

3.11.3 Construction Natural Resources

3.11.3.1 Introduction

This section assesses the potential for the Proposed Project to result in significant adverse impacts to natural resources during construction. Natural resources are defined by the *City Environmental Quality Review (CEQR) Technical Manual* as New York City's "biodiversity (plants, wildlife and other organisms); any aquatic or terrestrial areas capable of providing suitable habitat to sustain the life processes of plants, wildlife, and other organisms; and any areas capable of functioning in support of the ecological systems that maintain the City's environmental stability." Natural resources within the Study Area, as documented in Chapter 3.5, "Natural Resources," include groundwater, floodplains, wetlands, aquatic resources, terrestrial resources (i.e., wildlife and ecological communities), protected species, and sensitive habitats. This chapter describes potential construction period impacts to natural resources resulting from implementation of the North/West Battery Park City Resiliency Project (the Proposed Project) in accordance with the New York State Environmental Quality Review Act (SEQR) and CEQR.

3.11.3.2 Principal Conclusions

Construction of the Proposed Project would not result in significant adverse impacts to natural resources in the Study Area, including groundwater, floodplains, wetlands, aquatic resources, terrestrial resources, threatened and endangered species, and sensitive habitats.

Groundwater recovered during construction dewatering would be treated in accordance with permitting requirements prior to discharge.

Construction of the Proposed Project would not adversely affect hydrology or the floodplain, nor would it exacerbate flooding conditions. In addition, the construction zone would be protected from flooding in the event of storm event.

Potential impacts to littoral zone tidal wetlands during in-water construction due to turbidity and increases in suspended sediment would be temporary and would be minimized with the use of best management practices. In addition, upland erosion and sediment control measures would minimize the discharge of materials to littoral zone tidal wetlands during construction in the upland areas.

All construction activities would be completed in accordance with applicable permits. In addition, to avoid and minimize impacts to aquatic resources, in-water elements of the Proposed Project have been designed to avoid and minimize in-water work to the greatest extent practicable. To minimize resuspension of bottom sediment, barges would maintain sufficient distance from the river bottom. Containment booms and full-length turbidity curtains would be used around work areas to minimize the potential for impacts from sediment resuspension. Any sediment resuspended during in-water work would be contained by a turbidity curtain and would result in minor, short-term adverse impacts and no long-term impacts to water quality. Increases in turbidity during in-water activities, including pile driving, would be temporary and localized, and suspended sediments would dissipate quickly with the tidal currents. The use of bubble curtains around pile driving activities would reduce the effect of underwater

noise on aquatic species. With the use of bubble curtains, installation of the piles would result in temporary increased underwater noise levels that would not be expected to exceed the threshold for physiological injury to fishes. Therefore, with these measures in place, the Proposed Project would avoid significant adverse impacts to aquatic resources, including water and sediment quality, aquatic biota, and essential fish habitat.

Ecological communities in the Study Area are limited to previously modified communities common to urban settings. Any impacts to ecological communities within the Study Area during construction would not limit the availability of this ecological community in the greater urban setting. Where possible, trees within the Study Area would be retained and protected during construction. As described in Chapter 3.5, “Natural Resources,” a total of approximately 420 trees would be removed in the Project Area and 390 trees would be planted.

Construction activities resulting from the Proposed Project have the potential to result in minor short-term impacts to terrestrial wildlife. Species that occur in the vicinity of the Proposed Project would be temporarily displaced due to increased noise and human activity during construction, but would be able to relocate to suitable habitat that is available within Battery Park City.

Construction of the Proposed Project would not result in significant adverse impacts to state-listed or federally listed threatened, endangered, or candidate species. There is no essential breeding habitat for monarch butterfly (i.e., milkweed plants) in the Study Area, and any monarch butterflies that may be present are expected to be occasional migratory individuals rather than breeding populations. Peregrine falcons are known to have nest sites throughout southern Manhattan and have been documented by the New York Natural Heritage Program (NYNHP) as nesting within 0.5 miles of the Project Site (see Chapter 3.5, “Natural Resources”). Any falcons in the area would be expected to avoid the Study Area during active construction and return during quiet periods, like other terrestrial wildlife adapted to urban environments. To minimize potential impacts to peregrine falcon during construction, all tall equipment such as cranes and drill rigs would include anti-perching devices such as flagging at the top of the equipment that will create a physical deterrent to falcons perching on the equipment. Migration of shortnose sturgeon, Atlantic sturgeon, and sea turtles through the Hudson River during spring and early fall would not be obstructed by construction of the Proposed Project, which would only result in increased noise within a relatively small area of the Hudson River. Because impacts associated with the in-water construction activities would be localized, including resuspended sediments and elevated noise levels from pile driving as described above, the deeper channel habitat typically used by sturgeon would not be adversely impacted during construction of the Proposed Project. The temporary loss of potential foraging habitat due to avoidance of the Study Area would not result in significant adverse impacts to sturgeon or sea turtles, as similar suitable habitat would continue to be available nearby and they would be expected to return to the Study Area following construction.

In addition, construction of the Proposed Project would not adversely impact water or sediment and would not significantly affect habitat for aquatic biota, including striped bass, and would therefore not result in significant adverse impacts to the Lower Hudson Reach, which is designated as significant coastal fish and wildlife habitat, or to the Hudson River Park Estuarine Sanctuary.

3.11.3.3 Impact Assessment

3.11.3.3.1 Groundwater

Groundwater in the Study Area is not used as a source of potable water. Any groundwater recovered during construction dewatering would be treated in accordance with New York State Department of Environmental Conservation (NYSDEC) or New York City Department of Environmental Protection (DEP) permitting requirements prior to discharge to the Hudson River or to city sewers as appropriate. With these measures in-place, the Proposed Project would not result in significant adverse impacts on groundwater resources during construction.

3.11.3.3.2 Floodplains

While the majority of the Study Area is within the 100-year floodplain (Zone AE, Zone AO, and Zone VE; 1 percent annual chance flood hazard) and 500-year floodplain (Zone X; 0.2 percent annual chance flood hazard), construction of the Proposed Project would not adversely affect the local hydrology or the floodplain, nor would it exacerbate flooding conditions in neighboring locations. Construction documents would include measures to protect the construction zone in the event of a storm event. Therefore, construction of the Proposed Project would not result in significant adverse impacts on flooding or floodplains.

3.11.3.3.3 Wetlands

There are NYSDEC-regulated littoral zone tidal wetlands in the Study Area. There are no vegetated wetlands within the Study Area that would be regulated by the U.S. Army Corps of Engineers (USACE). The Proposed Project would have the potential to result in temporary impacts to NYSDEC-regulated littoral zone tidal wetlands outside the limit of in-water disturbance due to temporary sediment resuspension at Reach 2, Reach 4, Reach 5, Reach 6, and Reach 7. There would be no in-water construction activities at Reach 1 or Reach 3.

These potential impacts to littoral zone tidal wetlands during construction would be temporary and would be minimized using a full-length turbidity curtain during in-water activities, and the use of a closed (environmental) clamshell bucket and other best management practices during dredging. Increases in suspended sediment would be minimal and temporary and would not result in long-term adverse impacts to wetlands. Turbidity associated with these activities would dissipate quickly with the currents of the Hudson River, and sediments would settle over similar substrate. Erosion and sediment control measures (e.g., temporary berms, hay bales, silt fences, catch basin and inlet protection, tracking pads, concrete truck wash areas, stabilized construction entrances, compost filter socks, etc.) would be implemented in accordance with a Stormwater Pollution Prevention Plan (SWPPP) to minimize the discharge of materials to littoral zone tidal wetlands during upland construction.

Therefore, with the implementation of these measures, construction of the Proposed Project would not result in significant unmitigated adverse impacts to wetlands.

3.11.3.3.4 Aquatic Resources

Water and Sediment Quality

In-water construction activities for the Proposed Project have the potential to result in temporary adverse impacts to water and sediment quality due to sediment disturbance from the construction of in-water structures (e.g., seepage barriers, reconstructed platforms and installation of new piles, deep foundations, precast seawalls, bridging structures, etc.), dredging for the installation of bridging structures in Reach 5, and movement of construction vessels. In-water elements of the Proposed Project have been designed to avoid and minimize in-water work to the greatest extent practicable. In-water construction activities would be completed in Reaches 2, 4, 5, 6, and 7 over a 5.5-year construction duration, including approximately 4 months of dredging in Reach 5. To minimize resuspension of bottom sediment, barges would maintain sufficient distance from the river bottom. Erosion and sediment control measures (e.g., temporary berms, hay bales, silt fences, catch basin and inlet protection, tracking pads, concrete truck wash areas, stabilized construction entrances, compost filter socks, etc.) implemented in accordance with the SWPPP would minimize the discharge of materials from upland construction activities into the Hudson River.

Sediment disturbance associated with the placement of in-water structures in the Hudson River would result in minor, short-term increases in turbidity and resuspension and re-deposition of sediments. Containment booms and full-length turbidity curtains would be used around work areas to minimize the potential for impacts from sediment resuspension. Any sediment resuspended during in-water work would be contained by a turbidity curtain and would result in minor, short-term adverse impacts and no long-term impacts to water quality. Dredging would also result in temporary impacts to water quality from resuspended sediment and increased turbidity. The potential impacts of dredging would be minimized using best management practices (BMPs) and would be conducted in accordance with USACE and NYSDEC permit conditions implemented to protect water quality and aquatic resources. Removal of sediments would be conducted using mechanical methods, wherein material is collected using a bucket and placed in a scow for disposal. An environmental clamshell bucket would be used during dredging, and dredged material would be placed carefully onto the scows such that there is no loss of material into the water column either from the bucket or due to barge overflow. A turbidity curtain would be deployed around the dredging area to further minimize the potential effects of resuspended sediments beyond the work area. Dredged material would be transported offsite for upland disposal at a licensed facility in accordance with applicable regulations.

The installation of new piles would result in minimal and temporary increases in turbidity. In its evaluation of effects on listed species from pile driving, the National Oceanic and Atmospheric Administration (NOAA) Fisheries indicates that pile driving activities are expected to produce total suspended sediments (TSS) concentrations of approximately 5 to 10 mg/L above background levels within about 300 feet of a pile being driven. The resulting sediment plume would settle out of the water column within a few hours, and the associated TSS levels are below those shown to have adverse effect on fish and benthic communities

in estuarine environments.¹ Increases in turbidity during in-water activities would be temporary and localized, and suspended sediments would dissipate quickly with the tidal currents. No significant long-term adverse impacts to water or sediment quality would result from these temporary disturbances. Similarly, any contaminants released to the water column because of sediment disturbance would dissipate rapidly, would be consistent with the contamination levels in the Hudson River, and would not result in significant long-term impacts to water or sediment quality.

Aquatic Biota

All construction activities would be completed in accordance with permits issued by USACE and NYSDEC for the protection of waters. In-water construction activities would take place concurrently at Reaches 2, 4, 5, 6, and 7, and would result in temporary impacts to fishes and benthic macroinvertebrates at the Project Site due to temporary increases in suspended sediment, underwater noise, and shading from construction vessels, described in detail below.

Shading

Up to three construction barges would be used at the Project Site on any given day to support pile installation, platform replacement, and construction of the flood barrier structures. These barges would remain close to the shoreline next to the existing overwater platforms, where waters are already shaded, and would not result in significant changes to aquatic habitat or use of these waters by fish. In a study evaluating the effects of floating structures relative to open water on fish communities PANYNJ (2015) found that shading effects varied by species and the presence or absence of other shading sources. Ultimately, floating structures like construction barges were found to minimally influence the use of nearshore habitats in the New York Harbor by fish. The area temporarily shaded by construction vessels would be small in comparison to the area of the river left unshaded, and the barges would move periodically such that they would not result in permanent impacts from shading. Additionally, resident and migratory fish that occur in the Project Site are likely acclimated to vessel traffic and associated shading, as the area is affected by regular ferry traffic in Reach 4, the use of recreational vessels, and commercial shipping vessels.

Sediment Resuspension

Life stages of estuarine and anadromous fish and macroinvertebrate species are generally tolerant of elevated suspended sediment concentrations and have evolved behavioral and physiological mechanisms to adapt to variable conditions (Birtwell et al. 1987, LaSalle et al. 1991, Nightingale and Simenstad 2001). Any sediment resuspension that occurs during in-water work would be temporary, minimal, and localized, and would be well below physiological impact thresholds of adult and larval estuarine fish and benthic macroinvertebrates. The BMPs implemented to reduce the potential impacts of sediment resuspension described above (i.e., turbidity curtains, clearance between barges and river bottom, environmental

¹ NMFS Section 7 Effects Analysis: Turbidity in the Greater Atlantic Region; available at <https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effect-analysis-turbidity-greater-atlantic-region>

bucket, no barge overflow) would likewise reduce the potential effects of in-water construction on filtering organisms like oysters and other bivalves and on larval and adult fish that can occur in the lower Hudson River. Increases in turbidity would be temporary and intermittent during construction, and because suspended sediments would dissipate quickly with the tidal currents, there would be periods during nights, weekends, and breaks in active construction when increased turbidity would not occur. The intermittent nature of sediment resuspension and increased turbidity and the implementation of measures to reduce the potential impacts of these activities would ensure that the Proposed Project would not result in significant adverse effects on aquatic biota, including early life stages of fish, resident and migratory species, and filtering organisms like oysters and other bivalves.

Underwater Noise

Installation of the piles would result in temporary increased underwater noise levels that would not be expected to exceed the threshold for physiological injury to fishes. All pile driving would be conducted in accordance with NOAA Fisheries' conservation recommendations, which include restricted windows for the protection of Essential Fish Habitat (EFH), anadromous species, and other regulated resources. The drilled shaft method is the anticipated method to be used for pile driving; however, in some cases traditional pile-driving methods (vibratory or impact hammer) may be required on a case-by-case basis, with vibratory hammer to the maximum extent practicable followed by impact hammer as necessary to achieve the desired pile depth. The use of bubble curtains around pile driving activities would reduce the effect of underwater noise on aquatic species. If traditional pile driving methods are required, soft starts and a cushion for the impact hammer would be used to minimize noise impacts during installation.

Based on the NMFS Greater Atlantic Regional Fisheries Office (GARFO) Acoustic Tool analysis, potential impacts to EFH due to in-water noise generated during construction is not expected to have a substantial effect upon EFH-listed species (see **Tables 3.11.3-1 and 3.11.3-2**).

**Table 3.11.3 -1
Proxy-Based Estimates for Underwater Noise**

Type Of Pile	Hammer Type	Measurement Distance from Pile	Estimated Peak Noise Level (dB _{Peak}) ¹	Estimated Pressure Level (dB _{RMS}) ²
48" Steel Shell	Impact	10m	206	195
36" Steel Shell	Impact	10m	213	198
24" Steel Shell	Impact	10m	205	190
48" Steel Shell	Vibratory	10m	Not Provided	154
36" Steel Pipe (typical)	Vibratory	10m	180	165
24" AZ Steel Sheet Pile (loudest)	Vibratory	10m	182	165
13" Steel Pipe ³	Vibratory	10m	171	155

Notes:

1. Peak noise levels are provided, but NOAA Fisheries no longer relies on this metric for vibratory method.
2. Estimated pressure level shows a 5 dB_{RMS} reduction as a bubble curtain would be utilized during installation.
3. 13" steel pipe pile size was utilized for the proposed micropile material and sized to model the effects of the installation of the micropiles.

Sources: NMFS GARFO Acoustic Tool spreadsheet. Available from: [Section 7 Effects Analysis: Acoustics in the Greater Atlantic Region | NOAA Fisheries](#)

Table 3.11.3-2
Estimated Distances to Sturgeon/Salmon Injury and Behavioral Thresholds

Type of Pile	Hammer Type ¹	Distance (ft) to Injury Threshold (150 dB _{RMS})		Distance (ft) to Behavioral Threshold (150 dB _{RMS})
		Fish ≥ 2 grams	Fish < 2 grams	
48" Steel Shell	Impact	566.9	1,047.60	15,228.30
36" Steel Shell	Impact	566.9	1,047.60	24,135.2
24" Steel Shell	Impact	263.1	486.2	7,068.40
48" Steel Shell	Vibratory	N/A	N/A	60.6
36" Steel Pipe (typical)	Vibratory	N/A	N/A	328.1
4- AZ Steel Sheet Pile (loudest)	Vibratory	N/A	N/A	328.1
13" Steel Pipe	Vibratory	N/A	N/A	70.7

Note: 1. Bubble curtain proposed.
Sources: NMFS GARFO Acoustic Tool spreadsheet. Available from: [Section 7 Effects Analysis: Acoustics in the Greater Atlantic Region | NOAA Fisheries](#)

Analysis of in-water noise levels generated during construction indicates elevated noise at levels that may affect the behavior of sturgeon and other fish sensitive to acoustic stressors would be limited to within a range of about 328 feet from the source of the noise. Considering the width of New York Harbor in the vicinity of the Study Area is over 3,500 feet, approximately 94 percent (3,268 feet) of the river's width would remain unaffected by in-water noise generated during construction. Due to the motile nature of fish, it is expected that fish present within the Study Area would move away from the area with elevated noise levels during the performance of in-water work activity. Movements away from the elevated noise area would not be expected to affect essential anadromous fish behaviors (e.g., spawning, overwintering), as the area is not a spawning or overwintering habitat, and as the unaffected portion of the Hudson River is sufficiently large enough to allow fish to avoid the portion of the river with elevated noise while continuing to forage and migrate. For these reasons, the temporary increase in underwater noise during construction of the Proposed Project would not result in adverse effects on aquatic biota.

3.11.3.3.5 Essential Fish Habitat

For the reasons identified above, construction of the Proposed Project would not result in significant adverse impacts to water quality, aquatic habitat, or aquatic biota. Therefore, construction of the Proposed Project would not result in significant adverse impacts to EFH in the Study Area.

3.11.3.3.6 Terrestrial Resources

Ecological Communities

Ecological communities in the Study Area are limited to previously modified communities common to urban settings. Any impacts to ecological communities within the Study Area during construction would not limit the availability of this ecological community in the greater urban setting. Where possible, these areas would be restored after construction in keeping with the goal of maintaining and enhancing Battery Park City's rich biodiversity and enhancing and expanding habitats. In addition, where possible, trees within the Study Area would be retained and protected during construction. The Proposed Project would comply with the requirements of Chapter 5 of Title 56 of the Rules of the City of New York and Local Law 3 of 2010, and a tree clearing, protection, and replacement plan would be developed to address tree impacts to street trees under NYC Parks jurisdiction. Therefore, construction of the Proposed Project

would not result in any significant adverse impacts on terrestrial ecological communities, including trees. The total number of trees being removed, transplanted, and replaced with the Proposed Project is discussed in Chapter 3.5, "Natural Resources."

Wildlife

Construction activities resulting from the Proposed Project have the potential to result in minor short-term impacts to terrestrial wildlife. Species that occur in the vicinity of the Proposed Project would be temporarily displaced due to increased noise and human activity during construction. Any such displacement would be temporary and would not result in significant adverse impacts to these species, which are inherently habituated to conditions in urban habitats. Additionally, individuals that occur near the Study Area would be able to relocate to suitable habitat that is available within Battery Park City. Therefore, the Proposed Project would not result in long-term impacts to terrestrial wildlife.

3.11.3.3.7 Threatened, Endangered, and Special Concern Species

There is no essential breeding habitat for monarch butterfly (i.e., milkweed plants) in the Study Area, and any monarch butterflies that may be present are expected to be occasional migratory individuals rather than breeding populations. Therefore, construction of the Proposed Project would not impact monarch butterflies or monarch butterfly habitat.

Peregrine falcons, which have been observed nesting within 0.5 miles of the Project Site and are known to occur throughout lower Manhattan, would be expected to avoid the Study Area during active construction and return during quiet periods, like other terrestrial wildlife adapted to urban environments. Peregrine falcons are well distributed throughout New York City and are adapted to high levels of activity and ambient noise, and construction of the Proposed Project would not adversely affect peregrine falcons in the vicinity of the Study Area. To minimize potential impacts to peregrine falcon during construction, all tall equipment such as cranes and drill rigs would include anti-perching devices such as flagging at the top of the equipment that will create a physical deterrent to falcons perching on the equipment.

Federally listed species with the potential to occur at the Project Site include Atlantic sturgeon, shortnose sturgeon, and sea turtles. Because shortnose and Atlantic sturgeon are more likely to occur in deeper waters of the Hudson River during migration and foraging, it is unlikely that individuals of either species would occur in the shallower waters of the Study Area outside the navigation channel except as occasional transients. Similarly, sea turtles have the potential to occur within the Study Area on rare occasions, and only as transient individuals, rather than for long-term occupation for breeding, wintering, or growth and development. Migration of sturgeon and sea turtles through the Hudson River during spring and early fall would not be obstructed by construction of the Proposed Project, which would only result in increased noise within a relatively small area of the Hudson River. Because impacts associated with the in-water construction activities would be localized, including resuspended sediments and elevated noise levels from pile driving as described above, the deeper channel habitat typically used by sturgeon would not be adversely impacted during construction of the Proposed Project. The temporary loss of potential foraging habitat due to avoidance of the Study Area would not result in significant adverse impacts to sturgeon or

sea turtles, as similar suitable habitat would continue to be available nearby and they would be expected to return to the Study Area following construction.

In addition, the Proposed Project's Sturgeon Monitoring and Impact Avoidance Plan (SMIAP) details proposed measures to avoid adverse impacts to both shortnose and Atlantic sturgeon during in-water construction. These measures include BMPs to reduce in-water noise during construction, including installation of deep foundations using the drilled shaft method to the extent possible, use of a cushion block and pile tapping during use of an impact hammer for pile driving as needed, and deployment of bubble curtains during pile installation. Turbidity curtains would also be deployed to minimize the potential effects of sediment resuspension. The potential impacts of dredging would be minimized using BMPs, as described above, and would be conducted in accordance with USACE and NYSDEC permit conditions implemented to protect water quality and aquatic resources. Protected Species Observers (PSOs) would conduct physical observation and monitoring of the waters adjacent to the Project Site during in-water work between May 1 and July 31 and September 1 and September 30 via visual observations of the Hudson River during construction and acoustical monitoring of any tagged sturgeon's acoustic telemetry tag. The PSO would record daily results of the sturgeon monitoring surveys and submit the data to NYSDEC and NMFS, as appropriate. Any sightings of injured or dead sturgeon would be submitted within 24 hours to NYSDEC and NMFS, regardless of whether the injury or death was caused by a project-related vessel or construction activity. Therefore, with the measures identified in the SMIAP in place, construction of the Proposed Project would not adversely affect Atlantic sturgeon or shortnose sturgeon.

Therefore, construction of the Proposed Project would not have the potential to result in significant adverse impacts to state-listed or federally listed threatened, endangered, or candidate species.

3.11.3.3.8 Significant Coastal Fish and Wildlife Habitat

The Lower Hudson Reach was designated as a Significant Coastal Fish and Wildlife Habitat (SCFWH) primarily due to its use as wintering habitat by large numbers of juvenile striped bass. As described above, construction of the Proposed Project would not adversely impact water or sediment and would not significantly affect habitat for aquatic biota, including striped bass. Considering the available habitat within the lower Hudson River, the Study Area comprises a relatively small area of the Lower Hudson Reach SCFWH and there is ample habitat for juvenile striped bass that would remain unaffected by construction of the Proposed Project. Therefore, the Proposed Project would not result in significant adverse effects to the Lower Hudson Reach SCFWH.

3.11.3.3.9 Hudson River Park Estuarine Sanctuary

As described above, construction of the Proposed Project would not result in significant adverse impacts to groundwater, floodplains, wetlands, water quality, aquatic biota, ecological communities, wildlife, or threatened and endangered species. Therefore, construction of the Proposed Project would be consistent with the goals of the Hudson River Park Estuarine Sanctuary Management Plan and would not result in significant adverse impacts to the sanctuary.