Appendix B

NEW YORK DISTRICT
U.S. ARMY CORPS OF ENGINEERS, NEW YORK, NY.
CLEAN WATER ACT
SECTION 404 (B) (1) EVALUATION

PROJECT: Spring Creek North Restoration Project, Brooklyn, Kings County, New York

PROJECT MANAGER: Lisa Baron TEL. 917-790-8306, Lisa.A.Baron@usace.army.mil

FORM COMPLETED BY: Diana Kohtio TEL. 917- 790- 8619, Diana.M.Kohtio@usace.army.mil

PROJECT DESCRIPTION:

The recommended plan for this project is described in detail in Section 5 of the Feasibility Report and Environmental Assessment (FR/EA). In general the proposed plan will create approximately 7.6 acres of low marsh, 5.4 acres of high marsh, 1.0 acre of scrub-shrub, 2.1 acres of upland, and 19.0 acres of maritime forest for a total of 35.1 acres. The plan is designed to address the erosion presently occurring at this location by creating a less fragmented, more contiguous marsh, and reducing channel area. Low marsh restoration is achieved through excavation, the restoration of mudflat areas, and the filling in of select channel portions. Areas designed for maritime forest will tie into existing grade elevations and higher existing elevations will be re-graded to create low and high marsh. To achieve the designed wetland elevation, approximately 98,000 cubic yards of material excavated from onsite will be distributed to create the upland and maritime forest communities.

The excavation and re-contouring used to restore the inter-tidal salt marsh system will establish an elevational gradient that gradually transitions from open water to wetland to upland. Wetland vegetation primarily smooth cordgrass) would occupy a gentle slope of increasing elevation. At low tide, mudflat areas will be exposed along the edges of the interface of the salt marsh and the open water area; at high tide, the mudflat and salt marsh will be flooded at varying depths, depending on final elevations.

5. Actions to Minimize Adverse Effects (Subpart H)

	YES	NO
All appropriate and practicable steps have been taken, through application of recommendation of Section 230. 70-230. 77 to ensure minimal adverse effects of the proposed discharge.	X	

List actions taken:

Best Management Practices will be installed at the waterward limits of work prior to and maintained throughout construction to prevent in-situ and downstream sedimentation and erosion impacts. Such BMP's may include environmental windows as well as physical solutions such as hay bails and silt fences, temporary detention basins, filter bags, temporary seeding/stabilization and floating turbidity curtains. The disposal and dewatering sites will be located in upland areas to avoid impacts to aquatic and wetland resources.

The following actions will be taken to minimize adverse impacts to the biological resources within the projects area:

Clearing, grubbing, excavation and grading would take place during the winter months and would last through the early spring. In water work would take place at low tide during the winter, limiting the species that will be utilizing the nearshore habitat. Heavy machinery and earthwork would be complete prior to the beginning of the growing season and the seasonal activity period for most wildlife. Species of resident wildlife that are active in the winter months include some species of fish and birds. These species tend to be mobile and will seek refuge in other parts of Jamaica bay until the completion of construction. Planting will follow construction and would begin in the early spring taking approximately 6-8 weeks to complete. Planting would be accomplished primarily by hand causing minimal disturbances to resident and transient wildlife.

6. FACTUAL DETERMINATIONS

Review of Compliance – Section 230.10(a)-(d)

	YES	NO
a. The discharge represents the least environmentally damaging practicable alternative and, if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose.	X	
b. The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed threatened and endangered species or their habitat; and 3) violate requirements of any Federally designated marine sanctuary.	X	
c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values.	X	
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.	X	

Technical Evaluation Factors (Subparts C-F)

		N/A	Not Significant	Significant
a. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)				
	1) Substrate		X	
	2) Suspended particulates/turbidity		X	
	3) Water column impacts		X	
	4) Current patterns and water circulation		X	
	5) Normal water circulation		X	

	6) Salinity gradients	X		
b. Potential Impacts on Biological Characteristics on the Aquatic Ecosystem (Subpart D)				
	1) Threatened and endangered species		X	
	2) Fish, crustaceans, mollusks, and other organisms in the aquatic food web		X	
	3) Other wildlife (mammals, birds, reptiles and amphibians)		X	
c. Potential Impacts on Special Aquatic Sites (Subpart E)				
	1) Sanctuaries and refuges		X	
	2) Wetlands		X	
	3) Mud Flats		X	
	4) Vegetated Shallows	X		
	5) Coral reefs	X		
	6) Riffle and pool complexes	X		
d. Potential Effects on Human Use Characteristics (Subpart F)				
	1) Municipal and private water supplies	X		
	2) Recreational and commercial fisheries		X	
	3) Water-related recreation		X	
	4) Aesthetic impacts		X	
	5) Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves		X	

Evaluation and Testing – Subpart G

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)		
	1) Physical characteristics	X
	2) Hydrography in relation to known or anticipated sources of contaminants	X
	3) Results from previous testing of the material or similar material in the vicinity of the project	X
	4) Known, significant sources of persistent pesticides from land runoff or percolation	X

	5) Spill records for petroleum products or designated hazardous substances (Section 311 of CWA)	X
	6) Public records of significant introduction of contaminants from industries, municipalities or other sources	X
	7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	X
	8) Other sources (specify)	N/A
List appropriate references – See Environmental Assessment		

	YES	**NO**
b. An evaluation of the appropriate information factors in 3a above indicates that there is reason to believe the proposed dredged material is not a carrier of contaminants or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to require constraints.	X	

4. Disposal Site Delineation - Section 230.11(f)

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)		
	1) Depth of water at disposal site	Yes
	2) Current velocity, direction, variability at disposal site	Yes
	3) Degree of turbulence	Yes
	4) Water column stratification	Yes
	5) Discharge of vessel speed and direction	Yes
	6) Rate of discharge	Yes
	7) Dredged material characteristics (constituents, amount, and type of material, settling velocities)	Yes
	8) Number of discharges per unit of time	Yes
	9) Other factors affecting rates and patterns of mixing (specify)	Yes
List appropriate references – See Environmental Assessment		

	YES	**NO**
b. An evaluation of the appropriate information factors in 4a above indicated that the disposal sites and/or size of mixing zone are acceptable.	X	

6. Factual Determination – Section 230.11

A review of appropriate information, as identified in Items 2-5 above, indicates there is minimal potential for short or long-term environmental effects of the proposed discharge as related to:		
	YES	**NO**
a. Physical substrate at the disposal site (review Sections 2a, 3, 4 and 5 above)	X	
b. Water circulation, fluctuation and salinity (review Sections 2a, 3, 4 and 5)	X	
c. Suspended particulates/turbidity (review Sections 2a, 3, 4 and 5)	X	
d. Contaminant availability (review Sections 2a, 3 and 4)	X	
e. Aquatic ecosystem structure, function and organisms (review Sections 2b, 2c, 3 and 5)	X	
f. Proposed disposal site (review Sections 2, 4 and 5)	X	
g. Cumulative effects on the aquatic ecosystem	X	
h. Secondary effects on the aquatic ecosystem	X	

Findings of Compliance or Non-Compliance

	YES	**NO**
The proposed disposal site for discharge of dredged or fill material complies with Section 404(b)(1) guidelines.	X	

In summary, the implementation of the recommended Spring Creek North Ecosystem Restoration Project:

Will have no adverse effects of the discharge of pollutants on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.

Will have no significant adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;

Will have no significant adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability.

Will have no significant adverse effects of discharge of pollutants on recreational, aesthetic, and economic values.

NEW YORK STATE COASTAL ZONE MANAGEMENT PROGRAM AND NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM (WRP) CONSISTENCY DETERMINATION

Project: Spring Creek North Ecosystem Restoration Project.

Applicant: U.S. Army Corps of Engineers, New York District.

Applicable Policies: Based on a review of the Coastal Management Program policies for New York, 14 state policies, 4 New York City policies were found to be potentially applicable to the proposed Project. These policies are listed below.

Consistency Determination: All of the applicable policies were evaluated with respect to the Project's consistency with their stated goals. The Project has been found to be consistent with each policy.

State Policy 1 – Restore, revitalize and redevelop deteriorated and underutilized waterfront areas for commercial, industrial, cultural, recreational and other compatible uses.

Determination – The Spring Creek Restoration project is located within a portion gf Spring Creek Park, which is operated by the New York City Parks and Recreation Department. The project area encompasses portions of Spring Creek and all of Ralph's creek. The goal is to restore about 30 acres of coastal habitat within the park, from its current state, which is disturbed upland habitat that has been filled with dredge material and anthropogenic debris and is vegetated with invasive plant species, to its former state as intertidal salt marsh and maritime upland communities. Intertidal salt marshes are dependent on the daily fluctuating tides, thus making this project water dependent. Restoration of these native coastal ecosystems will improve fish and wildlife habitat, vegetative composition, scenic and aesthetic resources, and the recreational value of the park. The project directly supports Policy 1 by restoring and revitalizing a water-dependent site for recreational use.

State Policy 2 – Facilitate the siting of water dependent uses and facilities on or adjacent to coastal waters.

Determination – The Spring Creek Restoration project involves restoring approximately 30 acres of coastal habitats including up to 8.3 acres of low marsh salt marsh. Low marsh habitats are dependent on the daily fluctuating tides, thus making this project water dependent. Furthermore, in accordance with Policy 2, the project is considered water dependent because it will provide water-based recreational activities such as fishing and wildlife viewing.

State Policy 7 – Significant coastal fish and wildlife habitats would be protected, preserved, and where practical, restored so as to maintain their viability as habitats.

Also applicable: **NYC Policy 4-** – Protect and restore the quality and function of ecological systems within the New York City coastal area.

NYC Policy 5 – Protect and improve water quality in the New York City coastal area.

Determination – A portion of the Spring Creek Restoration project is located within an area designated as Significant Coastal Fish and Wildlife Habitat. This area encompasses the wetlands between Spring and Ralph's Creeks and is considered part of the Jamaica Bay habitat. The goal of the project is to restore approximately 30 acres of coastal habitat including up to 17.5 acres of salt marsh and 12.5 acres of upland maritime communities. Ultimately, this effort will improve the fish and wildlife habitat in the area by removing invasive plant species, increasing the biodiversity, and providing additional area for foraging and reproductive activities, thereby increasing the productivity of the bay in this area. There may be short-term impacts during the 12 month construction phase of the project, including temporary displacement of species and increased sedimentation/turbidity. It is expected that mobile fish and wildlife species will utilize adjacent marshes and waters during the construction phase. Sedimentation will be minimized to the extent possible by implementing approved Best Management Practices and sediment control devices such as hay bales, silt fencing, and/or sediment erosion control fabric as necessary. The proposed effort supports Policy 7 by restoring a highly disturbed upland habitat into productive salt marsh and upland maritime ecosystems.

State Policy 9- Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources.

Determination – The project will improve the restore the quality of 30 acres of coastal habitat, including about 17.5 acres of salt marsh and 12.5 acres of upland maritime habitat. Ultimately, the project will improve habitat for coastal recreational uses such as wildlife photography, bird watching, and nature study. Per Policy 9, the restoration efforts will be undertaken in accordance with state, federal, and local guidelines in order to minimize or mitigate potential impacts to fish and wildlife species during the restoration process.

State Policy 12 – Activities or development in the coastal area would be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands and bluffs.

Also applicable:

NYC Policy 6 – Minimize loss of life, structures and natural resources caused by flooding and erosion.

Determination – The Spring Creek salt marsh restoration project will involve excavating fill of former salt marsh and returning them to an elevation that supports salt marsh grasses such as *Spartina alterniflora*, *Spartina patens*, or *Distichlis spicata*. The plan is designed to address the erosion presently occurring at this location by creating a less fragmented, more contiguous marsh, and reducing channel area. Wetland habitats act as buffers for coastal erosion and flooding by absorbing and retaining water before it has the opportunity to reach developed land. Therefore, this project should help to naturally buffer flooding rather than increase it. During construction, approved Best Management Practices will be implemented to ensure

flooding/erosion does not impact any coastal features and that sedimentation and increased turbidity are minimized to the extent possible.

Several existing projects and ongoing efforts at the project site by the sponsor (NYCDPR) and other agencies further support the above listed policies and bolster the CSRM ecosystem services provided by this habitat (see section 1.3.1 of the FR/EA for further details).

State Policy 17 – Non-structural measures to minimize damage to natural resources and property from flooding and erosion shall be used whenever possible.

Determination – The project involves creating additional salt marsh habitat at the edge of the creeks in Spring Creek Park. As mentioned for Policy 12, wetland habitats are natural buffers to storm-induced erosion and coastal flooding as they are capable of retaining and/or baffling the flow of water. During construction, erosion to the project site will be minimized by implementing approved BMP's, such as hay bales, silt fence, and/or sediment erosion control fabric and then planting with native vegetation species appropriate for the restored habitats.

State Policy 18 – To safeguard the vital economic, social and environmental interests of the state and of its citizens, proposed major action in the coastal area must give full consideration to those interests, and to the safeguards which the state has established to protect valuable coastal resource areas.

Determination – The project will improve the quality of Spring Creek Park. Specifically, by restoring the native habitats (salt marsh and maritime upland habitats) and removing the prevalent invasive plant species *(Phragmites australis, Artemesia vulgaris),* the project should increase biodiversity of the site, improve wildlife habitat and utilization, provide additional coastal buffers to erosion and flooding, and provide increased opportunities for recreational uses such as wildlife viewing/photography, fishing, and nature study. These benefits directly support and safeguard the social and environmental interests of the State and its citizens.

State Policy 20 – Access to publicly-owned foreshore and to lands immediately adjacent to the foreshore or the water's edge that are publicly-owned shall be provided and it shall be provided in a manner compatible with adjoining uses.

Also applicable: **NYC Policy 8** – Provide Public Access to, from, and along New York City's coastal waters.

Determination – The project will improve the quality of a portion of the publicly-owned foreshore of Spring Creek Park. Although access to the site will be limited during the 12 month construction period, the long-term effects of the project will benefit the public by improving the recreational uses within the park. Also, the project involves only a small portion of Spring Creek Park, so there should be sufficient access to the unaffected portions of the park available for public enjoyment during the construction phase.

State Policy 21 – Water-dependent and water-enhanced recreation would be encouraged and facilitated, and would be given priority over non-water related uses along the coast.

Determination – The project will improve the water-related recreational and environmental uses of an existing city park by restoring about 30 acres of native coastal habitats. Since the site is already an existing city park, there will be no increased demands on the local community including the transportation system nor will there be impacts to onsite or adjacent land uses.

State Policy 22 – Development when located adjacent to the shore would provide for water-related recreation whenever such use is compatible with reasonably anticipated demand for such activities, and is compatible with the primary purpose of the development.

Determination – The proposed restoration project is located within the NYC-owned Spring Creek Park. The site is already used for water-related recreational purposes. However, as previously mentioned, the proposed undertaking will improve the quality of the coastal habitat thus providing improved opportunities for recreational usage. Since the proposed action does not affect the current land-use or activities onsite, it is compatible with the surrounding areas of Spring Creek Park.

State Policy 25 – Protect, restore or enhance natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area.

Determination – The project site is not located in an area designated as a Scenic Resource of Statewide Significance. Nonetheless, the restoration effort will improve the scenic quality of the site. The project involves the removal of the unsightly invasive plant species including *Phragmites australis* and *Artemesia vulgaris* and the excavation of material (dredge material and man-made debris) that has been used to fill an area of former salt marsh over the past 50+ years. Portions of the site will be re-graded to an elevation sufficient to support desirable, naturally occurring salt marsh grasses such as *Spartina alternafiora.* The remaining areas will be restored into maritime upland grassland and shrub communities. These restoration efforts should significantly improve the wildlife habitat as well as increase the aesthetic and scenic value of the site.

State Policy 37- Best management practices will be utilized to minimize the non-point discharge of excess nutrients, organics, and eroded soils into coastal waters.

Determination – Approved Best Management Practices will be implemented during construction of the restoration project to minimize impacts to the site and surrounding ecosystems. BMP's may include but are not limited to hay bales, silt fence, sediment erosion control fabric and the use of vegetation plantings to stabilize ground surfaces. Sediment erosion control devices will be installed prior to the initiation of ground alteration and will be monitored and maintained throughout the course of the construction phase to ensure they are properly functioning. These measures should minimize non-point discharge of eroded soils into coastal waters.

State Policy 38- The quality and quantity of surface water and groundwater supplies, will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.

Determination – A water quality certification will be obtained from the NYSDEC prior to undertaking the restoration project. All conditions of the certification will be complied with during the construction/planting phase of the project to ensure that impacts to the surrounding surface or ground water resources will not be affected.

State Policy 44 – Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas.

Determination – The Spring Creek Restoration Project will restore up to 8.3 acres of tidal wetlands. The project site was formerly intertidal salt marsh, but over the past century has been filled with dredge material and man-made debris and has lost most, if not all of its characteristic wetland features. The project seeks to restore this area into its previous state as a salt marsh state and hence will provide all of the functions naturally afforded by wetland systems including fish and wildlife habitat; erosion, flood and storm control; natural pollution treatment; groundwater protection; recreational opportunities; educational and scientific opportunities; and aesthetic open space.

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, N.Y. 10278-0090
October 7, 2015

REPLY TO
ATTENTION OF
Environmental Analysis Branch

Ms. Karen Greene
Northeast Region EFH Coordinator
National Marine Fisheries Service
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732

Attention: Ms. Melissa Alvarez

Dear Ms. Greene:

The U.S. Army Corps of Engineers, New York District (District), in partnership with the New York City Department of Parks and Recreation, is currently re-evaluating the 2010 draft recommended plan for the Spring Creek Park Ecosystem Restoration Project. Originally authorized under the Continuing Authorities Program, Section 1135(b) of the Water Resource Development Act (WRDA) of 1986; a draft Ecosystem Restoration Report and Environmental Assessment was prepared in 2010 with a recommended National Ecosystem Restoration plan which restored degraded ecosystem structure, function, and dynamic processes to less degraded and more natural conditions. The costs of the recommended plan exceeded what was then the maximum federal expenditure of $5 million including both planning and construction costs. In light of the 2014 WRDA amendment, increasing the maximum federal expenditure from the $5 million to $10 million, the NYD is optimizing the plan and updating initial designs to current conditions. The project area is a tributary to Jamaica Bay just north of the Belt parkway, on the border of the New York City boroughs of Brooklyn and Queens.

The District is presently updating the draft Ecosystem Restoration Report and Environmental Assessment evaluating the proposed optimized plan (see attached). The proposed plan will create approximately 8.3 acres of low marsh, 9.2 acres of high marsh, 0.9 acres of scrub-shrub, 2.1 acres of upland, and 9.5 acres of maritime forest. The plan is designed to address the erosion presently occurring at this location by creating a less fragmented, more contiguous marsh, and reducing channel area. Low marsh restoration is achieved through excavation, the restoration of mudflat areas, and the filling in of select channel portions. Areas designed for maritime forest will tie into existing grade elevations and higher existing elevations will be re-graded to create low and high marsh. The restoration would consist of excavating approximately 71,000 CY of material, with approximately 63,000 CY being reused on site.

In a letter dated February 2, 2004, we provided your office a draft Essential Fish Habitat Assessment (EFH) that concluded the project was not likely to significantly affect any of the species listed, due predominately to its location outside the main body of Jamaica Bay. The 2004 EFH assessment (attached) has been updated to account for recent design changes; while some

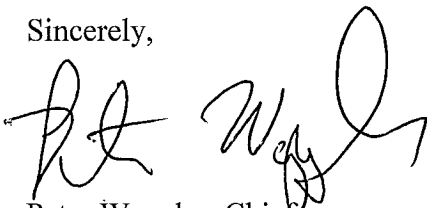
impacts are anticipated, they will be limited to the construction period, managed with best management practices, and are not expected to have a long-term effect. The District requests your review and confirmation of concurrence with the EFH Assessment.

During the course of our 2004 coordination, your office advised us of the possible occurrence of several species of endangered sea turtles within the project area; we would like to note that we are currently in contact with the Gloucester, Massachusetts office of National Marine Fisheries Service on all Endangered Species Act coordination.

The District plans to release the Draft Report to the Public in early December 2015 in order to coordinate grant funding (provided to improve the resiliency and coastal storm risk management benefits at the site) that has been awarded to NYCDP&R from the New York Rising – Howard Beach Community Reconstruction Plan and the National Fish and Wildlife Foundation's (NFWF) Hurricane Sandy Coastal Resiliency Program. Given the requirements of these grant programs, we greatly appreciate your responsiveness to this request.

Should you have any questions regarding this action or the above requests please contact the project biologist, Diana Kohtio, by phone (917) 790-8619, or by email at Diana.M.Kohtio@usace.army.mil.

Sincerely,



Peter Weppler, Chief
Environmental Analysis Branch

US Army Corps
of Engineers®
New York District

DRAFT ESSENTIAL FISH HABITAT ASSESSMENT

Spring Creek Ecosystem Restoration Project Brooklyn, NY

January 2004
Updated: October 2015

Prepared By: U.S. Army Corps of Engineers
Planning Division
New York District
26 Federal Plaza
New York, New York 10278-0090

Table of Contents

1.0 Magnuson-Stevens Fishery Conservation & Management Act

Essential fish habitat (EFH) is defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265), as amended by the Sustainable Fisheries Act (SFA) of 1996 (PL 104-267), as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". The SFA requires the identification of EFH for those species actively managed under Federal fishery management plans (FMP's). This includes species managed by the eight regional fishery management councils (FMC's), established under the MSFCMA, as well as those managed by the National Marine Fisheries Service (NMFS) under FMP's developed by the Secretary of Commerce.

EFH designations have been defined for specific life stages based on their occurrence in tidal freshwater, estuarine (i.e., mixing/brackish salinity zone) and marine (i.e., seawater salinity zone) waters. The project site is located within an estuarine mixing zone; therefore, only those species and lifestages with EFH designated in the estuaries of Jamaica Bay itself were considered (Table 1).

Table 1:
Essential Fish Habitat Designation in Jamaica Bay

Species	Eggs	Larvae	Juveniles	Adults
Whiting	X	X	X	
Red Hake	X	X	X	
Winter Flounder	X	X	X	X
Windowpane Flounder	X	X	X	X
Atlantic Sea Herring			X	X
Monkfish	X	X		
Bluefish			X	X
Atlantic Butterfish		X	X	X
Atlantic Mackerel			X	X
Summer Flounder		X	X	X
Scup	X	X	X	X
Black Sea Bass			X	X
King Mackerel *	X	X	X	X
Spanish Mackerel*	X	X	X	X
Cobia*	X	X	X	X
Sand Tiger Shark*		X		
Dusky Shark*		X		
Sandbar Shark *		X	X	X

* Migratory Species

EFH is considered to be particularly important to the long-term productivity of populations of one or more managed species or to be particularly vulnerable to degradation, it can also be identified by FMC's and NMFS as habitat areas of particular concern (HAPC). Those areas of EFH considered to be HAPC must demonstrate the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or will be, stressing the habitat type; or the rarity of the habitat. No HAPC have been identified in the project area.

The species with EFH listed in Jamaica Bay include: whiting (*Merluccius bilinearis*), red hake (*Urophycis chuss*), winter flounder (*Pleuronectes americanus*), windowpane flounder (*Scopthalmus aqupsus*), Atlantic sea herring (*Clupea hargenus*), monkfish (*Lophhius americanus*), bluefish (*Pomatomus saltatrix*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), summer flounder (*Paralicthys dentatus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristus striata*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel, (*Scomeberomorus maculates*), cobia (*Rachycentron canadum*), sand tiger shark (*Odontaspis taurus*), dusky shark (*Charcharinus obscurus*) and sandbar shark (*Charcharinus plumbeus*). Windowpane flounder, winter flounder, and scup have EFH designated in the project area for each stage of their life cycle. Red hake and whiting have EFH designated for egg to juvenile stages. Only monkfish has EFH designated for eggs and larval stages. Butterfish and summer flounder have EFH designated for larval to adult stages. Bluefish, black sea bass, Atlantic sea herring and Atlantic mackerel have EFH designated for juvenile and adult stages. King mackerel, Spanish mackerel, cobia, sand tiger shark, dusky shark, and sandbar shark have EFH designations for the Jamaica Bay estuary with no salinity zone indicated.

2.0 Proposed Action Description

The proposed design represents an optimization of the previously selected plan (2004) with regard to engineering and ecological constraints, cost effectiveness, and sea level change adaptability. The previously proposed turtle mounds were eliminated to increase the proportion of low marsh acreage; selected channel reaches were filled to address low marsh erosion. Importantly, the present plan addresses issues of constructability in areas of transition from low marsh to upland transition through the design of constructible and sustainable grades. Finally, the placement of excavated material in upland areas has been modified to incorporate presently available areas and current local constraints.

This optimized plan also addresses the need to restore upland areas that will be disturbed during construction.

The proposed plan will create approximately 8.3 acres of low marsh, 9.2 acres of high marsh, 0.9 acres of scrub-shrub, 2.1 acres of upland and 9.5 acres of maritime forest. The plan requires approximately 71,000 CY of excavation with the majority of the material remaining on site. Areas designed for maritime forest will tie into existing grade elevations and higher existing elevations will be regraded to create low and high marsh. The plan will also fill in two lengths of tributaries with approximately 7,000 CY (total) of clean sand: (1) an approximately 360-ft length of linear channel (possibly a mosquito ditch), which will bridge the remaining segments of the small tributary, restoring its prior sinuosity, and (2) an approximately 435-ft length of a larger tributary that will be filled to create more low marsh; these activities are expected to occur in winter. Areas of maritime forest will have a clean soil cap of 1.5 feet, while the remaining areas (low and high marsh, scrub-shrub and uplands) will have a 1.0-foot clean cap.

3.0 Essential Fish Habitat Species in Jamaica Bay

EFH has been defined for eighteen species within the vicinity of the proposed project. A description of the potential impacts to EFH due to changes in underlying substrate (e.g., loss of bottom habitat) or changes in water quality and an assessment of these impacts for each species are provided below.

General Impacts

Direct impacts could include smothering related to channel filling activities, as well as gill abrasion, suffocation, and decreased predation efficiency of sight feeding fish due to increased sedimentation and turbidity (Uncles et al. 1998). However, sand will be used for the restoration, which is expected to settle quickly out of the water column. The increase in turbidity is therefore expected to be relatively minor. Sedimentation will also be limited by completing construction at low tide and limiting the impact zone with the use of the geotubes. The segments of channel designated for fill are in the range of -2.5 - 2.0, thus potentially eliminating impacts to a number of species that would not typically occur at those depths. Additionally, Juvenile and adult life stages of fish will be able to avoid impacts by relocating to adjacent wetlands during construction. There are few fish species that

use the creek as a nursery, therefore impacts on egg and/or larval life stages are not expected to be significant.

Indirect negative impacts are expected to be minor; although the proposed project calls for a loss (< 1 acre) of open water habitat and the temporary loss of forage species at the site due to the filling. Many nearby areas have similar habitat to that which will be lost or temporarily unusable due to construction. Recolonization of temporarily disturbed areas is expected to occur soon after construction. Positive long-term benefits are expected from the restoration of marsh habitat, as many forage species are expected to benefit from the vegetation and increased detritus of the marsh system.

Black Sea Bass

EFH is defined within the vicinity of the project site for juveniles and adults. The offshore EFH habitat for juvenile and adult black sea bass is the demersal waters found over the Continental Shelf (from the coast out to the limits of the exclusive economic zone (EEZ)), from the Gulf of Maine to Cape Hatteras. The inshore EFH for juveniles and adults are estuaries with a common or high abundance of black sea bass. During the summer and spring juveniles are found in estuaries and prefer waters warmer than 6.1^{o}C with salinities greater than 18 parts per thousands (ppt). Adults and juveniles, are usually located in structured habitats (natural and man-made), as well as sandy and shell substrates, with temperatures above 6.1^{o}C.

The Jamaica Bay Ecosystem Research and Restoration Team (JABERRT) reported that black sea bass have been collected in the Dubos Point, and Brandt Point sections of Jamaica Bay (USACE NYD, 2002). The Northeast Fisheries Science Center (NEFSC) bottom trawl survey, 1963-1997 indicates the presence of juvenile black sea bass within Jamaica Bay during the fall from 1963 through 1996 (Steimle, F. et al., 1999a).

Potential impacts to black sea bass EFH at the project site would be minimal due to their strong association with structured habitats and rough bottoms. In addition, few adult or juvenile black sea bass have been collected near the project site during previous sampling programs and no larval black sea bass have been reported.

Red Hake

EFH is defined within the project site for eggs through juvenile lifestages of the red hake. The EFH for red hake eggs and larvae is defined as areas of coastal and offshore waters out to the offshore US boundary of the exclusive economic zone (EEZ). The EFH for red hake juveniles is defined as bottom habitats with an abundance of scallops and a shell fragmented substrate. Eggs are commonly located within sea surface water temperatures below 10^{o} C with salinities less than 25 ppt along the inner Continental Shelf. The larvae are commonly located within sea surface temperatures below 19^{o} C at depths less than 200 m and salinities greater than 0.5 ppt. Juveniles prefer water temperatures less than 16^{o} C and depths below 100 m with salinity ranges of 33-34 ppt.

The JABERRT report indicates that red hake are present in Jamaica Bay estuaries and Jamaica Bay; however few juvenile red hake have been collected near the project area during previous sampling programs. Although there have been no reports of egg or larvae of Red Hake within the project site the area is designated as EFH for red hake eggs and larvae. No direct impact is expected to red hake eggs and as they are found in marine pelagic environments and are not expected to occur at the project site in large numbers. The pelagic larvae are not expected to be heavily impacted as in water construction is expected to be completed before May when most red hake larvae are found.

Potential impacts to red hake would be minimal since red hake prefer fragmented shell substrate and the substrate at the project site is muddy. The project is not expected to have any adverse impacts to this species.

Windowpane Flounder

EFH is defined within the project area for all lifestages (egg through adults) of the windowpane flounder. The EFH for windowpane flounder has been described as coastal and offshore areas from the Gulf of Maine to Cape Hatteras. Windowpane eggs have a typical spawning temperature of 11^{o} C and are observed in the middle Atlantic from February to November with peaks in May and October. Adults and juvenile are found in water temperatures below 26.8^{o} C, at depths ranging from 1-75 meters, and in salinities between 5.5-36 ppt.

Windowpane flounder are one of the dominant species within Jamaica Bay. Windowpane flounder spawn between February and December, with a peak in May and have been reported in Jamaica Bay during that time; however no sexually mature windowpane flounder where collected during the JABERRT study.

Direct impacts to windowpane eggs, pelagic larvae, and young of year are likely to occur as construction activities do require fill of open water; these lifestages may be unable to move away from the fill material and general turbidity created by construction activities. Some impact is expected, but numbers should be minimal. Construction- related disturbances would be confined within the project site and would occur over a brief period of time. Channel filling activities will also cause permanent and temporary disruption of foraging habitat for juvenile and adult winter flounder during construction. Impacts due to loss of foraging habitat from channel fill are expected to be minor, as ample amounts of similar habitat surround the project site. Windowpane flounder would continue to use areas surrounding the project site during construction, for foraging and shelter. Since windowpane flounder larvae and juveniles have been collected within the project site, best management practices (BMP's) will be used to minimize the temporary construction disturbances such as increased sedimentation and turbidity. This project is expected to have a measurable positive impact on this species, by increasing the area and quality of the salt marsh habitat within Spring Creek.

Winter Flounder

EFH for the winter flounder eggs, juveniles and adults has been defined as benthic habitats comprised of gravel, mud, muddy sand and sand. Eggs prefer water temperatures less than 10^{o}C, with salinities between 10-30 ppt and water depths less than 5 m. Juveniles and adults prefer water temperatures below 25^{o} C, depths from 1-100 m and salinities between 15-33 ppt. The EFH for winter flounder larvae has been defined as pelagic and bottom waters. Larvae are commonly found within sea surface temperatures less than 15^{o} C and salinities ranging from 4-30 ppt, and water depths less than 6 m.

Winter flounder are located throughout Jamaica Bay making them one of the dominant species of the bay. From May 2000 to May 2001 JABERRT collected winter flounder within the project area (USACE NYD, 2002). Winter flounder spawn and lay demersal eggs during winter to early spring in

estuaries such as Jamaica Bay; however the timing is temperature dependent. Research indicates that spawning occurs from January to March in New Jersey, and occurred when temperatures were below 5^0C from January to April (NEFMC, 1998a). Water temperatures in Jamaica Bay have been reported to be below 5^o C during the spawning period; however sexually mature winter flounder have not been reported in Jamaica Bay during this time period.

Direct impacts to the demersal eggs, larvae, and young-of-year juveniles are likely to occur as they may be unable to move away from the filling activities as well as general turbidity created by construction activities. Some impact is expected, but numbers should be minimal. Additionally, channel filling activities will cause permanent and temporary disruption of foraging habitat for juvenile and adult winter flounder during construction. Impacts due to loss of foraging habitat from channel fill are expected to be minor, as ample amounts of similar habitat surround the project site. Construction-related disturbances would be confined within the project site and would occur over a brief period of time. Winter flounder would continue to use areas surrounding the project site during construction, for foraging and shelter. Since winter flounder larvae and juveniles have been collected within the project site, best management practices (BMP's) will be used to minimize the level of disturbance. Overall, this project is expected to have a measurable positive impact on this species, by providing increased salt marsh habitat which, is used as foraging habitat by juvenile and adult winter flounder.

Atlantic Sea Herring

EFH for Atlantic herring juveniles and adults is defined as pelagic waters and bottom/benthic habitats. Juveniles and adults prefer water temperatures greater than 10^o C, at depths ranging between 15-135 m and salinities of 26-32 ppt.

Jamaica Bay is included in the designated bays and estuaries identified by the NOAA ELMR program as supporting Atlantic herring at "common" or "abundant" levels (NEFMC, 1998b). Atlantic herring are a schooling pelagic species, not generally associated with bottom habitats or nearshore areas; therefore the project is not expected to have any effect on this species or its habitat.

Butterfish

Butterfish EFH is designated for larvae, juveniles and adults within the project site. EFH for butterfish is defined as pelagic offshore and inshore waters where butterfish are common, or abundant. Butterfish larvae are commonly found at salinities ranging from 6.4-37.4 ppt and at temperatures of 9^{o}-19^{o} C. They are frequently found in bays and estuaries from Massachusetts to New York in the summer and fall. Juveniles are commonly found in salinities of 3.0-37.4 ppt, with temperatures ranging from 4.4o - 29.7^{o} C.

The NEFSC Multiscale Advanced Raster Map (MARMAP) icthyoplankton survey (January through November, 1977-1987), reports the presence of butterfish offshore of Jamaica Bay, (Cross, J. et al., 1999b). During July 2000 butterfish were collected in the Dead Horse Bay section of Jamaica Bay, which is located approximately 4 miles west of the project site. Butterfish larvae are found between late May and July, minimal impacts are expected as in water construction is expected to be completed before May. Butterfish juveniles and adults are both pelagic, and not typically associated with bottom habitats or nearshore areas; those that make their way into the project site would be expected to escape the construction area for nearby similar habitat. Direct impact should therefore be minimal to these age groups.

Indirect long-term impacts to butterfish are expected to be positive as their forage species would be expected to thrive at the project site with completion of the restoration. Butterfish prey on plankton, small crustaceans, small fish and polychaetes; which will all benefit from the added vegetation, cover, and detritus produced by the restored marsh.

Summer Flounder

Summer flounder EFH is designated for larvae, juveniles and adults within the project site. Summer flounder EFH is defined as estuaries in the ELMR database where salinity ranges from 0.5-25ppt. Planktonic summer flounder larvae are found offshore and would not be affected by this construction; however, post-larvae migrate in shore from October- May (Packer et al. 1999). Larvae have been reported in water temperatures ranging from 0-23^{o} C, but are commonly found between 9-18^{o} C and are usually sited in higher salinity portions of estuaries (26.6-35.6 ppt); however they have also been

reported at salinities ranging from 10-35 ppt. Summer flounder juveniles are found in water temperatures ranging from 15-27^{o} C with salinities ranging from 23.5-33 ppt. Adult summer flounder are found in a range of temperatures depending on the season; 9-26o C during the fall, 4-13^{o} C in the winter, 2-20^{o} C in the spring and 9-27^{o} C in the summer.

Summer flounder larvae and juveniles were collected during the sampling efforts conducted by JBERRT. Summer flounder accounted for less than 1% of the species collect during the sampling. Potential direct impacts to larval and juvenile summer flounder include smothering and direct loss of lifestage habitat due to channel filling activities. Although some impact is expected, numbers should be minimal. Older juveniles and adults are expected to escape the construction area, so that impacts will be minimal but will include temporary displacement due to activity in the area.

Potential indirect impacts to summer flounder EFH include temporary and permanent disruption of foraging habitat for juvenile and adult summer flounder. Impacts due to loss of foraging habitat from channel fill are expected to be minor, as ample amounts of similar habitat surround the project site. Construction-related disturbances would be confined within the project site and would occur over a brief period of time. Adult and juvenile summer flounder would continue to use the project site during construction, for foraging and shelter. BMP's will be used to minimize the level of disturbance, and any adverse impacts. This project will have a beneficial impact on the species with the addition of salt marsh habitat, which is used as foraging habitat by juvenile and adult summer flounder.

Atlantic Mackerel

Atlantic mackerel EFH is designated for juveniles and adults and is defined as the pelagic waters found over the Continental Shelf (from the coast out to the limits of the EEZ), from Cape Hatteras to Maine. The inshore EFH is defined as "mixing" and "seawater" portions of all estuaries where Atlantic mackerel are common, abundant or highly abundant. Atlantic mackerel are generally located at depths from 10- 325 m and temperature between 3.8^{o} C and 22^{o} C. Juveniles feed primarily on small crustaceans and small pelagic mollusks. Atlantic mackerel are a schooling fish and are not generally associated with bottom habitats or nearshore areas; therefore potential impacts due to the ecosystem restoration are not expected. Juveniles and adults that may make their way into the project site would be expected to escape the construction area for nearby similar habitat, minimizing direct impacts to

these age groups.

Bluefish

The EFH for bluefish juveniles and adults is defined as pelagic water over the Continental Shelf (from the coast out to the limits of the EEZ) from Massachusetts south to Cape Hatteras. Bluefish juveniles are usually found in waters with salinities of 23.0-33.0 ppt, but can endure salinities as low as 3.0 ppt. During the JABERRT study bluefish where collected within the project site; however, direct impacts to juvenile and adult bluefish are expected to be minor as these life stages are mobile and would leave the construction area for nearby similar unaffected habitats. Indirect negative impacts are expected to be negligible.

Scup

EFH in the project area is designated for all life stages and is defined as estuaries and demersal waters. Scup eggs and larvae are generally found in water with temperature between 12^{o}-22^{o}C and salinities greater than 15 ppt. During the period when theses life stages may be present, salinities within the project site have been known to go below 15 ppt; therefore potential impacts due to the ecosystem restoration project are not expected to occur.

Juvenile scups have previously been collected within the project area; however, juveniles and adults which may come into the project area would be expected to escape the construction area for nearby similar habitat, limiting the direct impacts.

Whiting

The project site has been described as EFH for whiting eggs, larvae and juveniles. Whiting spawn in water depths of 30 and 325 meter, which are much deeper than those within the project site; therefore potential impacts due to project are not expected to occur.

Monkfish

Monkfish EFH within Jamaica Bay has been designated for eggs and larvae. Monkfish spawn during

February to August at water depths from 25-200 meters and a salinity range from 29.9-36.7 ppt. These conditions are not present within the project site; as a result potential impacts due to the project are not expected to occur.

Migratory Species

King mackerel, Spanish mackerel, cobia, sand tiger shark, dusky shark, and sandbar shark have EFH designations for the Jamaica Bay estuary; however they are pelagic migratory species; therefore impacts to these species are not expected to occur.

4.0 Summary

Essential fish habitat (EFH) is defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265), as amended by the Sustainable Fisheries Act (SFA) of 1996 (PL 104-267), as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity".

EFH has been designated for eighteen species within Jamaica Bay as follows: windowpane flounder, winter flounder, and scup have EFH designated in the project area for each stage of their life cycle; Red hake and whiting have EFH designated for egg to juvenile stages; monkfish has an EFH designated for eggs and larval stages; Butterfish and summer flounder have EFH designated for larval to adult stages, and bluefish, black sea bass, Atlantic sea herring and Atlantic mackerel have an EFH designated for juvenile and adult stages. King mackerel, Spanish mackerel, cobia, sand tiger shark, dusky shark, and sandbar shark have EFH designations for the Jamaica Bay estuary but no salinity zone indicated.

Direct impacts from the proposed ecosystem restoration project are expected for summer flounder (larvae, juveniles), butterfish (larvae), winter flounder (egg, larvae, juveniles), windowpane flounder (egg, larvae, juveniles), and red hake (larvae). Potential impact to EFH would be limited to the proposed construction period and may include smothering, increased sedimentation, turbidity, or temporary exclusion from the project site. The impacts are not expected to have a long-term effect on any of the species present.

Several best management practices will be utilized to minimize negative impacts to species. Silt fences, floating sediment curtains, and hay bales will be erected to minimize turbidity and sedimentation to the surrounding areas. Timing of the construction should also minimize impacts, by constructing at low tide during the winter; it should limit the species that will be utilizing this nearshore habitat.

This project will have a beneficial impact to all EFH species present within the project area. The additional 17.5 acres of salt marsh habitat will provide valuable foraging and spawning habitat for a number of fish species and ultimately increase the productivity of Jamaica Bay.

5.0 References

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Environmental Analysis Branch July 10, 2017
(CENAN-PL-E)

RECORD OF NON-APPLICABILITY (RONA)

Project Name: Spring Creek North
Reference: Equipment list in draft RONA provided by Diana Kohtio (26 June 17) to Jenine Gallo via email

Project/Action Point of Contact: Diana Kohtio

Begin Date: May 2019

End Date: Fall, 2020

1. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).

2. The requirements of this rule do not apply because the total direct and indirect emissions from this project are significantly less than the 100 tons trigger levels for NO_x, $PM_{2.5}$, CO, and SO_2 and less than 50 tons for VOCs for each project year (40CFR§93.153(b)(1) & (2)). The estimated total NO_x emissions for the project are 5.8 tons. VOC, $PM_{2.5,}$ CO, and SO_2 are all less than 1 ton each for the project (see attached estimates).

3. The project is presumed to conform with the General Conformity requirements and is exempted from Subpart B under 40CFR§93.153(c)(1).

Encl

Emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

$$\mathbf{E = hrs \times LF \times EF}$$

Where:

E = Emissions per period of time such as a year or the entire project.
hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).
LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.
EF = Emission factor, an estimate of the amount of a pollutant (such as NO_x) that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of pollutant per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

$$\mathbf{250 \text{ horsepower} \times 0.43 \times 1{,}000 \text{ hours} = 107{,}500 \text{ hphr}}$$

The emissions from diesel engines vary with the age of an engine and, most importantly, with when it was built. Newer engines of a given size and function typically emit lower levels of most pollutants than older engines. The emission factors used in these calculations assume that the equipment pre-dates most emission control requirements (known as Tier 0 engines in most cases), to provide a reasonable "upper bound" to the emission estimates. If newer engines are actually used in the work, then emissions will be lower than estimated for the same amount of work. In the example of the crane engine, a NO_x emission factor of 9.5 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$$\frac{\mathbf{107{,}500 \text{ hphr} \times 9.5 \text{ g } NO_x\text{/hphr}}}{\mathbf{453.59 \text{ g/lb} \times 2{,}000 \text{ lbs/ton}}} = \mathbf{1.1 \text{ tons of } NO_x}$$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Land-side nonroad equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

Emission factors have also been sourced from a variety of documents and other sources depending on engine type and pollutant. Nonroad equipment NOx and other emission factors have been derived from EPA emission standards and documentation.

As noted above, the emission factors have been chosen to be moderately conservative so as not to underestimate project emissions. Actual project emissions will be estimated and tracked during the course of the project and will be based on the characteristics and operating hours of the specific equipment chosen by the contractor to do the work.

The following pages summarize the estimated emissions in sum for the project including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project.

U.S. Army Corps of Engineers
Project : Spring Creek North
General Conformity Related Emission Estimates
DRAFT
7/10/2017

Summary of Emissions*

Pollutants:	NO_x	tons VOC	$PM_{2.5}$	CO	SO_2
Calendar Year					
2019	2.9	0.06	0.05	0.37	0.002
2020	2.9	0.06	0.05	0.37	0.002
Totals	**5.8**	**0.12**	**0.10**	**0.74**	**0.003**

* Assuming equal work in each of two calendar years. Worst-case would be all work during one year.

Equipment Type	Make /model	Quantity	Horse-power	Load factor	Percent utilization	Operating hours	hp-hours	Emissions, tons NO_x	VOC	$PM_{2.5}$	CO	SO_2
Backhoe	Cat 225LC	1	135	0.21	100%	1,040	29,484	0.31	0.01	0.01	0.04	0.0002
Dump truck	Cat 769C	2	450	0.59	50%	1,040	276,120	2.89	0.06	0.05	0.37	0.0015
Dozer	Cat D7G	2	200	0.59	60%	1,248	147,264	1.54	0.03	0.03	0.20	0.0008
Loader	Cat 966D	2	200	0.21	60%	1,248	52,416	0.55	0.01	0.01	0.07	0.0003
Compactor	Cat 825C	1	310	0.43	20%	208	27,726	0.29	0.01	0.00	0.04	0.0002
Grader	Cat 12G	1	135	0.59	30%	312	24,851	0.26	0.01	0.00	0.03	0.0001
Totals							**557,861**	**5.84**	**0.12**	**0.10**	**0.74**	**0.0031**

Greenhouse gas (GHG) emissions have been estimated using project planning information developed by the New York District, consisting of anticipated equipment types and estimates of the horsepower and operating hours of the diesel engines powering the equipment. In addition to this planning information, conservative factors have been used to represent the average level of engine load of operating engines (load factors) and the average emissions of typical engines used to power the equipment (emission factors). The basic emission estimating equation is the following:

E = hrs x LF x EF

Where:

E = Emissions per period of time such as a year or the entire project.
hrs = Number of operating hours in the period of time (e.g., hours per year, hours per project).
LF = Load factor, an estimate of the average percentage of full load an engine is run at in its usual operating mode.
EF = Emission factor, an estimate of the amount of greenhouse gas that an engine emits while performing a defined amount of work.

In these estimates, the emission factors are in units of grams of GHG per horsepower hour (g/hphr). For each piece of equipment, the number of horsepower hours (hphr) is calculated by multiplying the engine's horsepower by the load factor assigned to the type of equipment and the number of hours that piece of equipment is anticipated to work during the year or during the project. For example, a crane with a 250-horsepower engine would have a load factor of 0.43 (meaning on average the crane's engine operates at 43% of its maximum rated power output). If the crane were anticipated to operate 1,000 hours during the course of the project, the horsepower hours would be calculated by:

250 horsepower x 0.43 x 1,000 hours = 107,500 hphr

The CO_2 emission factors used in these calculations are based on locally-specific emissions data related to off-road and on-road diesel engines.[1] In the example of the crane engine, a CO_2 emission factor of 571 g/hphr would be used to estimate emissions from this crane on the project by the following equation:

$$\frac{107{,}500 \text{ hphr} \times 571 \text{ g } CO_2/\text{hphr}}{1{,}000{,}000 \text{ g/metric ton}} = 61.4 \text{ metric tons (tonnes) of } CO_2$$

As noted above, information on the equipment types, horsepower, and hours of operation associated with the project have been obtained from the project's plans and represent current best estimates of the equipment and work that will be required. Load factors have been obtained from various sources depending on the type of equipment. Land-side non-

[1] http://www.panynj.gov/about/pdf/PANYNJ-2014%20Multi-Facility-EI-Report-1-Mar-16-scg.pdf

road equipment load factors are from the documentation for EPA's NONROAD emission estimating model, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA420-P-04-005, April 2004."

The following pages summarize the estimated emissions of CO_2 in sum for the project including the anticipated equipment and engine information developed by the New York District, the load factors and emission factors as discussed above, and the estimated emissions for the project by piece of equipment.

U.S. Army Corps of Engineers
Project : Spring Creek North
Greenhouse Gas Emission Estimates
DRAFT
7/10/2017

GHG emissions, metric tons CO_2

Calendar Year	
2019	159
2020	159
Total	319

Equipment Type	**Make /model**	**Quantity**	**Horse-power**	**Load factor**	**Percent utilization**	**Operating hours**	**hp-hours**	**Emissions CO_2 metric tons**
Backhoe	Cat 225LC	1	135	0.21	100%	1,040	29,484	17
Dump truck	Cat 769C	2	450	0.59	50%	1,040	276,120	158
Dozer	Cat D7G	2	200	0.59	60%	1,248	147,264	84
Loader	Cat 966D	2	200	0.21	60%	1,248	52,416	30
Compactor	Cat 825C	1	310	0.43	20%	208	27,726	16
Grader	Cat 12G	1	135	0.59	30%	312	24,851	14
Totals							**557,861**	**319**