municipal centers;*
- *To advance projects in developed areas or areas designated for concentrated infill development in a municipally approved comprehensive land use plan, local waterfront revitalization plan and/or brownfield opportunity area plan;*
- *To foster mixed land uses and compact development, downtown revitalization, brownfield redevelopment, the enhancement of beauty in public spaces, the diversity and affordability of housing in proximity to places of employment, recreation and commercial development and the integration of all income and age groups;*
- *To provide mobility through transportation choices including improved public transportation and reduced automobile dependency; and*
- *To promote sustainability by strengthening existing and creating new communities which reduce greenhouse gas emissions and do not compromise the needs of future generations, by among other means encouraging broad based public involvement in developing and implementing a community plan and ensuring the governance structure is adequate to sustain its implementation.*

The Smart Growth Impact Statement for the Proposed Actions is included in Appendix C, "Smart Growth."

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ (CCP) campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term comprehensive plan for a sustainable and resilient New York City, which began as *PlaNYC 2030* in 2007, and continues to evolve today as OneNYC, includes GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 ("30 by 30") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[9] The City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 ("80 by 50"), which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. More recently, as part of OneNYC, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025. To achieve the 80 by 50 goal, the City is convening 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.

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. USEPA's Energy Star is a voluntary labeling program designed to identify and promote the construction of new energy efficient buildings, facilities, and homes and the purchase of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

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

14.4 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. Nonetheless, prudent planning dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them. Therefore, this chapter presents the total GHG emissions potentially associated with the Proposed Actions and identifies measures that would be implemented and measures that are still under consideration to limit emissions.

As detailed in Chapter 1, "Purpose and Need and Alternatives," there are four Alternatives being studied in this EIS. Alternative 1 is the No Action alternative, and assumes that no new structural risk reduction or marine habitat restoration projects will be implemented in the project area; Alternative 2 consists of the implementation of two individual projects: the Breakwaters Project and the Shoreline Project; Alternative 3 includes only the Breakwater Project component; and Alternative 4 includes only the Shoreline Project component.

The analysis of GHG emissions that would be associated with the Proposed Actions is based on the methodology presented in the CEQ guidance and the *CEQR Technical Manual*. Given that the resulting development which would have operational energy use and associated emissions is limited to the Water Hub, if located on-shore (as part of Alternatives 2 and 3),[10] which is very small, minor occasional maintenance activity, and minor electricity use for open space purposes such as lighting, emissions for the Proposed Actions' operations have not been quantified, but are discussed and evaluated qualitatively. The Proposed Actions would also not fundamentally change the City's solid waste management system. Therefore, as per the *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified. GHG emissions associated with construction of the breakwaters and the shoreline protection systems have been quantified. Since details regarding the amount of construction materials required for the construction of the water hub are not yet available, and since the small structure (5,000 gross square feet of use space on 35,000 square feet of paved surfaces) would require relatively small amounts of materials and ensuing GHG emissions, quantified GHG emissions from this element are not required and have not been included.

[10] Subsequent to the issuance of the DEIS, an additional Water Hub location has been included for consideration. Potential Location 3 would involve a "floating" Water Hub—a vessel operated by a non-profit organization (e.g., BOP). The vessel would be docked at existing facilities in the City and would visit the project area approximately once per week from April through November for student based teaching events, and host community events approximately twice per month. Should Water Hub programming be located at Potential Location 3, similar to Potential Location 2, wayfinding, interpretive elements, and potential storage for kayaks would be constructed near the terminus of Page Avenue, and additional wayfinding, interpretive signage, and monitoring locations would be integrated along the length of the shoreline as part of the Water Hub's educational programming. No additional parking facilities would be required with this option. Also, because this option does not include an on-shore facility, a seasonally deployed temporary floating boat launch would not be included as part of the project.

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. 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 (see "Pollutants of Concern," above).

14.4.1 CONSTRUCTION MOBILE SOURCE EMISSIONS

The number of vehicle trips by mode (worker cars, delivery trucks) that would be generated by the Proposed Actions' construction was calculated using the assumptions developed for the analysis and presented in Chapter 17, "Construction." The assumptions used in the calculation include average daily workers, the percentage of auto trips, and the average vehicle occupancy to develop annual VMT associated with workers commuting to the project site. An average commute distance for construction use in the New York City Region was used. Similarly, the numbers of trucks (concrete trucks, dump trucks, and tractor trailers) for each phase of construction activity were used to estimate truck VMT. Distances for truck deliveries were developed based on estimates of the origin and destination of materials. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type and the most recent version of the USEPA MOVES model was used to obtain an estimate of car and truck GHG emission factors used to produce the associated emissions attributable to the Proposed Actions.

The Proposed Actions would result in construction worker travel of 145,158 vehicle miles traveled (VMT) with the Breakwaters Project (Alternative 3), 168,061 VMT with the Shoreline Project (Alternative 4), and a total of 313,219 VMT for both projects combined (Alternative 2). Additionally, the Proposed Actions would result in construction truck trips totaling 487,308 VMT with the Breakwaters Project (Alternative 3), 949,212 VMT with the Shoreline Project (Alternative 4), and a total of 1,436,520 VMT for both projects combined (Alternative 2). These data were used as the basis for the GHG emissions calculations from mobile sources.

Based on the latest fuel lifecycle model from Argonne National Laboratory,[11] emissions from producing and delivering fuel ("well-to-pump") are estimated to add an additional 25 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 and New York State GHG inventories, which are the basis of the GHG reduction goals for the City and State.

14.4.2 CONSTRUCTION ON-SITE AND EMBEDDED EMISSIONS

A description of construction activities is provided in Chapter 17, "Construction." Emissions associated with construction have been estimated explicitly for the Proposed Actions, based on specific estimates of construction activity. In addition to the on-road sources mentioned above, on-site emissions were calculated for non-road construction engines (including marine engines),

[11] Based on GREET1_2016 model from Argonne National Laboratory.

based on fuel consumption data from USEPA's NONROAD emissions model. The Breakwaters Project (Alternative 3) and Shoreline Project (Alternative 4) are estimated to require 359,197 and 128,328 gallons of diesel fuel for nonroad engines, respectively, or a total of 487,525 gallons for both projects combined (Alternative 2). Emissions associated with grid power used during construction are expected to be negligible.

Upstream emissions related to the production of construction materials were estimated based on the expected quantity of iron or steel and cement. Although other materials will be used, cement and metals have the largest embodied energy and direct GHG emissions associated with their production, and substantial quantities would be used for the Proposed Action.

The construction of the Breakwaters Project (Alternative 3) and Shoreline Project (Alternative 4) are estimated to require 2,470 and 5,583 metric tons of cement, respectively, or a total of 8,053 metric tons for both projects combined (Alternative 2) (excluding the materials for the proposed Water Hub which were not quantified, as described above). An emission factor of 0.928 metric tons of CO_2e per metric ton of cement produced was applied to estimate emissions associated with energy consumption (including extraction, transport, and processing) and process emissions for cement production.[12] The precise origin of cement for this project is unknown at this time.

The construction of the Shoreline Project or both projects combined (Alternative 2 or Alternative 4) are estimated to require 1 metric ton of steel (excluding the materials for the proposed Water Hub, which were not quantified, as described above); very small amounts of steel would be required for construction of the Breakwaters Project (Alternative 3). An emission factor of 0.6 metric tons of CO_2e per metric ton of steel product produced was applied to estimate emissions associated with production energy consumption (including extraction, transport, and processing),[13] and 0.65 metric tons of CO_2e per metric ton of steel product produced for process emissions associated with iron and steel production were applied.[14]

The breakwaters would be designed to be relatively maintenance free (from a structural standpoint) over their intended design life. Rubble mound breakwater structures have a typical design life of over 50 years. Concrete components of the system will have a design life of 50 years. Therefore, the operations and maintenance requirements focus on monitoring protocols to ensure that the structural integrity of the breakwater system is maintained, and would be minimal. Emissions associated with maintenance activity were therefore not quantified.

14.4.3 TREE REMOVAL

Under Alternatives 2 and 3, if Potential Location 1 is selected for the Water Hub, 12 to 19 existing trees would be removed during construction of the proposed Water Hub and associated parking lot, and some trees may be removed for the proposed earthen berm (Alternatives 2 and 4) (for more details, see Chapter 9, "Natural Resources"). If the Water Hub is implemented at Potential Location 2, some trees may be removed for the construction of a potential ramp leading from the selected rehabilitated NYC Parks building to the shoreline if water access is provided near the site.

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[12] The Portland Cement Association. Life Cycle Inventory of Portland Cement Manufacture. 2006.

[13] Arpad Horvath et al. Pavement Life-cycle Assessment Tool for Environmental and Economic Effects, Consortium on Green Design and Manufacturing. UC Berkeley. 2007.

[14] Based on 42.3 teragrams of CO_2e emitted and 65,460 thousand tons produced; USEPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2009, April 15, 2011.

Under Alternatives 2 and 3, if Potential Location 1 is selected for the Water Hub, some tree planting would be undertaken as part of the landscaping when the Water Hub property is restored. Under Alternatives 2 and 4, some tree planting would be undertaken as part of the landscaping when the Shoreline Project is completed.

Overall, this would result in negligible changes in GHG emissions and carbon sequestration in the future. Overall, since the removal of trees for the Proposed Actions would be minimal, the GHG emissions associated with tree removal are discussed qualitatively and have not been quantified.

14.5 EFFECTS ASSESSMENT

The estimated GHG emissions from construction of the Proposed Actions under the four alternatives are presented in **Table 14-2**. The highest emissions would be from Alternative 2, which includes construction of both projects. Note that the embedded emissions for Alternatives 2 and 3 would be somewhat higher than presented with the inclusion of the proposed Water Hub materials. The embedded emissions associated with construction materials for the Water Hub (not included explicitly) and the nonroad emissions associated with the Water Hub construction would be somewhat lower if Potential Location 2 or 3 were selected since they would involve either the rehabilitation and adaptive reuse of an existing NYC Parks building or a vessel for Water Hub programming rather than the construction of a new building. Therefore, the overall construction emissions associated with Alternatives 2 and 3 would be somewhat lower if Potential Location 2 or 3 were selected.

Table 14-2
GHG Emissions Associated with Construction

Alternative	Nonroad Emissions	Mobile Sources Emissions	Embedded Emissions (Materials)	*Total Emissions*
	metric tons CO2 equivalent			
Alternative 1—No Action	*No construction emissions from No Action*			
Alternative 2—Preferred Alternative	5,030	6,153	7,474 (1)	*18,657*
Alternative 3—Breakwaters Project Only	3,706	2,087	2,292 (1)	*8,085*
Alternative 4—Shoreline Project Only	1,324	4,065	5,182	*10,572*

Note:
(1) Embedded emissions exclude emissions associated with construction materials required for the construction of the proposed Water Hub component.

In addition to the construction-related emissions, there would be minimal GHG emissions associated with operations. These would be associated with maintenance activity, power use such as lighting for open space, building energy emissions (fuel and electricity) associated with the Water Hub building if located at either Potential Locations 1 or 2, and some emissions from boat operations. If the "floating" Water Hub is selected (Potential Location 3), there would be no additional building energy emissions, and there would be some emissions from the operation of a larger boat.

14.6 CONSISTENCY WITH EMISSIONS REDUCTION POLICIES

Options for reducing GHG emissions have been assessed and included where practicable. The Proposed Actions would include a number of sustainable design features which would, among other benefits, result in lower GHG emissions—these features would be specified and required by the agencies responsible for the various construction contracts. These features and other

measures currently under consideration are discussed in this section, addressing the PlaNYC and OneNYC goals as outlined in the *CEQR Technical Manual* and New York State's emissions reduction goals and other policies described above. The implementation of the various design measures and features described would result in development that is consistent with the City and State's emissions reduction goals and other policies.

14.6.1 BUILD EFFICIENT BUILDINGS

With respect to Alternatives 2 and 3, the Water Hub (if located on-shore) would be designed to minimize its energy use and carbon footprint. The design would exceed the minimum NYC building code requirements, and would include any energy efficiency design measures identified as practicable by the overseeing agency at the beginning of the design process, including but not limited to being designed to meet the LEED standard, if practicable, or equivalent energy efficiency measures achieving a USEPA Energy Star Rating, if practicable and applicable.

14.6.2 USE CLEAN POWER

Viable on-site energy generation associated with the proposed Water Hub (Alternatives 2 and 3) will be included in these efforts, such as solar panels, wind turbines, and/or geothermal energy use as feasible.

14.6.3 TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The proposed Water Hub (Alternatives 2 and 3), if located on-shore, would be located in an area served by limited transit options. With transit access available directly via the S59 and S78 or by transfer to these local bus routes from the Staten Island Railway, and via X17, X22, and X22A express bus routes, most trip-making to the Water Hub is expected to be made via automobile. Given the relatively low number of trips to the Water Hub and associated emissions, and given the location-based objective of the project, transit-oriented development is not an option for the Proposed Actions and adding transit options is not practicable.

14.6.4 REDUCE CONSTRUCTION OPERATION EMISSIONS

Construction specifications would include a diesel emissions reduction program, as described in detail in Chapter 17, "Construction," including diesel particle filters for large construction engines 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.

In addition, if 20-percent biodiesel blends (B20) were used for construction engines (with few exceptions, B20 can be used as "drop in" fuel replacing petroleum diesel), GHG emissions associated with nonroad engine use would be reduced by 14 percent.[15] As part of the contract bid process, the contracting agency would also request that proposals include an option for the use of biodiesel blends of 20 percent (B20) if practicable.

Any excavated materials would be used locally, to the extent practicable, to avoid excess transportation emissions.

[15] Based on GREET1_2016 model from Argonne National Laboratory.

14.6.5 USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

Recycled steel would most likely be used for most structural steel since the steel available in the region is mostly recycled. Steel use would be limited (mostly for the proposed Water Hub if located on-shore, and some small quantities for the Shoreline Project elements). Some cement replacements such as fly ash and/or slag may also be used, and concrete content would be optimized to the extent feasible. As part of the contract bid process, the contracting agency would request that proposals incorporate recycled steel and the use of cement replacements such as slag, and interground limestone to the extent practicable while meeting all design requirements for steel and concrete. ✷