U.S. Army Corps of Engineers
New York District

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
MAMARONECK AND SHELDRAKE RIVERS
FLOOD RISK MANAGEMENT
VILLAGE OF MAMARONECK, WESTCHESTER COUNTY, NEW YORK
GENERAL RE-EVALUATION REPORT

U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
ENVIRONMENTAL ANALYSIS BRANCH
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278-0090

JANUARY 2016

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FOR THE
MAMARONECK AND SHELDRAKE RIVERS
VILLAGE OF MAMARONECK
WESTCHESTER COUNTY, NEW YORK

FLOOD RISK MANAGEMENT PROJECT

JANUARY 2016

Prepared for:

U.S. Army Corps of Engineers
New York District
Environmental Analysis Branch
Jacob K. Javits Federal Building
New York, New York 10278-0090

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EXECUTIVE SUMMARY

This Draft Environmental Impact Statement (DEIS) is being prepared as part of the General Re-evaluation Report (GRR) for the Mamaroneck and Sheldrake Flood Risk Management Project (Project or Proposed Action) proposed for construction by the U.S. Army Corps of Engineers (USACE), New York District (District) and the New York State Department of Environmental Conservation (NYSDEC). The Project was previously authorized by Section 401(a) of the 1986 Water Resources Development Act following development of the 1979 Environmental Impact Statement (USACE New York District 1979) in accordance with the National Environmental Policy Act of 1969, as amended (Public Law 91-190, 42 United States Code 4321 *et seq*.). The purpose of this document is to re-evaluate Project alternatives, including the Preferred Alternative per Engineering Regulation 1105-2-100 §4.1 (b), which requires the preparation of post-authorization change reports when economic, engineering, or environmental conditions have changed in the Project area.

This DEIS addresses flood risk management measures that the District has considered and proposed in the Village of Mamaroneck, located on the Long Island Sound in Westchester County, New York. This area has been damaged repeatedly as a result of hurricanes, northeasters, and extra-tropical storms, and flooding has been particularly serious at the confluence of the Mamaroneck and Sheldrake rivers. This DEIS presents the results of the District's evaluation of an array of structural and nonstructural flood risk management measures intended to reduce damages caused by storm events (see Section 2.0 Alternatives), identifies the potentially affected environment (Section 3.0 Affected Environment), and assesses the environmental impacts of the Preferred Alternatives and No Action alternative (Section 4.0 Environmental Consequences).

The primary purpose of the Proposed Action is to improve flood and storm protection for the Village of Mamaroneck, to reduce the flood risks and associated urban damages caused by repetitive flooding of the Mamaroneck and Sheldrake rivers within the Mamaroneck and Sheldrake Rivers Basin (study area) in the Village of Mamaroneck. In addition, the Proposed Action aims to ensure protection of the fish and wildlife resources of the existing rivers, the cultural attributes of significant sites found within the study area, and the water quality of the rivers in the study area. The purpose of the Proposed Action is supported by a primary mission of the USACE, which is to develop engineering solutions that will reduce damages caused by flooding and storm events.

The District formulated and evaluated eight alternative plans across a range of potential scales to demonstrate the various approaches' relative effectiveness at reducing flood risk in the study area (see Section 2.0 Alternatives). One of these, Alternative 1, became the Tentatively Selected Plan, which was then optimized into modified plans that were further evaluated. The product of this process is Preferred Alternative, or the National Economic Development (NED) Plan (Alternative 1Z), which was selected by the District. Alternatives for the Proposed Action were developed in consideration of study area problems and opportunities, as well as study goals, objectives, and constraints with consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. Two nonstructural alternatives were identified, but it was determined that nonstructural measures alone would not 1) provide an adequate level of

protection, 2) be cost effective, or 3) be supported by local government. Six structural alternatives also were identified. None of the non-preferred alternatives were carried forward in the analysis section of this DEIS (Section 4.0) because they do not meet the Federal requirements of Engineering Regulation 1105-2-100 due to a lack of completeness and/or acceptability, and they do not meet the level of protection desired by the local sponsor.

The flood risk management measure comprised by the Preferred Alternative include channel modifications, retaining walls, bridge removal and replacement, and trapezoidal cuts along the Mamaroneck and Sheldrake Rivers. In addition, the Mamaroneck River will flow through an underground box culvert that will be located under the parking lot at the confluence of the two rivers. All river channels will be deepened and widened to one vertical on two-and-a-half horizontal (1:2.5) side slopes. Several bridges will be removed and replaced. Channel modification will consist of natural bed channel, with riprap used in areas with high velocities and vertical concrete retaining walls used in areas with limited space. Construction may require the clearance of temporary work areas along the rivers measuring 15 feet (4.6 meters) from the edge of the channel bank outwards, though this is expected to vary depending on access to the work sites; access to channel segments will occur via approved, public right-of-ways to the extent practicable. Construction activities are expected to occur primarily along and within river segments located throughout the Project area, with the exception of Columbus Park, which will be used as the Project's staging area. The NED Plan includes the potential implementation of nonstructural measures along both the Mamaroneck and Sheldrake Rivers for structures with estimated positive benefit-cost ratios. The NED Plan is detailed in Section 2.3 and summarized in Table 2.

MAJOR FINDINGS AND CONCLUSIONS

Following is a summary of the primary environmental effects that will result from the Proposed Action, most of which will be concentrated in and along the streambed, banks, and floodplain areas of the Mamaroneck and Sheldrake rivers within the Project area. Although the No Action Alternative would avoid potential Proposed Action-related environmental impacts and financial expenditures, it would not fulfill the Proposed Action's primary purpose of improving flood and storm protection for the Village of Mamaroneck, and it also would fail to produce the social, economic, and environmental benefits associated with the Project. The No Action alternative would therefore result in continued risk to human health, including potential loss of life, local socioeconomics including personal property and housing, and transportation within the study area.

The Project, based on the optimal plan for flood risk management in the Mamaroneck and Sheldrake Rivers Basin as detailed in the GRR and based on NED plan criteria, will result in an overall long-term benefit to natural resources and inhabitants of the Project area and region due to the substantial reduction in flood risk that will be realized. The hydrology of the Sheldrake and Mamaroneck Rivers will be altered to reduce the flood potential within the study area, and temporary impacts to water flows within these two river systems will occur periodically throughout the construction phase of the Project. A floodplain map revision will be required for the Project area once construction is completed to reflect the reduced flood risk provided by channel and structural improvements. Following is a synopsis of the potential environmental

impacts and benefits that may result from implementation of the Proposed Action and some measures that will be taken to minimize and mitigate these impacts.

Short- and long-term minor adverse impacts on surficial geologic resources are expected to result from the Proposed Action, though the Project is not anticipated to have substantial impacts on bedrock or mineral resources and topography, nor will it affect or increase the risk for any geologic hazards to the community. The impacts, which are expected to have negligible cumulative effects overall, are primarily associated with sedimentation, dust and waste generated by rock excavation, the clearing and grading of construction and staging sites, and other channel modifications. In addition, the channel improvements associated with the Project will have long-term beneficial effects on flood-induced stream channel erosion and streambed scour.

Implementation of the Proposed Action will have short- and long-term minor adverse impacts, as well as long-term beneficial effects, on land use and cover. Short-term impacts on residential and commercial land uses around temporary workspaces will occur during and immediately after construction, whereas long-term adverse impacts on land cover will result from the removal of mature trees. The District will avoid or minimize the clearing of forested habitat during the breeding period for sensitive wildlife species, including birds, in compliance with the MBTA, and bats. Tree-cutting will be prohibited from 1 April to 1 August to avoid the removal of roost trees greater than nine inches (22 cm) in diameter. However, implementation of the Proposed Action also is expected to result in long-term benefits by reducing the flood risk to surrounding properties, which if left unaddressed could negatively impact land use in the future.

Short-term minor adverse impacts to soils and vegetation, caused by the movement and operation of construction vehicles and equipment within the Project area during the construction period, are expected to temporally impact water quality. In-stream work associated with the Project also could adversely affect aquatic and terrestrial wildlife species that inhabit or utilize waters within the Project area. Temporary increases in turbidity and suspended sediments near and downstream of in-stream construction activities could cause direct mortality or indirect decreased reproductive success in species over the short-term. In-stream construction activities also could temporarily increase ambient water temperature, although such conditions should dissipate once the construction phase ends. Implementation of sediment and erosion control plans and best management practices (BMPs) to protect water quality will aid in minimizing impacts to water quality and fish and wildlife during construction.

Short-term minor and long-term minor and moderate adverse impacts to wetland resources and riparian areas are expected to result from the Proposed Action. Short-term effects include temporary wetland impacts outside the footprint of the expanded channel but within construction workspaces where heavy equipment will access construction sites, soil compaction, trampling and removal of vegetation, and tree removal. BMPs will minimize construction impacts to wetlands, and restoration of the riparian areas will occur after work is completed. Long-term impacts to riparian areas will occur from the permanent loss of these habitats. Wetland impacts will be permitted as required by the New York State Department of Environmental Conservation certification and permit requirements. The removal of mature trees, required for the access of construction equipment to workspaces and as part of channel work, will produce long-term adverse impacts because it will take many decades for trees to reach their original size. However, the post-construction restoration of riparian habitat (i.e., revegetation, tree planting)

will produce some long-term beneficial effects to natural resources that may outweigh many of these adverse impacts. Any invasive species removed during the Project will be replaced with native species, and the channel improvements are expected to reduce sediment loads within the rivers and minimize transportation of these sediment loads during flood events, thereby improving habitat for fish and wildlife resources and water quality. Short-term impacts to native fish and wildlife populations within the Project area will be limited to the construction period. No rare, threatened, or endangered species or their critical habitat will be adversely affected by the Proposed Action. The District will avoid or minimize the clearing of forested habitat during the breeding period for sensitive wildlife species, including birds, in compliance with the MBTA, and bats. Tree-cutting will be prohibited from1 April to 1 August to avoid the removal of roost trees greater than nine inches (22 cm) in diameter. No in-water work will occur from 1 June through 1 September.

The Project is expected to have a long-term benefit to economy, income, housing and other structures, and environmental justice communities due to the reduction in flood risk and the various costs associated with flood damages. Short-term minor and long-term minor and moderate adverse impacts to aesthetic and scenic resources are expected to result from the Proposed Action. Short- and long-term impacts to aesthetics and scenic resources resulting from construction activities will be mitigated using various measures.

The Proposed Action will produce short-term minor adverse impacts to recreation from construction activities and the use of Columbus Park as a staging area, as well as long-term moderate adverse impacts to recreation resulting from the permanent removal of three pedestrian footbridges. Short-term impacts to recreation will be minor due to the availability of alternative recreation opportunities in the region, and long-term impacts will be reduced by the availability of other pedestrian access routes within the park area. Long-term recreational benefits will occur in the study area due to a reduction in the flooding of Village parks, a reduction in increased sediment loads delivered to Mamaroneck Harbor during flooding events that affect water quality and water-related recreation (e.g., swimming and fishing), and the minimization of other disruptions of recreational activities due to flooding.

Short-term minor and long-term moderate adverse impacts to transportation are expected from the Project. Worker commutes and traffic may be temporarily affected by construction traffic (e.g., the delivery of equipment and materials) on haul routes and roadways leading to and from construction sites and the Columbus Park staging area, as well as temporary road and bridge closures requiring the use of alternative routes. Long-term moderate adverse impacts will result from the permanent closure of the Ward Avenue Bridge and three pedestrian footbridges crossing Sheldrake River. The removal and replacement of the Waverly Place Bridge will produce long-term benefits to transportation infrastructure, and the Proposed Action will have no effect on air, rail, or public transportation. The Project will create short-term minor adverse impacts on air quality and noise resulting from construction activities and increased construction-related vehicle and equipment use in the study area. However, the Proposed Action may also introduce long-term incremental beneficial effects to air quality by reducing emissions associated with flood related traffic congestion and heavy construction activities during post-flooding reconstruction efforts.

A Coastal Zone Management Consistency Determination is anticipated to be received from New York Department of State and therefore no impacts to the coastal zone are expected from the Project.

No areas were identified as containing potential environmental contamination or were considered to have a great risk to human health for most of the Project Area. A single state Superfund site is situated along the Sheldrake River. Prior to construction in this area, testing to determine VOC levels will be conducted and coordinated with the NYSDEC. Any soil removal and disposal will be conducted in accordance with state and Federal regulations at an acceptable, regulated facility.

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Abbreviations and Acronyms

%	percent
§	Section
°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
1:2.5	one vertical on two-and-a-half horizontal
1:3	one vertical on three horizontal
AADT	average annual daily traffic
ac	acre(s)
ACHP	Advisory Council on Historic Preservation
a.m.	between midnight and noon
amsl	above mean sea level
ANSI	American National Standards Institute
APE	Area of Potential Effect
AQCR	Air-Quality Control Region
BMPs	best management practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter(s)
CMP	Coastal Management Program
cms	cubic meters per second
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
dB	decibel(s)
dBA	A-weighted decibel(s)
DDT	dichlorodiphenyltrichloroethane
DEIS	Draft Environmental Impact Statement
District	United States Army Corps of Engineers, New York District
DNL	Day-night Sound Level
DO	dissolved oxygen
EFH	essential fish habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ER	Engineering Regulation
ESCP	erosion and sediment control plan
FEMA	Federal Emergency Management Agency
FRM	Flood Risk Management

Abbreviations and Acronyms

ft	foot/feet
GDM	General Design Memorandum
GHG	greenhouse gas
GRR	General Re-evaluation Report
ha	hectare(s)
HTRW	Hazardous, Toxic and Radioactive Wastes
I	Interstate
IBI	Index of Biological Integrity
in	inch(es)
IPCC	Intergovernmental Panel on Climate Change
km	kilometer(s)
km^2	square kilometers
L_{eq}	Equivalent Sound Level
LISS	Long Island Sound Study
LOS	Level of Service
m	meter(s)
MBTA	Migratory Bird Treaty Act
mi	mile(s)
mi^2	square miles
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MTA	Metropolitan Transportation Authority
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NED	National Economic Development
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NFIP	National Flood Insurance Program
n.d.	no date
NJIS	New Jersey Impairment Score
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	oxides of nitrogen
NRHP	National Register of Historic Places
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York Department of State
NYSECL	New York State Environmental Conservation Law
NYSHPO	New York State Historic Preservation Office
NYSM	New York State Museum
O_3	Ozone

Abbreviations and Acronyms

OASA(CW)	Office of Assistant Secretary of the Army for Civil Works
OPRHP	Office of Parks, Recreation and Historic Preservation
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PEM	palustrine emergent (wetland type)
PFO	palustrine forested (wetland type)
PGA	peak ground acceleration
PL	Public Law
p.m.	between noon and midnight
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
ppb	Parts per billion
ppm	parts per million
Project	Mamaroneck and Sheldrake Flood Risk Management Project
PSS	palustrine scrub-shrub (wetland type)
RBP	Rapid Bioassessment Protocol
SFHA	Special Flood Hazard Area
SIP	State Implementation Plan
SLR	sea level rise
SO_2	sulfur dioxide
SO_x	oxides of sulfur
spp.	two or more species
SWPPP	stormwater pollution prevention plan
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V/C	volume to capacity ratio
VE Zone	velocity zone
VOC	volatile organic compounds
vpd	vehicles per day
vph	vehicles per hour
WAC	Watershed Advisory Committee
WJWW	Westchester Joint Water Works
WRDA	Water Resources and Development Act

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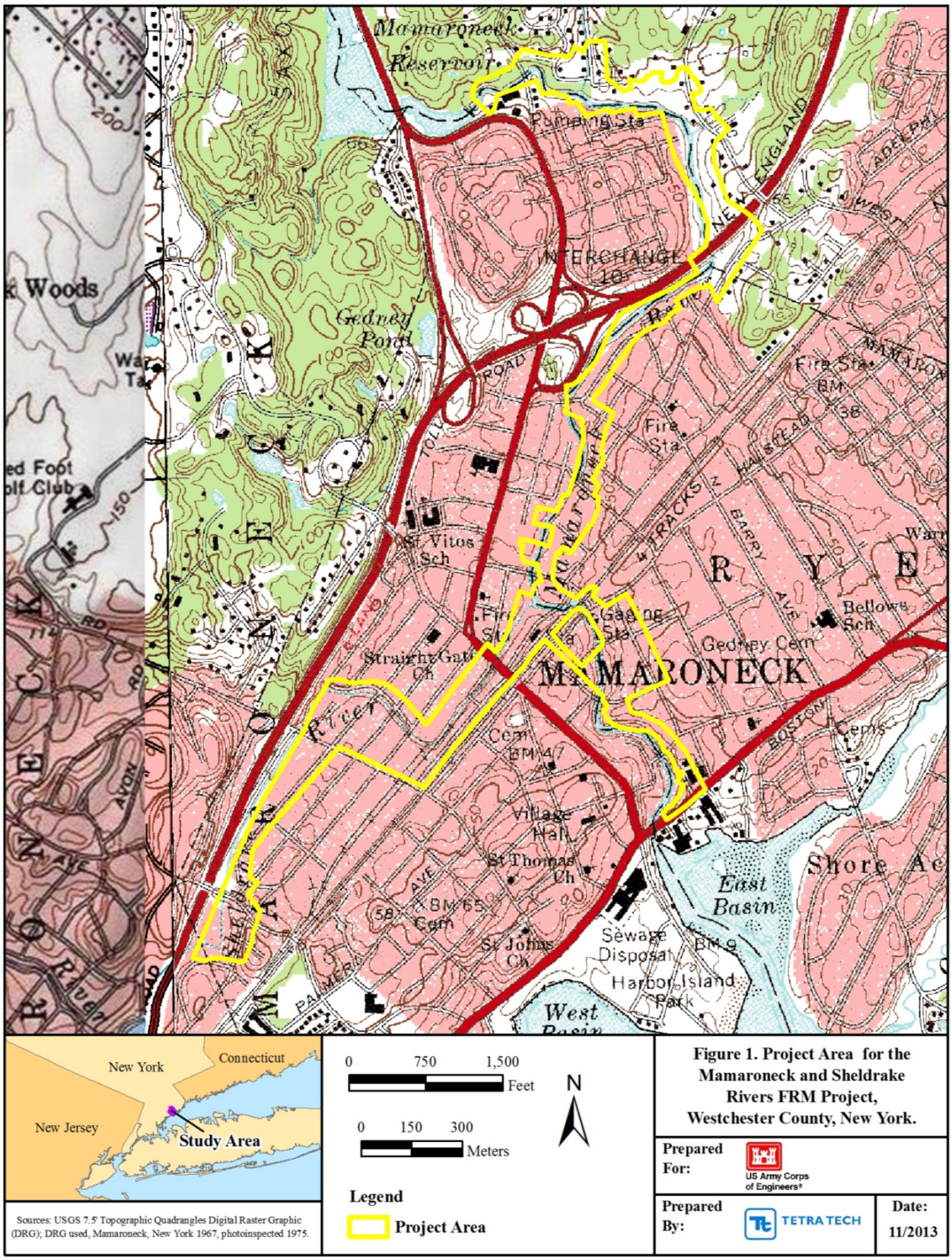
1.0 INTRODUCTION

This document is a Draft Environmental Impact Statement (DEIS) that is being prepared as part of the General Re-evaluation Report (GRR) for the Mamaroneck and Sheldrake Flood Risk Management (FRM) Project (Project or Proposed Action) proposed for construction by the U.S. Army Corps of Engineers (USACE), New York District (District). The Project was previously authorized by Section 401(a) of the 1986 Water Resources Development Act (WRDA) following development of the 1979 Environmental Impact Statement (EIS) (USACE New York District 1979) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law [PL] 91-190, 42 United States Code [USC] 4321 *et seq*.). NEPA requires Federal agencies to prepare a detailed statement (i.e., an EIS) for major Federal actions that may significantly affect the quality of the human environment prior to commencement of the action. The purpose of this document is to re-evaluate Project alternatives, including the Preferred Alternative, per Engineering Regulation (ER) 1105-2-100 §4.1 (b), which requires the preparation of post-authorization change reports when economic, engineering, or environmental conditions have changed in the Project area. In accordance with NEPA, this DEIS provides a full and fair discussion of significant environmental impacts to inform decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment (The Council on Environmental Quality [CEQ] Regulations, Section 1502.1). This DEIS also is prepared in accordance with the President's CEQ Rules and Regulations for implementing NEPA (Title 40, Code of Federal Regulations [CFR], Sections 1500–1508), the USACE's *Procedures for Implementing NEPA* (ER 200-2-2), and other applicable Federal and State environmental laws.

A primary mission of the USACE is to provide solutions to reduce damages caused by floods and storm events. This DEIS addresses flood risk management measures that the District has considered and proposed in the Village of Mamaroneck, located on the Long Island Sound in Westchester County, New York (Figure 1). This area has been damaged repeatedly as a result of hurricanes, northeasters, and extra-tropical storms, and flooding has been particularly serious at the confluence of the Mamaroneck and Sheldrake rivers. This DEIS presents the results of the District's evaluation of an array of structural and nonstructural flood risk management measures intended to reduce damages caused by storm events (see Section 2.0 Alternatives), identifies the potentially affected environment (Section 3.0 Affected Environment), assesses the environmental impacts of the Preferred Alternative and the No Action alternative (Section 4.0 Environmental Consequences) and identifies mitigation measures (Section 5.0 Avoidance, Minimization and Mitigation Measures). The goals of the Proposed Action are to 1) reduce the flood risks and associated urban damages from floods, 2) ensure protection of the fish and wildlife resources of the existing rivers, 3) maintain the cultural attributes of significant sites found within potential Proposed Action boundaries, and 4) maintain the water quality of the rivers in the study area. Achieving these goals will result in improved flood and storm protection for the Village of Mamaroneck, as well as associated social, economic, and environmental benefits.


Mamaroneck Reservoir
Pumping Sta
INTERCHANGE 10
Gedney Pond
Fire Sta
St Vitos Sch
Gaging Sta
Gedney Cem
MAMARONECK
Bellows Sch
Straight Gate Ch
Cem
Village Hall
St Thomas Ch
St Johns Ch
Sewage Disposal
Harbor Island Park
East Basin
West Basin
Shore Ac
New York
Connecticut
New Jersey
Study Area
0 750 1,500 Feet
0 150 300 Meters
N
Legend
Project Area
Sources: USGS 7.5' Topographic Quadrangles Digital Raster Graphic (DRG); DRG used, Mamaroneck, New York 1967, photoinspected 1975.
Figure 1. Project Area for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.
Prepared For:
US Army Corps of Engineers®
Prepared By:
TETRA TECH
Date: 11/2013
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1.1 PROJECT AUTHORIZATION

The Federal government authorized the study of the water resource problems and potential solutions along the Mamaroneck and Sheldrake rivers in the Village of Mamaroneck, Westchester County, New York under resolutions adopted September 14, 1955 and November 14, 1955 by the United States Senate Committee on Public Works, and a resolution adopted June 13, 1956 by the United States House of Representatives Committee on Public Works (USACE New York District 2011a). Following the disastrous floods of June 1972 and September 1975, local interests requested Federal assistance. The Chief of Engineers, by letter to the North Atlantic Division dated April 22, 1976, granted approval for the preparation of an interim report for the Mamaroneck and Sheldrake rivers under the Westchester County Streams Survey Investigation. The USACE conducted a feasibility study and completed the *Feasibility Report for Flood Control, Mamaroneck and Sheldrake Rivers Basin and Byram River Basin* in October 1977 (USACE New York District 1977). The report recommended a combination of channel widening and deepening, retaining walls, stream realignment, bridge replacement and enlargement, levees, and a diversion tunnel. The recommended plan for the Mamaroneck and Sheldrake Rivers Basin was economically favorable, and the project was recommended for further development. The Final EIS was completed in 1979 and developed in accordance with NEPA requirements and applicable USACE regulations (USACE New York District 1979). This plan was authorized for construction on November 17, 1986 in Section 401(a) of WRDA (PL 99-662, 99th Congress, 2nd Session), as follows:

> *The project for flood control, Mamaroneck and Sheldrake River Basins, New York and Connecticut, and Byram River Basin, New York and Connecticut: Report of the Chief of Engineers, dated April 4, 1979, at a total cost of $68,500,000, with an estimated first Federal cost of $51,400,000 and an estimated first non-Federal cost of $17,100,000. Such project shall include flood protection for the Town of Mamaroneck as recommended in the report of the Division Engineer, North Atlantic Division, dated March 28, 1978.*[1]

A General Design Memorandum (GDM) was completed in 1989 that would have provided for modifying approximately 10,400 feet (ft) (3,170 meters [m]) of river channel, constructing about 7,200 ft (2,195 m) of retaining walls, replacing six bridges, and removing one bridge on the Mamaroneck River (USACE New York District 1989a). On the Sheldrake River, modifications would have included a diversion tunnel 3,550 ft (1,082 m) in length from its inlet at Fenimore Road to the west basin of Mamaroneck Harbor, channel modification along approximately 4,200 ft (1,280 m), and a retaining wall for a length of approximately 900 ft (274 m). However, this project was not constructed due to concerns relating to costs, separable element justification, and concerns of the non-Federal sponsors and other local interested parties. As a result of these issues, the project as envisioned in the GDM did not advance any further.

However, interest in the project was renewed following several flood events, particularly two events in the spring of 2007. In May 2007, a Presidential Disaster Declaration (Federal Emergency Management Agency [FEMA]-1692-DR, New York) was issued for most of the

[1] It is noted that the Village of Mamaroneck project was one of three independent plans authorized under WRDA 1986. The other authorized projects were the Sheldrake River in the Town of Mamaroneck, New York, and the Byram River in the area of Greenwich, Connecticut and Port Chester, New York. These latter two projects are not addressed in this DEIS.

Lower Hudson Valley as well as other affected counties in the state, including Westchester County, in response to severe flooding resulting from the April 15–16 Nor'easter. Subsequent to the issuance of the disaster declaration, on May 25, 2007, the "U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007" was signed into law by the President as PL 110-28. Title V, Chapter 3, pages 51–53 of PL 110-28 states "For an additional amount for 'Investigations' for flood damage reduction studies to address flooding associated with disasters covered by Presidential Disaster Declaration FEMA-1692-DR, $8,165,000, to remain available until expended." Supplemental Implementation Guidance was issued and approved by the Office of the Assistant Secretary of the Army for Civil Works (OASA [CW]) on June 28, 2007. This required that an initial assessment of the existing conditions in the area be conducted in order to determine whether to initiate a re-evaluation report or Feasibility Study for the Mamaroneck and Sheldrake River Basin project, which remained authorized under Section 401(a) of WRDA 1986. Initial funding approved by the OASA (CW) on June 28, 2007 also authorized coordination with the New York State Department of Environmental Conservation (NYSDEC), the potential non-Federal partner, to develop the Project Management Plan and cost-sharing documents. On March 1, 2010, a Design Agreement for the project was executed between NYSDEC and the Department of the Army, represented by the District Engineer, and NYSDEC and Westchester County also signed a sub-agreement. The Design Agreement required that NYSDEC and the County share responsibility for 25 percent (%) of the cost of the project design (Department of the Army and NYSDEC 2010).

1.2 PURPOSE AND NEED

The purpose of this Draft EIS, which is being prepared as part of the GRR, is to analyze the Project alternatives that were previously authorized by WRDA in 1986 based on the 1977 Feasibility Report (USACE New York District 1977) and 1979 EIS (USACE New York District 1979), as well as identify new alternatives/plans identified during public scoping of the previously authorized project. Per ER 1105-2-100 §4.1 (b) dated April 22, 2000, post-authorization change reports are required when conditions of economics, engineering, or environment have changed in the Project area. Given that 18 years separated the completion of the 1989 GDM (USACE New York District 1989a) and the issuance of funding in 2007, changes in existing conditions were evident. Thus in February 2008 USACE prepared a "Letter Report Responding to Supplemental Funding Implementation Guidance for Mamaroneck and Sheldrake Rivers Basin" (Brickman 2008) in order to justify the decision to initiate the process to re-evaluate the project in the Village of Mamaroneck as a GRR. Based on the preliminary analysis of hydrology, economics, and environmental considerations documented in the Letter Report, the USACE North Atlantic Division approved the determination that changes in the study area precipitated the need to proceed with a GRR. This re-evaluation, which is being prepared in accordance with the provisions of ER 1110-2-1150 (as modified) (USACE New York District 2011a), is necessary to clearly demonstrate that either 1) the plan authorized for construction by WRDA 1986 is still the most appropriate plan from an engineering, economical, and environmental aspect, or 2) another plan for flood damage reduction is more appropriate in the basin.

The central purpose of the GRR is to detail the optimal plan for flood damage reduction in the Mamaroneck and Sheldrake Rivers Basin within the Village of Mamaroneck, based on National

Economic Development (NED) plan criteria. The GRR will provide recommendations for cooperative actions that should be taken by the Federal Government and non-Federal sponsor of the FRM project, based on the following, which will be documented in the GRR:

- identification of the FRM problems;
- determination of the relationship of FRM problems to the environmental and socioeconomic needs and desires of the people living and working in the study area;
- refinement of solutions identified in the 1977 Feasibility Report for protecting the flood prone areas and reducing flood risk and re-examining the NED plan in the 1989 GDM;
- determination of the costs and benefits as well as the environmental, social and economic impacts associated with implementing these measures;
- selection of the plan that would greatly reduce the flood risk in the Village of Mamaroneck consistent with Federal and local planning objectives;
- provision for protection to emergency response and other critical lifeline facilities impacting the general health and welfare of the region, as well as facilities of public congregation such as schools, municipal buildings, and so forth; and
- identification of the shared responsibilities of the Federal government and non-Federal sponsor.

As part of the effort to identify new plans and alternatives to reduce flood risks, the District held a public Feasibility Scoping Meeting in June 2010 to address NEPA issues and questions on the scope and schedule of the re-evaluation study. This DEIS, required under NEPA, outlines the alternatives that have been newly refined and formulated to provide FRM solutions (Section 2.0), summarizes the existing conditions in the study area (Section 3.0), and analyzes the environmental consequences of the two Preferred Alternatives and the No Action alternative (Section 4.0). Ultimately, the GRR, which this DEIS supports, will document the re-evaluation of the recommended plan, provide a basis for a decision on construction authorization of the project, and serve as the decision document for execution of a Project Partnership Agreement. If this results in a Record of Decision (ROD), this DEIS will support the GRR in seeking congressional authorization and appropriation for construction of a new Federal project.

The primary purpose of the Proposed Action is to reduce the flood risks and associated urban damages from repetitive flooding caused by the Mamaroneck and Sheldrake rivers (USACE New York District 2011a). In addition, the Proposed Action aims to ensure protection of the fish and wildlife resources of the existing rivers, protect the cultural attributes of significant sites found within the study area, and protect the water quality of the rivers in the study area. The purpose of the Project alternative and plans development is supported by a primary mission of the USACE, which is to develop engineering solutions that will reduce damages caused by flooding and storm events.

The need for the Project alternatives is evident given that flooding has been and continues to be a major problem in the Village of Mamaroneck. Westchester County not only is experiencing storms with greater overall intensity (large amounts of rain in shorter periods of time) but also an increase in frequency (a greater number of intense storms each year). The study area's severe

flood risk is evident based on the recurrence of flood events and the damages sustained in the Village of Mamaroneck. The largest floods of record resulted from the storms of October 1955, June 1972, and September 1975. In addition, there have been significant flood events in July 1889, October 1903, March 1936, July 1938, September 1938, August 1942, September 1944, August 1971, November 1977, April 1980, April 1983, July 1984, May 1990, April 1996, October 1996, September 2004, March 2007 and April 2007, and most recently in August 2011 (Hurricane Irene) and October 2012 (Hurricane Sandy) (USACE New York District 2011a).

Damages within the Mamaroneck and Sheldrake Rivers Basin for the June 1972 and September 1975 floods amounted to approximately $14,600,000 and $82,030,000, respectively, based on conditions of development at the time and December 2010 price levels (USACE New York District 2011a). The flood waters from these storms inundated large areas of industrial, commercial, and residential property within the Village of Mamaroneck. Further, during the September 1975 flood, one person drowned when the car in which he was traveling was submerged. People have continually been evacuated from homes, businesses, and vehicles during these damaging floods along both the Mamaroneck and Sheldrake rivers. The April 2007 Nor'easter flood, which was greater than the 1% annual expected exceedance and largest flood to date, damaged more than 300 residential and 100 commercial structures and disrupted the lives of thousands of people through transportation delays and loss of income.

Flooding along the Mamaroneck River predominantly occurs downstream of the Westchester Joint Water Works (WJWW) dam located adjacent to Mamaroneck Avenue, and generally is associated with high intensity rainfall events; this includes rainfall events of a prolonged duration falling on snow, frozen, or saturated ground, or tropical storms (USACE New York District 1989a and 2011b). Obstructions located at Glendale Road (in the Town of Harrison) and the Winfield Avenue Bridge also contribute to flooding within upstream areas of the Mamaroneck River. On the Sheldrake River damages occur from the confluence with the Mamaroneck River upstream to the Village line near the I-95 underpass. Primary causes of flooding are thought to be insufficient (low) channel capacity, low bridge restrictions, thick vegetation in overbanks, and a progressive increase in the amount of runoff due to increases in impervious surfaces resulting from development in the watershed (USACE New York District 2011c). Downstream of the confluence with the Sheldrake River small flow capacity, channel bends through bridges, and the small size of the Halstead Avenue Bridge are the primary causes of flooding in Mamaroneck Village. Additionally, two 90 degree bends in the Mamaroneck River that form an "S" turn at the Station Plaza Bridge near the Sheldrake River confluence, and constrictions associated with the Station Plaza Bridge, Metro-North Railroad Bridge, and Halsted Avenue Bridge are the cause of the most extensive flood pools that create backwater and flood upstream of the confluence into the Sheldrake River. Backwater effects from the Mamaroneck River can cause flooding to occur upstream to the Rockland Avenue Bridge (USACE New York District 2011c).

Residential and commercial structures, and bridges and roads located downstream of the WJWW dam are most affected and subject to flood risks, with impacts to road access and transportation occurring in this area during flood events.

The combination of low channel capacity, small bridge openings, developmental encroachment along both rivers, urbanization, and a poor flow conveyance at the rivers' confluence has contributed to significant and frequent flooding. The area most susceptible to flooding is around

the confluence of the Mamaroneck and Sheldrake rivers (converging at Columbus Park), which has experienced severe damages to surrounding properties during storm events, including during the 2007 Nor'easter and hurricanes Irene (2011) and Sandy (2012). The implementation of the Proposed Action will address the need for improved flood and storm protection, thereby reducing flood risk and damages (including socioeconomic, cultural, and environmental) in the Village of Mamaroneck. Without the implementation of new flood risk management measures, flooding resulting from storm events is expected to continue to cause damage to homes and property in the study area.

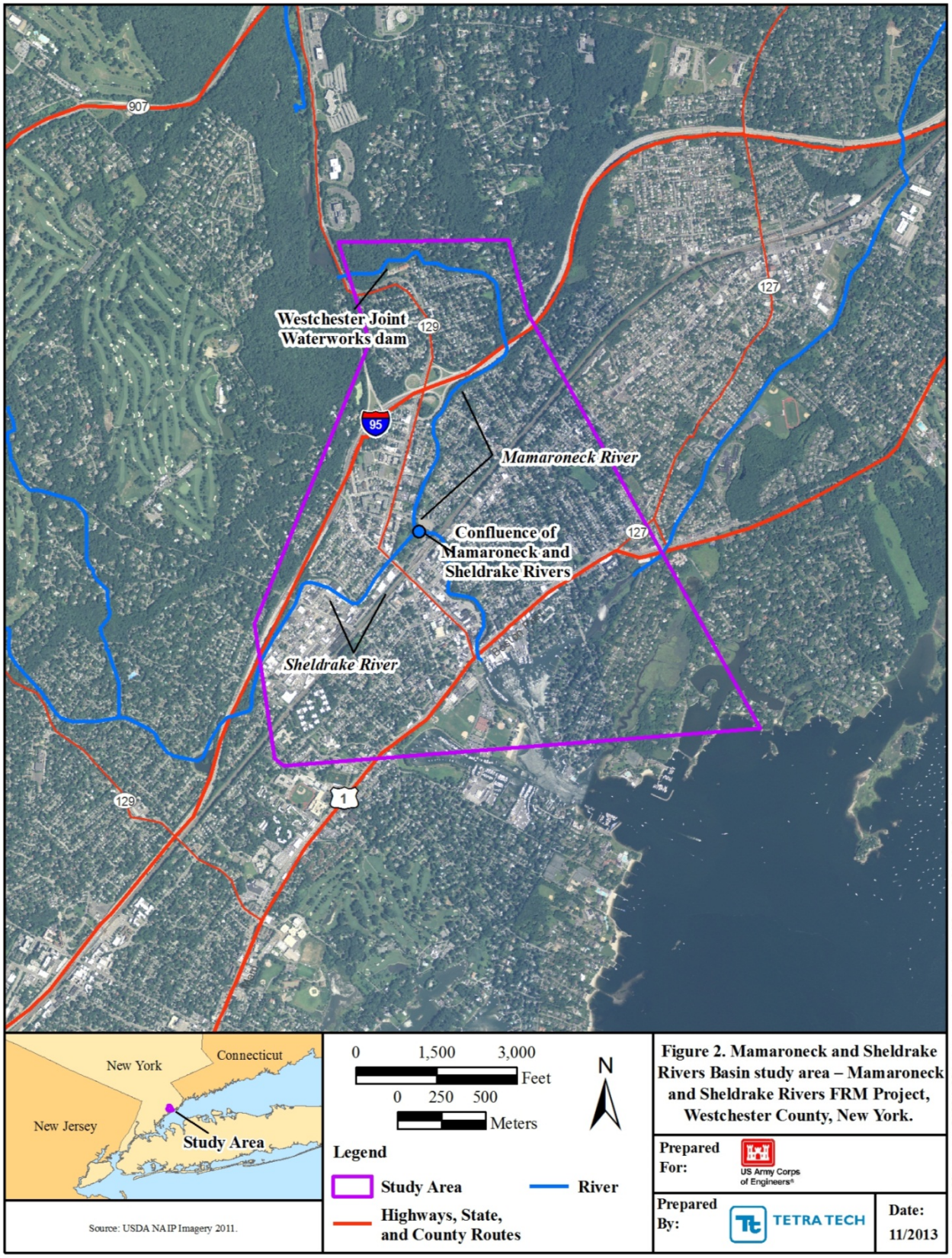
1.3 STUDY AREA DESCRIPTION

The study area encompasses the combined watersheds for the Mamaroneck and Sheldrake Rivers, also referred to as the Mamaroneck and Sheldrake Rivers Basin. This is in contrast to the Project area, which will refer only to the specific areas in which Project construction will be taking place once a Preferred Alternative or Plan is selected. The Mamaroneck and Sheldrake Rivers Basin is located along the northern coast of Long Island Sound within the New York City metropolitan area, approximately 10 miles (mi) (16 kilometers [km]) northeast of New York City (Figures 2 and 3). The Mamaroneck and Sheldrake Rivers Basin lies entirely within Westchester County, New York and contains portions of the Village and Town of Mamaroneck, the Cities of New Rochelle and White Plains, the Towns of Harrison and North Castle, and the Village of Scarsdale. The watersheds of the Mamaroneck and Sheldrake rivers cover a combined 23.63 square miles (mi^2) (61.20 square kilometers [km^2]). The rivers converge in the Village of Mamaroneck before draining into Long Island Sound.

The study area includes the 500-year floodplain, which extends from below Tompkins Avenue at Mamaroneck Harbor upstream to the WWJW dam on Mamaroneck River, and along the Sheldrake River from the confluence with the Mamaroneck River upstream to the Village line near the New England Thruway (Interstate [I]-95) bridge. Delineation of the 500-year floodplain in the Mamaroneck and Sheldrake Rivers Basin indicates the majority of the structures within the floodplain are located in the Village of Mamaroneck.

The Mamaroneck and Sheldrake Rivers Basin is heavily urbanized and developed. The lower reaches of the Mamaroneck and Sheldrake rivers within the Village of Mamaroneck study area consist of low-, medium- and high-density residential neighborhoods as well as varied commercial (retail and office) and light industrial properties. As with most urban rivers, extensive development in the basin, right up to the riverbanks, has resulted in changes in the hydrologic regime and morphology of the rivers. The existing channel side slopes are moderate, ranging from one vertical to one horizontal (1:1), to one vertical to three horizontal (1:3), and the river channel bottom has a moderate slope, approximately 12 ft (3.7 m) per mile (USACE New York District 2011a).

The Mamaroneck River is a natural stream with perennial flow that runs from north to south within the study area. The Mamaroneck River enters the northern portion of the study area southeast of the dam at WJWW. The river continues east and then south under several road crossings and pedestrian bridges before it empties into the East Basin of Mamaroneck Harbor. The river has moderate meander and is confined by a rock retaining wall for much of its length. Within the study area, the Mamaroneck River ranges in width from 30 to 50 ft (9 to 15 m) (water and bank), and in depth from approximately 20 inches (in) (51 centimeters [cm]) to more than 36


907
Westchester Joint Waterworks dam
129
95
Mamaroneck River
127
Confluence of Mamaroneck and Sheldrake Rivers
Sheldrake River
1
New York
Connecticut
New Jersey
Study Area
Source: USDA NAIP Imagery 2011.
0 1,500 3,000
Feet
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Meters
N
Legend
Study Area
River
Highways, State, and County Routes
Figure 2. Mamaroneck and Sheldrake Rivers Basin study area – Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.
Prepared For:
US Army Corps of Engineers®
Prepared By:
TETRA TECH
Date: 11/2013
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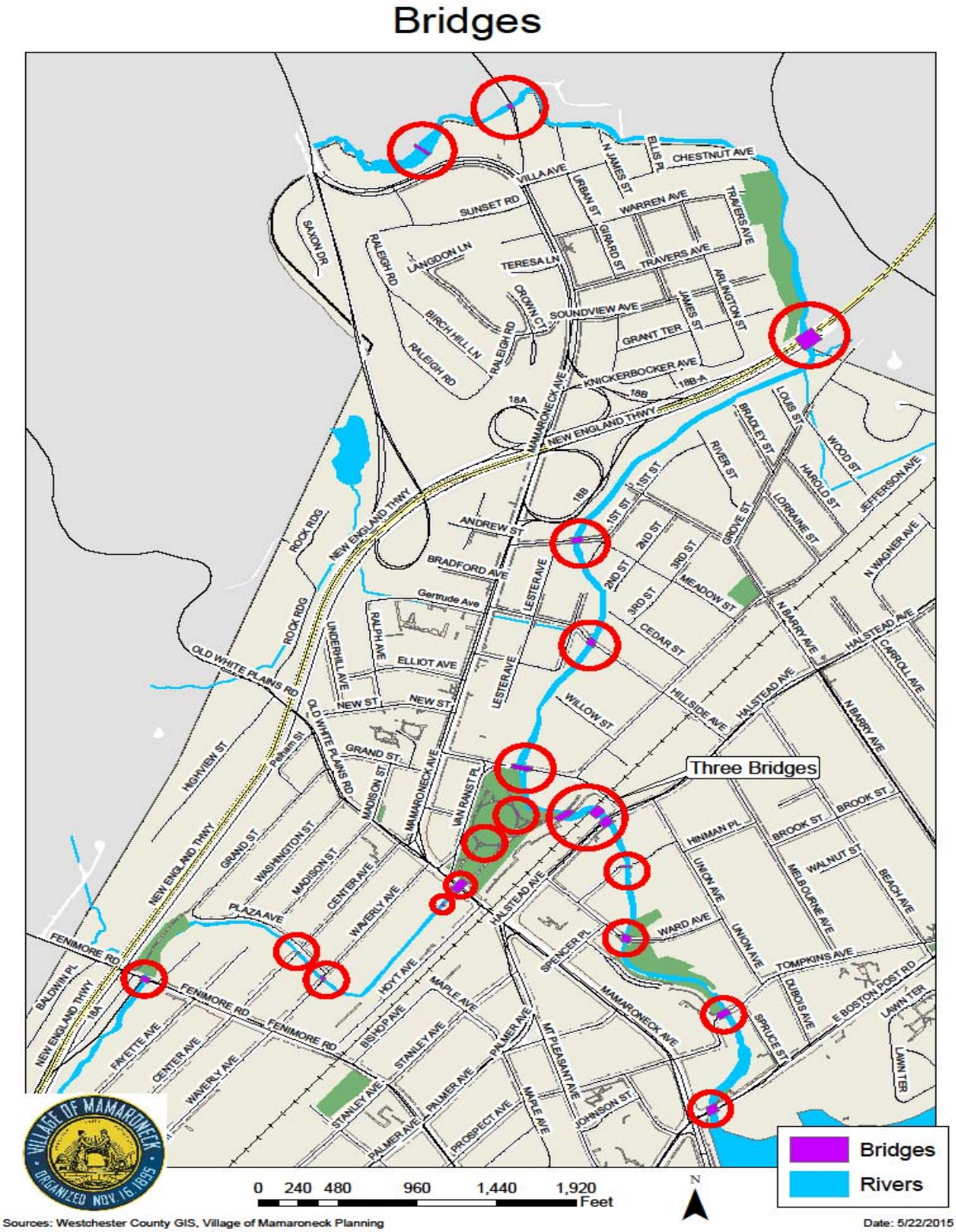


Figure 3: Bridges in Project Area.

in (91 cm) in pools. The majority of the Mamaroneck River riparian corridor has been reduced to narrow bands of mature trees and shrubs on either side of the river; the overbank area downstream of the confluence is more vegetated and contains a large amount of loose rocks. The only remaining significant cluster of trees is immediately downstream of the WJWW dam on the northern bank of the river. Works Project Administration-era walls have been constructed along most of the Mamaroneck River, further decreasing the riparian habitat. Invasive plant species have developed along the riverbanks (USACE New York District 2012a).

The Sheldrake River is a natural, perennial stream that flows northeast within the study area. The Sheldrake River enters the southwest portion of the study area at the I-95 underpass. The river continues northeast under several road crossings and pedestrian bridges before it empties into the Mamaroneck River at Columbus Park. The river has moderate meander and is confined by a rock retaining wall for much of its length. Within the study area, the Sheldrake River ranges in width from 20 to 40 ft (6 to 12 m) (water and bank), and in depth from approximately 10 in (25 cm) to more than 36 in (91 cm) in pools. A few trees remain along the banks but no large mature trees remain. The river has been confined with hardened shores along most of its length in the Village. Invasive plant species have developed along the riverbanks (USACE New York District 2012a). Downstream of the confluence, the overbank areas are highly vegetated with a large amount of loose rocks.

1.4 PROBLEMS AND OPPORTUNITIES

Because this is a FRM project, problems and opportunities are developed to address the Federal objective of NED. Goals, objectives, and constraints are developed to provide potential solutions to reduce flood risk and achieve the opportunities within the confines of legislative authority, policies, and other restrictions (see Section 1.5).

The problems associated with the study area result primarily from the water resources issue of severe flooding in the Mamaroneck and Sheldrake Rivers Basin. This occurs principally from stormwater runoff caused by precipitation of high intensity, large volume, and/or prolonged duration. Given that approximately 757 homes and businesses are located within the 500-year floodplain for the Mamaroneck and Sheldrake Rivers Basin within the Village of Mamaroneck and Town of Harrison (USACE New York District 2011a), flooding has an adverse effect on the economy and the general well-being of the flood-prone areas. Significant flooding causes physical damage to property and loss of commercial, industrial, and public activity, with consequent loss of business and wages. Vehicular traffic also is affected adversely, with consequent losses to those who depend on this mode of transportation. Recurring flooding represents a threat to the health and safety of those who live or work in these areas (USACE New York District 2011a). In addition to adversely affecting human health and economic well-being, flooding produces environmental impacts such as severe riverbank erosion throughout the length of the Mamaroneck and Sheldrake rivers, sediment transport, and habitat loss.

1.5 GOALS, OBJECTIVES, AND CONSTRAINTS

1.5.1 Goals

Project goals, objectives, and constraints were developed to comply with the Project authority and to respond to study area problems. The primary goal of the current study is to reduce flood

risk from repetitive flooding caused by the Mamaroneck and Sheldrake rivers (USACE New York District 2011a). In addition, the Proposed Action aims to maintain the 1) fish and wildlife resources of the existing rivers, 2) cultural attributes of significant sites found within the study area, and 3) water quality of the rivers in the study area.

Furthermore, the study addresses several goals of the USACE Campaign Plan (USACE 2013) by 1) recommending an integrated, sustainable, water resources solution and implementing collaborative approaches to effectively solve the water resources problem of flooding in the Mamaroneck and Sheldrake Rivers Basin; and 2) using the planning process to formulate, analyze, and evaluate alternative water resources solutions in pursuit of a sustainable, environmentally acceptable, and cost-effective solution for FRM.

1.5.2 Objectives

Planning objectives were identified based on the problems, needs, and opportunities as well as existing physical and environmental conditions present in the study area. The main Federal objective is to contribute to NED consistent with the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements (USACE New York District 2011a).

Planning objectives must be consistent with Federal, State, and local laws and policies, and technical, economic, environmental, regional, social, and institutional considerations. Recommended plans should avoid, minimize, and then compensate, if necessary, adverse project impacts to the environment. They also should maximize net economic benefit, avoid adverse social impacts, and meet local preferences to the fullest extent possible. In pursuit of the goal to reduce flooding damages in the study area, the following objectives for FRM in the Mamaroneck and Sheldrake Rivers Basin were established:

- Manage the risk of fluvial flooding of the Mamaroneck and Sheldrake rivers within the Village of Mamaroneck.
- Provide a plan that is compatible with future FRM and economic development opportunities.
- Avoid and minimize adverse environmental impacts.

1.5.3 Constraints

Constraints are actions that cannot be violated, and may be physical (i.e., limits associated with road or bridge crossing), financial (i.e., costs versus benefits), or spatial (i.e., lack of real estate or open space). The formulation and evaluation of alternative FRM plans also are constrained by universal planning constraints such as technical, environmental, economic, regional, social, and institutional considerations.

Technical Constraints:

- Plans must be sound, safe, acceptable engineering and environmental solutions.
- Plans must be in compliance with good engineering and environmental practice, taking into account low risk of failure and the safety of human lives and property.

- Plans must be realistic and must not rely on future research and development of key components, although they should contain a monitoring component to assess success and identify corrective actions as appropriate.
- Plans must be complete and not depend on future projects to provide the necessary flood protection.
- The 100-year flood flow water surface elevation should not increase more than 2.4 in (6.0 cm) with a FRM alternative in place.
- The Metro-North Railroad Bridge over the Mamaroneck River cannot be modified or relocated.

Environmental Constraints:

- Plans must not unreasonably impact environmental resources.
- Plans must first consider avoidance, followed by minimization, and compensation or replacement to fully mitigate for significant impacts to the environment.

Economic Constraints:

- Plans must be efficient. They must represent optimal use of resources in an overall sense.
- The economic justification of the Proposed Action must be determined by comparing the average annual tangible economic benefits, which would be realized over the project life, with the average annual costs. The average annual benefits must equal or exceed the average annual costs.
- Plans must consider avoiding impacts. Where this is not possible, minimization should next be considered, followed by mitigation or replacement, if justified.

Regional or Social Constraints:

- All reasonable opportunities for development within the Plans' scope must be weighed against each other. State and Local public interests' views must be solicited.
- The needs of other regions must be considered, and one area cannot be favored to the unacceptable detriment of another.

Institutional Constraints:

- Plans must be locally-supported to the extent that Local interests must, in the form of a signed Project Partnership Agreement, guarantee all items of project cooperation, including cost sharing. Local interests must agree to public access to the study area in accordance with all requirements of state laws and regulations.
- The Plan must be fair and find overall support in the region and State.

1.6 AREAS OF CONTROVERSY

Members of the public have had opportunities to comment on the development of Project alternatives from early on in the scoping process. In collaboration with the Village of Mamaroneck Flood Commission, the District has regularly attended meetings to present

information on the proposed Project alternatives and discuss development of Project alternatives presented in the ongoing re-evaluation. In addition, NYSDEC, Westchester County, and the Village of Mamaroneck have been fully involved in Project alternative discussions and public meetings throughout the entire plan formulation process. No controversial issues were raised during the June 22, 2010 feasibility study public scoping meeting. Questions from the public focused on how the study would be conducted, how it would account for flooding, and whether the study would identify short-term solutions that could be implemented by the local municipalities. A public meeting presenting the alternatives was held in the Village of Mamaroneck on May 22, 2014 to solicit comments on the proposed alternatives. In addition, bi-annual meetings of the Village of Mamaroneck Flood Board have been open to the public.

2.0 ALTERNATIVES

Alternatives are combinations of management measures that collectively meet Project goals and objectives within the defined Project constraints. Alternatives are assembled and compared against one another using performance outputs and costs. Alternative plans and their component management measures will be assessed relative to the objective of the NED. Preliminary costs, benefits, and environmental impacts of each potential alternative were developed to determine which FRM plans should be considered for more detailed design and economic analysis.

Alternative plans were formulated across a range of potential scales to demonstrate the relative effectiveness of various approaches at different scales. Alternatives for the Proposed Action were formulated in consideration of study area problems and opportunities, as well as Project goals, objectives, and constraints with consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

1. *Completeness* is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.
2. *Effectiveness* is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.
3. *Efficiency* is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.
4. *Acceptability* is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies.

The following District studies were used to develop the suite of alternatives:

- 1977 Feasibility Study – recommended a plan of protection on the Mamaroneck and Sheldrake rivers in the Village and Town of Mamaroneck, consisting of channel modifications, levees, retaining walls, and tunnel diversion works (USACE New York District 1977).
- 1979 Final EIS – analyzed environmental impacts of the proposed plan of protection, in accordance with NEPA requirements, which was authorized for construction by Section 401(a) of the 1986 WRDA (USACE New York District 1979).
- 1989 Final GDM – provided a detailed plan for modifying sections of the Mamaroneck and Sheldrake river channels (USACE New York District 1989a).
- This GRR – an update to the 1977 Feasibility Report and the 1989 GDM, focusing on the FRM problems in the Mamaroneck and Sheldrake Rivers Basin within the Village of Mamaroneck (USACE New York District 2011a).

The feasibility of FRM measures in the Mamaroneck and Sheldrake Rivers Basin will be examined in the GRR by:

- redefining the problems, needs, and opportunities for improvements associated with periodic flooding from storms within the Mamaroneck and Sheldrake Rivers Basin, New York;
- re-evaluating the technical, economic, environmental, and institutional feasibility for Federal interest in addressing flooding issues;
- identifying and re-evaluating potential solutions to flooding issues;
- resolving any significant concerns and issues related to biological, ecological, and cultural resources and Hazardous, Toxic and Radioactive Waste (HTRW); and
- determining if there is local support for implementation of the GRR tentatively selected plan.

Ultimately, the final GRR and EIS will identify the optimal plan for FRM in the Mamaroneck and Sheldrake Rivers Basin, based on NED plan criteria. During the re-evaluation, existing conditions are reassessed and "without-project" conditions are established. Plan formulation techniques are employed to guide the development, screening and selection of opportunities for improvement to the recommended plan, in accord with local interests' needs, while meeting planning objectives and staying within identified constraints. The formulation seeks to maintain the recommended plan's purposes of risk reduction while employing environmentally protective and sustainable solutions.

This section summarizes the study of alternatives that the District has carried out and continues to perform as it explores solutions for FRM for the study area, including:

1) The No Action alternative
2) A nonstructural alternative, which would include measures such as the flood proofing and raising of structures in the 1% annual exceedance (100-year) flood inundation map for the Mamaroneck and Sheldrake Rivers Basin
3) The nonstructural plan combined with any of the structural alternatives described below
4) A variety of structural alternatives that would provide protection for a 100-year flood event, including some combination of channel work, construction or improvements in wing walls and retaining walls, river realignment, bridge replacement, diversion tunnel, and riprap and streambank protection measures. These include:
    a. a variety of channel modifications only, including Mamaroneck River below the confluence, Mamaroneck River only, or the Mamaroneck and Sheldrake rivers;
    b. channel modifications with a new tunnel alignment along Mamaroneck Avenue or another route, with an outlet into the East Basin of Mamaroneck Harbor; and
    c. the authorized GDM Plan that includes channel modification and construction of a diversion tunnel underneath Fenimore Road.

An introduction to the different types of nonstructural and structural measures is provided in Section 2.1, the eight alternatives evaluated during the initial screening process are presented in Section 2.2 (see Table 1), and the optimized Preferred Alternative that is being evaluated in this

DEIS alongside the No Action alternative are presented in Section 2.3 (see Table 2). A discussion of the No Action alternative is presented in Section 2.4.

2.1 INTRODUCTION TO NONSTRUCTURAL AND STRUCTURAL ALTERNATIVES

Alternatives considered included both structural and nonstructural methods of solving the stated issues and problems along the Sheldrake and Mamaroneck rivers within the Village of Mamaroneck.

2.1.1 Nonstructural Alternatives

In accordance with the USACE National Nonstructural Flood Proofing Committee, nonstructural measures and flood proofing alternatives can be used to mitigate flood risks and damages. Nonstructural measures typically provide protection to individual structures and include modifications to individual buildings such as raising them above the flood level, acquiring and removing buildings from the floodplain, implementing zoning restrictions to prevent future development in the floodplain, or implementing flood warning systems (USACE New York District 2011a).

Elements considered for nonstructural alternatives include structure elevation, buy-out or acquisition, flood warning system, wet and dry floodproofing, surface periphery floodwalls or ringwalls, and rebuilding. Elevation is the process of raising a structure so that the main living area (main floor) is above design flood elevation. In most cases, the process involves separating a structure from its foundation, raising it on hydraulic jacks, and holding it in place with temporary supports while a new or extended foundation is constructed below. The resulting living area is raised and only the foundation remains exposed to flooding. The new or extended foundation may consist of continuous walls or separate piers, posts, columns, or pilings.

Buy-out or acquisition of properties is the result of permanent removal or evacuation of structures within the floodplain and is typically applied when other nonstructural measures are too costly. Buy-outs involve the acquisition of a property and its structures, either through voluntary sale by the owner or by exercising the powers of eminent domain. Following acquisition, the structure and associated property development is either demolished or relocated. Acquired lands are typically restored to a natural condition and used for recreation or other purposes that would not be jeopardized by the flood risks.

There is no flood warning system currently in place for the Mamaroneck and Sheldrake Rivers Basin to warn residents of the area subject to flooding. A flood warning system may be utilized to warn property owners of impending floods, and to therefore allow time to evacuate and relocate property subject to flood damage. Although a state-of-the-art flood warning system would increase the awareness of residents and allow for a more orderly evacuation, a warning system alone would not provide sufficient time to significantly reduce flood damages. As the Mamaroneck and Sheldrake Rivers Basin is small within the study area, and the time to overbanking may be very rapid, it is expected that there would not be sufficient forecast and warning time in order to implement an effective evacuation for flash flooding from the Mamaroneck or Sheldrake rivers.

Floodproofing is the process of incorporating any combination of structural or nonstructural changes or adjustments into the design, construction, or alteration of individual buildings or properties in order to reduce flood damages. This can be done through wet or dry floodproofing measures. Wet floodproofing provides for protection of a building by allowing floodwaters to enter and exit freely in such a way that internal and external hydrostatic pressures are equalized. This equalization of pressures reduces the loads imposed on a structure and reduces the probability of structural damage or failure. Basement utilities subjected to flooding may be relocated to an above-grade utility room, where space permits; otherwise, basement utilities may be surrounded by a watertight barrier. Dry floodproofing protects a building by sealing its exterior walls and by providing removable flood shields at a structure's openings to prevent entry of floodwaters. Dry floodproofing is practical only for buildings with structurally sound walls and only where flood depths are low: no more than 2.0–3.0 ft (0.6–0.9 m) for wood frame structures, or 3.0–4.0 ft (0.9–1.2 m) for brick with masonry foundation walls.

Surface periphery floodwalls or ringwalls are used for structures that are too large to elevate (generally in excess of a 2,000 square-foot [186 square-meter] footprint). This method involves construction of a concrete wall or levee that surrounds the structure's property, where space and aesthetics permit.

If the estimated cost of any other nonstructural alternative exceeds the estimated cost to demolish a structure and rebuild an equivalent structure, rebuilding the structure above the design flood elevation may be an economically viable nonstructural alternative.

2.1.2 Structural Alternatives

Structural alternatives typically consist of constructed barriers that protect areas of development, and may include levees, walls, and detention basins. Structural alternatives also may include increasing the size of existing floodwater conveyances, such as channel-widening and deepening, or diverting floodwaters through other channels, pipes, and culverts. Structural measures also typically require that runoff from behind any constructed barrier be temporarily stored or conveyed through the barrier. In addition, any barrier must not increase flooding from interior runoff that becomes trapped behind it. To address these requirements, any structural plan that includes a barrier also may require interior drainage facilities that may include pump stations, ponding areas, or pipe diversions (USACE New York District 2011a).

Diversions consist of an underground culvert that may be used to divert river overflow from upstream of a developed area. Flood flows contained within the culvert would bypass the developed area and re-enter the river downstream. Under normal conditions, base flow would continue to flow within the river channel. An intake structure would allow flood flows to be diverted into the culvert. This type of structural alternative also can minimize environmental impacts to the stream by avoiding alterations within the river channel.

Channel modifications may be used to help protect communities against riverine flooding and stream blockages and can include dredging, deepening and widening, rechannelization, dam modifications, and elevating or widening bridges. Channel modifications can be an effective tool to reduce flooding; however, environmental impacts may be significant. Channel modifications are typically only effective for low frequency floods rather than large flood events.

Detention basins may be used to reduce the peak flood flows by temporarily storing (detaining) floodwater, then releasing it at a substantially reduced flow to reduce peak flood flows. This reduces peak water surface elevations and helps to minimize flood damages downstream.

Levees and floodwalls are intended to provide protection against flooding to homes, commercial buildings, municipal buildings, roadways, and bridges by prohibiting floodwaters from reaching these structures. Whereas levees and floodwalls can provide a cost-effective means of preventing the flooding of low-lying areas, interior drainage facilities are required to handle run-off trapped behind them to prevent interior residual flooding.

2.2 ALTERNATIVES CONSIDERED

To provide a basis for selection of the final plan and design, the District evaluated eight alternatives for their potential results in addressing the specific problems, needs, and objectives of the Project (Table 1). The evaluation assessed or measured the differences between each with- and without-project condition and appraised or weighted those differences. These differences are referred to as the benefits of the action alternative. Criteria to evaluate the alternative plans include all significant resources, outputs, and plan effects. They also include contributions to the Federal objective, the Project planning objectives, compliance with environmental protection requirements, four evaluation criteria (completeness, effectiveness, efficiency and acceptability) and other criteria deemed significant by participating stakeholders. Evaluation of the beneficial and adverse effects (including both monetary and nonmonetary benefits and costs) of the alternatives provided a basis for determining which plans should be considered further, dropped or reformulated. As required by ER 1105-2-100, alternatives were evaluated by comparing conditions expected under with- and without-project scenarios. Alternatives (including the No Action alternative) were compared against each other, with emphasis on the outputs and effects that would have the most influence in the decision-making process. The identification and documentation of tradeoffs were used to support the final recommendation. The output of this comparison process resulted in the ranking of alternatives considered.

The nonstructural alternatives identified for the study area would incorporate flood proofing measures (e.g., sealing basement windows on residential properties) and the raising of buildings within the floodplain. The existing floodplain zones would be maintained, with flood risks reduced through modifications of existing structures. Two nonstructural alternatives were identified. These nonstructural alternatives are considered more invasive in comparison to the structural alternatives described, and are generally reserved to reduce damages in frequently flooded properties (i.e., less than 25-year flood event) due to their associated high costs. The nonstructural alternatives would generally meet FRM requirements for flood events smaller than 100-year flood events, such as flood events that occur less than every 25 years on average. Due to the large number of structures inundated during large flood events (i.e., above 50-year event), the sole use of nonstructural measures to provide a sizable level of protection is not expected to be cost effective, nor supported by local government.

Six structural alternatives were identified. As a contrast to the nonstructural alternatives, all of the structural alternatives identified for the study area would at least meet FRM requirements for a 100-year flood event.

2.2.1 Alternative 1 – Lower Mamaroneck River and Confluence Area

Alternative 1 would include channel deepening and widening along both the Mamaroneck and Sheldrake rivers from above the confluence to the Tompkins Avenue Bridge (tidal limit). An overflow diversion culvert would be under the commuter parking lot located on the left bank (north side) of the river. The culvert would start just downstream of the Jefferson Avenue Bridge and discharge almost directly into the Rail Road Bridge opening. The culvert will be about 390 feet long with a slope of 0.36 feet per 100 feet, 25 feet wide, 8 feet high, will be about three feet above the proposed bottom of the river and about 3.5 feet under the finish grade of the parking lot. Therefore, the culvert will be (high and) dry during normal flows but it will divert a portion of the Mamaroneck River flows for a one year event or greater. Trapezoidal channel improvements will consist of a natural bed channel with a 30 to 50 ft width and side slopes of one vertical on two and a half horizontal (1:2.5) from the Rail Road Bridge to the Jefferson Avenue Bridge. Along the Mamaroneck River, channel work would extend from the Tompkins Avenue Bridge to 400 ft (122 m) above the Hillside Avenue Bridge for an approximated total length of 4,200 ft (1,280 m). Along the Sheldrake River, channel work would extend from the confluence to 700 ft (213 m) above the Mamaroneck Avenue Bridge for an approximated total length of 1,400 ft (427 m).

Four bridge replacements would be associated with Alternative 1: Halstead Avenue, Ward Avenue, and the two pedestrian bridges located in Columbus Park. Placement of riprap within the channel and streambank protection also would be included.

2.2.2 Alternative 2 – Mamaroneck River and Confluence Area

Alternative 2 is a combination of Alternative 1 plus additional channel work and improvements along the Mamaroneck River up to the Winfield Avenue Bridge. Alternative 2 would involve channel work downstream and upstream of the confluence of the Mamaroneck and Sheldrake rivers, extending from the Tompkins Avenue Bridge to 270 ft (82 m) above the Winfield Avenue Bridge for an approximated total length of 6,700 ft (2,042 m). Along the Sheldrake River, channel work would extend from the confluence to 750 ft (229 m) above the Mamaroneck Avenue Bridge for an approximate total length of 1,500 ft (457 m). The river would be realigned just downstream of the confluence and just below the Ward Avenue Bridge. Trapezoidal channel improvements would consist of a natural bed channel 30–50 ft (9–15 m) wide along the Mamaroneck and 20–40 ft (6–12 m) wide along the Sheldrake, side slopes ranging from 1:2.5, and vertical concrete walls in areas limited by structural development.

Six bridge replacements would be associated with Alternative 2: Station Plaza, Halstead Avenue, Ward Avenue, Hillside Avenue, and the two pedestrian bridges located in Columbus Park. Placement of riprap within the channel and streambank protection also would be included.

Columbus Park would be used as the staging area during construction. Articulated concrete block mats may be used through and just downstream of the Winfield Avenue Bridge due to the high stream velocities.

2.2.3 Alternative 3 – Mamaroneck and Sheldrake Rivers

Alternative 3 is a combination of Alternative 2 plus additional channel deepening work along the Sheldrake River. In addition to channel work along Mamaroneck River described in Alternative

2, channel work along the Sheldrake River would extend from the confluence to 450 ft (137 m) above the Rockland Avenue Bridge for an approximated total length of 5,700 ft (1,737 m). The river would be realigned just downstream of the confluence and just below the Ward Avenue Bridge. Trapezoidal channel improvements would consist of a natural bed channel 30–50 ft (9–15 m) wide along the Mamaroneck and 20–40 ft (6–12-m) wide along the Sheldrake, side slopes ranging from 1:2.5, and vertical concrete walls in areas limited by structural development. A significant amount of retaining walls would be used for this alternative including a rectangular channel with concrete retaining walls and channel bottom that would extend from the Railroad Bridge to the Halstead Avenue Bridge.

Eight bridge replacements would be associated with Alternative 3: Station Plaza, Halstead Avenue, Ward Avenue, Valley Place (Anita Lane), Hillside Avenue, Center Avenue, and the two pedestrian bridges located in Columbus Park. Placement of riprap within the channel and streambank protection also would be included.

Columbus Park would be used as the staging area during construction. Articulated concrete block mats may be used through and just downstream of the Winfield Avenue Bridge due to the high stream velocities.

2.2.4 Alternative 4 – GDM and Fenimore Road Tunnel

Alternative 4 is the 1989 GDM river diversion and channel improvement alternative that is based on protection from a 200-year flood event. Alternative 4 would include construction of a tunnel beneath Fenimore Road from the Sheldrake River south to the West Basin of the Mamaroneck Harbor. This 16-ft (5-m) wide by 16-ft (5-m) high tunnel system, which is approximately 4,010 ft (1,222 m) in length, comprises an inlet structure, the tunnel works, and the outlet structure. Channel work in the Mamaroneck River would total 10,420 ft (3,176 m) in length and would include trapezoidal channelization consisting of a natural bed channel, 45–60 ft (14–18 m) wide. Side slopes ranging from 1:3 with vertical concrete walls will be used where space is limited. Sheldrake improvements extend from Mamaroneck Avenue to I-95 for a total length of 5,740 ft (1,750 m), with a trapezoidal channel with a natural bed channel 30 ft (9 m) wide.

2.2.5 Alternative 5 – Ward Avenue Tunnel

Alternative 5 would include channel works throughout the Mamaroneck and Sheldrake rivers. Along the Mamaroneck River, channel work would extend from Tompkins Avenue Bridge to 270 ft (82 m) above Winfield Avenue Bridge for an approximate total length of 6,700 ft (2,042 m). In the Sheldrake River, channel work would extend from the confluence to 450 ft (137 m) above the Rockland Avenue Bridge for an approximate total length of 5,700 ft (1,737 m). Trapezoidal channel improvements would consist of a natural bed channel 30–50 ft (9–15 m) wide along the Mamaroneck and 20–40 ft (6–12 m) wide along the Sheldrake, side slopes ranging from 1:2.5, and vertical concrete walls in areas limited by structures and private properties.

A diversion tunnel with an ogee spillway approximately 5.3 ft (1.6 m) high and 40 ft (12 m) long would be constructed just downstream of the confluence between the Mamaroneck and Sheldrake rivers. The diversion tunnel, of approximately 1,050 ft (320 m) in length and 13 ft (4

m) in diameter, would start at the confluence and run underneath the railroad and Ward Avenue, discharging back into the Mamaroneck River just downstream of a new Ward Avenue Bridge.

Five bridges would be removed and replaced: Ward Avenue, Hillside Avenue, Center Avenue, and the two Columbus Park pedestrian bridges. The Ward Avenue Bridge would be relocated approximately 20 ft (6 m) upstream of its current location to allow the proposed tunnel to discharge downstream of the bridge. Because of the relocation, approximately 130 ft (40 m) of approach road on each side of the bridge would be impacted by construction.

2.2.6 Alternative 6 – Nonstructural Alternative

Alternative 6 consists of flood risk management measures provided through modifications of existing structures in residential, commercial, and industrial areas. Nonstructural measures were identified and evaluated for 363 structures contained in the 1% annual exceedance (100-year) flood inundation map for the Mamaroneck and Sheldrake rivers. Nonstructural measures evaluated under this alternative include structure raising (elevating), wet floodproofing, dry floodproofing (sealants and closures), ringwalls/ring levees, and other actions.

2.2.7 Alternative 7 – Combined Nonstructural and Structural Alternative

Alternative 7 was conceived as a combination of structural and nonstructural alternatives. However, this plan was never fully developed because the non-Federal sponsor, NYSDEC, and Westchester County proposed Alternative 8.

2.2.8 Alternative 8 – Reservoir and Bridge Plan

Alternative 8 was proposed by NYSDEC and Westchester County and consisted of several detention and bridge modifications. Alternative 8 included the construction of several detention basins and bridge modifications. The alternative was divided into four parts to describe the different types of modifications that would be included under this alternative.

- Alternative 8A – Enlarging Mamaroneck Reservoir to the WJWW dam to maximize the storage of flood waters from the Mamaroneck River. Includes removal of sediment accumulation near Mamaroneck Avenue Bridge, which has been identified as a major cause of ineffective flows or dead storage within Mamaroneck Reservoir. New lower level outlet design would be based on a 5-year flood event.
- Alternative 8B – Enlarging the Sheldrake Lake/Larchmont Reservoir with modifications to the dam. This plan would include dredging and sediment removal, which would add approximately 85.4 million gallons of volume capacity (an approximately 50% increase in the reservoir volume). The dam would require an additional 30-in (76-cm) diameter pipe below the existing outlet and five ft (1.5 m) above the reservoir's lowest bottom elevation.
- Alternative 8C – Bridge modification/removal to reduce water surface elevations throughout the study area. The Ward Avenue and Winfield Avenue bridges would be removed, as well as a short extension of Glendale Road (the "Road to Nowhere"). The Halsted Avenue, Valley Place (Anita Lane), Hillside Avenue and Jefferson Avenue bridges would be modified. The confluence would be redesigned and the Station Plaza Bridge would be aligned with the railroad and Halsted Avenue bridges.

- Alternative 8D – Combines Alternatives 8A, 8B, and 8C, with WCJWW dam modifications, Sheldrake Lake/Larchmont Reservoir modifications and bridge modification and/or removal.

- Alternative 8E - This alternative includes all of Alternative 8D "combination plan", and added a series of smaller storage/retention areas including Garden Lakes Pond, Golf course modifications, Carpenters Pond and Goodliffe Pond.

2.2.9 Summary and Evaluation of Alternatives Considered

A range of nonstructural and structural alternatives were considered and evaluated. Evaluation consisted of four general tasks described below:

- forecast the most likely with-project condition expected under each alternative plan;
- compare each with-project condition to the without-project condition and document the differences between the two;
- characterize the beneficial and adverse effects by magnitude, location, timing and duration; and
- identify the plans that will be further considered in the planning process, based on a comparison of the adverse and beneficial effects and the evaluation criteria.

Plans were evaluated based on all relevant resources, outputs, and plan effects; contributions to the Federal objective (NED); the Project goals and objectives; compliance with environmental protection requirements; the four evaluation criteria (completeness, effectiveness, efficiency and acceptability) described in ER 1105-2-100; and other criteria deemed significant by participating stakeholders. Any alternative plans that did not meet the Planning Guidance Notebook's four evaluation criteria are not carried forward for further evaluation in this DEIS. The non-preferred alternatives do not meet the requirements of ER 1105-2-100 due to lack of completeness and/or acceptability. These alternatives are not carried forward in Section 4.0; they were determined to be unacceptable because they do not meet the level of protection desired by the local sponsor.

2.3 PREFERRED ALTERNATIVE/NED PLAN (ALTERNATIVE 1Z)

Of these eight alternative plans under initial consideration, the District selected Alternative 1 as the Tentatively Selected Plan (see Sections 6-8 of the Main Report). This alternative was subsequently optimized by engineering and further evaluated as four modified plans: Alternative 1, Small (S); Alternative 1, Medium (M); Alternative 1, Large (L), and Alternative 1, Final (F). Each plan was developed to include increasing lengths of channel modification (see Sections 7 and 8 of the Main Report).

Based on the analysis of the Benefit to Cost Ratios, Net Benefits and Local Cost Sharing Amounts, it was determined that Alternative 1F optimized the annual net benefits. However, Alternative 1M provided higher level of flood risk management. Both Alternatives 1M and 1F were retained for additional analysis. Additional analysis of project elements indicated channel modification for the Harbor Heights area was not incrementally justified. Alternative 1M was modified to create Alternative 1Z to include the channel modification for the area below Harbor

Heights as identified in Alternative 1M. Non-structural alternatives were added to the Harbor Heights reach (see Section 8 in the Main Report).

Table 1. Summary of Actions for the initial eight alternatives for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Actions	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 8C *
Bridge Removal/Replacement							
Ward Avenue	Remove and replace	Remove and replace	Remove and replace		Remove and replace [1]		Remove
Station Plaza	No Action	No action	No action				Modify[2]
Waverly Place	No action	Remove and replace	No action		No action		No action
Halstead Avenue	Remove and replace	Remove and replace	Remove and replace				Modify
Hillside Avenue		Remove and replace	Remove and replace		Remove and replace		Modify
Valley Place (Anita Lane)			Remove and replace	No action		No action	Modify
Winfield Avenue	No action	No action	No action		No action		Remove
Jefferson Avenue			No action				Modify
Centre Avenue Footbridge			Remove and replace		Remove and replace		
Footbridge 1 (near confluence)	Remove and replace	Remove and replace	Remove and replace		Remove and replace		No action
Footbridge 2	Remove and replace	Remove and replace	Remove and replace		Remove and replace		
Road Removal							
Glendale Avenue	No action	No action	No action	No action	No action	No action	Remove
Tunnel/Culvert & Spillway Construction							
Tunnel length / diameter (ft)	390	390	390	4,010.00 / 16.00	1,050.00 / 13.00	No action	No action
Tunnel construction details	Beneath railroad parking	Beneath railroad parking	Beneath railroad parking	Beneath Fenimore Rd. from the Sheldrake River south to the West Basin of the Mamaroneck Harbor	Beneath the railroad and Ward Ave. from the confluence to the Mamaroneck River, downstream of new Ward Ave. Bridge	No action	No action
Ogee spillway length / height (ft)	No action	No action	No action	No action	40.00 / 5.30	No action	No action

Actions	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 8C *
Ogee spillway construction details	No action	No action	No action	No action	From just downstream of the confluence between the two rivers	No action	No action
Channel Work Length (ft)							
Mamaroneck	4,200.00 (Tomkins Ave. Bridge to 400 ft above Hillside Ave. Bridge)	6,700.00 (Tomkins Ave. Bridge to 270 ft above Winfield Ave. Bridge)	6,700.00 (Tomkins Ave. Bridge to 270 ft above Winfield Ave. Bridge)	10,420	6,700.00 (Tomkins Ave. Bridge to 270 ft above Winfield Ave. Bridge)	No action	No action
Sheldrake	1,400.00 (confluence to 700 ft. above Mamaroneck Ave. Bridge)	1,500.00 (confluence to 750 ft. above Mamaroneck Ave. Bridge)	5,700.00 (confluence to 450 ft. above Rockland Ave. Bridge)	5,740 (Mamaroneck Avenue to I-95)	5,700.00 (confluence to 450 ft. above Rockland Ave.)	No action	No action
Channel Width Size (ft)							
Mamaroneck	30.00–50.00	30.00–50.00	30.00–50.00	45.00–60.00	30.00–50.00	No action	No action
Sheldrake	20.00–40.00	20.00–40.00	20.00–40.00	30.00	20.00–40.00	No action	No action
Channel Slope							
	1:2.5	1:2.5	1:2.5	1:3	1:2.5	No action	No action
Nonstructural	No action	No action	No action	No action	No action	363 structures evaluated for structure raising, wet/dry floodproofing, ringwalls/ ring levees, etc.	No action

* **Alternative 7 was** conceived as a combination of structural and nonstructural alternatives. However, this plan has been omitted from this table because it was never fully developed due to the local sponsor's preference for Alternative 8. Alternative 8A would consist of enlarging Mamaroneck Reservoir with modifications to the WJWW dam including removal of sediment accumulation near Mamaroneck Avenue Bridge. Alternative 8B would consist of enlarging the Sheldrake Lake/Larchmont Reservoir with modifications to the dam and would include dredging and sediment removal. Alternative 8D would be a combination plan; details for this alternative were not fully developed.

[1] Under Alternative 5 the Ward Avenue Bridge would be relocated approximately 20 ft (6 m) upstream of its current location to allow the proposed tunnel to discharge downstream of the bridge.

[2] Under Alternative 8C the Station Plaza Bridge would be aligned with the railroad and Halsted Avenue bridges.

The NED plan is detailed in Sections 2.3.1 and summarized in Table 2 below.

2.3.1 NED Plan (Alternative 1Z)

The NED Plan (Alternative 1Z) was selected by the District based on consideration of benefits from an assessment of damages avoided in accordance with economic and environmental USACE procedures. It involves channel modifications, retaining walls, bridge removal and replacement, a culvert under the railroad parking lot, and trapezoidal cuts along the Mamaroneck and Sheldrake rivers, as well as nonstructural measures potentially applied to a maximum of eight residences and one non-residential building. The NED Plan includes approximately 1.82 miles of channel modification in the Mamaroneck and Sheldrake rivers. The average height of the new channel retaining walls will be 8.5 ft and the total combined length of new channel retaining walls in the entire Project area will be 4,360 ft.

Riprap and concrete was selected to protect the banks of the Mamaroneck and Sheldrake Rivers from erosion. This solution will stabilize the stream bank using techniques consistent with the requirements of the USACE, NYSDEC, Westchester County and the Town of Mamaroneck. The size and gradation of the riprap was determined following Corps of Engineers' procedures and methodology presented in EM 1110-2-1601, 1 July 1991, revised 30 June, 1994. Approximately 1,200 linear feet of riprap (i.e.; 13,000 square feet, 600 cubic yards) will be used for the Mamaroneck and Sheldrake Rivers. About 500 feet of riprap will be located roughly 200 feet both upstream and downstream of the North Barry Avenue Extension Bridge over the Mamaroneck River and 700 feet of riprap will be placed at the 90 degree turn in the Sheldrake River located downstream of the Fen
imore Road Bridge. Also, due to high velocities and structural considerations along the Mamaroneck River from the Station Plaza Bridge to just downstream of the Halstead Avenue Bridge, 300 lf concrete will placed along the bottom of the stream prevent scour under and around the footings of these three bridges.

Channel work on the segment of the Mamaroneck River south of I-95 and upstream of the confluence with Sheldrake River will total approximately 2,400 ft (732 m), and channel work on the segment stretching from south of the confluence to just downstream of the Tompkins Avenue Bridge also will total approximately 2,400 ft (732 m). In both segments, the river channel will be deepened and widened to 1:2.5 side slopes, and the channel bottom will be widened to 45 ft (14 m) with 0.25% slope. The removal and replacement of retaining walls and utilities will be necessary in certain locations including the removal and replacement of the Ward Avenue Bridge.

Channel work on the Sheldrake River from Fenimore Road to the confluence in Columbus Park will total approximately 3,470 ft (1,058 m). The river channel will be deepened and widened to 33 feet wide and 3.4 ft cut with 0.25% slope. Rectangular channel modification will be executed, upstream of Mamaroneck Avenue Bridge. The removal and replacement of retaining walls and utilities will be necessary in certain locations including the removal/replacement of Waverly Avenue Bridge and the removal of the Center Avenue footbridge. Two footbridges in Columbus Park (footbridge 1, near the confluence, and footbridge 2, closer to the southern edge of the park across from Station Plaza) also will be removed and not replaced.

In addition to channel work along both rivers, the NED Plan will have a nonstructural component along the Mamaroneck and Sheldrake rivers. A total of nine structures were selected based on a

benefit-cost evaluation. Eight of these are residential properties in the Harbor Heights neighborhood just south of the Mamaroneck River, all of which are candidates for structure elevation, or raising). The ninth structure is a nonresidential property in the Village's industrial area along Fenimore Road and just south of the Sheldrake River, which is a candidate for the construction of a ringwall. All nonstructural actions are contingent upon owner approval and will adhere to construction standards outlined in Village Code Chapter 186-5 that apply to the improvement of structures located in areas of special flood hazard (Village of Mamaroneck 1987).

2.4 NO ACTION ALTERNATIVE

The No Action alternative consists of a continuation of the current "without-project" condition and reflects the continuation of existing economic, social, and environmental conditions and trends within the affected area. Failure to provide the Mamaroneck and Sheldrake Rivers Basin study area with FRM measures could continue to contribute to the potential loss of life and physical, including environmental, damage to study area communities in the event of significant flooding. Significant flooding can result in loss of life, infrastructure and environmental damage, loss of jobs, and closure of businesses.

Under the No Action alternative, no additional Federal actions would be taken to provide for storm damage protection along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck. Under this scenario, all natural forces and manmade conditions currently in effect would continue. Periodic storm-related flooding would continue to affect low-lying areas within the Village of Mamaroneck. No flood control improvements would be implemented through Federal actions to reduce flooding problems.

Future storms would continue to cause damage to properties within the Village of Mamaroneck. The level of protection afforded by the existing stream alterations would continue to decline, increasing the risk of damage to adjacent properties. As a result of the No Action alternative, flood damage would continue to occur to homes and properties in the Village of Mamaroneck area.

Although the No Action alternative might avoid environmental and other impacts associated with implementation of one of the Preferred Alternatives and other alternatives identified for risk reduction, as well as not accrue potential environmental benefits, this alternative fails to meet the storm damage reduction objectives and needs of this Project, and therefore, this alternative was rejected. However, the No Action alternative provides the baseline conditions against which the benefits of other alternatives are measured. Additionally, the No Action alternative would be implemented if the costs of storm damage reduction exceed the benefits, thus indicating that storm damage protection measures are not in the Federal interest under current NED guidelines. The No Action alternative will serve as the baseline or existing condition upon which environmental impact evaluation will be made for the DEIS.

Table 2: Summary of Actions for the NED Plan for the Mamaroneck and Sheldrake Rivers

Actions	Alternative 1Z – NED Plan
Bridge Removal	
Ward Avenue	**Remove**
Station Plaza	**No action**
Waverly Place	**Remove/replace**
Centre Avenue Footbridge	**Remove**
Footbridge #1 (near confluence)	**Remove**
Footbridge #2	**Remove**
Road Removal	
Glendale Avenue (20-ft section)	**Remove**
Channel Work Length (ft)	
Harbor Heights	**No action**
Mamaroneck Upstream	**2,400**
Mamaroneck Downstream	**2,400**
Sheldrake	**3,470**
Channel Width Size (ft)	
Harbor Heights	**No action**
Mamaroneck Upstream	**45**
Mamaroneck Downstream	**45**
Sheldrake	**33**
Channel Cut Depth (maximum) (ft)	
Harbor Heights	**No action**
Mamaroneck Upstream	**2.3**
Mamaroneck Downstream	**4.2**
Sheldrake	**3.4**
Walls (average height/length) (ft)	**8.5 4,360.00**
Nonstructural	**9 structures**

3.0 AFFECTED ENVIRONMENT

3.1 TOPOGRAPHY AND GEOLOGY

3.1.1 Bedrock Geology

Lower Westchester County, where the study area is located, is within the Manhattan Prong of the New England Upland Physiographic Province (United States Geological Survey [USGS] 2003). The region is characterized by ridges, valleys, and streams that trend north to northeast (USACE New York District 1989a). The underlying bedrock is predominantly composed of Ordovician- to Precambrian-aged metamorphic rock (443 million to more than 1 billion years old) including Fordham Gneiss, Inwood Marble, and Manhattan Schist, as well as sedimentary rock and magmatic intrusions (Geological Society of America 2012, McCully 2011, USACE New York District 1989a and 1989b, and USGS 2013a). The bedrock has undergone extensive folding, faulting, intrusions, weathering, and erosion over time. There are bedrock outcrops at several locations along the Mamaroneck River in the study area, with lesser exposures of bedrock along the lower reaches of the Sheldrake River (where it flows through the study area). The maximum depth to bedrock is estimated to be approximately 40 ft (12 m).

3.1.2 Topography

The Village of Mamaroneck is part of the coastal plain, with elevations ranging from a high of 120 ft (36 m) above mean sea level (amsl) in the northern part of the Village to sea level in the south (USGS 1975 and Google Earth 2013). Low hills rise above the generally level to gently sloping plain. Some of these hills have steep slopes greater than 15%. There are extensive low-lying floodplains along the Mamaroneck and Sheldrake rivers and along the coast.

The upland portions of the study area range from approximately 5 to 50 ft (1 to 15 m) amsl, with generally level to moderately sloping ground. The Mamaroneck River portion of the study area begins in a valley between hills that exceed 100 ft (30 m) amsl at approximately 45 ft (14 m) amsl southeast of the WJWW dam (USGS 1975). The Sheldrake River portion of the study area starts at the I-95 underpass at approximately 30 ft (9 m) amsl. The confluence of the two streams is at approximately 15 ft (5 m) amsl. The Mamaroneck River drains into Long Island Sound at the East Basin of Mamaroneck Harbor (at mean sea level).

The combined watershed of the two rivers is an approximately 24-mi^2 (61-km^2) rectangle, oriented in a north-south direction (USACE New York District 1989a). Elevations in the upper Mamaroneck River watershed reach approximately 520 ft (158 m) amsl in Harrison, New York. The upper portion of the Mamaroneck River watershed (upstream and northwest of the study area) includes gently rolling terrain with generally north-south trending ridges (USACE New York District 1989a). The upper portion of the watershed is characterized as lightly wooded. The lower reaches are generally cleared. The Sheldrake River begins in Scarsdale, New York at an elevation of approximately 300 ft (91 m) amsl.

Channel depth varies from 10 to 20 ft (3 to 6 m) in the Mamaroneck River and from 5 to 15 ft (2 to 5 m) in the Sheldrake River. The channel bottom has a moderate slope, approximately 12 ft (4 m) per mile.

3.1.3 Surficial Geology

The bedrock is generally overlain by unconsolidated glacial deposits. Hill slopes are covered with varying depths of glacial till (a mix of glacially-deposited clays, sands, rocks, and boulders). Lower-lying areas are typically overlain by stratified drift mixed with more recent alluvial deposits (USACE New York District 1989b, U.S. Department of the Interior 2013).

Previous surveys in the study area characterized the surficial material as moderately thin alluvial deposits that vary in composition and are predominantly gravelly sand with some boulders and minor amounts of clay and silt (USACE New York District 1989b). The *Geological and Soil Investigations* (USACE New York District 1989b) noted that there were occasional layers of silt are found interbedded with the sandy soils. These layers were usually less than 1.0 ft (0.3 m) in thickness, except in the vicinity of the confluence of the Sheldrake River where the silt attained a depth of 12 ft (4 m) and extended below the streambed level. The material in the streambed generally consisted of recent alluvial deposits of sand and gravel with occasional boulders and cobbles in the upstream section. There are bedrock outcrops in several areas along the channel and banks through the proposed alignment. The riverbanks from First Street to downstream of Hillside Avenue are lined with riprap protection and masonry walls.

The general soil profile along the Sheldrake River consisted of sand and sand-gravel materials with varying amounts of silt, cobbles, and boulders. Generally, a silty sand and sand layer overlies a layer of sand-gravel material, which is found below the streambed level and above the bedrock. Gneissic bedrock, which is exposed at several areas adjacent to the channel, is generally close to the river bottom. The riverbanks downstream of Fenimore Road were composed of miscellaneous overbank fill and debris to a point in the vicinity of Center Avenue, and below this area the banks were composed of dry masonry walls.

3.1.4 Mineral Resources

There are no known mineral resources, mines, or regulated wells (e.g., oil or natural gas) in the study area (NYSDEC 2013a).

3.1.5 Seismic Risk and Geologic Hazards

For some areas of the United States, geologic features or topography can create hazards to structures and public safety. Such hazards include seismic hazards (e.g., earthquakes), landslides, land subsidence, soil liquefaction, volcanism, and dam failure. A review of historic data, existing geologic and slope conditions, and the Village of Mamaroneck's *Final Local Hazard Mitigation Plan* (2012a) concludes that there is little to no risk for earthquakes and other geologic hazards. The *Hazard Mitigation Plan* utilized the New York State Office of Emergency Management's Hazards New York analysis program to rate potential hazard based on the relative scope and likelihood of future occurrence and the extent or magnitude of each hazard. That report concluded that there were no geologic or topographic conditions that represent a high or even moderately high hazard (such as flooding and storm-related hazards).

The risks for earthquakes or landslides were ranked as "moderately low." Instances of severe erosion, land subsidence, and volcanic activity were not considered possible hazards.

Landslides. Risks associated with landslides include both the risk that an improvement may adversely affect slope stability, and the risk that post-construction land movements could damage Project structures. Landslides can occur as a result of the undercutting, destabilization, overloading, or saturation of steep slopes, and strong ground shaking (i.e., earthquakes). There are typically four potential types of landslide failure: 1) toppling failures on rock slopes (particularly where there are steeply-dipping fractures and joints), 2) movement of boulders or unsupported rock masses, 3) rotational landsliding of soil, and 4) subsidence failure of fill material, particularly along a shoreline (USACE New York District 1997). Landslide failures typically need steep slopes and a triggering event (i.e., strong ground shaking) to destabilize the material and initiate a landslide. However, the geology and topography in the study area, low incidence of recorded landslides, combined with the relatively low risk of prolonged ground shaking, means the area has a moderately low susceptibility for landslides (New York State Office of Emergency Management 2008, USGS National Landslides Hazards Program 2012, and Village of Mamaroneck 2012a).

Land Subsidence. The study area is partially underlain by metamorphosed carbonate rocks, so there is a minor risk of land subsidence, but the area is not characterized as an area with a high risk for subsidence in the National Atlas (U.S. Department of the Interior 2013), and the Village's hazard management plan does not consider subsidence a risk.

Stream Channel Erosion and Streambed Scour. Lateral streambank erosion (channel widening) and/or streambed downcutting (scour) are typically associated with flood events and can impact slope stability and pose a hazard to nearby structures and utilities. Channel widening is defined as the erosion and subsequent recession of one or both streambanks that widens the channel without changing the channel location. Streambed scour is erosion of the streambed resulting in the development of deep pools and/or the systematic lowering of the channel floor elevation. Streambed scour also may result from the passage of debris flows and debris torrents. As described above, the Mamaroneck and Sheldrake rivers have an extensive history of flooding, as well as significant channel erosion and streambed scour.

3.2 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Databases maintained by the NYSDEC and Federal agencies, including those maintained US Environmental Protection Agency (USEPA). The NYSDEC lists one state Superfund site located within the proposed project areas (ITT Sealectro) (Figure 4). The Comprehensive Environmental Response and Liability Information System (CERCLIS), the CERCLIS No Further Action Planned (NFRAP), and the Toxic Release Inventory System (TRIS) databases did not list any sites within the proposed project area. The Resource Conservation and Recovery Information System (RCRIS) database identified one site within the area of the proposed project. This site, located at 160 Jefferson Avenue, is situated directly on the Mamaroneck River, just above the confluence with the Sheldrake River. An above ground storage tank with toluene was removed from the site, but the site has remained on the list.

The Environmental Cleanup and Brownfields database as well as the NYSDEC Region 3 Environmental Remediation Project Information database did not listed any sites within or near

the proposed project area. The Spill Incident database, which keeps an annual active list of spills, leaking underground storage tanks and releases, did not identify any spills that were labeled as on-going investigation or under remedial action with the proposed project area. There were archived reports of oil sheen on both rivers, but they were closed without the identification of the sources.

Figure 4: NYSDEC State Superfund Site ITT Sealectro

3.3 LAND USE, COVER, AND ZONING

3.3.1 Land Use

The Village of Mamaroneck covers a total area of approximately 6.7 mi^2 (17.4 km^2), of which approximately half is submerged (i.e., Mamaroneck Harbor in Long Island Sound). The remaining 3.2 mi^2 or 2,048 acres (8.3 km^2 or 829 hectares, respectively) is a suburban/commuter residential community with a mix of residences, commercial business, and manufacturing, as well as a major inland harbor for pleasure boats and yachts (Village of Mamaroneck 2012a and 2012b).

Within the study area, the Mamaroneck River runs from the WJWW dam, along a residential area and the northeastern border of the Village, flows under I-95 (which crosses the Village in a southwest-northeast direction), then runs through the mixed residential/commercial center of the Village before emptying into Mamaroneck Harbor (Figure 5). The study area extends along the entire length of the Mamaroneck River as it flows through the Village. The Sheldrake River enters the Village from the west and flows northeast through a manufacturing/industrial zone, residential area, and Columbus Park to its confluence with the Mamaroneck River near the center of the Village. The study area encompasses almost the entire length of the Sheldrake River as it flows through the Village.

Community planners have categorized the Village into 11 land use zones, including waterbodies (Village of Mamaroneck 2012b). The combined Mamaroneck-Sheldrake river system crosses nine of these land use categories, five of which are predominant within the study area. The 11 land use categories (including *Waterbodies*, not listed below) are:

Residential – Residential land use is the dominant land use in the study area and also accounts for the majority of the Village's land area. Residential use within the Village includes single-, two-, and multi-family residences, apartments, townhouse complexes, and condominiums in a mix of low-, medium- and high-density residential neighborhoods.

Manufacturing/Industrial – The Sheldrake River flows along and through the Manufacturing/Industrial zone, which is located on the west side of the Village. This zone includes commercial and light manufacturing, auto-repair shops, wholesale and trucking operations, and warehouses, as well as a few residences. Much of this area lies within the 100-year floodplain.

Commercial/Office – The Village has several concentrations of commercial retail and office space (including along Mamaroneck Avenue, East and West Boston Post Road, and Halstead Avenue). The Mamaroneck River flows through or alongside a large portion of the central business district. Many of these businesses are in the floodplain, and more than 100 commercial buildings and hundreds of businesses were damaged in floods in April 2007.

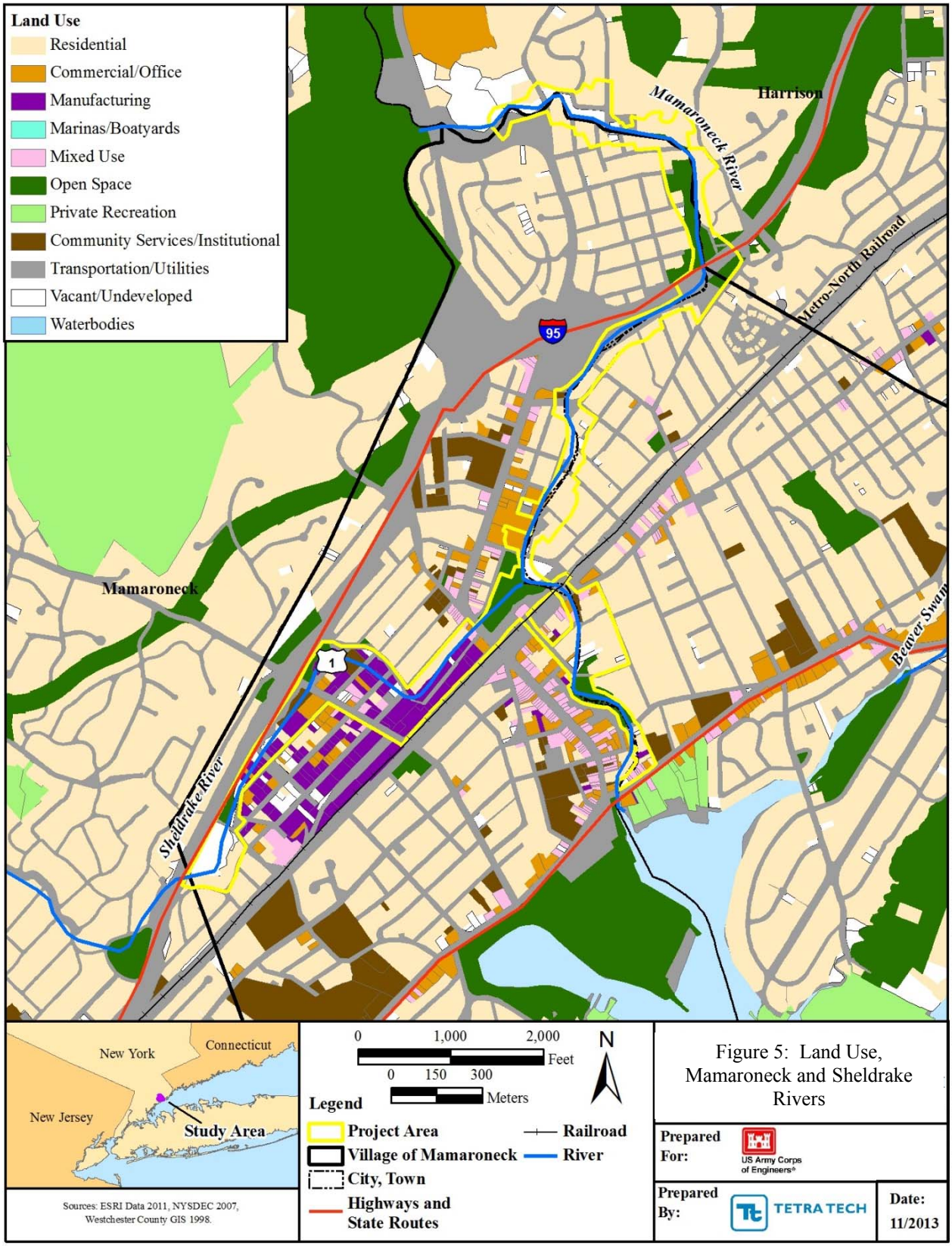


Figure 5: Land Use, Mamaroneck and Sheldrake Rivers

Transportation/Utilities – Both rivers run along the two major transportation corridors that cross the Village: I-95 and the Metro-North Railroad, operated by the Metropolitan Transportation Authority (MTA). I-95, also known as the "New England Thruway," is the major highway between New York City and Boston and is the busiest transportation corridor in the Northeast (Village of Mamaroneck 2012a). The New Haven Line (Metro-North Railroad) is a major commuter rail line that offers a 40-minute train ride to Midtown Manhattan and has a busy station (i.e., Mamaroneck), which is located near the confluence and adjacent to the proposed staging area at Columbus Park. There are several parking areas along the Mamaroneck River near the train station and along Philips Park Road upstream from Tompkins Avenue (see Section 3.12).

Open Space – There are several parks and open spaces within the study area. The largest, Columbus Park (6 ac [2.4 ha]), is located at the confluence of the two rivers and is subject to extensive flooding during flood events. Details about other area parks and open spaces can be found in Section 3.11.

The following land uses are either not encompassed by the study area (i.e., Marinas/Boatyards and Private Recreation/Clubs) or comprise only a small portion of the study area:

Community Services/Institutional – This land use includes schools, a sewage treatment plant, and Village Hall facilities.

Marinas/Boatyards – The Marinas/Boatyards land use zone is located at the mouth of the Mamaroneck River, below the Project area. This area provides a variety of services for pleasure boating and yachting. It includes marinas, slips, moorings, boatyards, and other harbor facilities.

Mixed Use – There are several parcels that are categorized as mixed (commercial/residential) use, for example, an apartment above a street-level office.

Vacant/Undeveloped – There are several parking areas and undeveloped open spaces categorized as Vacant/Undeveloped land. This includes parking at the Station Plaza (train) station, which includes 254 spaces.

Private Recreation/Clubs – This land use includes a golf course and private beach club.

3.3.2 Land Cover

The majority of the study area is developed land dominated by structures, roads, and other impermeable surfaces. Many structures, backyards, roads, and developed areas (e.g., parking or storage areas) are constructed or maintained up to the edge of the streambanks. The Mamaroneck and Sheldrake river channels provide a narrow band of open water and undeveloped riparian areas that wind through the mostly developed residential and commercial areas. Sections 3.4 Water Resources and 3.5 Vegetation describe the riparian areas in greater detail. The Mamaroneck River can be summarized as a narrow, partially shrub- and tree-lined or open riparian corridor generally 100–200 ft (30–61 m) wide. The upper reaches of the Mamaroneck River upstream of I-95 are bordered by more extensive upland and floodplain forests and shrub dominated areas, which include larger stands of riparian forest. The lower reaches of the Mamaroneck are more commonly channelized and bordered by retaining walls.

The Sheldrake River is typically narrower and more constrained by surrounding development. The upper reaches are similarly shrub- and tree-lined, but the lower reaches are more commonly confined to retaining walls with limited riparian habitat and the riparian corridor is less than 50 ft (15 m) wide.

3.3.3 Zoning

The Village of Mamaroneck recently prepared a comprehensive plan (Village of Mamaroneck 2012b), which describes current land use and zoning within the Village. Seven of the Village's twenty-one zoning districts are found within the study area (Table 3 and Figure 6): three residential zones, two general commercial zones, a manufacturing zone, and parking.

Table 3. Zoning Districts for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Zoning District	Description
R-5	One-family residential; 5,000 ft^2 minimum lot
R-20	One-family residential; 20,000 ft^2 lot
R-2F	One and two-family residential
C-1	General commercial
C-2	General commercial
M-1	Manufacturing
P	Parking

Source: Village of Mamaroneck 2012b

As Figure 6 illustrates, the two rivers are commonly used as physical dividing lines between land use zones. Current use of the channels does not conflict with any of these land uses.

3.4 WATER RESOURCES

3.4.1 Regional Hydrogeology and Groundwater Resources

The study area is located in the New England Upland section of the New England physiographic province (USGS 1995). The principal aquifer type in the study area is New England crystalline-rock aquifer, composed of a variety of igneous (mainly granite, gabbro, diorite, granodiorite, and pegmatite) and metamorphic (mainly schist, gneiss, quartzite, slate, and argillite) rocks. Crystalline rock aquifers are one of the least productive types of aquifers found within the New England–New York region, with typical wells yielding 2.0–10.0 gallons (7.6–37.9 liters) per minute.

Groundwater recharge is the replenishment of groundwater reserves through infiltration. Increases in impervious surfaces due to development activities typically results in decreased amounts of groundwater recharge. Groundwater may contribute to wetland discharge, and wetlands also may contribute to groundwater recharge. The presence of aquatic buffers in groundwater recharge areas, such as those located along streams and streambanks, provide added protection to the water quality of alluvial groundwater by reducing pollutant loads and assimilating pollutants, such as sediment, heavy metals, nutrients, pathogens, and pesticides

through natural filtration (Westchester County Department of Planning and Soil and Water Conservation District 2007).

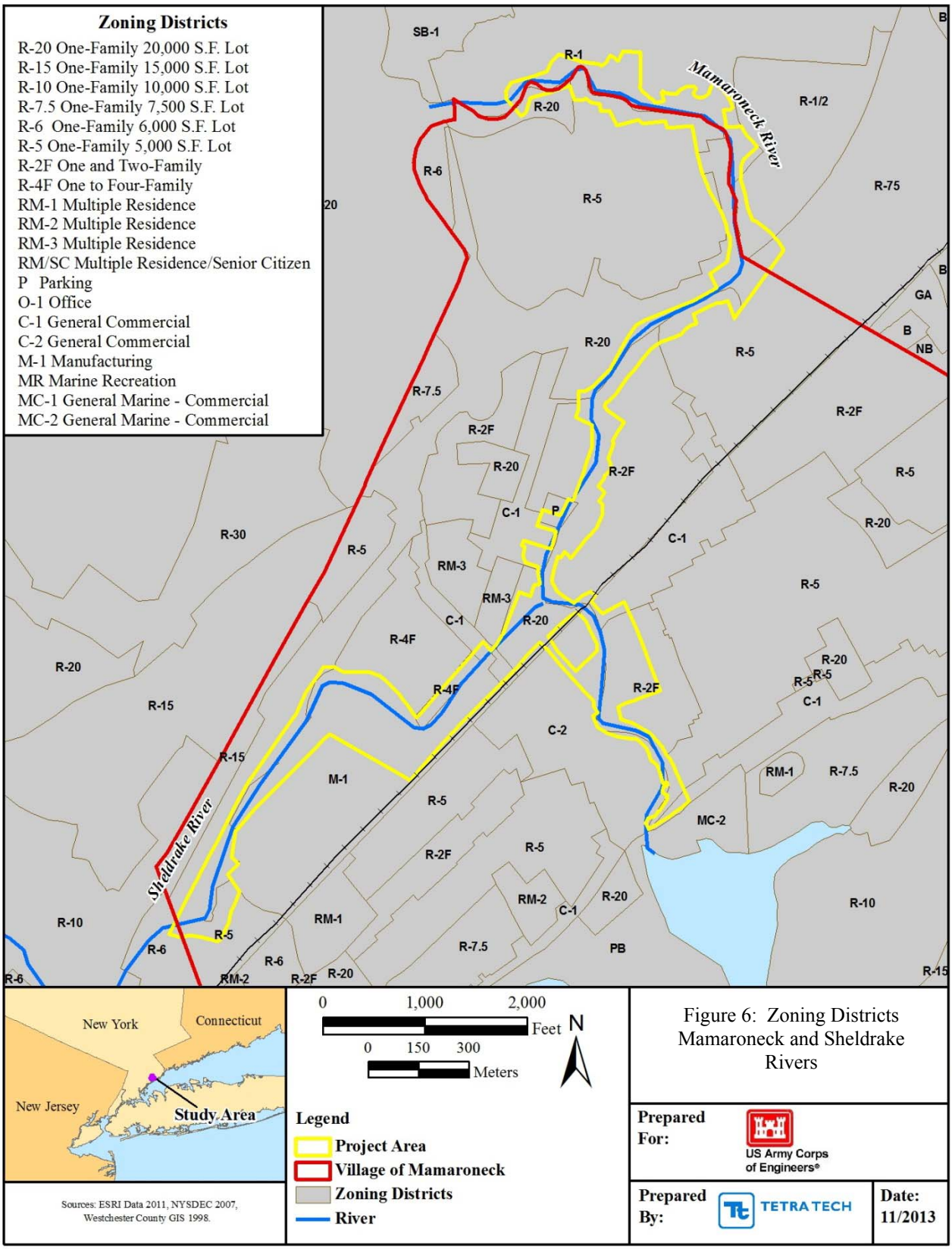


Figure 6: Zoning Districts Mamaroneck and Sheldrake Rivers

In 1985 the approximate rate of freshwater withdrawals from groundwater aquifers in the region was 10–50 million gallons per day (6,944–34,750 gallons per minute or 26,286–131,429 liters per minute), largely used for domestic and commercial purposes. None of the drinking water for the study area is provided by groundwater sources (WJWW 2013). No USGS or Westchester County groundwater monitoring wells or data were identified for the study area. The nearest groundwater well operated by the USGS is located in Yorktown Heights, New York, approximately 22 mi (35 km) north of the study area (USGS 2013c).

3.4.2 Surface Water

Hydrology

The Sheldrake and Mamaroneck rivers basin comprises the Mamaroneck River watershed, Sheldrake River watershed, and drainage area for Mamaroneck Harbor (Figure 7). The combined watersheds of the Mamaroneck and Sheldrake rivers have a total drainage area of 23.63 mi^2 (61.20 km^2) (USACE New York District 1989a, Westchester County 2001 and USACE New York District 2011a) The watershed is approximately 9 mi (15 km) from north to south and 2–3 mi (3–5 km) wide. The confluence of the Sheldrake River with the Mamaroneck River is at Columbus Park, with the Mamaroneck River draining into the East Basin of inner Mamaroneck Harbor. Mamaroneck Harbor is part of Long Island Sound and consists of inner and outer harbors connected by an approximate 350-ft (107-m) channel. The inner harbor contains the East and West basins, which are separated by a peninsula, Harbor Island Park.

The Mamaroneck River Watershed is located within the coastal zone (see Appendix D) and is part of the Atlantic Ocean/Long Island Sound Watershed, which drains most of the New York City metropolitan area and all of Long Island Sound (NYSDEC 2013b). Water basins of Westchester County, New York that are connected to the Long Island Sound Watershed have been divided into seven study areas, each having an assigned Watershed Advisory Committee (WAC) that is responsible for development of a watershed management plan for their respective area. The Mamaroneck River Watershed is part of the Westchester County WAC 4 study area, which includes the municipalities of the Town/Village of Harrison, Mamaroneck Town and Village, City of New Rochelle, Village of Scarsdale, and the City of White Plains, New York. A nonpoint source pollution control plan (2001) for the Mamaroneck River Watershed, adopted by the municipalities associated with WAC 4, includes management recommendations for conducting stream assessments and restoration, freshwater and tidal wetland monitoring, stormwater management, local comprehensive planning and ordinances, and outreach and education (Westchester County 2001).

The amount of impervious surfaces within the Mamaroneck River Basin from 1982 to 2002 increased approximately 3.3% (Hurd et al. 2006). Currently approximately 30% of land within the watershed is considered to be impervious, with projected increases in impervious surfaces based on future projected conditions ranging from approximately 1% to 5% (USACE New York District 2011a). Project-related increases in impervious surfaces would be expected to result in an increase of 30 cubic feet per second (cfs) for peak discharge.

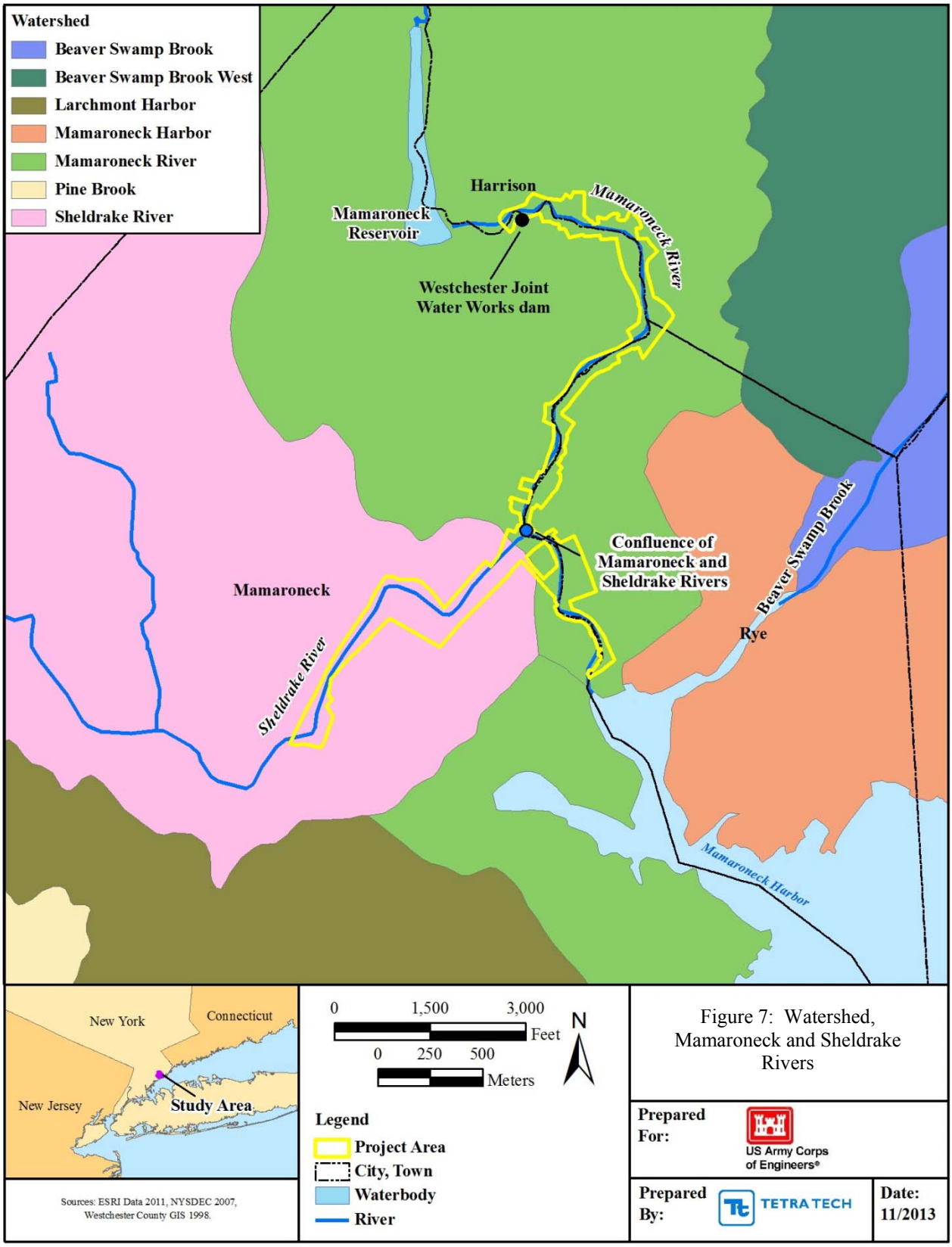


Figure 7: Watershed, Mamaroneck and Sheldrake Rivers

The 43-year average annual discharge for the Mamaroneck River watershed for years 1945–1952 and 1955–1989, as recorded at the Mamaroneck River stream gauge (USGS ID: 01301000) located approximately 700 ft (213 m) downstream of the confluence with the Sheldrake River, is 35.9 cfs (1.0 cubic meters per second [cms]) (USACE New York District 2011b). This discharge is equal to about 20.8 in (52.8 cm) of runoff, or 46.7% of the estimated average rainfall within the Mamaroneck and Sheldrake Rivers Basin of 44.5 in (113.0 cm). Peak flows at the Mamaroneck River stream gauge, recorded during flood events that occurred in the study area between 1990 and 2010, ranged from 2,130 to 3,060 cfs (60 to 87 cms). Peak flow at this gauge for a storm occurring on April 15–16, 2007, as estimated through hydrological modeling and confirmed with recorded high water marks on the Mamaroneck and Sheldrake rivers, was 5,340 cfs (151 cms) (USACE New York District 2011a).

The Mamaroneck River Watershed contains several ponds, lakes, and human-made reservoirs (USACE New York District 1989c). The WJWW, a public benefit corporation established under an inter-municipal agreement, operates and maintains the Mamaroneck Reservoir, a water supply reservoir that serves the Villages of Mamaroneck and Larchmont, and portions of Harrison and the City of Rye (USACE New York District1989c and Westchester County Board of Health 2002). The WJWW is located approximately 2.5 mi (4 km) north of the mouth of the Mamaroneck River (Figure 9).

Channel side slopes of the Mamaroneck River are moderate, ranging from 5 to 15 ft (1.5 to 4.6 m) in height (USACE New York District 2011c). The channel bottom of the Mamaroneck River has a moderate slope of about 12 ft (3.7 m) per mile, varying in width from 20 ft (6 m) at the upstream end to 55 ft (17 m) at the mouth. The mouth of the Mamaroneck River is short and steep and subject to tidal inundation. In comparison to the Mamaroneck River, the Sheldrake River is narrower with steeper side slopes. In 1933, using Federal work relief funds, the Village cleared the channels of the rivers within its corporate limits. In 1937, using Works Progress Administration funds (WPA), the channel of the Mamaroneck River has widened to 30 feet and masonry walls were constructed from North Barry Avenue to Jefferson Avenue, a distance of approximately 2,400 feet.

The Mamaroneck River is characterized as having a mixed sand/cobble substrate with lesser amounts of gravel, small boulders, and rough bedrock (USACE 2011f). The surrounding land-use is predominantly residential, and the reach is constrained by human altered banks consisting of rock and concrete walls. The dominant vegetation within the riparian corridor consists of deciduous trees with a shrub layer. Invasive species were observed growing within the riparian corridor, including Japanese knotweed (*Fallopia japonica*), multiflora rose (*Rosa multiflora*), and tree-of-heaven (*Alianthus altissima*) (USACE 2011f). The Mamaroneck River was determined to be a low gradient stream (USACE 2011f).

Water Classification

NYSDEC classifies surface and groundwater according to their best usage and qualities. Water classification of the tidal portion of the Mamaroneck River (from the mouth extending upstream to East Boston Post Road in Mamaroneck) is classified as Class SC (saline surface waters) (NYSDEC 2013c and NYSDEC 2013d). The water classification of the portion of Mamaroneck River upstream from East Boston Post Road and the Sheldrake River is class C (fresh surface waters). Both of these classifications include a best usage of these waters for fishing, and waters

that are suitable for fish, shellfish, and wildlife propagation and survival. Water quality of Class SC and C waters shall be suitable for primary and secondary contact recreation, although other factors may limit use for these purposes (NYSDEC 2013c).

Mamaroneck Harbor is classified as Class SB (saline surface waters), which has a best usage definition of waters used for primary and secondary contact recreation and fishing (NYSDEC 2013c and 2013d). Class SB waters shall be suitable for fish, shellfish, and wildlife propagation and survival. Part 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations, Section 703.2 of Chapter X – Division of Water provides a narrative of the water quality standards for these waters (NYSDEC 2013e).

The NYSDEC *Protection of Waters Program* (Article 15, NYSECL Implementing Regulations 6NYCRR Part 608) was created to "prevent undesirable activities on water bodies by establishing and enforcing regulations that: (1) are compatible with the preservation, protection and enhancement of the present and potential values of water resources; (2) protect the public health and welfare; and, (3) are consistent with the reasonable economic and social development of the state." All waters of the state are afforded protection under Article 15, based on the water classification and standard designation.

Water Quality

Approximately 53% of rivers and streams located within the Atlantic Ocean/Long Island Sound Watershed have been assessed for water quality by NYSDEC. This assessment included both the Mamaroneck and Sheldrake rivers. Results of the assessment determined that approximately 17% of surface waters within the watershed are of good water quality (fully support designated activities and uses), 13% have satisfactory water quality conditions (fully supports designated activities, but with minor impacts), and 30% have poor water quality (impaired waters that do not support designated activities and uses) (NYSDEC 2013b). The remaining 40% of surface waters of the watershed were not included in the assessment. The primary water quality issue within the watershed is low dissolved oxygen (DO), which can be detrimental to aerobic organisms. Discharge of treated wastewater into the watershed adds nutrients to the system, which can contribute to the pathogen loads of fresh and saline waters located downstream of their location.

The *Waterbody Inventory for the Western Long Island Sound Watershed* (NYSDEC 2010) identifies surface waters that do not meet their designated class standards for one or more uses, or are threatened due to poor water quality. The lower segment of the Mamaroneck River is listed on the New York State 2010 Section 303(d) List of Impaired Waters, with the tidal portion of the river (from the mouth upstream to Route 1) classified as impaired for aquatic life and recreation, and stressed for aesthetics (NYSDEC 2010). Aquatic life and recreation are impaired in this segment of the Mamaroneck River due to low DO levels and nutrient loads, as well as silt and sediment originating from urban stormwater runoff and other nonpoint sources. Periodic beach closures are associated with heavier rainstorms that can wash pollutants into Mamaroneck Harbor. A 2008 biological assessment of the Mamaroneck River (near Ward Avenue) determined this segment to have poor water quality and not fully supportive of aquatic life (NYSDEC 2010).

The Sheldrake River, from the mouth to Upper Larchmont Reservoir, including tributaries, is listed on the New York State 2010 Section 303(d) List of Impaired Waters and is impaired for fish consumption, aquatic life, and recreation (NYSDEC 2010). Fish consumption is impaired due to pesticide levels in contaminated sediment. Aquatic life and recreational uses are considered impaired by nutrients as well as silt and sediment loads associated with urban stormwater runoff and other nonpoint sources; however, water quality sampling has not fully documented these impairments. Although the 2008 biological assessment described above for the Mamaroneck River did not include the Sheldrake River, similar water quality impacts are likely associated with this waterbody.

Mamaroneck Harbor is listed on the New York State 2010 Section 303(d) List of Impaired Waters (NYSDEC 2010). The 2010 *Waterbody Inventory for the Western Long Island Sound Watershed* identified portions of Mamaroneck Harbor that are impaired for human uses (public bathing and recreation), with other portions identified as stressed for use by aquatic life, fish consumption, and aesthetics (NYSDEC 2010). Public bathing and recreation are impaired due to pathogen levels that result in shellfishing restrictions and periodic beach closures. Urban stormwater runoff is the primary source of pathogens, although waterfowl and boat discharges also likely contribute. Floatable debris is cited as impacting recreation and aesthetics. Aquatic life is impacted periodically from low DO levels stemming from elevated nitrogen loads occurring from municipal wastewater discharges, urban stormwater runoff, and other nonpoint sources; atmospheric deposition; and tidal exchange with Long Island Sound and Connecticut waters. Fish consumption advisories for the harbor are in place due to elevated levels of polychlorinated biphenyls (PCBs) identified in migratory fish. PCB contamination in highly migratory fish populations is not thought to be related to known contamination in the harbor or adjacent waters.

Fish consumption and health advisories associated with the study area are discussed in Sections 3.6.1 and 3.6.2.

3.4.3 Tidal Influences

Specific tidal information for the Mamaroneck River and Harbor are lacking (USACE New York District 1989c). Tide levels provided for the East and West basins correspond to tide levels observed in Long Island Sound, obtained from tide information provided by the National Oceanic and Atmospheric Administration (NOAA). The NOAA tide station nearest to the study area is located approximately 9 mi (14.5 km) south of Mamaroneck Harbor, at Kings Point, New York. The mean tide range (difference in height between mean high water and mean low water) for the Kings Point tide station (Station ID: 8516945) is 7.2 ft (2.2 m), with a diurnal range (difference in height between mean higher high water and mean lower low water) of 7.8 ft (2.4 m) (NOAA 2010).

Storms such as hurricanes and Nor'easters that coincide with high tide periods have the potential to cause storm surges. Based on a recent hydraulic analysis of the study area, the influence of storm surges associated with high tides is not expected to extend beyond the Tompkins Avenue Bridge due to the step-like pattern caused by bridges and channel constrictions located in the region of the Mamaroneck River downstream of Tompkins Avenue Bridge (USACE New York District 2011c). These restrictions serve to impede the flow of tidally influenced upstream flows in the lower reach of the Mamaroneck River, but also serve to restrict outflows, thereby

contributing to upstream flooding. Due to the steep nature of the channel bed and channel bends within the section of the Mamaroneck River located downstream of the Tompkins Avenue Bridge, possible scouring of the channel may result from high velocity flows experienced during periods of low tide and significant fluvial events.

3.4.4 Floodplains

A review of FEMA Flood Insurance Rate Maps indicates that all of the Proposed Action area is located within the 100-year or 500-year floodplain (Figure 8) (FEMA 2007, Village of Mamaroneck 2012a and 2012b). These floodplain areas are located immediately adjacent to both rivers, within low-lying flood prone areas, and within other areas that have been subject to historical flooding.

The study area is defined by the 500-year floodplain, which extends from below Tompkins Avenue at Mamaroneck Harbor upstream to the WJWW dam. Delineation of the 500-year floodplain in the Mamaroneck and Sheldrake Rivers Basin indicates the majority of the structures within the floodplain are located in the Village of Mamaroneck.

Base flood elevation is the elevation to which a 100-year flood would be expected to rise (NYSDEC Division of Water 2006). Base flood elevations for the Sheldrake River are 26–27 ft (7.9–8.2 m) (in elevation as referenced by the North American Vertical Datum [NAVD] of 1988) (FEMA 2007). Base flood elevations for the section of the Mamaroneck River north of the Sheldrake River confluence and south of I-95 are 26–29 ft (7.9–8.8 m) NAVD. North of I-95, base flood elevations are 30–47 ft (9.1–14.3 m) NAVD, with higher elevations associated with the section of Mamaroneck River located north of Mamaroneck Avenue. South of the Sheldrake River confluence base flood elevations range from 16 to 25 ft (4.9 to 7.6 m) elevation NAVD, with higher flood elevations associated with the confluence area (FEMA 2007).

In addition to the 100-year and 500-year floodplains that are associated with the study area, FEMA also has designated a velocity zone (VE Zone) within Mamaroneck Harbor (Figure 10) (FEMA 2007). As defined by FEMA, a Coastal High Hazard Area (V or VE Zones) is the Special Flood Hazard Area (SFHA) that extends from offshore to the inland limit of a primary frontal dune along an open coast, and any other area subject to high-velocity wave action from storms or seismic sources (FEMA no date [n.d.]). Typically, this is the area where the computed wave heights for the base flood are 3.0 ft (0.9 m) or more. These zones are subject to more stringent building requirements and different flood insurance rates than other zones shown on the FIRM because these areas are exposed to a higher level of risk than other coastal flooding areas. VE Zones also are classified as an Effective Flood Hazard Zone, which is the area subject to high velocity wave action (a 3.0-ft [0.9-m] breaking wave) from the 1% annual chance coastal flood.

3.4.5 Wetlands

Wetlands (e.g., marshes, swamps, bogs) are categorized as special aquatic sites by the U.S. Environmental Protection Agency (USEPA). Wetlands are defined by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987). In addition to wetlands, other special aquatic sites defined by the USEPA include areas

such as vegetated shallows (e.g., SAV) and areas that may be unvegetated, including sand flats and mud flats. Wetlands and other special aquatic sites as defined by the USEPA are afforded protection under Section 404 *Permits to Discharge Dredged or Fill Material* of the CWA and in some cases Section 10 of the River and Harbors Act (RHA) as well.

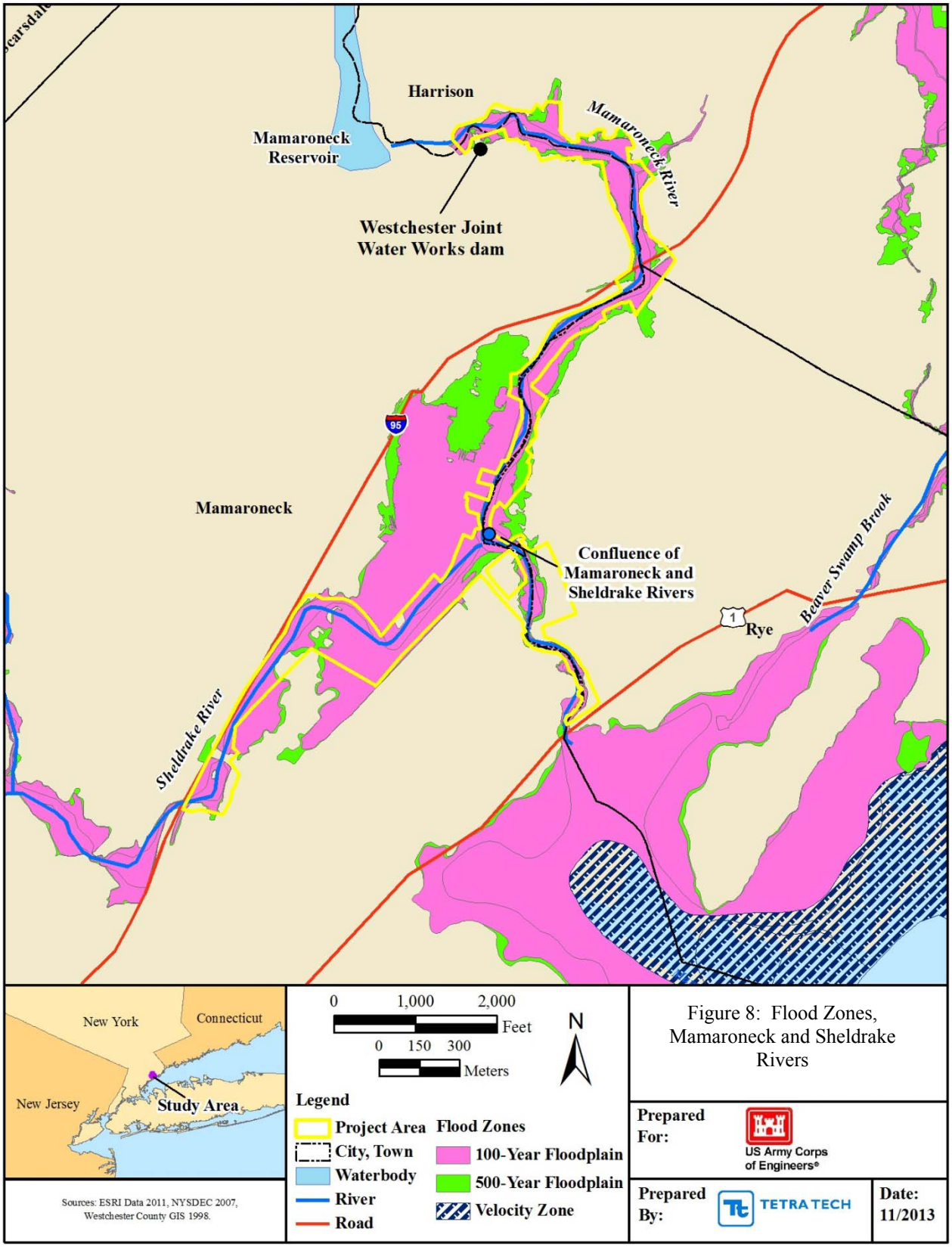


Figure 8: Flood Zones, Mamaroneck and Sheldrake Rivers

Project area along the banks of both the Mamaroneck and Sheldrake rivers (USACE New York District 2012a).

A geographic information system analysis of mature trees located within the Project area footprint identified approximately 6.2 ac (2.5 ha) of mature trees.

The NYSDEC *Freshwater Wetlands Permit Program* only recognizes wetlands that are greater than 12.4 acres (ac) (5 hectares [ha]) and occur outside of the influence of the ebb and flow of the tides. The NYSDEC Tidal Wetlands Permit Program recognizes both vegetated and unvegetated areas as occurring within the areas of the influence of the tides. Common categories subject to tidal wetlands regulation include unvegetated coastal shoals, bars, and mudflats, vegetated intertidal marsh and high marsh, and the littoral zone that includes lands under tidal waters (not included in any other tidal wetland category) that are no deeper than six feet at mean low water (MLW). New York State defined freshwater and tidal wetlands are generally afforded protection under Article 24 (freshwater wetlands) and Article 25 (tidal wetlands) of the New York State Environmental Conservation Law (NYSECL). Adjacent upland areas (100 feet from freshwater wetlands and 300 feet or the 10 foot elevation mark from tidal wetlands) are also regulated by Articles 24 and 25 of NYSECL.

Relatively few riparian wetlands remain as a result of dense commercial and residential development within the watershed, including a rock retaining wall and riprap that lines much of the length of both the Mamaroneck and Sheldrake rivers. It is estimated that nearly 60% of wetlands that occurred within the Mamaroneck River Watershed have been destroyed (Westchester County 2001). The NYSDEC (1974) Tidal Wetlands Inventory Maps indicate tidal wetlands within the Project area boundary (Figure 9). These tidal wetlands are shown in small areas along the Project area boundary in the East and West basins of the Mamaroneck Harbor and are comprised of: Coastal Shoals, Bars and Mudflats (2010 SM); Littoral Zone (2020 LZ); and Intertidal Marsh (3000 IM). The NYSDEC (2011a) Freshwater Wetland Map does not indicate any wetlands within the Project area boundary. The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory map indicates a single freshwater wetland within Columbus Park, which is classified as a freshwater pond (Figure 10) (USFWS 2015). Additionally, there are tidal habitats along the East and West basins of the Mamaroneck Harbor classified as estuarine subtidal unconsolidated bottom, subtidal wetlands (E1UBL).

A wetland delineation field survey was conducted in May 2011 (USACE New York District 2012a). At the time of this survey, access (i.e., right of entry) was granted for approximately 5% of the parcels that comprised the survey area; however many areas were able to be evaluated from bridge crossings and public access points. During the field survey, a single, small (0.03 acre) palustrine forested (PFO) wetland (Wetland 002-W1) was identified and mapped within the northern part of the study area boundary in the Town of Harrison, across from Harbor Heights section of the Village (Figure 11).

Small pockets of riparian areas consisting of possible palustrine scrub-shrub (PSS) and palustrine emergent (PEM) wetland were observed (based only on visual identification) on parcels where access had not been granted and also within the stream channel where sediment had accumulated along an existing retaining wall or section of riprap. These riparian areas were predominantly linear features located along the streambanks. Additional wetlands likely occur in the larger forested tracts that are present in the southwest, central, and northern parts of the Project area, but were not accessible (i.e., no right of entry was obtained) at the time of survey.

Although small tidal wetlands (i.e., salt marshes) occur to the west of the Project area along the west side of the West Basin of Mamaroneck Harbor, no tidal wetlands were documented within

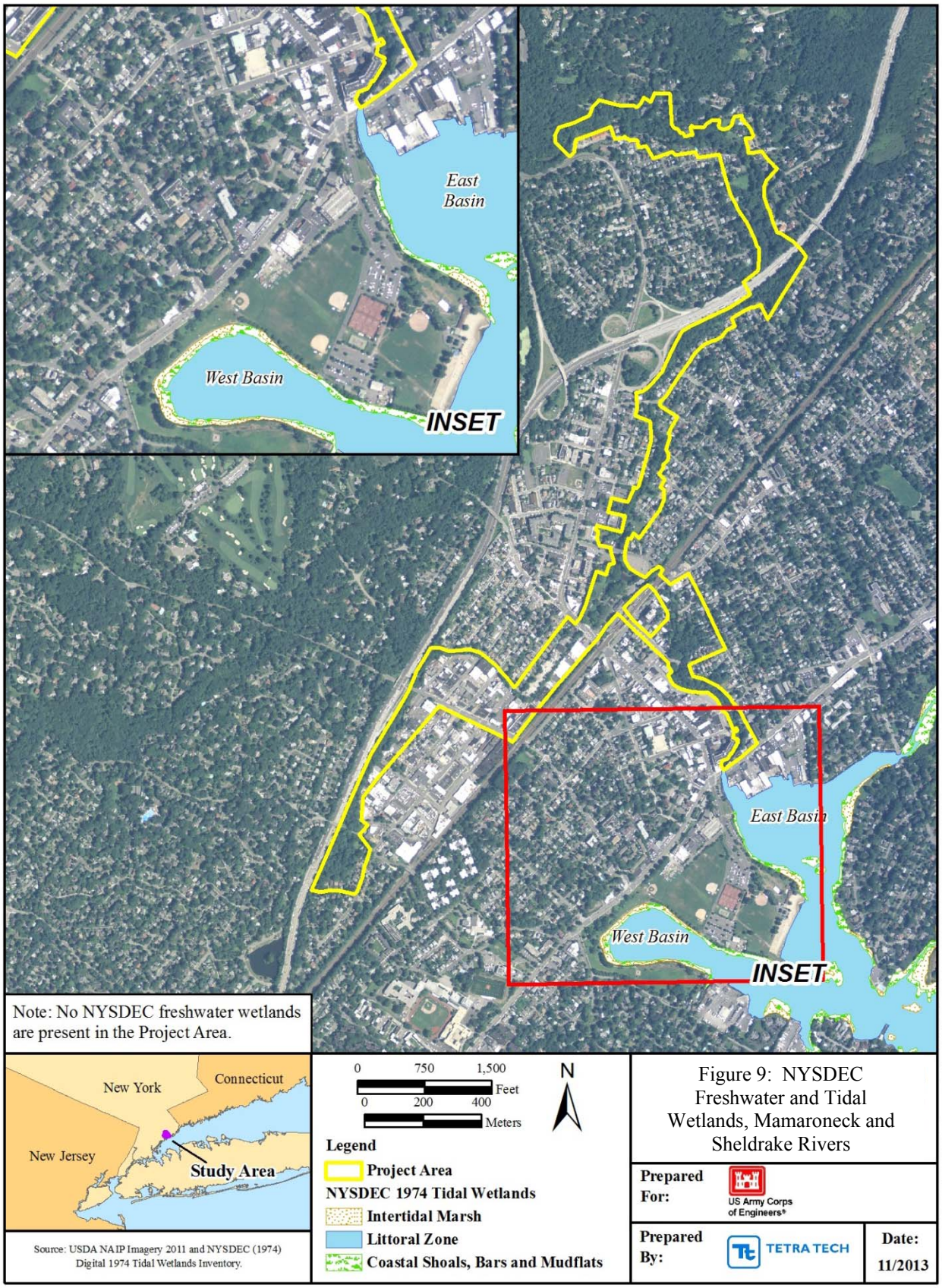


Figure 9: NYSDEC Freshwater and Tidal Wetlands, Mamaroneck and Sheldrake Rivers

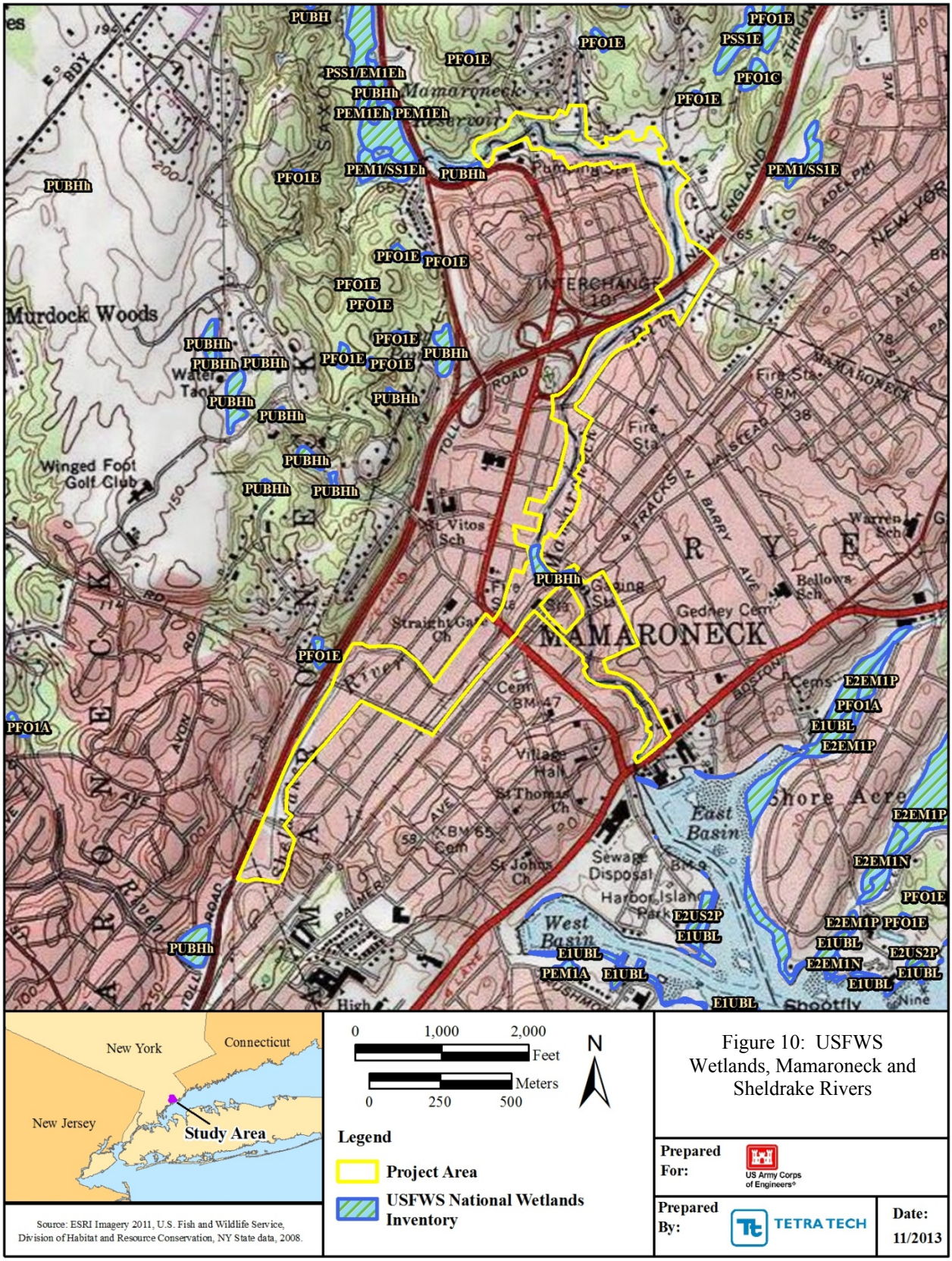
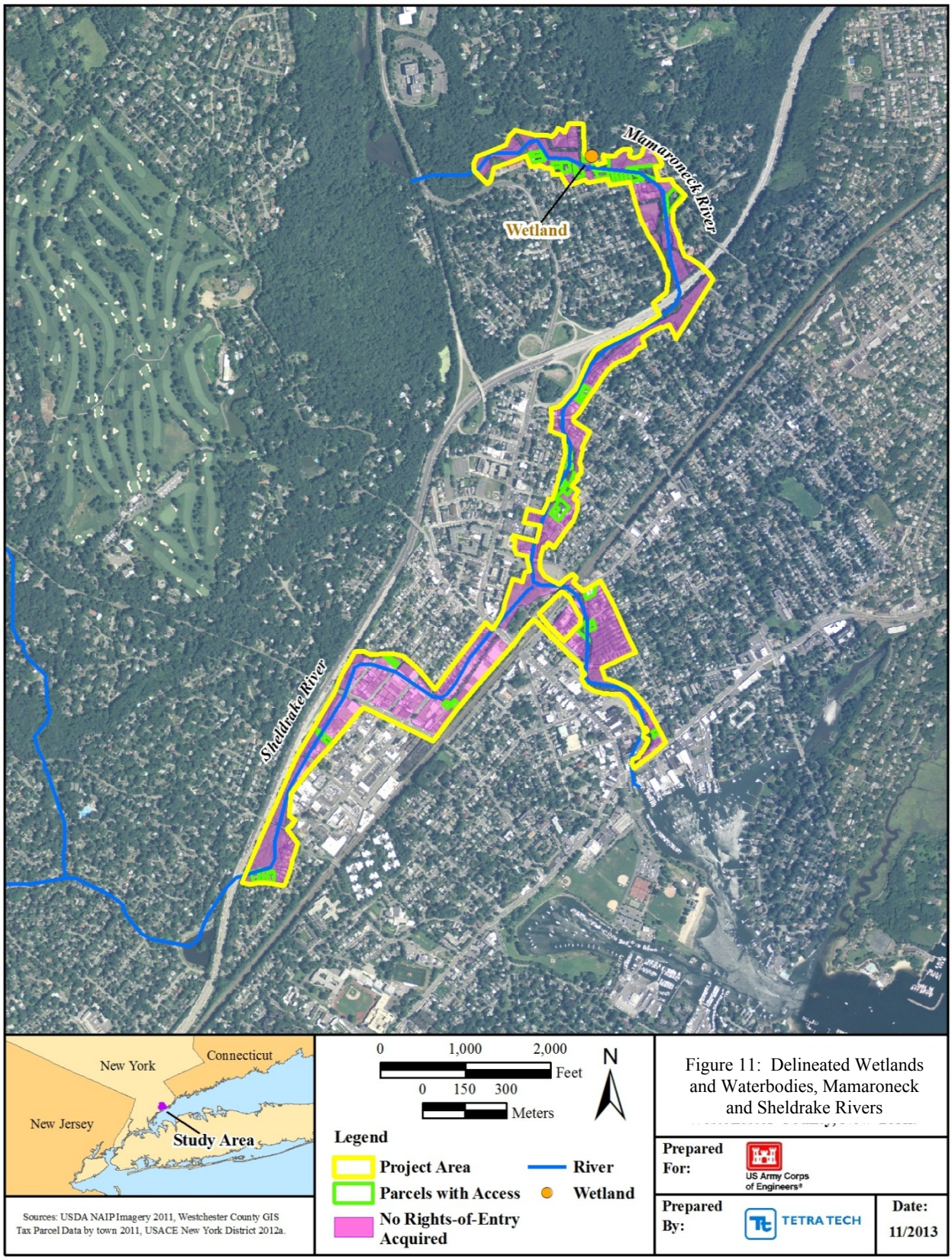


Figure 10: USFWS Wetlands, Mamaroneck and Sheldrake Rivers


Mamaroneck River
Wetland
Sheldrake River
New York
Connecticut
New Jersey
Study Area
Sources: USDA NAIP Imagery 2011, Westchester County GIS Tax Parcel Data by town 2011, USACE New York District 2012a.
0 1,000 2,000 Feet
0 150 300 Meters
N
Legend
Project Area
Parcels with Access
No Rights-of-Entry Acquired
River
Wetland
Figure 11: Delineated Wetlands and Waterbodies, Mamaroneck and Sheldrake Rivers
Prepared For:
US Army Corps of Engineers®
Prepared By:
TETRA TECH
Date: 11/2013
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the project area in the east or west basin. As in the other sections of the project area, a vertical seawall and development, including a marina, line the harbor.

3.5 VEGETATION

3.5.1 Uplands

The majority of upland within the Project area is commercial, residential, or transportation development. Vegetated uplands are mostly maintained lawns dominated by a variety of common native and nonnative grass species. A narrow band of vegetation lines the Mamaroneck and Sheldrake rivers. Larger swaths of upland and floodplain forests and shrub-dominated areas do occur in some sections, primarily in the north and west sections of the Project area as well as in the several of the Village's parks and natural areas. Common tree species that occur in upland forests include tulip poplar (*Liriodendron tulipifera*), Norway maple (*Acer platanoides*), American sycamore (*Platanus occidentalis*), red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black cherry (*Prunus serotina*), box elder (*Acer negundo*), American beech (*Fagus grandifolia*), and sugar maple (*Acer saccharum*). Common shrub and vine species include multiflora rose (*Rosa multiflora*), Asiatic bittersweet (*Celastris orbiculatus*), and Japanese honeysuckle (*Lonicera japonica*), and herbaceous species include garlic mustard (*Alliaria petiolata*), bittersweet nightshade (*Solanum dulcamara*), and violets (*Viola* species [spp.]). Japanese knotweed (*Polygonum cuspidatum*) was especially abundant throughout the Project area along the banks of both the Mamaroneck and Sheldrake rivers (USACE New York District 2012a).

A geographic information system analysis of mature trees located within the Project area footprint identified less than six non-contiguous, linear acres of mature trees.

3.5.2 Wetlands

Wetland communities are relatively uncommon within the Project area due in large part to development in the surrounding area as well as the rock retaining wall and riprap that lines much of the Mamaroneck and Sheldrake rivers. However, seasonally-flooded forested wetlands are likely scattered throughout the Project area, particularly in the northern sections.

The PFO wetland found across from the Harbor Heights section, is dominated by common wetland plant species such as red maple (*Acer rubrum*), green ash (*Fraxinus pensylvanica*), spicebush (*Lindera benzoin*), skunk cabbage (*Symplocarpus foetidus*), and sweet white violet (*Viola incognita*) (USACE New York District 2012a) (Figure 11). Several PSS/PEM wetland communities occur in small patches along both the Mamaroneck and Sheldrake rivers. Common species in the PSS communities include arrowwood (*Viburnum recognitum*), speckled alder (*Alnus incana* ssp. *rugosa*), dogwoods (*Cornus* spp.), green ash (*Fraxinus pensylvanicum*), willows (*Salix* spp.), spotted jewelweed (*Impatiens capensis*), sedges (*Carex* spp.), and yellowflag iris (*Iris pseudocorus*) (USACE New York District 2012a). Vegetation for the PuBHh wetland in Columbus Park consists of Japanese knotweed (*Fallopia japonica)*, garlic mustard (*Allliaria petiolata)*, multiflora rose (*Rosa multiflora)*, box elder (*Acer negundo)*, willow (*Salix babylonica)*, black locust (*Robinia pseudoacacia)* and Norway maple (*Acer platanoide.).*

3.5.3 Rare, Threatened, Endangered and Special Concern Species

A rare, threatened, and endangered plant survey has not been conducted for the study area. Approximately 150 New York State special status species are known to or have the potential to occur in Westchester County (Young 2010 and Appendix A). Review of the Federal threatened and endangered species lists available for Westchester County did not identify any Federally-listed plant species with the potential to occur in the study area (USFWS 2012; USFWS 2015). The study area also was analyzed using the NYSDEC Environmental Resource Mapper, which displays the location of all State listed species in New York (NYSDEC n.d.). This desktop review did not identify any known occurrences or observations of rare plants within the study area. The draft Fish and Wildlife Coordination Act Report (FWCAR) did not identify any federally-listed or proposed species that are identified as having the potential to occur in the project area. In addition, there is no federally-designated critical habitat within the Project area (USFWS 2015; Appendix A). Due to the highly developed nature of the study area, and the limited amount of quality, suitable habitat to support rare plant species, state or Federal rare, threatened, and endangered species are not likely to occur.

3.6 FISH AND WILDLIFE

3.6.1 Shellfish

Little historical information is available on the history of shellfishing within Mamaroneck Harbor; however, historically the western area of Long Island Sound was a prime area for shellfishing including clams (class Pelecypoda), oysters and mussels (class Bivalvia), and scallops (family Pectinidae). Long Island Sound had a well-known oystering trade from the 19th century into the early 20th century (Long Island Sound Study [LISS] 2013a). Oyster harvests plummeted in the 1990s due to a parasitic disease; however, the oyster population in Long Island Sound has shown signs of improvement as impacts from this disease have subsided (LISS 2010). Oyster populations were again impacted from substantial sedimentation within the Sound from Hurricane Irene in 2011 and Hurricane Sandy in 2012 (LISS 2012). Lobster populations in the Sound also have been subject to drastic declines; however, this species has not shown any recent signs of improvement (LISS 2010).

Shellfish harvesting for consumption purposes in Mamaroneck Harbor, just below the reach of the Mamaroneck River located in the Project area, is designated as uncertified for the taking of shellfish for use as food. Although neither the harbor nor lower Mamaroneck River include shellfishing as an appropriate use, other recreational uses are considered to be impacted based on pathogen monitoring in shellfish (NYSDEC 2010). Shellfish that are available for harvesting within western Long Island Sound are likely contaminated with pollutants, and thus are unsafe for human consumption. 1 New York Codes, Rules and Regulations, Part 41 states that all shellfish landings from several New York counties, including Westchester County are "*in such sanitary condition that the shellfish thereon shall not be taken for use as food and such are designated as uncertified areas except for those shellfish lands listed below in subdivision (b)* [regional areas of the Atlantic Ocean] *which are designated as certified*" (NYSDEC 2011b). Atlantic jackknife clam (*Ensis directus*), softshell clam (*Mya arenaria*), and hard clam (*Mercenaria mercenaria*) are associated with the shoal areas located along the north side of Harbor Island Park; however, consumption of these species is not recommended due to contaminated sediments. Approximately 73% of the 66,000 ac (26,709 ha) of productive

shellfishing beds in New York have been closed or subject to harvesting limits since 1990 (Westchester County Board of Health 2002).

The ongoing LISS has been evaluating the historic trends of several indicator species of shellfish, including horseshoe crab (*Limulus polyphemus*), American lobster (*Homarus americanus*), hard clam, and eastern oyster (*Crassostrea virginica*). The LISS website contains detailed abundance and trend data for these species (LISS 2013b)[2]. New York conducts ongoing reviews of shellfishing areas to evaluate improvements in or degradation of water quality, and the population status of live clams, oysters, mussels, and scallops, to determine if closures or shellfishing limits should be modified. In New York most certified shellfishing beds are located in open areas of Long Island Sound and away from stormwater discharges.

3.6.2 Finfish

Fish diversity in the Mamaroneck River Watershed is expected to be low due to poor water quality and insufficient flows that are not favorable to natural fish propagation, particularly for game fish species; insufficient base flow resulting in low flow conditions during portions of the year; relatively poor stream cover along sections of the river that are heavily populated/urbanized; and a high level of suspended sediments in the water column and sedimentation (Westchester County 2001 and USACE New York District 2011a).

Studies conducted by Westchester County during the mid-1980s identified 15 freshwater fish species that are likely to occur within the Mamaroneck River Watershed, upstream of I-95. Freshwater fish species expected to occur in the study area include redbreast sunfish (*Lepomis auritus*), pumpkinseed, and minnows (family Cyprinidae), and the study area is reported to support a warmwater recreational fishery for common (white) suckers (*Catostomus commersonii*) and pumpkinseed (*Lepomis gibbous*) (USACE New York District 1989d).

A fish survey conducted within the study area of the Mamaroneck and Sheldrake rivers in 2011 identified American eel, bluegill (*Lepomis macrochirus*), green sunfish (*L. cyanellus*), redbreast sunfish, pumpkinseed, brown bullhead (*Ameiurus nebulosus*), largemouth bass (*Micropterus salmoides*), tessellated darter (*Etheostoma olmstedi*), and white sucker (USACE New York District 2011e). The most abundant species collected within the Mamaroneck River just upstream from Columbus Park were American eel (approximately 49% of total catch), redbreast sunfish (approximately 34% of total catch), and white sucker (approximately 8% of total catch). The most abundant species collected within the Sheldrake River at Columbus Park were tessellated darter (approximately 46% of total catch), white sucker (approximately 21% of total catch), American eel (approximately 16% of total catch), and pumpkinseed (approximately 12% of total catch).

USEPA'S Rapid Bioassessment Protocol (RBP) for wadeable streams and rivers is a single ecologically-based index used for fish assemblage assessment that is based on the zoogeographic, ecosystem, community, and population aspects of the fish composition. The fish RBP survey produces an objective discrete measure of the condition of the fish assemblage from which an Index of Biological Integrity (IBI) can be generated. Data provided by the fish RBP and the IBI can serve to assess use attainment, develop biological criteria, prioritize sites for

[2] See: http://longislandsoundstudy.net/category/status-and-trends/living-marine-resources/

further evaluation, provide a reproducible impact assessment, and evaluate status and trends of the fish assemblage (Barbour et al. 1999). Based on the analysis of fish species collected during the 2011 fish survey within the study area, water quality within the Mamaroneck and Sheldrake rivers is marginal as it pertains to aquatic resource habitat and water quality based on the RBP criteria. Based on the 2011 fish data collected, both of the reaches sampled in the study area had an IBI of poor. According to a New Jersey Department of Environmental Protection Fish IBI Report (New Jersey Department of Environmental Protection 2008), rivers and streams in the "poor" category have low species richness and are dominated by generalists and tolerant species, with no piscivores (excluding eels). None of the fish collected in the 2011 survey exhibited signs of disease or parasites, or had any observed deformities, erosion, lesions, or tumor anomalies.

The Westchester County studies identified approximately 60 estuarine fish species that are likely to occur within estuaries that form the north shore of Long Island Sound, including Mamaroneck Harbor (Westchester County 2001). Mamaroneck Harbor supports a small snapper (family Lutjanidae) and bluefish (*Pomatomus saltatrix*) fishery, and a diminished seasonal fishery for striped bass (*Morone saxatilis*) and tautog (*Tautoga onitis*) within the outer harbor area. Species associated with the benthos include American eel (*Anguilla rostrata*), stickleback (family Gasterosteidae), oyster toadfish (*Opsanus tau*) sculpin (superfamily Cotttoidea), killifish (*Fundulus* spp.), flounder (family Pleuronectidae), and various other underutilized fish. Recreational fisheries include flounder, rainbow smelt (*Osmerus mordax mordax*), and snappers. Large schools of bunkers (*Brevoortia patronus*) can be found within Mamaroneck Harbor during the summer. Fish diversity would be expected to increase toward the outer harbor and Long Island Sound, as water quality is generally better in open water areas.

The New York State Department of Health (NYSDOH) has issued precautionary health advisories recommending limited consumption of American eel, bluefish, striped bass, and weakfish (*Cynoscion regalis*) from Long Island Sound and tributary waters, including Mamaroneck Harbor, due to possible elevated levels of PCBs (NYSDEC 2010). These advisories are largely precautionary and are related to the specific habits and characteristics of these species, specifically their wide migratory range, predatory nature, and high lipid/fat content, which make them more likely to accumulate contaminants. Because possible contamination is more a result of the migratory range and other factors rather than any known sources of PCBs in this waterbody, fish consumption use in this segment is considered to be stressed. In addition, for some species the advisories recommend limiting consumption to no more than one meal per week, which is no more stringent than the general statewide advisory for all New York waters and does not result in significant impact to uses. Health advisories regarding the consumption of fish are revised regularly. The most current advisories are available on the NYSDOH website (NYSDOH 2013a):

http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/regional/.

Fish consumption in the section of the Mamaroneck River located upstream from Route 1 is considered stressed due to pesticides. Sampling conducted by NYSDEC identified two sites that contained elevated levels of dichlorodiphenyltrichloroethane (DDT) and chlordane, and results suggest fish in this section of the river are contaminated with levels of chlordane above the U.S. Food and Drug Administration limit (NYSDEC 2010). Fish consumption in the Sheldrake River

is considered impaired, and due to elevated chlordane and dieldrin levels and the NYSDOH has issued a health advisory recommending American eel not be consumed, and for goldfish (*Carassius auratus*) to be consumed no more than once per month (NYSDEC 2010 and NYSDOH 2013b). The source of this contamination is considered to be contaminated sediment resulting from past applications of these pesticides emanating from both point and non-point sources. For all freshwater fish species the NYSDOH recommends consuming no more than four meals a month (NYSDOH 2013b).

3.6.3 Benthic Resources

Benthic resources are described as the community of plants and animals that reside on or in the bottom sediments of oceans, streams, and wetlands. In general, water quality in the Mamaroneck River is considered to be poor and aquatic life is not fully supported in the river. A stream bioassessment of the Mamaroneck River conducted by NYSDEC in 2000 determined that macroinvertebrate communities are moderately impacted by poor water quality caused by urban stormwater runoff (USACE New York District 2011a).

A benthic macroinvertebrate survey conducted within the Mamaroneck and Sheldrake rivers in 2011 in support of the Project established existing conditions for benthic macroinvertebrate assemblages, and assessed the impacts to these species and their habitat resulting from the implementation of the proposed flood management measures (USACE New York District 2011e). Benthic macroinvertebrate survey locations within the study area included a segment of the Mamaroneck River located just upstream from Columbus Park, and within the Sheldrake River at Columbus Park. A reference reach also was surveyed within the Mamaroneck River in White Plains, New York. Benthic survey data was collected using a multi-habitat approach. Data analysis of the collected benthic macroinvertebrate data included use of several "biometrics" to measure components of community structure, and were based on the New Jersey Impairment Score (NJIS) (New Jersey Department of Environmental Protection 2000 and 2007). The NJIS was selected because New York State does not have a biological index for macroinvertebrates collected using a multi-habitat sampling approach. In addition, the NJIS provides a composite score of several biometrics that have been used to determine the impairment level of comparable environments surveyed by the USACE (USACE 2010).

Based on the results and metrics analysis conducted for the benthic macroinvertebrates collected within the Mamaroneck and Sheldrake rivers, water quality was considered moderately impaired according to NJIS rankings, and the habitat was determined to be of "marginal" condition based on USEPA physical habitat assessment criteria (Barbour et al. 1999). According to the Hilsenhoff (family) Biotic Index results, water quality within the Mamaroneck River was considered fair, and water quality within the Sheldrake River was considered fairly poor. Based on habitat, geographic location, and water quality characteristics, the Mamaroneck and Sheldrake rivers are considered marginal in terms of aquatic resource habitat and water quality based on the RBP criteria (Barbour et al. 1999). Generally, results from the 2011 benthic macroinvertebrate survey were consistent with this classification. Based on the NJIS rating, all reaches sampled were considered moderately impaired with the Sheldrake Reach earning the worst score.

NYSDEC has identified the segments of the Mamaroneck and Sheldrake Rivers that are located in the Project area as impaired (see Water Quality discussion in Section 3.4.2). Macroinvertebrate samples collected as part of the study were dominated by facultative species

or species classified as having a high tolerance to pollution. Benthic resources information for Mamaroneck Harbor is lacking.

An assessment of contaminant levels in sediment samples collected from seven sites located within harbors of Long Island Sound in the 1980s identified Mamaroneck Harbor as having the second highest level of contaminated sediments of the sites surveyed, and all sites located within western Long Island Sound having the highest contamination levels (Turgeon and O'Connor 1991). A macroinvertebrate assessment of Mamaroneck River near Ward Avenue conducted in 2008 indicated moderately impacted conditions, with sensitive macroinvertebrate species markedly reduced or missing within the samples collected, and distribution of major groups significantly unbalanced relative to what would be expected (NYSDEC 2010). Samples were dominated by more tolerant species, nutrient biotic index indicated elevated enrichment, and impact source determination revealed the fauna to be most similar to communities influenced by nonpoint municipal and industrial sources, nonpoint toxics from urban sources/stormwater runoff, and organic loads and low DO from sewage or animal wastes. These results are consistent with macroinvertebrate sampling conducted in the river in 1999 at multiple sites surveyed in the Mamaroneck River between Mamaroneck and White Plains (NYSDEC Division of Water 1999). Sampling results in the 1999 survey also indicated water quality to be moderately impacted at all sites, with multiple sources of impacts identified including nutrient additions, organic wastes, complex (municipal/industrial) sources, and siltation.

Benthic resources data for the Sheldrake River are lacking but would likely show similar water quality and benthic composition as described for the Mamaroneck River.

3.6.4 Reptiles and Amphibians

The Mamaroneck and Sheldrake rivers and adjacent riparian areas—where present—provide habitat for common amphibian and reptile species. Four species of herpetofauna were observed within the Project area during field surveys conducted in May 2011: eastern painted turtle (*Chrysemys picta*), red-eared slider (*Trachemys script elegans*), snapping turtle (*Chelydra serpentina*), and green frog (*Lithobates clamitans*) (field notes [in support of USACE New York District 2012a], May 24, 2011). Although all of these species were observed along the Sheldrake River, it is likely they occur within the Project area along the Mamaroneck River as well, particularly where vegetated buffers are present.

Records collected for the New York State Herp Atlas (NYSDEC 2011c) indicate that fourteen additional species of reptiles and amphibians occur in proximity to the Project area and can reasonably assumed to be present where appropriate habitat exists. These species include, but are not limited to, northern redback salamander (*Plethodon cinereus*), Fowler's toad (*Bufo fowleri*), northern spring peeper (*Pseudacris crucifer*), pickerel frog (*Lithobates palustris*), eastern box turtle (*Terrapene carolina*), common garter snake (*Thamnophis sirtalis*), and eastern milk snake (*Lampropeltis triangulatum*).

3.6.5 Birds

Site specific studies and/or surveys describing the diversity and abundance of birds within the Project area are not available. However, information exists on bird species composition from local, county, and regional sources found online as well as in previous reports. Many common

bird species that are typical of a suburban habitat have been recorded in the vicinity of the Project area. Nearby coastal wetlands and coastal bays provide habitat for shorebirds, waterfowl, and seabirds. Coastlines are typically used by passerines and raptors during migration. Nearby parks, coastal habitats, and protected (for conservation) coastal habitats can provide migratory stopover habitat.

Bird species observed within the Project area during field efforts include black-crowned night heron (*Nicticorax nictiocorax*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), mallard (*Cathartes aura*), bluejay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), gray cat (*Dumetella carolinensis*), Carolina wren (*Thryothorus ludovicianus*), eastern peewee (*Contopus virens*), black-capped chickadee (*Parus atricapillus*), red-eyed vireo (*Vireo olivaceus*), song sparrow (*Melospiza melodia*), rufous-sided towhee (*Pipilo erythrophthalmum*), grackle, and scarlet tanager (*Piranga olivacea*) (field notes [in support of USACE New York District 2012a], May 24, 2011). Other species that may be expected to utilize the narrow riparian corridors and isolated forest fragments that occur in the Project area for nesting or during migration include, but are not limited to, belted kingfisher (*Megaceryle alcyon*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), flicker (*Colaptes auratus*), nuthatches (*Sitta* spp.), and several species of sparrows, warblers, and hawks (*Accipiter* spp.) (Greenburgh Nature Center 2003). Species that were observed or that may be expected to occur in the bay habitat that occurs within the East and West basins include several species of gulls (*Larus* spp.), and waterfowl and coastal seabirds such as mallards, black ducks (*Anas rubripes*), double-crested cormorants (*Phalacrocorax auritus*), loons (*Gavia* spp.), grebes (*Podiceps* spp.), and red-breasted merganser (*Mergus serrator*) (Coastal Research and Education Society of Long Island2013).

The USFWS Information for Planning and Conservation (IPaC) website identified 26 species of migratory birds that may be within the proposed project area utilizing the habitat year round for breeding or wintering purposes. These species include one state-endangered species, the short-eared owl (*Asio flammeus)* and five state-threatened species: upland sandpiper (*Bartramia longicauda)*; pied-billed grebe (*Podilymbus podiceps)*; least tern (*Sternula antillarum)*, least bittern (*Ixobrychus exilis)*; and the bald eagle (*Haliaeetus leucocephalus)*. Five are listed as a state species of special concern: American bittern (*Botaurus lentiginosus*); black skimmer (*Rynchops niger*), cerulean warbler (*Dendroica cerulean*); golden-winged warbler (*Vermivora chrysoptera*); and the seaside sparrow (*Ammodramus maritimus*) (USFWS 2015).

Nearly all migratory bird species that have the potential to occur in the study area are protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703–712). Under the MBTA, Federal project proponents are required to comply with the provisions of the MBTA that do not allow intentional or unintentional take of migratory birds.

3.6.6 Mammals

Five species of mammals were observed within the Project area during field surveys conducted in May 2011 (field notes [in support of USACE New York District 2012a], May 24, 2011). The species observed directly include eastern gray squirrels (*Sciurus carolinensis*), eastern chipmunks (*Tamias striatus*), muskrat (*Ondatra zibethicus),* and eastern cottontail rabbit (*Sylvilagus floridanus*). Tracks of two additional species also were observed; whitetail deer (*Odocoileus virginianus*) tracks were present along the stream edge at the northern end of the

Project area near the reservoir, and raccoon (*Procyon lotor*) tracks were frequently observed along the edges of both the Mamaroneck and Sheldrake rivers.

Additional mammalian species have been documented at the nearby Greenburgh Nature Center in southern Westchester County and also likely occur within the Project area where suitable habitat exists. These species may include common species such as Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), woodchuck (*Marmota monax*), house mouse (*Mus musculus*), white-footed mouse (*Peromyscus leucopus*), hoary bat (*Lasiurus cinereus*), and little brown bat (*Myotis lucifugus*) (Greenburgh Nature Center 2003).

3.6.7 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA [PL 94-265]), as amended, is the primary law governing the conservation and management of fisheries in Federal waters of the United States. The MSFCMA, enacted in 1976, created eight regional fishery management councils that are responsible for regional conservation and management of Federally-managed fish species. The MSFCMA was amended in 1996, which required fishery management councils to identify essential fish habitat (EFH) that is necessary for Federally-managed fish species to perform their basic life functions (NOAA Fisheries Service 2007). The regional fisheries management council responsible for consultation regarding impacts to EFH within the study area is the Mid-Atlantic Fishery Management Council.

NOAA Fisheries Service defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA Fisheries Service 2007, p. 1). Habitat Areas of Particular Concern are a subset of EFH and represent EFH areas that provide extremely important ecological functions and/or are especially vulnerable to degradation. A formal EFH analysis of the study area has not been conducted; however, a review of EFH designations available on NOAA Fisheries Service's EFH-mapper website did not identify any EFH or Habitat Areas of Particular Concern within the study area (NOAA Fisheries Service Habitat Conservation Division n.d. a). However, the EFH summary for the area that includes Mamaroneck Harbor identifies 16 fish species with designated EFH (NOAA Fisheries Service Habitat Conservation Division n.d. b).

3.6.8 Rare, Threatened, Endangered and Special Concern Species

Review of the Federal threatened and endangered species lists available for Westchester County identified three Federally listed species that have the potential to occur in the county: the Federally endangered Indiana bat (*Myotis sodalis*) and the Federally threatened bog turtle (*Clemmys muhlenbergii*), and the northern long-eared bat (*Myotis septentrionalis*) (also known as northern myotis and eastern long-eared bat) (USFWS 2012). Two additional species with the potential to occur in Westchester County are New England cottontail (*Sylvilagus transitionalis*), a Federal candidate species for listing; and the bald eagle (*Haliaeetus leucocephalus*). Although the bald eagle has been Federally delisted, it is still protected by the Bald and Golden Eagle Protection Act (16 USC 668–668c) and the MBTA. Habitat to support New England cottontail, bald eagle, and bog turtle are not present in the study area. Although the study area may contain suitable roosting and foraging habitat for Indiana bat and northern long-eared bat (NYSDEC 2013f), the developed and urbanized nature of the Project area (e.g., high ambient light levels;

lack of large, contiguous forested blocks) substantially lower the likelihood for Indiana bat and northern long-eared bat to be present.

In accordance with the Fish and Wildlife Coordination Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq*.) USFWS prepared a draft FWCAR (USFWS 2015; Appendix C). The FWCAR noted that there are no federally-listed or proposed species that are identified as having the potential to occur in the project area. In addition, there is no federally-designated critical habitat within the proposed project area.

A review of the study area using the NYSDEC Environmental Resource Mapper tool did not identify any state listed wildlife species (NYSDEC n.d.).

3.7 SOCIOECONOMICS

3.7.1 Demographic Characteristics

The population of the Village of Mamaroneck fluctuated slightly between 1970 and 2010, experiencing a decline between 1970 and 1990, followed by an increase over the next 20 years that returned the population to the 1970 level (Westchester County Department of Planning 2010a) (Table 4). Although the total change in population in the Village of Mamaroneck during this time was only 0.4%, three neighboring municipalities experienced decreases in population, and the Town of Harrison experienced a massive 27.5% increase between 1970 and 2010. With an average of 5,736 people per square mile, the Village of Mamaroneck is the eleventh densest municipality in Westchester County, which averages 2,205 people per square mile. The Village's population density remained fairly steady between 2000 and 2010 (Westchester County Department of Planning 2010b).

Table 4. Population Changes (1970–2010) in the Village of Mamaroneck and Surrounding Environs for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

	Population 1970	Population 1980 (% Δ)*	Population 1990 (% Δ)*	Population 2000 (% Δ)*	Population 2010 (% Δ)*	% change 1970–2010
Village of Mamaroneck	18,852	17,616 (-6.5%)	17,325 (-1.7%)	18,752 (8.2%)	18,929 (0.9%)	0.4%
Town of Mamaroneck	13,002	12,428 (-4%)	11,231 (-10%)	11,141 (-1%)	11,977 (8%)	-7.9%
Village of Larchmont	7,203	6,308 (-12%)	6,181 (-2%)	6,485 (5%)	5,864 (-10%)	-18.6%
City of Rye	15,869	15,083 (-5%)	14,936 (-1%)	14,955 –	15,720 (5%)	-0.9%
Town of Harrison	21,544	23,046 (7%)	23,308 (1%)	24,154 (4%)	27,472 (14%)	27.5%
Westchester County	894,104	866,599 (-3%)	874,866 (1%)	923,459 (6%)	949,113 (3%)	6.2%

* % Δ = percent of population change since previous U.S. Census record

Source: Westchester County Department of Planning 2010a

Racial population trends in the Village of Mamaroneck mirror county-wide demographic changes. The Village's white population, although still a large majority, has been steadily decreasing over the years (76.8% in 2010, down from 84.6% in 2000), with the proportion of Asian residents increasing slightly (4.9% in 2010, up from 3.5% in 2000), and the black or African American population remaining steady (4.1% in 2010 and 2000) (Table 5) (U.S. Census Bureau 2000a and 2000b, Westchester County Department of Planning 2010c). Recent population gains in Westchester County have largely been fueled by increases in persons who identify as Hispanic or Latino ethnicity, which constitute 22% of the county's population (Westchester County Department of Planning 2013). Between 2000 and 2010 every municipality in the county recorded a gain in Hispanic residents, including the Village of Mamaroneck whose Hispanic population increased from 3,284 in 2000 (17.5% of total population) to 4,602 in 2010 (24.3%), nearly one quarter of the Village's total population (Table 5) (Westchester County Department of Planning 2010c).

Table 5. Race and Ethnicity Changes (2000–2010) in the Village of Mamaroneck and Westchester County for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

	Village of Mamaroneck Percent of Population		Westchester County Percent of Population	
	2000	2010	2000	2010
White (alone)	84.6	76.8	71.4	68.1
Black or African American (alone)	4.1	4.1	14.2	14.6
Asian (alone)	3.5	4.9	4.5	5.5
American Indian and Alaska Native (alone)	0.2	0.3	0.3	0.4
Native Hawaiian and Other Pacific Islander (alone)	0.1	0.1	0.04	0.04
Other race (alone)	4.8	10.9	6.6	8.3
Two or more races	2.6	3.1	3.1	3.2
Total persons of Hispanic or Latino origin[1]	17.5	24.3	15.6	21.8

[1] Hispanics or Latinos may be of any race, and thus also are included in applicable race categories.

Sources: U.S. Census Bureau 2000a and 2000b, Westchester County Department of Planning 2010c

3.7.2 Economy and Income

The majority of residents work outside of the Village of Mamaroneck within Westchester County, which boasts nearly 34,000 firms (including the headquarters of more than 170 businesses) and approximately 400,000 employees (Westchester County Department of Planning 2012). Residents' commutes to work average approximately 30 minutes, and from 2007 to 2011 approximately 65% traveled by automobile, 23% by public transportation, and the remainder commuted via other means or worked at home (U.S. Census Bureau 2011a). The Village has a mixed workforce of both white- and blue-collar jobs: 49% of the Village's residents are employed in management occupations; 19% are employed in sales and office occupations; 17%

in service occupations; 9% in natural resources, construction, and maintenance; and 7% in production and transport (U.S. Census Bureau 2011a).

As reported by the County in 2004, there were six employers in the Village with more than 200 employees (Village of Mamaroneck 2012b). The largest employer as of 2004 is the Mamaroneck Union Free School District with 812 people working in the Village's elementary and secondary schools, followed by the Sarah Neuman Center for Health (400 employees) (Village of Mamaroneck 2012b).

The average per capita annual income in the Village of Mamaroneck from 2007 to 2011 (the most recent years for which these data are available) was $51,825, slightly higher than the average income in Westchester County ($48,306) during the same period. This also was the case for median household income between 2007 and 2011, which averaged $85,801 in Mamaroneck and $80,725 county-wide. The percent of people below the poverty line during the years 2007–2011 was significantly lower in the Village of Mamaroneck (5.1%) than in Westchester County (8.9%) (U.S. Census Bureau 2013a and 2013b).

The northern section of the Village's central business district and the industrial area along Fenimore Road are especially vulnerable to riverine flooding during storms. The April 2007 flood damaged more than 100 commercial structures, affected hundreds of businesses, and caused significant transportation delays and losses of income (USACE New York District 2011a). The total economic loss estimated for a 500-year return hurricane is more than $1.2 billion, $283 million of which is due to the interruption of business in the Village (Village of Mamaroneck 2012a). Estimates for downtime losses for commercial/industrial properties from flood damages exceed $1 million in the 100-year flood zone and $275,220 in the 500-year flood zone (Village of Mamaroneck 2012a).

3.7.3 Housing

Residential uses account for the vast majority of Mamaroneck Village's land area, and single family housing in the Village includes waterfront estates, suburban developments, apartment houses, townhouse complexes, condominiums, apartments above storefronts, and single- and two-family houses (Village of Mamaroneck 2012b). There were a total of 7,512 housing units[3] in the Village of Mamaroneck in 2010, which represents an increase of 1,030 units (nearly 16%) since 1980 (Village of Mamaroneck 2012b). The largest increases in housing units between 1990 and 2010 took place in Census Tract 72, which includes the Village Center neighborhood bordering the Mamaroneck River to the west (below its confluence with Sheldrake River), just before it drains into the harbor. The highest percentage of housing units were built in 1939 or earlier, the lowest percentage of housing units were built in 2005 or later, and the median year housing units were constructed was 1952 (U.S. Census Bureau 2011b). The median value of owner-occupied housing units from 2007 to 2011 was $584,600, up from approximately $317,900 in 2000; this is significantly higher than the median value in Westchester County ($301,000) during the same period (U.S. Census Bureau 2013a and 2013b).

[3] As defined by the U.S. Census Bureau, a housing unit may be a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or is intended for occupancy if vacant) as separate living quarters.

A major objective of the Project is to reduce the flood risks and associated urban damages from floods within the study area. The Mamaroneck and Sheldrake Rivers Basin is heavily urbanized and developed. Approximately 13.4% and 6.1% of Village properties would be at risk from a 100-year and a 500-year flood event, respectively (Table 6); major impacts would result from flooding of single residential homes (Village of Mamaroneck 2012a). The total value of properties estimated to be at risk from 100-year flood damage is about $579 million; the 500-year flood would result in a risk of about $266 million (Village of Mamaroneck 2012a).

The lower reaches of the Mamaroneck and Sheldrake rivers consist of low-, medium- and high-density residential neighborhoods as well as varied commercial (retail and office) and light industrial properties; many of these have been constructed to the edge of the riverbanks (USACE New York District 2011a). Areas most frequently damaged during storm and flood events include along Howard Avenue (which sits in between Mamaroneck Avenue and the Mamaroneck River) and Waverly Avenue, the area around the confluence of the Mamaroneck and Sheldrake rivers (converging at Columbus Park), in the vicinity of the intersection of Mamaroneck Avenue and Jefferson Avenue, the Harbor Heights neighborhood north of I-95, as well as industrial properties along Fenimore Road (USACE New York District 2011a).

Table 6. Buildings in the Village of Mamaroneck Subject to Flood Risks for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Category	Single and Multi-Residential	Commercial/ Industrial	Community Services*	Total Properties at Risk	% Properties at Risk
100-Year flood	508	154	8	670	13.4
500-Year flood	263	33	9	305	6.1
Total Village Properties	3,636	1,285	63	4,984	

* Includes education, government, and religious facilities, and other community services.

Source: Village of Mamaroneck 2012a

3.7.4 Environmental Justice

This section describes the environmental justice (EJ) populations within and adjacent to the Project area, which addresses the requirements under the following Federal and state policies. In accordance with EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations* (11 February 1994), Federal agencies are required to identify and address the potential for disproportionately high and adverse environmental and human health effects on minority and low-income populations resulting from the agencies' programs, policies, and activities. According to EO 12898, minority populations exist where the percentage of minorities exceeds 50%, or where the minority population percentage in the affected area is meaningfully greater than in the general population. EO 12898 does not provide criteria to determine if an affected area consists of a low-income population.

New York State's EJ policy was established in March 2003 under NYSDEC Commissioner Policy 29, *Environmental Justice and Permitting* (CP-29), which defines "Potential Environmental Justice Areas" based on data from the 2000 U.S. Census Bureau. In relation to

the Village of Mamaroneck, which is designated as urban, potential EJ areas are those with U.S. Census block groups of 250–500 households with populations that met or exceeded one or both of the following statistical thresholds:

- at least 51.1% of the population reported themselves to be members of minority groups, or
- at least 23.59% of the population had household incomes below the Federal poverty level (i.e., single-person household annual income equal to or less than $11,670, adding $4,060 for each additional person in the family).

At the Village scale, neither the percentage of minorities nor the percentage of households with incomes below the Federal poverty level meet state or Federal EJ criteria. As described earlier in Section 3.7.1, 23.2% of the Village of Mamaroneck's population identified themselves as minority (i.e., those not listed as "White – not Hispanic") in the 2010 U.S. Census, which is well below Federal and New York State EJ thresholds. In addition, 5.4% of families and 7.5% of individuals had household incomes below the Federal poverty level, which is again significantly below NYSDEC's EJ statistical threshold (U.S. Census Bureau 2012). However, based on 2008–2012 census data, two census block groups within the Project area—007300-1 and 007200-1—do meet Federal minority population EJ criteria as well as state minority and poverty level EJ criteria. Within Census Block Group 007300-1, which overlaps with the Sheldrake River portion of the Project area (stretching northeast from Fenimore Road to Mamaroneck Avenue), 60.9% of residents self-identified as Hispanic or Latino, 5.7% as Black or African American, 2.7% as Asian, and 0.8% as Native (i.e., American Indian, Alaska Native, Pacific Islander) (USA.com 2014a). In addition, 25% of families have household incomes below the Federal poverty level (USA.com 2014b). Within Census Block Group 007200-1, which overlaps with the southern portion of the Project area (south from Columbus Park to the Tomkins Avenue bridge, on the west side of Mamaroneck River), 53.2% of residents self-identified as Hispanic or Latino, 7.8% as Black or African American, 4.7% as Asian, and 0.9% as Native (USA.com 2014c). Also, 45.8% of families in this census block have household incomes below the Federal poverty level (USA.com 2014d).

Affordable housing is of ongoing concern and focus in the Village, including within the Project area, with residents who are facing eviction due to high rent prices sometimes relocating to places like Yonkers, the Bronx, or even out of state (Helms 2014). The Washingtonville Housing Alliance is a non-profit corporation formed to improve the housing conditions of low and moderate-income residents. Eighty percent (80%) of its clients can afford to pay $400–$600 a month, whereas two-bedroom apartment rent prices can be as high as $1,300 per month and three-bedroom units can reach upwards of $2,300 per month (Helms 2014). This discrepancy is evident within both census block groups that meet state and Federal EJ criteria. Within Census Block Group 007300-1, the median household income is $58,144 but the median house price is $478,700. Median monthly owner costs for housing units with and without a mortgage are $3,463 and $1,001, respectively, with 60% of renters paying between $1,000 and $1,999 per month (USA.com 2014e). In Census Block Group 007200-1, the median household income is $25,827 but the median housing price is $319,100. Median monthly owner costs for housing units with and without a mortgage are $2,942 and $956, respectively, with 54% of renters paying between $1,000 and $1,999 per month (USA.com 2014f).

The Town of Mamaroneck Housing Authority administers the Federal Department of Housing and Urban Development Section 8 Rental Assistance Program (i.e., the Housing Choice Voucher Program) for eligible Village residents in need of rental assistance. Of the 198 households receiving federal housing assistance in the Village of Mamaroneck, 22 are located in Census Block Group 007300-1 and 33 are in Census Block Group 007200-1 (A. Danoy, Director of Community Services and Housing, Town of Mamaroneck, NY, personal communication, May 2014). Among residents in need of affordable housing assistance, the Village of Mamaroneck's undocumented immigrant population is affected disproportionately because at least one person in the family must be a citizen or legal resident in order to apply for Section 8 benefits.

3.8 CULTURAL RESOURCES

As an agency of the Federal government, the District has certain responsibilities regarding the identification and protection of cultural resources. The Federal statutes and regulations authorizing the District to undertake these responsibilities include Section 106 of the National Historic Preservation Act, as amended, and the Advisory Council on Historic Preservation Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800). The District is required to identify historic properties with the Area of Potential Effect (APE) of proposed projects and determine if the proposed project will have an effect on those properties. The District must allow the relevant State Historic Preservation Office, Federally-recognized Tribe, the Advisory Council on Historic Preservation and the public an opportunity to comment on the its determination of effect.

The current APE includes areas that will be directly affected by the proposed undertaking (see Figure 1). The APE also included the alignments of proposed culvert underneath Columbus Park beginning at the confluence of the Sheldrake and Mamaroneck Rivers and ending at the at the confluence of the Sheldrake and Mamaroneck Rivers to the railroad bridge over the Mamaroneck River. The construction staging area will be located within Columbus Park, within the APE.

3.8.1 Previous Studies

Reported Archaeological Sites: According to the files of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) and the New York State Museum (NYSM), 34 archaeological sites have been reported within a two mile radius of the APE. These sites represent a range of sites from shell middens and camps to burial sites dating to all periods, including potential Paleoindian, Archaic and Woodlands periods. Almost all of the sites were reported in the 1920s by Arthur C. Parker, the former state archaeologist, based on information provided by local residents (Blair, Wheeler and Kirk 2011; Scarpa 2012).

Two archaeological sites, New York State Museum Sites (NYSM) 5227 and 7710, are located within the APE and consist of two pre-contact period camps. These sites were identified at the northern end of the APE between Winfield Avenue and I-95 by Parker in 1922. Testing in this area in 1977 did not encounter any further evidence of these sites (Scarpa 2012; Zukerman and Rothschild 1977).

The OPRHP and NYSM files identify seven historic period sites located with a two-mile radius of the APE. None of these sites are within the APE. Based on the documentary research and the previous identification of sites, it was determined that the APE has sensitivity for the presence of

both prehistoric and historic period sites. Based on the pedestrian surveys conducted as part of this project, most, if not all of the APE has undergone prior disturbance resulting from the development of the Village and the rechanneling of the rivers within the Village (Blair, Wheeler and Kirk 2011; Scarpa 2012).

State and National Register of Historic Places: There is one listed National Register of Historic Places (NRHP) property, the Mamaroneck Railroad Station at Station Plaza, within the current APE.

Previous Surveys: In 1977, the District completed a cultural resource investigation titled, *Reconnaissance Level Study of Cultural Resources, Mamaroneck and Sheldrake River Basin and Byram River Basin Flood Control Projects* as part of the original feasibility study for this project (Zuckerman and Rothschild 1977). Much of the current APE was included in this survey, except for the portion of the Sheldrake River between Rockland Avenue and the New England Thruway. The field investigations included a pedestrian survey, scrapings of exposed hillsides, shovel test pits and posthole tests. The survey concluded that the project, as designed in 1977, would not impact cultural resources. Since this survey, four additional cultural resource surveys have been conducted within or in the immediate vicinity to the current APE (Blair, Wheeler and Kirk 2011).

In 1981, an archaeological investigation was conducted in several areas in the Town and Village of Harrison to the east and north of the northern extent of the Mamaroneck River, at Winfield Avenue and West Street. No cultural resources were identified by these investigations (Cultural Resource Surveys, Inc 1981; Blair, Wheeler and Kirk 2011).

Five years later, other locations in Mamaroneck and Harrison were investigated as part of a rehabilitation project undertaken by the Mamaroneck Sewer District. Two of the survey areas were in proximity to the current APE at Knollwood Avenue and Crown Court and along Van Ranst Place near Columbus Park. No cultural resources were identified. The banks of the Mamaroneck River were also investigated but determined to be disturbed (ESARCO Inc. 1986; Blair, Wheeler and Kirk 2011).

Phase I and II archaeological investigations were conducted prior to the construction of a Big V supermarket on eight acres along the Mamaroneck River upstream of the current APE in 1994. The survey identified two historic sites; one of which was the Fisk-Clay site, which dates to the late 18th and early 19th centuries. The second site was dated to the late 19th and early 20th centuries. Neither site was determined to be eligible for the National Register of Historic Places (The Chazen Companies 1994; Blair, Wheeler and Kirk 2011).

In 2008, an archaeological assessment was completed along a small area along the left bank of the Sheldrake River west of Mamaroneck Avenue at 270 Waverly Avenue at the site of the Blood Brothers Auto Wreckers and included a portion of the current APE between Mamaroneck Avenue and Waverly Avenue. The Sheldrake River in this area had been channelized with mortar and stone walls in the mid-19th century. The survey determined that the site was extensively disturbed with no potential for any intact historical or archaeological resources (City/Scape 2008; Blair, Wheeler and Kirk 2011).

3.8.2 Historic Overview

Although Mamaroneck Avenue and the Boston Post Road have been depicted on maps since the late 18th century, most of the current APE was dominated by farms and rural estates. By 1851, the New York and New Haven Railroad was built along the east shores of the Mamaroneck and Sheldrake Rivers north of the confluence. The Village of Mamaroneck developed as part of a town called Rye Neck. In the 1850s and 1860s, some of the estates were subdivided into smaller, urban lots. A decade later, Fenimore Road was constructed and the Village of Rye Neck remained the most developed section of the current Village of Mamaroneck. Other neighborhoods were developed, using the landscape aesthetics of Olmstead and Vaux. The development of neighborhoods that would eventually form the Village of Mamaroneck continued through the first half of the 20th century. The development of neighborhoods in different decades has resulted in a variety of styles (Blair, Wheeler and Kirk 2011).

During the 1930s, large-scale Works Progress Administration (WPA)-funded projects added a number of significant features to the Village. These included the construction of bridges over and retaining walls along the Mamaroneck River within the APE, the Harbor Island Beach, jetty and East Basin Walls, and the Village Garage on Fayette Avenue. The stone used in these projects were from the removal of the large rock outcroppings that were once in the Village. Development in the Village slowed by the 1950s, and more recently, consists of larger scale residential condominium and apartment complexes, that respond to the need for residences for people commuting to New York City (Blair, Wheeler and Kirk 2011).

3.8.3 Architectural Survey

As part of the current study, an architectural survey was conducted in April 2011 to identify cultural resources that had the potential to be eligible for the State and National Registers within or adjacent to the APE. This survey included a review of the OPRHP structure files and a field inspection of structures located within and adjacent to the project area. Anything that was built before 1962 (greater than 50 years) was evaluated using the National Register criteria for significance as a guideline (Blair, Wheeler and Kirk 2011).

A total of 254 structures were identified within or adjacent to the APE dating to before 1962. Of these, a total of 30 structures and objects as well as the numerous stone retaining walls lining both sides of the river were identified to be potentially eligible for the National Register, pending further assessment (Table 7). Included in this list is the Mamaroneck Railroad Station at Station Plaza, which was previously determined to be eligible (see Table 7).

3.8.4 Archaeological Survey

Based on the results of the research and pedestrian survey, in comparison with the 1977 field investigations, two areas were recommended for limited archaeological investigation: 1) along the left bank of the Mamaroneck River on either side of Glendale Road; and 2) along the Sheldrake River near the upper limit of the project area. These areas were not tested or had limited testing in 1977 and were undisturbed. The other areas along the APE were previously disturbed or subjected to sufficient testing in 1977. In 2012, a total of 21 shovel tests were excavated within the two areas. No archaeological remains were identified. (Blair, Wheeler and Kirk 2011; Scarpa 2012).

Table 7: List of properties identified as potentially eligible for the New York State and National Registers

Address	Description
1625 Mamaroneck Avenue South	Westchester Joint Waterworks, Structure 1
412 Chestnut Avenue	
416 Chestnut Avenue	
504 Chestnut Avenue	
Hillside Avenue Bridge	Vehicular and Pedestrian Bridge over Mamaroneck River; stone and poured concrete; WPA c. 1903.
1 Station Plaza	Mamaroneck Train Station; Stone, brick, terra cotta; constructed 1888
253 Halstead Avenue	Fuhrmann Kitchens
421 Ward Avenue	Trinity Independent Assemblies of God; originally constructed in 1942 as Carpenter's Hall
(4) Staub Court	Early poured in place concrete house
Ward Avenue Bridge	Over the Mamaroneck River; stone and poured concrete; 1937
Bridge, NE of Valley Place	Over the Mamaroneck River; stone and poured concrete; 1937
131-141 East Boston Post Road	Mixed commercial/professional businesses
155 Fenimore Road	First Church of Christ Scientist
122 Fenimore Road	Saint John Lutheran Church
150 Fenimore Road/412 Munro Avenue	Heathcote Manor
160 Fenimore Road	
210 Fenimore Road	
216 Fenimore Road	
397 Palmer Avenue	Mamaroneck Dental
47 Revere Road	
45 Revere Road	
43 Revere Road	
41 Revere Road	
Railroad Bridge over Mamaroneck	Near Halstead Avenue; built between 1849 and 1885
Rye Neck Iron Bridge	Carries the Boston Post Road over the Mamaroneck River, built 1885
Tompkins Avenue Bridge	Constructed in 1893 (marker); stone, cast iron and concrete
206 Fenimore Road	Shingle Style, c. 1890
347 Prospect Avenue	Shingle Style with Colonial Revival details, c. 1890
431 Fayette Avenue	Factory built before c. 1888; possibly the earliest remaining industrial building in the Village
87 Winfield Avenue	"Butterfly Farm" built c. 1827 with later 19th century

	modification
Stone Retaining Walls	Winfield to Warren Avenue, First Street to Willow Street, and Ward Avenue to Thompkins Avenue on the Mamaroneck River; Mamaroneck Avenue to Waverly Avenue and the Vicinity of Grand Street/Plaza Avenue on the Sheldrake Avenue.

3.9 COASTAL ZONE MANAGEMENT

NOAA defines the coastal zone as the seaward boundary, which for nearly every state aside from Great Lake states is the 3-nautical mile (5.6-km) territorial sea (except for Florida, Puerto Rico, and Texas). New York's coastal zone varies from region to region and incorporates the following conditions:

- The inland boundary is approximately 1,000 ft (305 m) from the shoreline of the mainland.
- In urbanized and developed coastal locations the landward boundary is approximately 500 ft (152 m) from the mainland's shoreline, or less than 500 ft (152 m) where a roadway or railroad line runs parallel to the shoreline at a distance of under 500 ft (152 m) and defines the boundary.
- In locations where major state-owned lands and facilities or electric power generating facilities abut the shoreline, the boundary extends inland to include them.
- In some areas, such as Long Island Sound and the Hudson River Valley, the boundary may extend inland up to 10,000 feet (3,048 m) to encompass significant coastal resources, such as areas of exceptional scenic value, agricultural or recreational lands, and major tributaries and headlands (NOAA 2012).

3.9.1 Affected Environment

The Project area is entirely located within the New York-designated coastal zone management area that is associated with Long Island Sound (New York State Department of State [NYSDOS] Coastal Management Program [CMP] 1999). Pursuant to 15 CFR Part 930.34(b) of the Federal Coastal Zone Management Act, USACE New York District must evaluate the Preferred Alternatives and consult with the CMP to ensure that the Preferred Alternatives are consistent with the 44 NYSDOS CMP Coastal Policies and that neither would have undue adverse impacts on New York coastal zone resources (NYSDOS CMP 2001). The 44 New York State Coastal Policies are grouped together to address issues related to development, fish and wildlife resources, flooding and erosion hazards, general issues, public access, recreation, historic and scenic resources, agricultural lands, energy and ice management, and water and air resources in New York-designated coastal zone areas. To ensure that the Preferred Alternatives are consistent with NYSDOS' Coastal Policies and will have no undue adverse impacts on New York coastal zone resources, the District must coordinate and consult with the NYSDOS CMP and other agencies.

3.10 AESTHETICS AND SCENIC RESOURCES

The study area is a residential, commercial, and industrial area, and most of the land along the rivers is highly developed with properties and lots built right up to the rivers' edges. Aesthetic and scenic resources in the study area consist primarily of tree-lined and vegetated segments of the Sheldrake and Mamaroneck rivers.

The topography is generally level with gentle grades (see Section 3.1) (Village of Mamaroneck 2012a). Due to the Village's gently upward sloping terrain from the Mamaroneck Harbor waterfront, the sweeping views of Long Island Sound enjoyed at Harbor Island Park are not visible within the Project area.

Much of the land along the rivers is developed with residential dwellings and local business/industries, and the Project area is visually-saturated with highly-developed areas. The visual setting of the Project area is therefore characterized by moderate to high density development along the margins of rivers. The viewsheds outward from any given point within the Project area present visual transects of residential and commercial land use. Whereas the northern extent of the Project area is more forested and strictly residential, several parks in the Village that abut the rivers (see Section 3.11) provide green spaces, walking paths and footbridges along and over the rivers, and scenic river views (Village of Mamaroneck 2012b). Notwithstanding things such as litter, river channelization, numerous infrastructure crossings, an abundance of invasive plant species (USACE New York District 2012a), and water quality problems (Village of Mamaroneck 2011b), the parks in the Project area do offer visual appeal.

3.11 RECREATION

Recreational activities in the Village of Mamaroneck are varied and include those centered around Long Island Sound as well as the Village's network of parks and open spaces, several of which are located within or very close to the Project area and all of which lie within the 100-year floodplain (see Figure 10). The largest of these, Harbor Island Park (44 ac [18 ha]), is considered the centerpiece of Mamaroneck's park system and serves as the Village's primary waterfront public access point (Village of Mamaroneck 2012b). This park is annually used by more than 100,000 residents and non-residents and contains a public boat launching ramp, saltwater beach, playground, ball fields, docks, rest rooms, fishing floats, and other recreational and special event facilities (Village of Mamaroneck 2012b). The park's entrance at the intersection of Mamaroneck Avenue and Boston Post Road, adjacent to the outfall of the Mamaroneck River into the East Basin of Mamaroneck Harbor, is just downstream of the Project area and has experienced flooding during past storm events (Village of Mamaroneck 2012a).

The largest Village park within the Project area is Columbus Park (6 ac [2.4 ha]), which surrounds the Mamaroneck and Sheldrake rivers at their confluence (Village of Mamaroneck 2012b). This popular park, which contains a playground, basketball courts, benches, walking paths and footbridges across the rivers, is unique because it offers one of the few areas along the Sheldrake River where development does not encroach up to the river's edge (USACE New York District 2012a). Columbus Park experiences substantial flooding problems during high flow periods following storm events.

Several parks are found along the Mamaroneck River including Warren Avenue Park, off of Mamaroneck Avenue just north of I-95, which abuts the river's western bank. It is located in the Harbor Heights neighborhood and contains a playground, basketball and tennis courts, ball field, walking track, and nature trail (Village of Mamaroneck 2012b). This park, too, has a history of flooding in inclement weather (McMenamin 2011). More centrally located in the Village are Ward Avenue Park (at Ward Avenue and Spencer Place), which contains a playground, tables, and walking path along the river; and O'Connell Park (along Phillips Park Road), a tiny park with benches and tables overlooking the river (Village of Mamaroneck 2011b).

"Bub" Walker Park, located along the Sheldrake River at the intersection of Grand Street and Plaza Avenue, is a small yet popular park that contains a walking trail, bocce ball court, and sitting area. Public access to the Sheldrake River is largely confined to this park's walking trail (Village of Mamaroneck 2011b). Just downstream, at the intersection of Plaza Avenue and Washington Street, is Gianunzio Park, a very small "pocket" park with a sitting area and tables.

There is currently very limited public access to the Village of Mamaroneck's rivers. Much of the property abutting the Mamaroneck and Sheldrake rivers is privately owned (mostly residential) and is therefore unavailable for public open space and recreational use (Village of Mamaroneck 2012b). The Village's Flood Mitigation Advisory Committee is continuing to explore the potential for a Village-wide system of riverwalks in an effort to enhance public access and visibility of waterways (Village of Mamaroneck 2011b).

In addition to recreational use of public parks, other recreational activities include walking, jogging, and bicycling along the roadways within the study area. Although there are no designated wildlife refuges or preserves in the study area, the tidal wetlands in the East and West basins of the Mamaroneck Harbor provide opportunities for wildlife observation, particularly of resident and migratory wildfowl (USACE New York District 2012a). There are no state or county parklands or recreational areas in the study area.

3.12 TRANSPORTATION

3.12.1 Description of Local Transportation Network

Transportation in the Village of Mamaroneck mainly consists of road and street networks and pedestrian walkways. The Village is a suburban area with a well-traveled network of roadways throughout. I-95 is the major thoroughfare in the area, traveling northeast through Westchester County with Exit 18 at Mamaroneck Avenue. Secondary roadways within the area include Jefferson Avenue, Station Plaza, Hillside Avenue, Palmer Avenue, Halstead Avenue, and Ward Street. In addition to I-95, regional access is provided by Metro-North Railroad commuter rail service (the New Haven Line) that operates between New York City and New Haven, Connecticut with branches to Waterbury, Danbury, and New Canaan, Connecticut (MTA 2013 and Metro-North Railroad 2013a). State routes that provide access to the area include Mamaroneck Avenue and Old White Plains Road. Jefferson Avenue, Station Plaza, Hillside Avenue, Palmer Avenue, Halstead Avenue, and Ward Street provide direct access to the Project area; and Jefferson Avenue, Mamaroneck Avenue, and Van Ranst Place provide access to Columbus Park, which is the staging area under both Preferred Alternatives.

Jefferson Avenue and Jefferson Street: Jefferson Avenue has three legs, each of which is a two-lane roadway. Between Halstead Avenue and the Columbus Park parking area, it is called Jefferson Street, which is an approximately 300-ft (91-m) roadway with an underpass leading directly to Station Plaza and municipal parking areas (Metro-North Railroad 2013b). At the entrance to Station Plaza, Jefferson Avenue splits, the longer leg traveling northeast and the approximately 500-ft (152-m) leg (Jefferson Avenue extension) trending northwest and ending at Mamaroneck Avenue. The Jefferson Avenue extension leads to Van Ranst Place and additional parking. The 3,000-ft (914-m) leg of Jefferson Avenue is primarily residential and ends in the 1000 block past Wood Street.

Station Plaza and Hoyt Avenue: Station Plaza roadway provides access to the Metro-North Railroad's Mamaroneck Station and LAZ parking lots (Metro-North Railroad 2013b). This access roadway is approximately 1,200 ft (366 m) in length and runs between Mamaroneck Avenue and Jefferson Street. Hoyt Avenue, off Mamaroneck Avenue, provides additional parking spaces next to the rail line.

Hillside Avenue: Hillside Avenue is a primarily residential two-lane roadway running in a northwesterly direction. The southern terminus of Hillside Avenue intersects with Halstead Avenue, and the northern terminus, after intersecting with Howard and Lester Avenue, terminates at the Mamaroneck Avenue commercial district.

Mamaroneck Avenue: Mamaroneck Avenue is primarily a four-lane road running in a northwesterly direction through mostly commercial land uses. The southern terminus of Mamaroneck Avenue is near Boston Post Road (U.S. Route 1). Mamaroneck Avenue intersects with Hoyt Avenue at the Mamaroneck Railroad Station. Northwest of Hoyt Avenue is the Mamaroneck Bridge over the Sheldrake River. Between the Mamaroneck Avenue signalized intersection with Waverly Avenue and the unsignalized East Plaza/Mamaroneck intersection is a channel for traffic to enter Van Ranst Place. Waverly Avenue and Van Ranst Place traffic must turn onto Mamaroneck Avenue, and Mamaroneck Avenue traffic must go straight.

One block northwest of Waverly Avenue, Mamaroneck Avenue turns north toward the Mamaroneck/I-95 exit. In this area Mamaroneck Avenue intersects with White Plains Road and an offset extension of Center Avenue. This intersection is referred to herein as Mamaroneck Avenue, White Plains Road, and Center Avenue.

Palmer Avenue: Palmer Avenue travels east from Larchmont and is a two-lane roadway with curbside parking in clearly marked designated areas. Palmer Avenue is a major thoroughfare and travels through residential and commercial areas, although after crossing Fenimore Road it is primarily commercial. Palmer Avenue also runs parallel with MTA's New Haven Line.

Halstead Avenue: Bishop Avenue becomes Halstead Avenue at the intersection of Mamaroneck Avenue. Halstead Avenue travels in a northeasterly direction parallel with MTA's New Haven Line and Station Plaza, and is primarily a commercial thoroughfare. Halstead Avenue is a two-lane road with curbside parking in clearly marked designated areas.

Ward Avenue. Ward Avenue is a two-lane roadway that travels west-northwest through a residential and wooded area between Union Avenue and Halstead Avenue. It is approximately

1,200 ft (366 m) in length, and approaching Halstead Avenue it intersects with Spencer Place, Staub Court, and Valley Place, all of which lead to commercial businesses and parking.

Glendale Road. Glendale Road is a two-lane roadway that travels north-south in the Town of Harrison through the Harbor Heights residential neighborhood. Winfield Avenue provides access and intersects with Union Avenue traveling east-west between Mamaroneck Avenue and Harrison Avenue. Glendale Road is approximately 1,200 ft (366 m) in length and has a leg leading to residences on the east, while a portion of the road continues south, dead-ending at the Mamaroneck River.

Annual average daily traffic (AADT) counts are listed in Table 8 for major roadways near the Project area. The AADT is the average number of vehicles traveling along a roadway each day. Level of Service (LOS) is a measure of the operational conditions on a roadway or at an intersection. LOS range from A to F, with "A" representing the best operating conditions (free flow, little delay) and "F" the worst (congestion, long delays). LOS A, B, or C are typically considered good operating conditions. Table 8 outlines the routes near the proposed construction sites, their AADT, and their estimated existing LOS. Notably, some of the nearby roadways are already congested during peak traffic periods (i.e., LOS D, E, or F). A speed limit of 30 miles per hour applies to most roadways throughout the village (New York State Department of Transportation 2013 and Institute of Transportation Engineers 2003). Detailed LOS calculations are in Appendix B.

Table 8. Existing Annual Average Daily Traffic (AADT) and Level of Service (LOS) on Nearby Roadways in the Village of Mamaroneck for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Roadway	Average Annual Daily Traffic (AADT) [vpd][1]	One-Way Peak Hour Volume [vph][2]	Volume to Capacity Ratio (V/C)	Estimated Existing Level of Service (LOS)
I-95	114,849	4,135	2.43	F
Mamaroneck Avenue	28,032	1,514	0.89	E
Old White Plains Road	6,086	329	0.19	B
Palmer Avenue	9,836	531	0.31	C
Halstead Avenue	8,654	467	0.27	C

[1] vpd = vehicles per day

[2] vph = vehicles per hour

Source: New York State Department of Transportation 2013, Institute of Transportation Engineers 2003

The local government is responsible for local road maintenance including snow removal, storm drains, and sanitary sewers in the area. The Village performs both routine and seasonal tasks, as well as emergency maintenance. Due to the heavily urbanized and developed nature of the Mamaroneck and Sheldrake Rivers Basin, two in (5 cm) of rainfall in 24 hours or four in (10 cm) in 48 hours can cause the rivers to flood, and residential roadways can retain as much as three ft (0.9 m) of water for several days after heavy rains have subsided (USACE New York District 2011a).

3.12.2 Air, Rail, and Public Transportation

The closest airport is Westchester County Airport (HPN), which is ten mi (16 km) away and has 441 operations per day (AirNav 2013). The closest international airport is La Guardia (LGA), which is 15 mi (24 km) away and has 726 operations per day (AirNav 2013). Other nearby airports include Teterboro and Danbury municipal airports (TEB and DXR, respectively). The closest Amtrak station is four mi (6.4 km) away in New Rochelle (Amtrak 2013). The public agencies that provide transit service to the Village of Mamaroneck are the Westchester County Bee-line bus system and MTA's Metro-North Railroad (Metro-North Railroad 2013a).

3.12.3 Parking

Curbside parking and parking lots are provided in both residential and commercial areas throughout the Village. Metro-North Railroad and the Village of Mamaroneck provide nine distinct parking areas near the Mamaroneck Station for commuters. LAZ Parking (the parking operator for Metro-North Railroad at the Mamaroneck Station) provides metered and permit parking and has a capacity of 254 spaces near the station building and platform on Station Plaza and Hoyt Avenue. Village of Mamaroneck metered parking has a capacity of 358 spaces in lots and/or along the street on Van Ranst Place, Jefferson Avenue, and Halstead Avenue (Metro-North Railroad 2013b). Parking fees can be paid daily or monthly by permit; both providers offer free weekend and holiday parking (Metro-North Railroad 2013b and 2013c).

3.13 AIR QUALITY

The USEPA Region 2 and NYSDEC regulate air quality in New York. The Clean Air Act (CAA) (42 USC 7401-7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter [PM_{10}] and particulate matter less than 2.5 microns in diameter [$PM_{2.5}$]), sulfur dioxide (SO_2), carbon monoxide (CO), oxides of nitrogen (NO_X), ozone (O_3), and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. Although each state has the authority to adopt standards stricter than those established under the Federal program, New York State has adopted slightly stricter standards for NO_x (0.05 ppm) and 3-hour SO_2 (0.050 ppm), and has standards for total suspended particulates and non-methane hydrocarbons (NYSDEC 2013g).

Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs with levels below the NAAQS as *attainment* areas. *Maintenance* areas are AQCRs that have previously been designated as nonattainment and have been redesignated to attainment for a probationary period through implementation of maintenance plans. According to the severity of the pollution problem, O_3 and PM_{10} nonattainment areas can be categorized as marginal, moderate, serious, severe, or extreme.

3.13.1 Existing Conditions

Westchester County (and therefore all areas associated with the Proposed Action) is within the New Jersey–New York–Connecticut Interstate AQCR (AQCR 43) (40 CFR 81.13). The USEPA has designated Westchester County as moderate nonattainment for the 8-hour O_3 NAAQS, nonattainment for the $PM_{2.5}$ NAAQS, and maintenance for the CO NAAQS (USEPA 2013a). In addition, it is located in the Ozone Transport Region, which includes twelve states and the District of Columbia. The USEPA monitors levels of criteria pollutants at representative sites in each region throughout New York State. For reference purposes, Table 9 shows the monitored concentrations of criteria pollutants at the monitoring location closest to the Village of Mamaroneck.

The CAA defines mandatory Class I Federal areas as certain national parks, wilderness areas, national memorial parks, and international parks that were in existence as of August 1977. There are no Class I areas in New York State. Class I Areas closest to the Proposed Action include Brigantine Wilderness Area in New Jersey and Lye Brook Wilderness in Vermont (USEPA 2013c).

3.13.2 Greenhouse Gases and Climate Change

The average high temperature in Westchester County is 86 °Fahrenheit (°F) (30.0 °Celsius [°C]) in the hottest month of July, and the average low temperature is 20.1 °F (-6.6 °C) in the coldest month of January. Westchester County has an average annual precipitation of 46.5 in (118.1

Table 9. Air Quality Standards and Monitored Data near the Village of Mamaroneck for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Pollutant	NAAQS/New York State Air Standards	Monitored Data near Village of Mamaroneck
CO		
1-hour[a] (ppm)	35	No Data
8-hour[a] (ppm)	9	No Data
NO_2		
1-hour (ppb)	100	No Data
O_3		
8-hour[b] (ppm)	0.075	0.076
SO_2		
1-hour[a] (ppb)	75	No Data
3-hour[a] (ppm)	0.050	No Data
$PM_{2.5}$		
24-hour[c] (µg/m^3)	35	23
Annual arithmetic mean[d] (µg/m^3)	12	9.3
PM_{10}		
24-Hour[a] (µg/m^3)	150	No Data

Source: National Primary And Secondary Ambient Air Quality Standards (40 CFR 50.1-50.12); USEPA 2013b

Note: ppm = parts per million, µg/m^3 = micrograms per cubic meter, NO_2 = Nitrogen dioxide

[a] Not to be exceeded more than once per year

[b] The 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations over each year must not

exceed 0.08 ppm.

[c] The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 35 $\mu g/m^3$.

[d] The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from must not exceed 12.0 $\mu g/m^3$

cm). The wettest month of the year is September with an average rainfall of 4.4 in (11.2 cm) (Idcide 2013).

Greenhouse gases (GHGs) are components of the atmosphere that trap heat relatively near the surface of the earth, and therefore contribute to the greenhouse effect and climate change. Most GHGs occur naturally in the atmosphere, but increase in their concentration as a result of human activities such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add carbon dioxide (CO_2), methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Whether or not rainfall will increase or decrease remains difficult to project for specific regions (USEPA 2013c and Intergovernmental Panel on Climate Change [IPCC] 2007).

The CEQ recently released draft guidance on when and how Federal agencies should consider GHG emissions and climate change in NEPA analyses. The draft guidance includes a presumptive effects threshold of 27,563 tons per year (25,000 metric tons per year) of CO_2 equivalent emissions from a Federal action (CEQ 2010).

In considering project effects on GHG, the effect of vegetation removal, particularly of mature trees, and their replacement with younger, smaller trees, should also be addressed. Trees take carbon dioxide from the air and use it to grow roots, leaves, etc. Over its lifetime, a tree can remove several tons of carbon dioxide from the air. Trees also lower air temperature, transpire water and provide shade that can reduce energy use, indirectly reducing carbon dioxide emissions (McPherson 2007; Nowak et al 2002).

Maximum carbon dioxide reductions require a relatively stable population of trees, representing a mix of species, sizes and ages. Sequestration rates will level off with mature trees, although energy savings will continue. Trees that are larger at their maturity will sequester more carbon than smaller trees and faster-growing trees will sequester carbon sooner. In an urban setting, planting should include long-lived, low maintenance, moderate to fast growing species that are large at maturity but require minimal maintenance to increase survival and longevity.

As stated above (Section 3.5) within the project area, there are approximately less than six, non-contiguous acres of mature trees along the Sheldrake and Mamaroneck Rivers. These acres include a mix of native and non-native species. Concerned with the health and maintenance of its existing trees as well as expanding planting throughout, the Village of Mamaroneck established a Village Tree Committee to advise the Planning Board, Village Engineer, and Department of Public Works. The Village Tree Committee developed and administers a management plan for the Village trees, as well as reviews site plans and subdivisions to preserve trees or advise on proper tree plantings taken from a list of species of trees recommended as suitable for planting within the Village. The Village is currently replanting trees lost during Hurricane Sandy as well as continuing to replace and expand planting throughout the Village to maintain its neighborhoods' aesthetics as well as increase erosion control and carbon reduction

3.14 NOISE

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's *quality of life*, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighing," measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their dBA levels are provided in Table 10.

Table 10. Common Sounds and their dBA Levels for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Outdoor	Sound Level (dBA)	Indoor
Motorcycle	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

The dBA noise metric describes steady noise levels, although very few noises are, in fact, constant. Therefore, A-weighted Day-night Sound Level has been developed. Day-night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 p.m.–7 a.m.). DNL is a useful descriptor for noise because 1) it averages ongoing yet intermittent noise, and 2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}) is often used to describe the overall noise environment. L_{eq} is the average sound level in dB.

The Noise Control Act of 1972 (PL 92-574) directs Federal agencies to comply with applicable Federal, state, and local noise control regulations. In 1974, the USEPA provided information suggesting that continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals. The Village of Mamaroneck maintains a noise ordinance that limits construction noise in residential areas to the hours of 8:00 a.m.–6:00 p.m. Monday–Saturday, whereas no construction noise is permitted on Sundays or major holidays (Village of Mamaroneck Noise Ordinance §254-

3). The adjacent community of Harrison, limits construction noise to the hours of 7:30 a.m.–8:00 p.m. weekdays, and 10:00 a.m.–8:00 p.m. on weekends and holidays (Harrison Noise Ordinance §177-2.F).

3.14.1 Existing Conditions

Existing sources of noise near the Project area include local and interstate traffic, high-altitude aircraft overflights, boat and harbor noise, and natural noises such as leaves rustling and bird vocalizations. Existing noise levels (L_{eq} and DNL) were estimated for the area using the techniques specified in the *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with an observer present* (American National Standards Institute [ANSI] 2003), and are provided in Table 11.

Table 11. Estimated Existing Noise Levels in the Village of Mamaroneck for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Location	Sound Level (dBA)			
	Land Use Category	L_{eq} (daytime)	L_{eq} (nighttime)	DNL
Areas further than 1,000 feet from I-95 Residential, recreational, and open space areas along the rivers	Quiet Suburban Residential	48	42	47–52
Areas closer than 1,000 feet to I-95 Commercial and light industrial areas along the rivers	Urban and Noisy Suburban Residential	58	52	57–62

Source: ANSI 2003

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents the potential adverse impacts and beneficial effects associated with implementing the Preferred Alternative or NED Plan and the No Action alternative. For each resource subsection, impacts related to the NED Plan are comprehensively analyzed and presented first. The expected outcomes of selecting the No Action alternative are then summarized based on the assessment of environmental consequences of the NED Plan.

4.1 TOPOGRAPHY AND GEOLOGY

4.1.1 NED Plan

The NED Plan is expected to have short- and long-term minor adverse impacts on surficial geologic resources, while also having beneficial effects by limiting storm-related bank erosion and flooding. The NED Plan is not anticipated to have substantial impacts on bedrock or mineral resources, nor will it affect or increase the risk for any geologic hazards to the community. Geological surveys identify the bedrock layer to begin 10-30 below the river bottom. The implementation of nonstructural measures is expected to result in no impacts on the area's topography and geology.

4.1.1.1 Bedrock Geology and Mineral Resources

The NED Plan will have no short- or long-term adverse impacts on mineral and non-mineral geologic resources. The results of previous geotechnical investigations indicate that subsurface conditions are generally suitable for the proposed flood improvements, provided that adequate site preparation and appropriate design and construction methods are implemented. The GDM concluded that "the overall project site is geologically feasible for construction of the proposed channel improvement, retaining walls, and bridge replacements" (USACE New York District 1989a, p. 21). There are no mines, known mineral resources, or oil or gas wells within the Project vicinity. Implementation of the NED Plan will not significantly change existing conditions in terms of the potential future utilization or potential leasable resources.

Blasting. No areas of blasting were identified because the Project area consists of unconsolidated materials or sufficiently-weathered rock that can be ripped by conventional excavation equipment.

Excavation and Fill Material. The proposed channel modifications and flood improvements will require the excavation and removal of rock and loose material from the streambed and banks, removal of some of the existing retaining wall material, the importation of riprap and bedding material, and the handling and disposal of excavated material. This will have short-term minor adverse impacts resulting from potential soil erosion and sedimentation, dust and waste generation, and noise and traffic due to rock fracturing and excavation activities (see Sections 4.2 HTRW, 4.4 Water Resources, 4.12 Transportation, 4.13 Air Quality, and 4.14 Noise for additional details on these impacts).

Preliminary estimates of the volume of materials that will be excavated are 11,250 cubic yards of rock and 60,990 cubic yards (8,601 cubic meters and 52,147 cubic meters, respectively) of soil. Preliminary estimates also include the use of 25,700 cubic yards of fill, riprap, and crushed

stone. Material may be temporarily staged at the Columbus Park staging area, shipped to an appropriate offsite location, or may be used as fill for the Project.

Monitoring equipment will be used, as necessary, to ensure construction activities that cause ground vibrations do not exceed state and Federal thresholds to avoid damages to nearby structures. Pre-construction inspections of buildings may be required as part of the efforts to monitor effects of vibrations.

4.1.1.2 Topography

The NED Plan will create long-term changes to the topography of the channel through channelization, deepening and widening of the channel in some locations, slope adjustments, and changes to the streambed. In addition, there will be minor long-term changes along the top of some channel banks and at some of the structures (e.g., bridge replacements). Short-term changes to topography also are anticipated during construction because of site preparation and grading, but areas temporarily disturbed by construction will be re-contoured to pre-construction elevations once construction is complete. These changes are expected to have a negligible impact on topography or beneficial effect in terms of improving flood control. The anticipated changes to topography will be limited to a relatively narrow area around the channel.

4.1.1.3 Surficial Geology

The NED Plan is expected to have a minor, short- and long-term adverse impacts, as well as long-term beneficial effects on the surficial geology of the streambed and channel. Construction site preparation will require clearing and grading of several sites within the Project area for equipment and staging, and for channel modifications and other construction activities. The proposed modifications will involve some excavation and fill, but will generally be limited to the existing channel, and those changes will be limited in scope (e.g., channel depth and width, and volume of material). Furthermore, much of the effected channel has already been disturbed or modified in the past. The staging area within Columbus Park also will sustain short-term minor impacts during construction activities.

4.1.1.4 Seismic Risk and Other Geologic Hazards

No adverse impacts on seismic risk or other geologic hazards are expected from implementation of the NED Plan. The proposed activities do not trigger or cause earthquakes, landslides, subsidence, or other geologic hazards. Moreover, the region is considered to have a low to moderately low susceptibility for these types of geologic hazards to health and property. No faults are reported in the immediate area, and the Project area is located in a region with historically low to moderate seismic activity, particularly earthquakes of sufficient magnitude to cause significant damage. Thus, the NED Plan will likely avoid seismic, landslide, and other geologic hazards.

4.1.1.5 Stream Channel Erosion and Streambed Scour

One of the primary goals of the Proposed Action is to reduce flooding, so the Project will improve flood conditions and have long-term beneficial effects on flood-induced stream channel erosion and streambed scour.

4.1.2 No Action Alternative

Selecting the No Action alternative would not result in any continued change to the topographic and geologic resources within the Project area. However, without any flood improvements or channel modifications implemented under the Proposed Action, flooding, erosion and sedimentation, and scour will continue to occur in the long-term.

4.2 HAZARDOUS TOXIC AND RADIOACTIVE WASTE

4.2.1 NED Plan

The ITT Sealectro site, a state Superfund site, is located on the Sheldrake River within the Project Area. Surrounding soil and ground water are contaminated with volatile organics stemming leaking underground storage tanks and poor maintenance and operations when the plant was active. Remedial deigns and actions to neutralize, remove, decrease the level of contamination though pump-and-treat and soil gas extraction have been implemented. These steps were completed in early 1990's. In 2009 a remedial design for controlling the soil vapor intrusion was implemented.

Prior to construction, the District will test for VOCs and will contact the NYSD Remediation staff to determine if contaminated soils are to be disturbed. Soils removed as part of construction may require handling and disposal in accordance with NYSDEC standards. The NED Plan will have negligible cumulative effects on issues involving HTRW.

4.2.2 No Action Alternative

Selecting the No Action alternative would not change the HTRW condition within the Project area. However, without any flood improvements or channel modifications implemented under the Proposed Action, flooding, erosion, and scour will continue to occur in the long-term potentially releasing contaminated groundwater or soil.

4.3 LAND USE, COVER, AND ZONING

4.3.1 NED Plan

4.3.1.1 Land Use and Cover

Implementation of the NED Plan will have short- and long-term minor adverse impacts, as well as long-term beneficial effects, on land use and cover. The NED Plan will have short-term minor impacts on residential and commercial/retail land uses around temporary workspaces during and immediately after construction. Long-term adverse impacts on land cover will result from the removal of mature trees. However, implementation of the NED Plan also is expected to result in long-term benefits by reducing the flood risk to surrounding properties through both structural and nonstructural actions, which if left unaddressed could negatively impact land use in the future. The implementation of nonstructural measures is expected to result in no impacts on the area's land use and cover.

The permanent removal of the Ward Avenue Bridge and three footbridges will not represent major changes in land use given that alternative crossings are located near the bridges slated for removal (see Section 3.12.1).

In the short term, the NED Plan will have minor impacts on land use within temporary workspaces, located along various channel segments and at specific bridge replacement and removal locations, as well as for some abutting properties during and immediately after construction. The NED Plan assumes a 15-ft (4.5-m) clearance from the channel bank edge for temporary workspace along portions of the Project area—this is shown as light blue-shaded areas in Figure 3—but not all areas shown in the figure will be needed or used depending upon access to the site. Access to channel segments will occur via approved, public right-of-ways to the extent practicable, and construction activities are expected to occur primarily within the channel. There will be a few instances where construction activity and staging could occur on land outside the channel, especially where there is ample space and Village property available, such as at Columbus Park. Equipment will need to be moved out of the channel at the end of the work day, so there will be some storage areas outside the channel that may be temporarily impacted during construction. If Project construction requires the additional occupation of private and public lands (e.g., private yards, gardens, residential and commercial parking), impacts will be minimal and temporary.

The Columbus Park staging area will occupy approximately six acres (2.4 ha). Use of this acreage will mean the temporary conversion of public open space for construction purposes. The installation of the culvert underneath the parking area adjacent to Columbus Park will affect commuter parking for approximately six months. It is anticipated that parking will be reinstated once the culvert is completed and consist of the same number of spaces. The Village will assist in helping to provide additional, temporary areas for commuter parking. Despite these impacts, the lack of suitable alternatives for a staging area was determined to outweigh the temporary adverse impacts to this site.

Temporary workspaces at specific bridge replacement and removal locations will result in minor short-term impacts for surrounding residential and commercial/retail uses primarily due to noise and traffic disruptions (e.g., traffic detours and congestion, decreased parking availability, decreased retail traffic) during the period of time necessary to demolish and re-construct bridges. However, these impacts should be relatively limited in geographic scope, and they will not preclude these uses (see Sections 4.5 Vegetation, 4.10 Aesthetics and Scenic Resources, 4.11 Recreation, 4.12 Transportation, and 4.14 Noise). The NED Plan is unlikely to affect schools, public institutions, and commercial enterprises in the central business district and manufacturing/industrial zone, as well as port and harbor operations.

In the long term, the NED Plan will be compatible with surrounding land uses. Long-term uses of the rivers and river corridors will not change, nor will the open space character of the channels. Increased turbidity may affect fishing and recreational use of the river and harbor downstream from the direct area of disturbance, though this potential impact will be minor and temporary. Portions of the existing channels will be widened or modified, but there will be no direct long-term conversion of adjacent land uses. Although the river channels will remain open space, the removal of vegetation from the river channels will have long-term adverse impacts on land cover. The riparian vegetation, especially mature trees, which provide shade and privacy

screening for abutting residential yards, will impact the character and use of some residential and commercial properties. However, the removal of mature trees will be limited. Although vegetation will be replanted and replaced, it may take decades for new trees to reach the height and character of trees found in the existing riparian habitat (see Sections 4.5 Vegetation and 4.10 Aesthetics and Scenic Resources). Shrubs and other low-growing vegetation will take considerably less time to reach pre-construction conditions.

Implementation of the NED Plan will likely produce significant long-term benefits by reducing flood risk and future damage to residential, manufacturing/industrial, commercial/office, transportation/utilities, and open space land uses located within the Project area and study area.

4.3.1.2 Zoning

Implementation of the NED Plan will not negatively impact land use in the short- or long-term, but it will likely produce long-term benefits by reducing flood risks and future damages to abutting properties that could result in changes to zoning (e.g., preventing redevelopment of a frequently affected area).

4.3.2 No Action Alternative

In the short-term, selecting the No Action alternative would not change land use, land cover, and zoning in the study area. However, in the long term flood damages to properties abutting the rivers, particularly those in flood-prone areas like the confluence, are likely to sustain continued damage during future intense storm events. Without proactively addressing flood risks, costly damages will continue to accrue and some businesses and residences may eventually be abandoned, property values may decrease, or development may be prohibited, all of which could lead to changes in land use, cover, or zoning.

4.4 WATER RESOURCES

Water resources potentially affected by the Proposed Action include regional hydrology and groundwater resources, surface water, tidal influences, floodplains, and wetlands. All navigable watercourses and waterbodies are protected under the jurisdiction of NYSDEC and USACE. Disturbance of water resources would require Federal and appropriate state permits, including but not limited to compliance with CWA regulations Section 404 and Section 401 (approved by NYSDEC) requirements. These resources, as well as the permits required and the potential impacts associated with implementing the NED Plan and No Action alternatives, are discussed in the following sections.

4.4.1 NED Plan

4.4.1.1 Regional Hydrogeology and Groundwater Resources

Construction and implementation of the NED Plan is not expected to have a significant impact on regional hydrogeology or groundwater resources. Channel bed alterations will consist of a natural bed channel and placement of riprap material, with vertical concrete retaining walls used in areas with limited space. The construction actions associated with the NED Plan are not expected to significantly alter the hydrogeology or groundwater infiltration within the study or Proposed Action areas.

4.4.1.2 Surface Water

Modifications to existing stream channels in the Project area will occur, resulting in short-term minor impacts and long-term beneficial effects with decreased erosion and sedimentation into the surface water. In the short term, water quality will be impacted by in-stream excavation and construction activities that will increase turbidity and sedimentation within the Project area and downstream segments of the Sheldrake and Mamaroneck rivers, including Mamaroneck Harbor. Removal of bankside vegetation and exposure of soils, disturbance of the channel bottom through widening and deepening activities, and placement of fill, all have the potential to increase turbidity, sedimentation, and erosion. The implementation of nonstructural measures is expected to result in no impacts on the area's water resources.

The hydrology of the Sheldrake and Mamaroneck rivers will be altered to reduce the flood potential within the study area, and temporary impacts to water flows within these two river systems will occur periodically throughout the construction period. Additionally, the creation of water diversions during construction may temporarily increase water temperatures within stream segments downstream of these activities. Rock pools, riffles, and low flow channels will be constructed to maintain similar pre construction characteristics within the rivers.

Excavation activities associated with the NED Plan have the potential to disturb heavy metals (iron, copper, lead, chromium, and zinc), PCBs, and pesticides that may be present in the river sediments. These materials may become mobilized within the water column during sediment removal and deposition, thereby becoming available for uptake by aquatic flora and fauna. However, coordination between the District and NYSDEC as part of the original design plan developed in 1989 indicated that implementation of the flood risk management improvements would be expected to improve water quality within the study area (USACE New York District 1989d). Grain size analysis of aquatic sites that may potentially be impacted by the flood risk management improvements indicate a high percentage of sand and gravel sediments, and these types of sediments are not expected to accumulate high concentrations of persistent pollutants. Excavation and removal of these sediments would not be expected to contribute pollutant loads to the aquatic system during construction, and would not pose a hazard for disposal.

All construction activities are required to proceed in accordance with applicable Federal, New York State, and local regulations for maintaining water quality and providing protection to water resources. This includes preparing and implementing an erosion and sediment control plan (ESCP), preparing a site-specific Storm Water Pollution Prevention Plan (SWPPP), and meeting the requirements of the New York State SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 [NYSDEC 2015]) for ground disturbances involving 1 or more acres (0.4 ha or more). NYSDEC will likely require an Article 15 *Protection of Waters Program* permit, and CWA Section 404 and Section 401 permits. Under Village Code Chapter 186-10, the District must also obtain a site development permit from the Village of Mamaroneck permitting authority, which is subject to approval by the Village Engineer in consultation with the Westchester County Soil and Water Conservation District (Village of Mamaroneck 1987). The site development permit application must be prepared in accordance with the standards and requirements contained in the Westchester County Best Management Practices Manuals prepared by Westchester County. In addition, construction activities that disturb 5 ac (2 ha) of land or more require a special authorization from Region 6 of the NYSDEC.

Operation of the NED Plan is expected to decrease erosion and sedimentation resulting from channel improvements and streambank stabilization activities that will occur as a result of the Project's flood risk management improvements. In-stream activities will be avoided from 1 June through 1 September to protect fish, amphibian and other resources.

4.4.1.3 Tidal Influences

The NED Plan is not expected to impact tidal influences. The NED Plan is not expected to improve protection from tidally influenced flooding events or storm surges, and because flooding in the existing channel would not be impacted by sea level rise (SLR), no change in damage estimates are associated with SLR.

The NED Plan is not expected to provide additional protection from tidal or coastal surge events. The influence of high tides during fluvial events on the Mamaroneck River does not extend beyond the Tompkins Avenue Bridge because of the steep bed slope and topographic characteristics of the overbanks that surround the mouth of the Mamaroneck River (USACE New York District 2011a and 2011c). Although the frequency of floods caused by tidal conditions may increase due to SLR, fluvial flooding in the existing channel would not be impacted, as impacts from SLR are expected to be limited to the mouth of the Mamaroneck River (USACE New York District 2011b). The NED Plan would not be expected to either ameliorate or exacerbate the effects of SLR.

4.4.1.4 Floodplains

The NED Plan will reduce the potential for flooding in the study area and will require a change to floodplain maps for the area as a result of the Project's proposed flood risk management measures. The study area is located within a SFHA, which defines those areas having a 1% annual risk of experiencing a 100-year flood. The National Flood Insurance Program (NFIP) was created in 1968 to provide flood insurance to home and business owners, and renters located in SFHAs (NYSDEC Division of Water 2006). Although participation in the NFIP is voluntary, communities that do not participate in the program may not be able to obtain flood insurance or Federal disaster assistance, so most communities that are associated with SFHAs are active participants in the program. Municipalities participating in the program are required to have local laws for flood damage prevention that contain standards for SFHAs as mapped by FEMA. Flood damage claims were filed with the NFIP for four storms that occurred in the study area between 1990 and 2010 (USACE New York District 2011a).

Construction or development projects located in floodplain areas of communities covered by the NFIP are subject to special requirements. Local communities, such as the Town/Village of Mamaroneck, are responsible for regulating development within SFHAs; however for state- and Federally-funded projects, regulation is provided by the responsible agency, in this case the District. Technical assistance also is provided by NYSDEC and FEMA.

Local communities are encouraged to pass more restrictive standards to provide an extra margin of safety by requiring structures to be elevated above base flood elevations. The Village of Mamaroneck continues to work at the local level to address flooding issues. Flood damage prevention requirements, including restrictions for development within a floodplain, are outlined in the Village of Mamaroneck Village Code Chapter 186 (Flood Damage Prevention; Erosion

and Sediment Control). The Village of Mamaroneck recently amended Village Code Chapter 186 in 2010 that enacted a new Letter of Map Revision to remain active in the NFIP as required by FEMA and NYSDEC (Village of Mamaroneck 2010). Adoption of the Local Multi-Hazard Mitigation Plan in 2012 (Village of Mamaroneck 2012a), which followed FEMA guidance, represented another critical step in assessing and preparing for natural and human-made flood hazards. Flooding in the Village of Mamaroneck received the highest hazard score (i.e., "Moderately High Hazard" with a score of 302) based on the Hazards New York method of assessing significant risks. Reducing the impacts of flooding was the plan's primary goal, and therefore a number of related floodplain management actions that will result in a reduction of flooding, including this FRM Project, were presented and evaluated.

The NFIP's Community Rating System is a voluntary incentive program offering flood insurance premium reductions to communities that exceed minimum requirements. Communities receive points for meeting additional requirements, and are ranked in up to 10 rating classes according to their total score. The higher the score, the greater the premium discount the community receives. Creditable activities are grouped into four categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. As part of its preparation of the Local Multi-Hazard Mitigation Plan, the Village of Mamaroneck is in the process of completing its application to qualify for rating under the Community Rating System (Village of Mamaroneck 2012b). If the Village of Mamaroneck qualifies for a rating of at least seven (7), which requires 1,500 credit points, it would reduce flood insurance premiums by an estimated 15%. Hydrological analysis and modeling was conducted by the District in 2011 to update available data for current conditions, as well as proposed future conditions that would result from implementation of selected alternatives. Results of hydrological modeling conducted for anticipated increases in impervious surfaces associated with development within the Mamaroneck River watershed were between 0.0% and 2.3% for current and future unimproved conditions (No Action alternative) (USACE New York District 2011a). The NED Plan, in combination with implementation of measures identified in the Local Multi-Hazard Mitigation Plan (Village of Mamaroneck 2012a), is expected to substantially reduce the flood-risk that is currently associated with the study area.

4.4.1.5 Wetlands

Short-term minor and long-term minor and moderate adverse impacts to wetland resources are expected to result from the NED Plan. Short-term impacts include the temporary impact of wetlands outside the footprint of the expanded channel but within the construction workspaces where heavy equipment will require access to complete construction activities associated with modifications to the river and banks (e.g., regrading and reshaping, and installing or replacing retaining walls or riprap). The primary impact within these workspaces will include soil compaction, trampling of vegetation, and removal of mature trees.

The removal of mature trees from forested wetlands also will result in the temporary conversion of wetland type from forested wetlands to some other type of wetlands, most immediately emergent wetland. Although post-construction restoration will include planting of native trees in places where large trees were removed, there will be a substantial time lag before forested wetlands will return to pre-construction conditions due to the length of time it takes for trees to mature. As such it will be decades before these areas return to pre-construction conditions.

In the long-term, riparian areas located within the footprint of the newly expanded channel or replacement bridges will be permanently lost. Most of the permanently impacted riparian areas will include the small pockets of PSS vegetation and possibly some amount of PFO vegetation located within and immediately adjacent to the river channels. Although wetlands were not delineated in the entire Project area due to lack of access right-of-entry, NYSDEC did not identify any New York State-regulated wetlands within the Project area. The USFWS only delineated the wetlands within Columbus Park. The wetlands within Columbus Park will not impacted by the installation culvert or the use of part of the park as a staging area as part of the NED plan.

The riparian areas are regulated by the NYSDEC. NYSDEC will require an Article 15 *Protection of Waters Program* permit, and under Village Code Chapter 192-5 the District must file an application for a wetland permit with the Clerk of the Village of Mamaroneck for review and approval by the Planning Board (Village of Mamaroneck 2007). It is unlikely that a *Freshwater Wetlands* permit (Article 24) will be required based on the likely size of the wetland. This will ensure that the NED Plan will not result in violations to local and state water quality standards and wetland regulations (NYSDEC 2010).

4.4.2 No Action Alternative

Significant flood events and flood-related damages would continue to occur if the proposed flood risk management measures are not implemented. The frequency and severity of flood events is expected to increase as a result of climate changes and anticipated SLR. SLR over the 50-year life of the Proposed Action is expected to range from 0.69 to 2.03 ft (0.21 to 0.62 m) (USACE New York District 2011b) based on the low, intermediate, and high rates of future SLR as determined by National Research Council (2010) and IPCC (2007) scenarios. Effects of predicted SLR would be expected to affect the area around the mouth of the Mamaroneck River due to the steep bed slope and topography of the overbanks. Tidally influenced flooding would not be expected to extend beyond the current limits identified as the Tompkins Avenue Bridge, although the frequency of tidal flooding could increase. The No Action alternative would not result in changes to the wetland systems or vegetated communities that occur within the Project area, except for those changes associated with future flooding events.

Although a small increase in flows is expected between existing conditions and future unimproved conditions, no increase in damages would be expected for the No Action alternative as a result of change in flows (USACE New York District 2011b).

4.5 VEGETATION

4.5.1 NED Plan

4.5.1.1 Uplands

Short-term minor and long-term moderate adverse impacts to vegetation will result from the NED Plan. Short-term impacts include the temporary impact on vegetation outside the footprint of the expanded channel but within the construction workspaces where heavy equipment will require access to complete construction activities associated with modifications to rivers and

banks (e.g., regrading and reshaping, installing or replacing retaining walls or riprap). The primary impact within these workspaces will include trampling of vegetation and removal of mature trees. Approximately 5.3 ac (2.1 ha) of the Project area contains mature trees that could be affected depending upon the location of work spaces along river segments (to be determined based on access to work sites). Long-term moderate impacts include the permanent loss of upland vegetation, including removal of approximately 221 mature trees located within the footprint of the newly expanded river channels. This includes the mature trees directly bordering the rivers' edges, which will require removal during channel work (i.e., trapezoidal cuts, retaining walls, and expansion of the channel bottom). This estimation also takes into account additional tree cutting that will take place in the creation of select temporary workspaces along the rivers measuring 15 ft (4.6 m) from the edge of the channel bank outwards. The implementation of nonstructural measures is expected to result in no impacts on the area's vegetation.

The Migratory Bird Treaty Act (MBTA), originally passed in 1918, prohibits the killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior (USFWS 2011). As a result, there is a requirement to protect bird species that may potentially nest within the project areas by implementing a restriction on shrub and tree removal during construction activities. Therefore, in order to comply with the MBTA, trees and shrubs will be cleared outside of a 1 March through 1 August window to avoid adverse impacts to any species that are covered under this Act.

4.5.1.2 Wetlands

Short-term minor and long-term moderate impacts to wetland vegetation will result from the NED Plan, and will be similar to those described for uplands. Furthermore, the removal of mature trees from forested wetlands also will result in the temporary conversion of wetland type from forested wetlands to some other type of wetlands, likely emergent wetland. Although post-construction restoration will include planting of native trees in places where mature trees were removed, there will be a time lag before forested wetlands will return to pre-construction conditions due to the length of time it takes for trees to mature. As such it will be decades before these areas return to pre-construction conditions.

4.5.1.3 Rare, Threatened, Endangered and Special Concern Species

No impacts to state or Federal rare, threatened, or endangered plant species are expected from implementation of the NED Plan.

4.5.2 No Action Alternative

Under the No Action Alternative, there would be may be periodic changes to the plant communities that occur within the Project area associated future flooding events and community succession.

4.6 FISH AND WILDLIFE

Fish and wildlife resources potentially affected by the Proposed Action include shellfish; finfish; benthic resources; reptiles and amphibians; birds; mammals; EFH; and rare, threatened, and endangered wildlife species. These resources and the potential impacts associated with

implementing the NED Plan and No Action alternative are discussed in the following sections. The implementation of nonstructural measures is expected to result in no impacts on the area's fish and wildlife resources.

4.6.1 NED Plan

4.6.1.1 Shellfish

Construction of the NED Plan may result in short-term minor impacts to shellfish within Mamaroneck Harbor as a result of the disturbance of sediments within construction areas located upstream of the harbor. Long-term beneficial effects on shellfish are expected from operation of the NED Plan. Disturbed sediments may increase turbidity and potentially re-suspend pollutants into the water column, which discharge from the Mamaroneck River into the East Basin of Mamaroneck Harbor. The decreased water quality is expected to be temporary because it will be limited to the duration of excavation or construction activities, effects will be minimized by the use of best management practices (BMPs) during construction, and also decreased water quality will be limited to the area immediately surrounding the construction sites, downstream river segments, and Mamaroneck Harbor. Since many shellfish species, such as bivalves (e.g., oysters, clams) are immobile, they will be unable to physically escape these water quality impacts by moving away from the impacted waters. Depending on the increased level of turbidity and re-suspended contaminants, there is a potential for mortality to occur in shellfish beds located near the mouth of the Mamaroneck Harbor.

Long-term beneficial effects on shellfish are expected from implementation of the NED Plan due to the expected improvements within the study area as described in Section 4.4.1.2.

4.6.1.2 Finfish

Short-term minor impacts to finfish will be similar to those described for shellfish, resulting from potential water quality impacts during construction. However, since finfish are mobile, impacts to finfish will be less since they have the ability to move away from impacted waters.

Long-term beneficial effects on finfish are expected from implementation of the NED Plan due to the expected improvement to water quality as described in Section 4.4.1.2.

4.6.1.3 Benthic Resources

Short-term moderate impacts on benthic resources will be similar to those described for shellfish, resulting from potential water quality impacts during construction. Similar to shellfish, many benthic resources are immobile or less mobile due to their size or physical characteristics, and movement away from impacted waters will therefore be restricted and will be buried and removed. Temporary increases in turbidity and suspended sediments near and downstream of in-stream construction activities could cause direct mortality or indirect decreased reproductive success in benthic species over the short-term. The impacts are expected to be temporary because they will be limited to the duration of excavation or construction activities, they will be minimized by the use of BMPs during construction, and they will be limited to the area immediately surrounding the construction sites, downstream river segments, and Mamaroneck Harbor.

Analysis of benthic macroinvertebrate data collected in 2011 indicates that water quality within the Mamaroneck and Sheldrake rivers is moderately impaired, and the rivers are expected to support a lower biological diversity of benthic macroinvertebrate assemblages in comparison to unimpaired waters. Removed vegetation will be replaced and will aid in the recolonization of the benthic resources. Recolonization of pre project benthic resources will be aided by upstream benthic resourses. Long-term beneficial effects on benthic resources are expected from implementation of the NED Plan due to the expected improvement to water quality as described in Section 4.4.1.2.

4.6.1.4 Reptiles and Amphibians

Short-term and long-term minor adverse impacts on amphibians and reptiles are expected to occur as a result of implementing the NED Plan. In the short-term, construction activities may cause mortality of individuals of less mobile species of reptiles and amphibians that reside in or pass through upland, wetland, or aquatic habitats within the Project area. More mobile species will be temporarily displaced from work areas, escaping to nearby undisturbed areas. Construction activities may deter some species from utilizing the Project area. Following construction, reptile and amphibian species are expected to resume their normal habits consistent with post-construction habitat availability in and within the vicinity of the Project area.

Long-term impacts include effects on movement patterns of some amphibians and reptiles, and loss or modification of habitat. Installation of a retaining wall or riprap in areas where there were banks prior to implementing the NED Plan will likely disrupt (restrict or preclude) movement of herpetofauna between terrestrial and aquatic habitats in those areas. However, the use of retaining walls will be limited to areas where space is limited due to proximate development or other infrastructure. Therefore, it is unlikely that much useable habitat will become inaccessible for this reason. Riprap and retaining walls also will reduce the amount of natural banks. The natural features that occur along banks (e.g., roots, different sized rocks, and vegetation) provide important cover and foraging habitat for many amphibians and reptiles. However, the impacts associated with installation of the retaining walls and riprap will be minor as these features are already present along much of both the Mamaroneck and Sheldrake rivers. Furthermore, expanding the footprint of the stream corridor will decrease the amount of available riparian habitat. Long-term beneficial effects on amphibians and reptiles are expected from implementation of the NED Plan due to the expected improvement to water quality as described in Section 4.4.1.2.

4.6.1.5 Birds

It is likely that migratory bird species inhabit or forage within the riparian areas located within the Project area and surrounding landscape. Short-term minor adverse impacts to migratory bird species are expected from the clearing of vegetation and trees from riparian areas, as well as noise associated with construction activities. However, since bird species are highly mobile, they are expected to move away from the Project area during construction. Furthermore, outside the breeding season these species do not permanently remain in any one location. Implementation of tree cutting restrictions, described in Section 5.6, will benefit ground- and tree-dwelling migratory birds during the breeding season. Therefore, adverse impacts to migratory bird species are expected to be short-term and minor, limited to the period of construction. Following construction, bird species are expected to resume their normal habits

consistent with post-construction habitat availability in and within the vicinity of the Project area. Furthermore, long-term beneficial effects on birds are expected from implementation of the NED Plan due to the expected improvement to water quality as described in Section 4.4.1.2.

4.6.1.6 Mammals

The NED Plan is expected to produce short- and long-term minor adverse impacts to mammals inhabiting riparian areas located within the Project area. Construction activities will result in the temporary disturbance of habitat (e.g., vegetation and tree removal) and possible mortality of less mobile, burrowing, and/or denning species of mammals. Construction activities also may cause the temporary and permanent displacement of more mobile species due to increased human activity and habitat alterations. Tree-cutting restrictions, described in Section 5.6, will provide some protection for tree-dwelling mammal species. Following construction, mammals are expected to resume their normal habits consistent with post-construction habitat availability in and within the vicinity of the Project area.

Long-term impacts on local mammal populations will be minor, resulting from permanent loss of habitat in areas where the stream channel is expanded into adjacent riparian habitat. However, long-term beneficial effects on mammals are expected from implementation of the NED Plan due to the expected improvement to water quality as described in Section 4.4.1.2.

4.6.1.7 Essential Fish Habitat

The NOAA Northeast Regional Office (NERO) is responsible for administering NOAA programs in the Northeastern U.S. The Habitat Conservation Division of NERO is responsible for the protection, management, and enhancement of marine fishery resources within the region, including oversight of EFH provisions of the MSFCMA and the Fish and Wildlife Coordination Act. These acts authorize NOAA Fisheries Service to review Federal development projects, including those proposed by the District (NOAA Fisheries Service Habitat Conservation Division 2013). Federally funded coastal development projects that have the potential to adversely affect marine, estuarine, or anadromous species or their habitat, are required to coordinate with NOAA Fisheries Service; in this case the NOAA NERO, to obtain recommendations that will avoid, minimize, or compensate for impacts to these resources.

No EFH is located within the study or Project areas; however, EFH designations have been provided for 16 marine fish species that may occur in waters of Mamaroneck Harbor (NOAA Fisheries Service Habitat Conservation Division n.d. b). Potential indirect impacts to EFH species associated with Mamaroneck Harbor include water quality impacts related to in-water and shoreline construction activities within and downstream of the Project, including impacts from stormwater runoff, increases in turbidity, sediment deposition, altered flows, and changes in dissolved oxygen levels. Potential water quality impacts will be mitigated and minimized through use of standard industry BMPs for in-water and shoreline construction activities. Furthermore, potential impacts to water quality within Mamaroneck Harbor are expected to be minor due to the distance of Project-related activities upstream from the harbor. Any decreased water quality in Mamaroneck Harbor associated with these activities is expected to be temporary because it will be limited to the duration of excavation or construction activities. Mobility of fish species also enables them to physically escape by moving away from impacted waters. The NED Plan is not expected to adversely affect EFH, and consultation with NOAA NERO

regarding the Proposed Action is not required. The NED Plan is expected to provide long-term benefits to EFH species of Mamaroneck Harbor as a result of expected improvements to water quality within the study area as described in Section 4.4.1.2.

4.6.1.8 Rare, Threatened, Endangered and Special Concern Species

The draft FWCAR determined there are no federally-listed or proposed species that are identified as having the potential to occur in the project area. In addition, there is no federally-designated cical habitat within the proposed project area (USFWS 2015). The NED Plan is not expected to impact Federally-listed species because the developed condition and urban location of the Proposed Action reduces the likelihood that any rare, threatened, or endangered species occur.

No state listed wildlife species will be affected from implementation of the NED Plan since none were found to inhabit the study area (NYSDEC n.d.).

No in-water activities will be conducted from 1 June through 1 September. Tree cutting will be avoided from 1 April to 1 August. If trees greater than three inches density breast height (dbh) will be removed from 1 January through 31 March, a survey for breeding raptors will be conducted. These seasonal windows will minimize impact to MBTA species and the potential for bat species, as well as potential impacts to fish, and other resources.

4.6.2 No Action Alternative

There would be no changes to the use of the Project area by herpetofauna, birds, or mammal communities. No action alternative would not achieve improvement to water quality resulting from NED Plan's reduction of streambank erosion and sedimentation. Shellfish, finfish and benthic resources would continue to be affected by existing erosion and sedimentation.

The No Action alternative would not change to rare, threatened, or endangered species that have the potential to occur in the study area nor would there be any changes to EFH.

4.7 SOCIOECONOMICS

4.7.1 NED Plan

4.7.1.1 Demographic Characteristics

The NED Plan will neither induce nor inhibit growth of existing or future populations in the Village of Mamaroneck because the area is already highly developed with no real potential for significant expansion. Furthermore, the NED Plan will have no impact on the density and racial composition of the residents living within the study area.

4.7.1.2 Economy and Income

The NED Plan will not affect poverty rates within the study area. However, it is likely to have a beneficial effect on residents' level of income due to a reduction in flooding-related interruptions to residents' lives such as work closures, loss of jobs, potential loss of life, or disruptions to travel and work commutes. It also will have direct beneficial economic effects on existing businesses in the study area by reducing potential structural damages and business closure and

interruption losses resulting from flood damages, as well as improving accessibility to businesses during storm events. There also will be minor, indirect beneficial economic effects on the local economy during the construction phase of the NED Plan from the introduction of construction workers and the resulting purchase of supplies and food.

4.7.1.3 Housing

The NED Plan will have a direct beneficial effect on housing and structures in the Village due to a reduction in potential flood risks to existing properties, particularly the nine properties selected as candidates for nonstructural measures including structural elevation and ringwall construction, and the subsequent reduction in associated costs to repair such damages. The NED Plan also will likely have an indirect beneficial effect on residential property values in the Project area due to the increase in flood protection of homes and businesses, as well as the protection of critical facilities and government services.

4.7.1.4 Environmental Justice

Implementation of the NED Plan is not expected to adversely impact minority and/or low income populations within and adjacent to the Project area. The NED Plan will not negatively impact socioeconomic factors, nor create disproportionately high and adverse environmental or health effects on low income or minority residents, including those within Census block groups 007300-1 and 007200-1.

EJ communities are expected to benefit in the long-term from flood risk management more than the general population because their relatively limited adaptation options make them particularly vulnerable to flood risks (e.g., restricted access to work, damage to personal property, forced relocation, adverse health risks resulting from clogged storm and sanitary sewers). The NED Plan is likely to have a beneficial effect on residents' level of income due to a reduction in flooding-related interruptions to residents' lives such as work closures, loss of housing, loss of jobs, potential loss of life, or disruptions to travel and work commutes. It also will have a direct beneficial effect on housing in the Village due to a reduction in potential flood risks to personal safety and damage to personal property, and the subsequent reduction in associated costs to repair such damages.

In theory, the NED Plan's indirect beneficial effects on residential property values could in turn increase the cost of housing within the Project area, which may adversely impact EJ communities. However, the area surrounding Columbus Park and the rivers' confluence, which is most severely affected by flooding, is part of a recent project to promote equitable, sustainable development near the Mamaroneck Metro-North Railroad Station (Village of Mamaroneck 2013). In 2012, the Village of Mamaroneck, in partnership with the Washingtonville Housing Alliance, was awarded a grant to support a community-based Transit-Oriented Development zoning study (Village of Mamaroneck 2013). The study area, which was delineated to cover a half-mile radius around the train station, falls within the Project area. In addition to furthering the Village's commitment to providing affordable housing, the Transit-Oriented Development zoning study aligns with efforts to address the area's periodic flooding, which has created hardships for residents and property owners including the forced relocation of low income residents in housing units affected by past flooding events (Town of Mamaroneck 2012).

In an effort to ensure effective public participation and access to information, hardcopies of this document will be made available at the Mamaroneck Public Library, Village Hall, and other public locations, and both hardcopies and electronic copies will be distributed to interested parties. USACE will reach out to the Washingtonville Housing Alliance and the Hispanic Resource Center to ensure that EJ communities within the Project area, including the Village's immigrant population, are given access to Project information and provided an opportunity to comment on the Draft EIS. Public comments received on the Draft EIS will be located in Appendix H once available. At the end of the re-evaluation study process, the District will hold a public meeting to outline the analysis, results, and any residual risk to the public as a result of the decision. The final GRR will be made available to the local municipality, the Flood Board, and online on the District's website (USACE New York District 2012b).

4.7.2 No Action Alternative

Under the No Action Alternative, population growth could be inhibited resulting in lower population densities within the study area as a result of residents choosing to move away due to the area's high flood risk or increasing expense of flood insurance. Changes to the racial composition of residents living within the study area would be unlikely.

Failing to minimize flooding that can inhibit residents' travel to places of employment or result in work closures and loss of jobs as well as result in increased economic losses including structural damages and losses due to business closure and interruption resulting from flood damages. Continued flooding would result in the continued need and possibly increase in the cost of flood insurance and other protections.

Continued flooding and failure to implement flood risk management measures aimed at reducing flood risks (e.g., restricted access to work, damage to personal property, adverse health risks resulting from clogged storm and sanitary sewers) may increase for residents who are particularly vulnerable to environmental problems and economic hardship.

4.8 CULTURAL RESOURCES

4.8.1 NED Plan

The NED plan will have an adverse impact on Ward Avenue Bridge and stone retaining walls; all historic properties that will be removed. The Ward Avenue Bridge is a stone and poured concrete, vehicular and pedestrian bridge built under the Works Progress Administration (WPA) in 1937. It was determined to be potentially eligible under Criterion A of the NRHP for its association with events that have made a significant contribution to the broad as well as Criterion C as a structure that embodies the distinctive characteristics of a type, period or method of construction as a good example of a WPA-era stone bridge. The bridge retains integrity of location, design, setting, materials, workmanship and association (Blair, Wheeler, and Kirk 2011).

The stone retaining walls are potentially eligible as a thematic district also under Criterion C as excellent examples of stone walls built from the late 18th century through the 20th century. Some sections of the stone walls, particularly those associated with the WPA-built stone bridges, were constructed in 1936-1937. The proposed district is comprised of stone retaining walls located

along the banks of the Mamaroneck and Sheldrake Rivers within the Village of Mamaroneck. The walls are primarily dry-laid coursed stone between four and 12 feet high, above the water surface, and approximately two and four feet thick. The walls vary in length along the channel. Those built by the WPA measure four feet wide at the base, four feet tall and two feet wide at the top. The walls are comprised of local gneiss and are topped with either horizontal capstones or mortared stone (Blair, Wheeler and Kirk 2011).

The retaining walls are approximately from Winfield Avenue to approximately Warren Avenue, First Street to approximately Willow Street, Ward Avenue to Thompkins Avenue along the Mamaroneck River. Along the Sheldrake River, stone walls are located along the river bank from Mamaroneck Avenue to Waverly Avenue and in the vicinity of Grand Street and Plaza Avenue (Blair, Wheeler and Kirk 2011).

The WPA was one of the New Deal programs established by President Franklin Delano Roosevelt in 1935 to employ millions of workers at public works projects. WPA funds were used to building the stone bridges and some of the stone retaining walls along the Mamaroneck River as well as widen the channel to 30 feet (Blair, Wheeler and Kirk 2011).

Based upon its review of the Phase IA, the New York State Historic Preservation Office (NYSHPO), agreed with the determination that the Ward Avenue Bridge and the stone retaining walls were eligible for the NRHP (Appendix C). The NYSHPO also agreed that the proposed project as described in 2011, which included elements from alternatives that are not included in the current NED Plan, would have an adverse effect on these properties if demolition was to be completed. The NYSHPO requested a review of an alternatives analysis that included the retention of these elements before concurring with the proposed removal of these structures (see Appendix C). The structural report (Appendix C4 of the GRR) notes some of the walls have significant deterioration, including undermining, erosion, cracking and the displacement of stones. A detailed engineering survey to evaluate whether all or part of these walls will be removed or stabilized and included within the project. Coordination of the sections of walls that are within the NED plan with the NYSHPO and local historical societies will be completed. The additional assessment of the walls, as part of the engineering survey, will also be coordinated as it is completed.

The structural report also includes the potential for a water diverter or nosing to be added to the center pier of the Metro-North Railroad Bridge to allow the water flow around the pier and reduce obstruction of the river's flow and related scour. The bridge was determined to be eligible for the National Register. Any object added to the bridge would have to be designed and added to avoid adverse effects to the bridge. Continued coordination with the NYSHPO will be undertaken.

The NED plan also include the non-structural element, including floodproofing, for nine structures in the Harbor Heights area. The determination of the individual structures and the specific alternative at each location (wet or dry floodproofing, etc.) has not been determined. Once the buildings and actions are determined, the District will determine if the building is listed or eligible for the National Register and if the proposed actions will have an adverse effect on historic properties. This will be coordinated with the NYSHPO and any interested parties. The process outlining this coordination will be included in the draft MOA (see Appendix C).

The NYSHPO reviewed and concurred with the report documenting the additional archaeological investigations. No additional archaeological investigations would be required. Consultation with the Stockbridge Munsee Band of Mohicans, the Delaware Nation, and the Delaware Tribal Historic Preservation Office has been initiated by correspondence to include the review of the project reports.

A preliminary draft Memorandum of Agreement (MOA) has been developed to address the NED Plan's adverse effects (Appendix C).

4.8.2 No Action Plan

Under the No Action Plan, the Ward Avenue Bridge and the stone retaining walls thematic district would not be removed and would remain on the landscape. However, the continued deterioration of the walls would likely result in their eventual removal or failure. The Ward Avenue Bridge would undergo periodic maintenance that may limit deterioration or result in the removal of character-defining features.

4.9 COASTAL ZONE MANAGEMENT

Environmental impacts in the coastal area that result from a project are considered significant if coastal resources—including fish and wildlife, historic and scenic, public access and recreation, and water and air resources—are unduly impaired as a result of project implementation. Impacts may range from short-term (less than 1 year) to long-term (greater than 10 years) prior to returning to pre-impact conditions. Also, the extent of impacts to coastal resources may be widespread, localized, or limited to a particular site.

To facilitate the coastal zone consistency determination process, the 44 New York Coastal Policies were reviewed. Twenty (20) policies were found to be applicable to the Proposed Action, as summarized below and detailed in Appendix D. These include policies 2, 4, 8, 11–14, 16–18, 23–25, 33, 37–39, 41, 43 and 44. Determinations for the consistency of the NED Plan with these 20 policies, and mitigation measures that would effectively mitigate potential impacts and maintain conformance with New York Coastal Policies, are presented in Appendix D. The District, in coordination with the Village of Mamaroneck, is required to consult with NYSDOS Division of Coastal Resources to request a Federal consistency determination with the CMP for the Proposed Action. Coastal zone resources and the potential impacts associated with implementing the NED Plan and No Action alternative are discussed in the following sections.

The District reached a negative determination of impacts under the Coastal Zone Management Act, Section 307(c) (1) and (2) and 15 CFR 930.35 (d). The District initiated consultation with the NYSDOS CMP regarding this negative determination. The District anticipates that the NYSDOS will issue its Coastal Zone Consistency Determination concurrence stating the Proposed Action will not result in reasonably foreseeable adverse effects to land and water uses or natural resources of the coastal zone (Appendices C and D).

As a result of the negative determination, no significant adverse impacts on the coastal zone will be expected from the Proposed Action. A mixture of short- and long-term minor adverse impacts and beneficial effects on some coastal resource components are expected from implementing the Proposed Action. Measures will be taken to effectively mitigate potential

impacts and to maintain conformance with New York Coastal Policies (specifically policy numbers 2, 4, 8, 11–14, 16, 18, 23–25, 33, 37–39, 41, 43, and 44). The NED Plan is expected to be consistent with the New York Coastal Policies related to development; fish and wildlife resources; flooding and erosion hazards; economic, social and environmental interests; historic and scenic resources; water resources; hazardous wastes; air resources, and wetlands in New York State-designated coastal zone areas. Special considerations applicable to a particular policy are covered in the consistency determination letter in Appendix C and in the State Coastal Policies evaluation in Appendix D.

4.9.1 No Action Alternative

Periodic, significant flood events would continue to affect future development, fish and wildlife resources; flooding and erosion hazards; economic, social and environmental interests; historic and scenic resources; and water resources.

4.10 AESTHETICS AND SCENIC RESOURCES

4.10.1 NED Plan

Short-term minor and long-term moderate adverse impacts to aesthetic and scenic resources are expected to result from the NED Plan. In the short-term the presence of construction equipment and active construction activities throughout the Project area will result in minimal temporary impacts to each construction site's immediate aesthetics and scenic resources. Columbus Park, in particular, will be aesthetically impacted in the short-term due to its use as a staging area during construction. Other temporary visual impacts, sustained only during the construction phase, will include modifications to the riverbanks (i.e., regrading and reshaping, the removal of retaining walls), wetland impacts, as well as the muddying of water downstream of construction areas and potentially in Mamaroneck Harbor at the mouth of the Mamaroneck River resulting from construction-related increases in suspended solids.

In the long term, channel modifications under the NED Plan will require the removal of mature trees and vegetation along and close to the riverbanks (see Section 4.5.1.1 for estimates). The greatest visual impacts will be sustained by the residential, commercial, and industrial landowners located closest to the proposed river channel modifications, though park visitors also will notice a reduction in greenery around the modified river channels. Vegetation will be replanted using native plants and trees. No trees will be allowed in the newly constructed channel or on slide slopes; these areas will be re-vegetated with other types of vegetation. The District will be working with the Village on a replanting plan and the Village's Tree Committee regarding replacement of trees. An additional long-term impact is the replacement, in some stream segments, of natural riverbed channels and old stone retaining walls with concrete retaining walls, which people generally find less visually appealing. The implementation of nonstructural measures, per the property owners' request, is expected to result in no impacts on the area's aesthetics and scenic resources.

4.10.2 No Action Alternative

Riverbank erosion and other flood related damages would be expected to result from future intense storm events.

4.11 RECREATION

4.11.1 NED Plan

Short-term minor adverse impacts, the result of construction activities, and long-term moderate adverse impacts are expected to result from the NED Plan. There will be long-term recreational benefits in the study area due to a reduction in the flooding of Village parks, a reduction in increased sediment loads delivered to the harbor during flooding events that affect water quality and water-related recreation (e.g., swimming and fishing), and the minimization of other disruptions of recreational activities due to flooding. The implementation of nonstructural measures is expected to result in no impacts on the area's recreational resources.

Columbus Park will be closed during the entire construction phase because it will be used as the staging area. Other parks that will likely experience temporary closures and disturbance of recreation because they are found within the Project area are "Bub" Walker Park, Ward Avenue Park, and O'Connell Park.

Harbor Island Park, the entrance of which lies approximately 850 ft (250 m) downstream of the Tompkins Avenue Bridge where construction activities are proposed to end, may experience short-term disturbance of recreation resulting from construction activities. A temporary increase in sedimentation in the rivers and harbor could affect fishing and swimming activities. In addition, an increase in traffic and noise levels from the use of heavy equipment may reduce or restrict the use of areas adjacent to the Project area for walking, jogging, and other such activities.

Long-term moderate adverse impacts are expected to result from the removal of two footbridges in Columbus Park. The park is bisected by the Sheldrake River; thus the two footbridges enable pedestrians and park visitors to easily access and move between the two park areas. Both footbridges also are frequently used by commuters who park in the lot at the northwest corner of the park (at Jefferson Avenue and Van Ranst Place) and then walk through Columbus Park and across the footbridges to Station Plaza. With the footbridges permanently removed, pedestrians will have to walk on sidewalks around the park perimeter in order to cross Sheldrake River.

In the long-term, implementation of the NED Plan is expected to improve the efficiency and capacity of the two rivers, especially at the confluence in Columbus Park where floodwaters back up and create the majority of flood damages. This will produce long-term recreational benefits because park closures due to flooding and consequent restoration activities will decrease. The sediment loads and pollutants transported to the harbor during and following flooding also will be minimized, which will benefit swimming, fishing, and other recreational activities that are popular in and around Harbor Island Park.

4.11.2 No Action Alternative

Flood damages to Columbus Park in particular, as well as other Village parks and recreational spaces, will continue with future intense storm events.

4.12 TRANSPORTATION

4.12.1 NED Plan

The NED Plan is expected to have short-term minor and long-term minor adverse impacts on transportation. Short-term impacts will be due to worker commutes, delivery of equipment and materials to and from the staging areas and construction sites, and potential minor road closings or detours during the implementation of nonstructural measures on specific properties in the Harbor Heights neighborhood and the industrial area along Fenimore Road, just south of the Sheldrake River. Although there will be some long-term beneficial effects to transportation infrastructure due to bridge replacements, there also will be long-term minor adverse impacts resulting from the permanent closure of the Ward Avenue Bridge and the two pedestrian bridges. The NED Plan will have no effect on air, rail, or public transportation.

Construction. During construction, traffic will increase on haul routes and roadways leading to the sites and the Columbus Park staging area. Table 12 provides the estimated additional vehicle trips per day resulting from construction activity associated with the NED Plan. On average, there will be approximately 40 trucks per day to and from the staging areas and work sites delivering concrete, raw materials, and supplies. Increases in local traffic will be seen more on Jefferson Street, Halstead Avenue, Mamaroneck Avenue, and Fenimore Road. Additional traffic will only be a small fraction of the existing traffic and will not change the LOS on any existing roadways (Table 12). Detailed information regarding equipment type and quantity are provided in Appendix B. The number of parking spaces around Columbus Park, the staging area, and the train station will be reduced during construction, but the exact number is undetermined. If the number of parking spaces is permanently reduced, then improvements by design may be considered at that time; however, any changes in parking will have less than significant effects under NEPA.

Table 12. Additional Roundtrips by Construction Activity for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Activity	Average Trips [trucks per day]
Excavation and Fill	26
Concrete for Retaining Walls	1
Clearing	1
Delivery of Equipment and Supplies	8
Total	**36**

Channel construction and its impacts on transportation will not be concentrated in any one location for extended periods of time. Impacts on transportation will be moved from area to area as construction progresses. Residential neighborhoods could experience short-duration encroachment on pedestrian walkways and on-street parking. The local roadways may experience minor delays in operations, and some temporary closures of roadways segments could occur. However, these impacts will be short-term and will end upon completion of the construction phase. In general, the existing transportation infrastructure will be sufficient to

support the increase in vehicle traffic, though some temporary access points to the canal may be required.

Bridge Replacement. Table 13 outlines the bridges (excluding footbridges) that will be removed or replaced and the associated roadways that could experience increases in traffic. Notably, all three bridges provide access to residential neighborhoods. During periods of closure, detouring of existing traffic will be required. The removal of the Ward Avenue Bridge will have long-term minor adverse impacts on transportation resources, as other crossings are available one or two blocks north and south of Ward Avenue. The replacement of the Waverly Avenue bridge will provide long-term beneficial effects to transportation infrastructure.

Pedestrian Bridge Removals. Pedestrian footbridges in Columbus Park provide access to the Metro-North Rail Station and parking areas along Van Ranst Place and Jefferson Avenue (Footbridge 1 is near the confluence, and Footbridge 2 is approximately 250 ft [76 m] upstream). These bridge removals will impact Metro-North Rail Station parking as well as pedestrian traffic along sidewalks and crosswalks leading to the station. These impacts will be primarily seen on Jefferson Avenue and Station Plaza. Although a direct route through the park will no longer be available, pedestrians will still be able to reach the station via sidewalks along Station Plaza Road bridge or, alternatively, along Mamaroneck Avenue. The Center Avenue pedestrian footbridge also will be removed. Pedestrians who used Center Avenue footbridge to cross Plaza Avenue will be required to cross at an alternate intersection, namely Waverly Avenue one block south. These impacts will be minor.

Table 13. Bridge Projects and Potentially Affected Roadways for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Bridge Removals and Replacements	Proposed Action	Roadways That Could Experience Additional Traffic During Closure	Possible Alternate Bridges for Detoured Traffic
Waverly Avenue bridge	Temporary removal and replacement	Fenimore Road, Bishop Avenue, Stanley Avenue, and Hoyt Avenue	Rockland and Center Avenue Bridges
Ward Avenue bridge	Permanent removal	Halstead Avenue, Union Avenue, Phillips Park Road, and Anita Lane	Halstead and Tompkins Avenue Bridges

4.12.2 No Action Alternative

Flooding events would periodically increase traffic with the closure of streets due to floodwaters.

4.13 AIR QUALITY

4.13.1 NED Plan

Implementation of the NED Plan is expected to result in short-term minor adverse impacts on air quality, and there is also the potential for long-term minor beneficial effects. Short-term impacts will result from the generation of airborne dust and other pollutants during construction and rock and soil excavation. The NED Plan could impact air quality through airborne dust and other

pollutants generated during channel and bridge construction and short duration releases of fugitive dust during rock excavation. Air quality impacts will be minor unless the emissions 1) are greater than the General Conformity Rule *de minimis* threshold, 2) exceed the GHG threshold in the draft CEQ guidance, or 3) contribute to a violation of any Federal, state, or local air regulations. In the long term, the NED Plan could potentially introduce incremental beneficial effects to air quality by reducing emissions associated with flood related traffic congestion and heavy construction activities during any post-flooding reconstruction efforts. The implementation of nonstructural measures is expected to result in no impacts on the area's air quality.

Clean Air Act Statement of Conformity. Construction emissions were estimated for fugitive dust, on- and off-road diesel equipment and vehicles, worker trips, architectural coatings, and paving off-gasses. USEPA has designated Westchester County as moderate nonattainment for the 8-hour O_3, $PM_{2.5}$, and maintenance for CO. The estimated emissions from the NED Plan will be below the General Conformity Rule *de minimis* thresholds; therefore, the general conformity rule does not apply (Table 14). These impacts will be minor. Detailed emission calculations are in Appendix E.

Table 14. Annual Air Emissions Compared to *de minimis* Thresholds under the NED Plan for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Activity	Emissions (tons/year)						*De minimis* threshold	Would emissions equal/exceed *de minimis* levels?
	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$		
Site Preparation and Construction	28.6	52.9	6.8	10.9	6.1	2.9	100 (50)[a]	No

[a] *de minimis* threshold for VOCs is 50 tons per year.

The implementation portion of the Project is in the preplanning stages, and a detailed construction schedule and a final list of equipment is not available at this time. For purposes of analysis, it was assumed that all construction activities will be compressed into a 12-month period. Therefore, regardless of the ultimate implementation schedule, annual emissions will be less than those specified herein.

There will be no permanent sources of air emissions associated with the flood risk management measures. Long-term incremental beneficial effects on air quality may include less disruption to traffic and no emissions from heavy equipment during rebuilding efforts after storm events. These impacts would be negligible. Notably, since there will be no permanent sources of air emissions there will be no impacts to air quality or visibility in any Class I areas.

Greenhouse Gases and Climate Change. There will be no ongoing sources of GHG emissions resulting from the NED Plan once the Project is completed. All construction activities combined will generate approximately 5,042 tons (4,574 metric tons) of CO_2, which will be below the CEQ threshold. These effects will be negligible.

There are less than six acres of mature trees within the project area, although not all of the trees may be removed nor is the acreage contiguous. The NED Plan avoids the removal of the mature

trees that form the larger upland forest located upstream of I-95 across from the Harbor Heights section of the Village. Most vegetation, including trees will be replaced and all tree removal and replacement will involve consultation with the Village's Tree Committee. It is anticipated that minor, short-term impacts to carbon sequestration and temperature reduction will occur until the trees achieve a larger size. In the long-term, replanting even with younger trees may introduce a variety of ages and species that would maximize carbon reduction over time.

4.13.2 No Action Alternative

Ambient air-quality would remain unchanged when compared to existing condition under the No Action Alternative. The no action plan would not result in any loss of vegetation, including trees, and would not likely result in the reduction of carbon sequestration or energy use. However, older trees that have reached the end of their life span, subjected to insect damage or lack of maintenance, may be more susceptible to loss during a storm or flood events. The Village lost 140 public trees in 2012 as a result of Hurricane Sandy.

4.14 NOISE

4.14.1 NED Plan

Short-term minor adverse impacts will be expected, specifically an increase in noise due to heavy equipment use during construction, rock excavation activities, and the potential implementation of nonstructural measures. The NED Plan will produce no permanent sources of noise and there will be no long-term changes in the noise environment.

The specific impact of construction activities on the nearby receptors will vary depending on the type, number, and loudness of equipment in use. Excavators and other heavy equipment, truck or watercraft removal of excavated material, and the delivery of riprap and concrete to workspaces will be the primary sources of noise. Individual pieces of heavy equipment typically generate noise levels of 80–90 dBA at a distance of 50 ft (15 m). With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high noise levels typically extends to distances of 400–800 ft (122–244 m) from the site of major equipment operations. Locations more than 800 ft (244 m) from construction sites seldom experience substantial levels (greater than 62 dBA) of noise. Table 15 presents typical noise levels (dBA at 50 ft) that USEPA has estimated for the main phases of outdoor construction.

Table 15. Noise Levels Associated with Outdoor Construction for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Construction Phase	L_{eq} (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	89

Source: USEPA 1971

Under the NED Plan, some nearby residents will experience appreciable amounts of noise from heavy equipment. However, given the temporary nature of proposed construction activities and the limited amount of noise that heavy equipment would generate, this impact will be minor. It is anticipated that excavation activities will take place intermittently over approximately 12 months along the length of the project area. In addition, limited truck and worker traffic may be audible at locations along haul roads and roadways approaching the construction area. These impacts also will be negligible. Channel construction and associated noise will not be concentrated in any one location for extended periods of time. Impacts to the noise environment will move from one area to another as construction progresses.

There will be no permanent or ongoing sources of noise from the NED Plan. Noise will end with the construction phase; therefore, there will be no long-term impacts on the noise environment.

4.14.2 No Action Alternative

Noise conditions would remain unchanged when compared to existing conditions.

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5.0 MITIGATION MEASURES

The measures developed to avoid and minimize the potential impacts identified in Section 4.0 apply to the NED Plan. Any incongruities in the plans for the NED Plan are specifically noted in the resource sections that follow.

5.1 TOPOGRAPHY AND GEOLOGY

The Proposed Action is designed to meet current applicable USACE design criteria, taking into account design flood requirements, site conditions, and physical constraints. Information from subsurface explorations and geotechnical investigations has been incorporated into the design of the Proposed Action. The sites will be adequately prepared in accordance with those findings, and appropriate construction methods will be implemented. Elements of the Proposed Action are designed to protect existing soils and surficial material (especially erodible soils exposed along the streambanks) by reinforcing the streambed and channel slopes with riprap, retaining walls, channel modifications, and other improvements. Following completion of modifications and structures, each construction site will be filled, compacted, and restored to pre-construction conditions. In addition, following completion of the Proposed Action, the staging area in Columbus Park also will be restored to pre-construction conditions.

Excavation and Fill. Excavated material will be handled, removed, utilized, and/or disposed of in accordance with applicable construction standards and regulations. In addition, USACE will coordinate with local authorities and make public announcements to help ensure public safety, acquire a Dig Safe permit to locate and identify utilities, and properly handle and dispose of waste material.

Landslides. Although the Proposed Action includes slope steepening in some instances, there is generally a low risk for landslides and slope failures, and more importantly, the improvements will be engineered to accommodate known potential floods and conditions. Standard construction practices, including the shoring-up of channel slopes, and Occupational Safety and Health Administration safety (OSHA) guidelines will be followed during construction.

5.2 HAZARDOUS TOXIC AND RADIOACTIVE WASTE

There should be no impacts to HTRW for most of the project area. The ITT Sealectro site, a State Superfund site, is located along a portion of the Sheldrake River. The soil in this area may have solvents. Prior to construction in this area, NYSDEC Environmental Remediation staff will be contacted and testing to determine VOC levels will be conducted. Any soil removal that may be required will be removed and disposed of at an acceptable facility.

5.3 LAND USE, COVER, AND ZONING

Various measures will be implemented to avoid, minimize, and mitigate impacts to land use. The Proposed Action was developed recognizing that available space for channel widening and temporary construction workspace is limited. Therefore, the District anticipates that most of the construction activity will occur within the existing channel, which will help minimize impacts to adjacent land uses. Temporary workspaces along the top of the channel will generally be limited to a 15 ft (4.5 m) clearance from the channel bank edge along portions of the Project area. In

addition, channel construction and its impacts will not be concentrated in any one location for extended periods of time, as construction will be moved from area to area as it progresses. Disturbed areas will be restored and their use returned to pre-construction conditions. Many of the impacts and mitigation measures are described in related sections (i.e., Sections 4.5 Vegetation, 4.9 Coastal Zone Management, 4.10 Aesthetics and Scenic Resources, 4.11 Recreation, 4.12 Transportation, and 4.14 Noise).

There are no specific mitigation measures for zoning because the Proposed Action is not expected to have an impact on zoning.

5.4 WATER RESOURCES

Standard industry BMPs to protect water quality and wetlands during in-stream work will be implemented to reduce the potential for impacts during construction, and water quality protection measures will be implemented in accordance with local, county, NYSDEC jurisdictional requirements and regulations. For example, the District will develop and implement a site-specific SWPPP in accordance with the SPDES General Permit for Stormwater Discharges from Construction Activity, create an ESCP, and upon completion, file a Notice of Termination to verify that BMPs were implemented and that disturbed areas were restored and stabilized.

A CWA Section 401 Water Quality Certification, Article 15 *Protection of Waters Program* permit, and other applicable permits, such as stream disturbance, excavation and fill in navigable waters, and freshwater wetlands permits, will be obtained from NYSDEC and the Village of Mamaroneck prior to implementation of the Proposed Action (Department of the Army and NYSDEC 2010). All other Federal, state, and local permits will be obtained, as needed.

During construction of the Proposed Action, work within wetlands will be avoided and minimized whenever possible. If construction equipment must enter a wetland, construction mats will be placed along the entire route within the wetland to minimize soil compaction. The minimum number of mature trees will be removed to allow access to workspaces. Following construction, temporary workspaces will be stabilized and revegetated by planting trees and shrubs in forested wetlands. To maximize the rate of revegetation and reduce the likelihood that invasive species will take over disturbed areas, native trees and shrubs will be planted and native wetlands seed mix applied to exposed soils. These and other efforts will be used to restore the Project area to pre-construction conditions.

5.5 VEGETATION

Mitigation for impacts to vegetation, including removal of mature trees, will include collaboration with local landowners, agencies, and the Village of Mamaroneck to identify appropriate areas and species for tree plantings. The District also recognizes and will support the Village's existing efforts to preserve and enhance open space and public access to the rivers within the Project area through the creation of riverwalks, improvements to existing parks, and/or restoration and creation of riparian buffers.

The Village of Mamaroneck Department of Public Works is responsible for maintenance of public parks and trees. Village Code Chapter 318 establishes the proper planting of new trees and the health and maintenance of existing trees, in order to aid in the maintenance of property

values, implement the design and environmental goals of the Village Master Plan, and promote the general welfare of the inhabitants of the Village of Mamaroneck (Village of Mamaroneck 1988). A Tree Committee also was created under Chapter 318 to promote the aforementioned goals by setting proper standards of planting, maintenance and removal of trees, and monitoring the observance of these standards. Specifically, the Committee serves in an advisory capacity and is responsible for investigating and developing and/or annually updating and administering a plan for the care, preservation, pruning, planting, replanting, removal or disposition of trees and shrubs in public areas. The Tree Committee also reviews project plans that are referred to it by the Planning Board and advises the Board on proper tree plantings and/or tree preservation techniques.

Impacts to vegetation resulting from the Proposed Action will be minimized and mitigated by restoration of the riparian areas to pre-construction conditions, to the maximum extent feasible. The District will coordinate with the Village of Mamaroneck Department of Public Works and Tree Committee to identify a list of native tree species that are recommended for restoration of the Project area (Village Code §318-6), obtain recommended planting guidelines that have been established for the Village (Village Code §318-7 and §318-9), and obtain any required tree planting permit(s). Following construction, temporary workspaces will be stabilized and revegetated by planting native trees and shrubs. To maximize the rate of revegetation and reduce the likelihood that invasive species will take over disturbed areas, the top layer of soil will be removed and replaced with clean topsoil that is seeded with a native upland or wetland seed mix immediately following completion of construction activities.

In addition to replanting trees onsite, directly within areas affected under the Proposed Action, potential off-site mitigation actions may include planting trees in other public areas (e.g., parks, sidewalks), working with the Tree Committee and private landowners (e.g., under Village Code §318-8) to assist with planting trees on property adjacent to the Project area or even within the study area at large, and/or collaborating with the Village to develop a restoration plan that improves public access to the Mamaroneck and Sheldrake rivers.

5.6 FISH AND WILDLIFE

As described in Section 5.4, potential impacts to water quality and the organisms that inhabit waters of the Mamaroneck and Sheldrake rivers and Mamaroneck Harbor will be mitigated through implementation of standard industry BMPs to protect water quality during in-stream work and other activities that will disturb or remove soils. These measures will be implemented in accordance with NYSDEC permitting requirements to reduce the potential for water quality impacts during construction.

Streamside wildlife habitat that is removed or disturbed will be revegetated using native plant and tree species, with immediate results expected for grasses and other herbaceous species and long-term restoration needed for establishment of larger shrub and tree species.

The District will avoid or minimize the clearing of forested habitat during the breeding period for sensitive wildlife species, including birds, in compliance with the MBTA, and bats. Measures to avoid or minimize impacts include:

- No tree cutting will occur from 1 April to 1 August;

- If trees greater than three inches density breast height (dbh) will be removed from 1 January through 31 March a survey for breeding raptors will be conducted;

To minimize impacts to fish and other resources, no in-stream work will be conducted from 1 June through 1 September.

No other measures are proposed to reduce impacts to fish and wildlife resources associated with the study area. Industry standard BMPs to protect water quality, restoration of disturbed streamside wildlife habitats, implementation of tree-cutting restrictions, and seasonal windows for in-stream activities have the potential to occur in the study area will reduce potential impacts to the extent practicable.

5.7 SOCIOECONOMICS

The Proposed Action will have no significant impacts on socioeconomics in the study area, and as such no mitigation measures will be required.

5.8 CULTURAL RESOURCES

The NED will have adverse effects on historic properties to include the Ward Avenue Bridge and the stone retaining walls thematic district. A draft MOA, developed to minimize or mitigate the project's adverse effect, is being reviewed as part of the public review of the GRR and the DEIS. In addition, an alternatives analysis considering the effects of alternatives on potentially eligible resources is also being prepared and coordinated with the NYSHPO and locally interested parties as well as being a part of consultation with federally-recognized Tribes. Mitigation, at minimum will include documentation of the resources. Incorporation of features into elements of the NED and other options may be considered as part of the development of plans and specifications, specifically for the retaining walls.

5.9 COASTAL ZONE MANAGEMENT

Mitigation measures required based on the negative determination issued by NYSDOS include implementation of standard industry BMPs to protect water quality during construction of the Proposed Action. These include the development of a SWPPP and ESCP to minimize erosion and subsequent sediment loss resulting from soil disturbing activities in accordance with local, county, NYSDEC, and USACE standards; restoration of pre-construction topographic site condition; revegetation of disturbed soils with native plants; compensatory wetland mitigation; and use of screening to minimize impacts to visual, aesthetic, and scenic resources during construction. More details on the measures to be taken to avoid, minimize and mitigate effects to coastal resources as a result of the Proposed Action are described in Sections 4.4, 4.5, 4.6, 4.10, and 4.11.

5.10 AESTHETICS AND SCENIC RESOURCES

Mitigation measures that could be implemented to reduce the short-term effects of construction activities include:

- adhering to the Project's ESCP to minimize the transport of suspended solids downstream, and

- erecting temporary fences in Columbus Park to screen the construction staging area from viewpoints outside the park.

Various mitigation measures will be implemented to reduce the Project's long-term adverse visual impacts and restore the Project area to pre-construction conditions. These include:

- riparian habitat restoration activities such as riverbank shaping, tree replanting, and revegetation; and
- the use of riprap and other more "natural" looking channel modifications where possible.

5.11 RECREATION

Mitigation measures that will be implemented to offset the impact of long-term adverse impacts resulting from the removal of two footbridges crossing Sheldrake River within Columbus Park include ensuring that there are safe and effective pedestrian routes encircling the park. In addition, upon Project completion, parks and surrounding areas will be restored to pre-construction conditions, access to other riverine areas and affected parks will be restored, and recreational uses and activities are expected to resume without additional or permanent impacts. Specific mitigation measures that could be implemented to reduce the limited short-term effects of construction activities include:

- adhering to the Project's ESCP to minimize the transport of suspended solids downstream,
- restricting construction primarily to normal weekday business hours in residential areas where people are more likely to be recreating,
- erecting temporary fences and other physical barriers to control movement through construction areas and maintain a safe distance for pedestrians,
- temporarily reducing vehicular speed limits if normal maximum speeds constitute a hazard for pedestrians, and
- hanging signage that informs residents and others using affected recreational spaces of the Proposed Action's purpose, duration, and expected outcomes.

The Village of Mamaroneck Comprehensive Plan identified exploration of the potential and feasibility to establish a Village-wide system of riverwalks to improve access and public visibility of its waterways (Village of Mamaroneck 2012b). Currently riverine access to sections of the Sheldrake River is limited to industrial areas within the Village, Columbus Park, the Gedney Pond Stream, the Guion Creek Nature Trail, and Otter Creek Preserve. Much of the Mamaroneck and Sheldrake rivers, Gedney Pond Stream, and Magid Pond (a local Conservation and Open Space Area and a Critical Environmental Area) do not have public access. Much of the land bordering the Mamaroneck and Sheldrake rivers and other waterways and waterbodies within the Village is privately owned and is therefore unavailable for public open space and recreational use. Opportunities to expand public access along the rivers can be identified for new site plans that are presented to the Planning Board, and the District should work with the Village of Mamaroneck to determine if expansion of public access to the Mamaroneck and Sheldrake rivers could be improved through establishment of riverwalk areas within the Project area as part of post-construction restoration of impacted shoreline and riparian areas. Coordination with the

Village of Mamaroneck will determine if and where expansion of public access along the Mamaroneck and Sheldrake rivers, including establishment of riverwalks, should be incorporated into post-construction restoration plans.

5.12 TRANSPORTATION

Because the impact on traffic and transportation will be less than significant, no mitigation measures will be required. USACE is currently evaluating additional measures to be implemented for construction activities to further reduce these already limited effects. Traffic control and operations strategies may include:

- preparing a Construction Traffic Management Plan (See Appendix B);
- routing and scheduling construction vehicles to minimize conflicts with other traffic;
- strategically locating localized staging areas to minimize traffic impacts;
- posting suggested alternate parking and pedestrian routes to alleviate congestion and overcrowding during peak travel hours (particularly in and around Columbus Park);
- erecting physical barriers and channelizing devices to separate traffic from the work area;
- equipping all construction vehicles with backing alarms, two-way radios, and Slow Moving Vehicle signs when appropriate;
- temporarily reducing speed limits if the normal maximum speeds would constitute a hazard for traffic, pedestrians, or construction workers;
- using flashing arrow signs to augment conventional traffic control devices to control traffic movement through construction areas;
- applying pavement markings such as striping, reflective devices, raised pavement markers, and pavement marking arrows to delineate the position of lanes and to designate travel directions;
- establishing detours and alternate routes when it is important to close the work area to perform certain construction tasks or when diverting traffic will substantially reduce traffic volumes;
- making signal timing adjustments if capacity can be increased during changes in travel patterns;
- providing temporary parking options, for example enabling parking permit holders in Station Plaza lots potentially impacted by construction and/or staging to use metered spaces on nearby streets free of charge (if parking spaces are permanently and significantly impacted, then mitigation would be addressed at that time);
- implementing turn restrictions to provide for an additional travel lane or to reduce traffic conflicts; and
- establishing truck restrictions to remove some vehicles from the construction area and increase the travel speed for the remaining vehicles

5.13 AIR QUALITY

Because the impact on air quality will be less than significant, no mitigation measures will be required outside of existing air quality regulations. NYSDEC outlines requirements applicable to construction, such as controlling fugitive dust and open burning. All persons responsible for any operation, process, handling, transportation, or storage facility that could result in fugitive dust will take reasonable precautions to prevent such dust from becoming airborne. Reasonable precautions might include using water to control dust from building construction and demolition, road grading, or land clearing. In addition, construction will be performed in full compliance with current NYSDEC Chapter III-Air Quality Regulations requirements, with compliant practices and/or products. These requirements include the following:

- Control of Open Burning and Incineration (NYSDEC Chapter III, Part 215)
- Control of Particulate Emissions (NYSDEC Chapter III, Subpart 257-3)
- Control of Organic Emissions (NYSDEC Chapter III, Part 212)
- Control of Fuels (NYSDEC Chapter III, Part 225)
- Idling Prohibition for Heavy Duty Vehicles (NYSDEC Chapter III, Part 217-3)

This listing is not all-inclusive; the USACE and any contractors will use BMPs during construction and comply with all applicable air pollution control regulations.

5.14 NOISE

Because the impact to the noise environment will be less than significant, no mitigation measures will be required. The District is currently evaluating noise risk management measures to be implemented for construction activities to further reduce these already limited impacts. In accordance with the local noise ordinance, sounds generated from heavy equipment will be required to close down after 6:00 p.m. from Monday through Saturday, and on Sundays and holidays (Section 3.14). Although the impacts will be minor, the following noise reduction measures could be incorporated into the construction activities:

- time construction to predominately occur during normal weekday business hours in areas adjacent to noise-sensitive land uses such as residential areas, and
- keep construction equipment mufflers properly maintained and in good working order.

Special variances to the local noise ordinance may be obtained; however, additional noise reduction measures could be required. The following measures may be used to reduce construction noise, as necessary:

- enclose construction power units,
- enclose pumps and engines where applicable,
- enclose generator sets,
- restrict the use of mobile equipment and trucks to daytime hours,
- use noise barriers,

- place silencers on equipment, and
- address individual landowner's impacts on a case-by-case basis with measures up to or including provisions for temporary lodging.

This list of noise mitigation measures is not exhaustive; the District and its contractors will comply with all applicable noise control regulations.

Construction noise will be expected to dominate the soundscape for all onsite personnel. Construction personnel, and particularly equipment operators, will don adequate personal hearing protection to limit exposure and ensure compliance with Federal health and safety regulations.

6.0 CUMULATIVE EFFECTS

This section analyzes the cumulative effects of the Proposed Action that would be expected from implementation of the NED Plan. There are no other projects within the study area currently or in the immediate future. Where there are differences in the environmental consequences of the two Preferred Alternatives, they are specifically noted in the resource sections that follow.

6.1 TOPOGRAPHY AND GEOLOGY

The Proposed Action will result in short- and long-term minor adverse impacts—primarily associated with sedimentation, dust and waste generated by rock excavation, the clearing and grading of construction and staging sites, and other channel modifications. However, these impacts are expected to have negligible cumulative effects overall. Implementation of the Proposed Action is expected to have long-term beneficial effects on stream channel erosion and streambed scour.

The Westchester County Joint Water Works Reservoir lies on the Mamaroneck River, upstream of the Project area in the Village of Mamaroneck. The Village is considering the decommissioning and removal of the dam. Construction activities for the removal of the dam would include: 1) demolition of the existing dam and associated structures; 2) channel modifications above the dam; 3) removal and disposal of sediment from the existing reservoir; 4) restoration/armouring of the surrounding area; 5) flood control measures downstream from the dam; and 6) erosion control measures.

To determine cumulative impacts of the decommissioning and removal of the existing dam was investigated to determine its potential for "future with project" impacts to the design of the selected plan. This evaluation indicated that, even with the removal of the dam and other modifications, the Village's decommissioning and removal of the existing structure provides no significant impact to the peak flows and water surface elevations and therefore will not cause adverse environmental impact to the selected plan or compound effects from the NED plan.

The removal of the dam could increase sediment load into the Mamaroneck River and, eventually the harbor and Long Island Sound. Sediment that was formerly trapped by the dam could be transported downstream. However, the Village, as part of its assessment of impacts of the dam removal and associated activities, would have to identify ways to limit and reduce sediments entering the river.

6.2 HAZARDOUS TOXIC AND RADIOACTIVE WASTE

The ITT Sealectro Site is located along the Sheldrake River within the project area, where retaining walls will be constructed. Prior to construction, the District will test soils for VOCs and will contact the NYSDEC Remediation staff to determine if contaminated soils are to be disturbed. Soils removed as part of construction may require handling and disposal in accordance with NYSDEC standards. The NED Plan will have negligible cumulative effects on issues involving HTRW.

6.3 LAND USE, COVER, AND ZONING

The Proposed Action will have negligible cumulative effects on land use.

6.4 WATER RESOURCES

The Proposed Action will have no significant adverse cumulative impacts on regional hydrogeology, groundwater resources, or tidal influences, and is expected to produce long-term benefits to water quality by decreasing storm-related erosion and sedimentation. The Proposed Action will not have an adverse effect on either of the wetlands located within the project area. No channel modification will be undertaken in the Harbor Heights area, where a wetlands was identified during the course of this study. Also, freshwater pond at the confluence of the Sheldrake and Mamaroneck Rivers will have no significant adverse impacts. It will be protected during construction and the use of the area around Columbus Park as a construction staging area. In-stream activities will be avoided from 1 June through 1 September. The Proposed Action will have no significant adverse cumulative impacts on regional hydrogeology, groundwater resources, or tidal influences, and is expected to produce long-term benefits to water quality by decreasing storm-related erosion and sedimentation.

The Proposed Action will result in short-term minor impacts to surface waters and water quality including an increase in turbidity, sedimentation, and erosion; water flow changes; an increase in downstream water temperatures; and mobilization of heavy metals, PCBs, and pesticides during excavation activities.

An update to existing floodplain maps for the study area also will be required; however, this is considered a beneficial effect resulting from the reduction in flood risk within the study area that will result from the Proposed Action.

The Proposed Action will result in short-term minor and long-term minor and moderate adverse impacts to wetland resources. Short-term impacts include loss of vegetation during construction activities. Short-term impacts are expected to be minor due to the relatively low density of riparian areas within the Project area and the restoration of riparian areas to pre-construction conditions.

6.5 VEGETATION

The Proposed Action will result in short-term minor and long-term moderate adverse impacts to upland and wetland vegetation within the Project area. Short-term impacts include trampling of vegetation within construction workspaces and conversion of forested uplands and wetlands to herbaceous communities. Short-term impacts will have negligible cumulative effects due to restoration of the impacted areas. In the long term, there will be an overall loss of riparian vegetation, including the removal of mature trees, where the new channel extends into existing riparian habitats and in construction workspaces. The loss of vegetation in a watershed with high density of development may have moderate cumulative impacts.

6.6 FISH AND WILDLIFE

The Proposed Action will result in short-term minor impacts and long-term beneficial effects on shellfish and finish, and short-term moderate impacts and long-term beneficial effects on benthic resources. No cumulative effects on EFH are expected from the Proposed Action. In the short-term, construction of the Proposed Action will result in some water quality impacts, which could cause mortality or displacement of shellfish, finfish, and benthic populations. In the long term, water quality in the study area is expected to improve as a result of the Proposed Action, which

would benefit these species. The short-term impacts are expected to be minor and temporary and, when combined with the long-term benefit to water quality, are expected to result in negligible cumulative impacts.

The Proposed Action will result in short- and long-term minor adverse impacts on local populations of amphibians and reptiles, birds, and mammals. In the short-term, construction of the Proposed Action will result in some mortality, displacement of individuals, and disrupted bird nesting. In the long term, there will be less overall riparian habitat where the new stream channel extends into riparian habitat. However, both short- and long-term adverse impacts are expected to result in negligible cumulative impacts, and long-term beneficial effects on amphibians and reptiles, birds, and mammals are also expected due to the anticipated improvement to water quality.

The Proposed Action is not expected to impact rare, threatened, and endangered species that have the potential to occur in the Project area. Due to the urban location of the Proposed Action and limited availability of roosting trees, there is a low likelihood that Indiana bat and northern long-eared bat occur in the Project area. Tree cutting will be avoided from 1 April to 1 August. If trees greater than three inches density breast height (dbh) will be removed from 1 January through 31 March, a survey for breeding raptors will be conducted. No in-stream work will be conducted from 1 June through 1 September. These measures will minimize any project impact to fish and wildlife.

6.7 SOCIOECONOMICS

The Proposed Action will have no adverse cumulative impacts on the existing demographics, economy, housing, and EJ communities in the study area. Increasing storm and flood protection will reduce damage to property and infrastructure within the study area; thus implementation of the Proposed Action is expected to benefit the local economy and housing in the long term.

6.8 CULTURAL RESOURCES

The cumulative effect of the removal of the Ward Avenue Bridge and the stone retaining walls will include the replacement of stone walls with concrete walls and no bridge. As part of the on-going consultation, mitigation efforts will look to reduce these effects.

6.9 COASTAL ZONE MANAGEMENT

The Proposed Action would result in short-term minor impacts to water resources, vegetation, fish and wildlife, aesthetics and scenic resources, and recreation, and long-term minor impacts to fish and wildlife resources. The Proposed Action also would result in long-term minor and moderate impacts to water resources, vegetation, aesthetics and scenic resources, and recreation. The mitigation described for impacts to these resources will have negligible cumulative effects, with an overall net benefit provided by the Proposed Action to development; fish and wildlife resources; flooding and erosion hazards; economic, social and environmental interests; historic and scenic resources; and water resources. No cumulative effects from hazardous wastes, air resources, or wetlands are expected from the Proposed Action.

6.10 AESTHETICS AND SCENIC RESOURCES

The Proposed Action will result in short-term minor adverse impacts to aesthetics and scenic resources, such as the presence of construction equipment and machinery in parks and neighborhoods and the muddying of water downstream of construction areas and potentially at the mouth of Mamaroneck River during construction, but these impacts will have negligible cumulative effects. In the long term, visual resources in the study area will be moderately adversely affected due to the removal of trees and other vegetation, as well as the utilization of concrete channels in some stream segments. However, the restoration of riparian areas to pre-construction conditions will reduce the cumulative effects to a minimal level.

6.11 RECREATION

The Proposed Action is expected to benefit recreational resources and activities in the study area by reducing damages from repetitive flooding, particularly in Columbus Park at the confluence of the Mamaroneck and Sheldrake rivers. The Proposed Action will result in short-term park closures and other construction-related disruptions to recreation, but these impacts will have negligible cumulative effects. In the long term, recreation in Columbus Park area may be adversely affected due to the removal of two footbridges, but the long-term benefits from river channel modifications that reduce flooding and future park damages will reduce these cumulative effects.

6.12 TRANSPORTATION

The size and scope of the changes in the transportation systems will be extremely small when compared to other planned projects in the area. As a result, the traffic impacts during construction will not contribute appreciably to cumulative effects. These impacts would be negligible.

6.13 AIR QUALITY

Based on air emissions calculations for the construction of the NED Plan, the project falls below de minimus levels. A Record of Non-Applicability (RONA) is included in Appendix E.

6.14 NOISE

The Proposed Action will introduce short-term incremental increases in the noise environment from construction and changes in traffic patterns. These changes will have negligible cumulative effects. Upon completion of the Project there will be no cumulative long-term impacts on the existing noise environment.

7.0 SUMMARY OF FINDINGS

This section provides a summary of the anticipated adverse impacts and/or beneficial effects for each resource area under the Proposed Action and No Action alternative scenarios of the Project (Table 16). This section also summarizes the impact minimization (e.g., BMPs) and mitigation measures that will be carried out if the Proposed Action (i.e., the NED Plan) is implemented (Table 17). These measures have been selected and designed to help avoid and minimize the adverse environmental impacts that are expected from implementing the Proposed Action, and to mitigate for those impacts that cannot be avoided.

Based on the results of the environmental consequences analysis and the proposed minimization and mitigation measures provided below, the Proposed Action is expected to result in an overall long-term benefit to natural resources and inhabitants of the study area due to the substantial reduction in flood risk that will be realized. Some short- and long-term minor and moderate adverse impacts will result from implementation of the Proposed Action, but these are expected to be outweighed by the long-term beneficial effects the Project will provide. No significant adverse impacts are associated with the Proposed Action.

The majority of the long-term impacts will be attributed to the removal and loss of vegetation, as well as the removal of three bridges required under the Proposed Action. More specifically, long-term impacts will result from the permanent removal and loss of vegetation and wetlands within the footprint of the newly expanded river channels, which serve as habitat for amphibians, reptiles, and small mammals. The concrete walls of river segments also may affect the movement patterns of some amphibians and reptiles. The removal of mature trees and other vegetation during construction activities and channel modifications will likely permanently impact aesthetic and scenic resources as well as land cover; although vegetation will be replanted and replaced, it may take decades for new trees to reach the height and character of trees found in the existing riparian habitat. There also will be long-term effects on recreation and transportation resulting from the permanent closure of the Ward Avenue Bridge and the two pedestrian bridges. The Ward Avenue bridge removal still offers two river crossing one block south and north. Pedestrians can walk around the park instead of the utilizing the footbridges with only a minute or two increase in time.

Short-term impacts will primarily be the result of temporary construction activities including impacts to land use, vegetation, water resources, recreation, and aesthetic and scenic resources resulting from the presence of construction equipment; the disturbance of sediments during channel modifications, which has the potential to affect water quality, shellfish species, and recreation activities downstream; the possible mortality of burrowing and/or denning species of mammals, as well as less mobile species of reptiles, amphibians, and mammals that pass through upland, wetland, or aquatic habitats located within workspaces; and temporary disruptions to transportation (e.g., traffic), air quality, and noise.

Table 16. Summary of Potential Environmental Consequences for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Resources	Proposed Action	No Action Alternative
Topography and Geology	Short-term minor adverse impacts Long-term minor adverse impacts Long-term beneficial effects	No impacts
HTRW	No impacts	No impacts
Land Use, Cover, and Zoning	Short-term minor adverse impacts Long-term minor adverse impacts Long-term beneficial effects	Long-term adverse impacts
Water Resources	Short-term minor adverse impacts Long-term minor and moderate adverse impacts Long-term beneficial effects	Long-term adverse impacts
Vegetation	Short-term minor adverse impacts Long-term moderate adverse impacts	No impacts
Fish and Wildlife	Short-term minor to moderate adverse impacts Long-term minor adverse impacts Long-term beneficial effects	Long-term adverse impacts
Socioeconomics	Long-term beneficial effects	Long-term adverse impacts
Cultural Resources	Adverse effects to eligible resources	No impacts
Coastal Zone Management	Short-term minor adverse impacts Long-term minor and moderate adverse impacts	Long-term adverse impacts
Aesthetics and Scenic Resources	Short-term minor adverse impacts Long-term moderate adverse impacts	Long-term adverse impacts
Recreation	Short-term minor adverse impacts Long-term moderate adverse impacts Long-term beneficial effects	Long-term adverse impacts
Transportation	Short-term minor adverse impacts Long-term moderate adverse impacts Long-term beneficial effects	Long-term adverse impacts
Air Quality	Short-term minor adverse impacts Long-term beneficial effects	No impacts
Noise	Short-term minor adverse impacts	No impacts

Table 17. Summary of Impact Minimization and Mitigation Measures for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Topography and Geology
• Current applicable USACE design criteria will be met, taking into account site conditions, physical constraints, and design flood requirements.
• Excavated material will be handled, removed, utilized, and/or disposed of in accordance with applicable construction standards and regulations.
• USACE will coordinate with local authorities and make public announcements to help ensure public safety, acquire a Dig Safe permit to locate and identify utilities, and properly handle and dispose of waste material.
• Proposed improvements will be designed and built to meet USACE and other applicable codes and standards, including seismic standards.
• OSHA guidelines and standard construction practices (e.g., shoring-up of channel slopes) will be followed during construction.
• Monitoring equipment will be used, as necessary, to ensure construction activities that cause ground vibrations do not exceed state and Federal thresholds to avoid damages to nearby structures. Pre-construction inspections of buildings may be required as part of the efforts to monitor effects of vibrations
HTRW
• There should be no impacts to HTRW for most of the project area. The ITT Sealectro site, a State Superfund site, is located along a portion of the Sheldrake River. The soil in this area will have solvents. Prior to construction in this area, NYSDEC Environmental Remediation staff will be contacted and testing to determine VOC levels will be conducted. Any soil removal that may be required will be removed and disposed of at an acceptable facility.
Land Use, Cover, and Zoning
• Most of the construction activity will occur within the existing channel, which will help minimize impacts to adjacent land uses. Temporary workspaces along the top of the channel will generally be limited to a 15 ft (4.5 m) clearance from the channel bank edge along portions of the Project area.
• Channel construction (and related impacts) will not be concentrated in any one location for extended periods of time; construction will be moved from area to area as it progresses.
• Disturbed areas will be restored and their use returned to pre-construction land uses.

Water Resources

- Standard industry BMPs to protect water quality and wetlands during in-stream work will be implemented to reduce the potential for impacts during construction.
- An ESCP and site-specific SWPPP will be developed and implemented in accordance with the SPDES General Permit for Stormwater Discharges from Construction Activity. Upon completion, a Notice of Termination will be filed to verify that BMPs were implemented and that disturbed areas were restored and stabilized.
- Water quality and water resources protection measures will be implemented in accordance with local, county, NYSDEC permitting requirements and regulations, CWA Sections 401 and 404, RHA Section 10, Article 15, and Village Code Chapter 192-5.
- Project area will be restored to pre-construction conditions: temporary workspaces will be stabilized and revegetated by planting trees and shrubs in forested wetlands, native trees and shrubs will be planted, and native wetlands seed mix applied to exposed soils to maximize the rate of revegetation and reduce the likelihood that invasive species will take over disturbed areas.
- In-stream activities will be avoided from 1 June through 1 September

Vegetation

- Impacts to vegetation will be minimized and mitigated by restoring riparian areas to pre-construction conditions. Following construction activities temporary workspaces will be stabilized and revegetated as recommended by the Village of Mamaroneck Department of Public Works and Tree Committee by planting trees where mature trees were removed, the top layer of soil will be removed and replaced with clean topsoil that is seeded with a native upland or wetland seed mix in order to maximize the rate of revegetation and reduce the likelihood that invasive species will take over disturbed areas, and native trees and shrubs will be planted in areas where mature trees and shrubs were removed during construction.

Fish and Wildlife

- Standard industry BMPs to protect water quality during in-stream work and activities that will disturb or remove soils will be implemented in accordance with NYSDEC and USACE CWA permitting requirements.
- Streamside wildlife habitat that is removed or disturbed will be revegetated using native plant species, with immediate results expected for grasses and other herbaceous species and long-term restoration needed for establishment of larger shrub and tree species.
- No tree cutting will occur from 1 April to 1 August. If trees greater than three inches density breast height (dbh) will be removed from 1 January through 31 March, a survey for breeding raptors will be conducted.
- No in-stream work will be conducted from 1 June through 1 September.

Cultural Resources

- Adverse effects to the Ward Avenue Bridge, Metro-North Railroad Bridge, and the stone retaining walls thematic district.
- Mitigation, at a minimum, will include consideration of incorporation of these elements into the NED Plan and the documentation of these resources
- A Memorandum of Agreement (MOA) will be prepared and consultation with the NYSHPO, interested parties and federally-recognized Tribes will further determine other appropriate measures.

Coastal Zone Management

- Mitigation measures required based on the negative determination issued by NYSDOS include implementation of standard industry BMPs to protect water quality during construction of the NED Plan (e.g., development of a SWPPP and ESCP).
- See impact mitigation and minimization measures for Water Resources, Vegetation, Fish and Wildlife, Aesthetics and Scenic Resources, and Recreation.

Aesthetic and Scenic Resources

- Measures that could be implemented to reduce the short-term effects of construction activities include: adhering to the Project's ESCP to minimize the transport of suspended solids downstream, and erecting temporary fences in Columbus Park to screen the construction staging area.
- Various measures will be implemented to reduce the Project's long-term adverse visual impacts and restore the Project area to pre-construction conditions including: riparian habitat restoration activities such as riverbank shaping, tree replanting, and revegetation; and the use of riprap and other more "natural" looking channel modifications where possible.

Recreation

- USACE will ensure that there are safe and effective pedestrian routes encircling Columbus Park following the removal of two pedestrian footbridges.
- Upon Project completion, parks and surrounding areas will be restored to pre-construction conditions and access to other riverine areas and affected parks will be restored.
- Additional specific measures that could be implemented to reduce the limited short-term effects of construction activities include: adhering to the Project's ESCP to minimize the transport of suspended solids downstream, restricting construction primarily to normal weekday business hours in residential areas, erecting temporary fences and other physical barriers around construction areas, temporarily reducing vehicular speed limits, and hanging signage that informs people of the Project's purpose, duration, and expected outcomes.
- USACE will work with the Village of Mamaroneck to determine if there are opportunities to improve public access to the rivers in the Project area during post-construction restoration by establishing riverwalk areas.

Transportation

- No mitigation measures will be required, but USACE is currently evaluating additional measures to be implemented for construction activities to further minimize these already limited effects. Traffic control and operations strategies may include measures like preparing a Construction Traffic Management Plan, establishing detours and alternate routes when/where needed, or temporarily reducing speed limits.

Air Quality

- Construction will be performed in full compliance with current NYSDEC Chapter III-Air Quality Regulations requirements, with compliant practices and/or products. No mitigation measures will be required outside of these and other applicable air pollution control regulations. A RONA is provided in Appendix E.

Noise

- No mitigation measures will be required, but USACE is currently evaluating additional noise risk management measures to be implemented for construction activities to further minimize these already limited effects.
- In accordance with the local noise ordinance, sounds generated from heavy equipment will be required to close down after 6:00 p.m. from Monday through Saturday, and on Sundays and holidays
- Special variances to the local noise ordinance may be obtained; however, additional noise reduction measures (e.g., enclosure of construction power units and generator sets, use of noise barriers) could be required.

Table 18. Primary Laws and Regulations Applicable for the Mamaroneck and Sheldrake Rivers FRM Project, Westchester County, New York.

Legislative Title	U.S. Code or Date	Compliance
Clean Air Act	42 U.S.C. §§ 7401-7671g	An air quality analysis was completed for the project. Based upon the completed analysis, the emissions are below the de minimus levels. A RONA is included in Appendix E.
Clean Water Act	33 U.S.C. §§ 1251 et seq.	Coordination with NYSDEC has indicated that the agency concurs with the draft EIS. Formal correspondence stating such is pending
Coastal Zone Management Act of 1972	16 U.S.C. §§ 1451-1464 N.J.A.C. 7:7 and N.J.A.C. 7:7E	A Coastal Zone Consistency Statement is included in Appendix D. Formal correspondence is pending
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	Information provided by the U.S. Fish and Wildlife Service indicates that the proposed project will not have adverse impacts to any endangered or threatened species.
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	A draft Fish and Wildlife Coordination Act Report is included in Appendix C.
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347	The notice of intent, public NEPA scoping meeting and the circulation of the Draft EIS
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The District will continue to coordinate with New York State Historic Preservation Office to fulfill requirements of this act. Correspondence indicating NYSHPO's review of the project and a draft MOA is located in Appendix C
Executive Order 11990, Protection of Wetlands	May 24, 1977	Circulation of this report for public and agency review fulfills the requirements of this order.
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	April 21, 1997	Implementation of this project will not adversely affect environmental health and safety risks to children. Circulation of this report for public and agency review fulfills the requirements of this order.

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APPENDIX A

New York State Threatened and Endangered Species Known or Having the Potential to Occur in Westchester County

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Scientific Name	Common Name	Legal Status[1]	County Occurrence Notes[2]
Acalypha virginica	Virginia three-seeded Mercury	E	Probable
Agastache nepetoides	Yellow giant-hyssop	T	Possible
Ageratina aromatica var. *aromatica*	Small white snakeroot	E	Possible
Agrimonia rostellata	Woodland agrimony	T	Probable
Amaranthus pumilus	Seabeach amaranth	E	Extirpated
Aplectrum hyemale	Puttyroot	E	Possible
Arethusa bulbosa	Dragon's mouth orchid	T	Probable
Asclepias variegate	White milkweed	E	Probable
Asclepias viridiflora	Green milkweed	T	Possible
Bartonia paniculata ssp. *paniculata*	Screw-stem	E	Confirmed
Bidens beckii	Water-marigold	T	Probable
Bidens bidentoides	Delmarva beggar-ticks	R	Possible
Bidens laevis	Smooth bur-marigold	T	Possible
Blephilia ciliate	Downy wood-mint	E	Probable
Bolboschoenus maritimus ssp. *Paludosus*	Seaside bulrush	E	Possible
Bolboschoenus novae-angliae	Saltmarsh bulrush	E	Probable
Botrychium oneidense	Blunt-lobe grape fern	E	Probable
Bouteloua curtipendula var. *Curtipendula*	Side-oats grama	E	Possible
Carex abscondita	Thicket sedge	T	Probable
Carex arcta	Northern clustered sedge	E	Probable
Carex bicknellii	Bicknell's sedge	T	Confirmed
Carex conjuncta	Soft fox sedge	E	Probable
Carex davisii	Davis' sedge	T	Probable
Carex lupuliformis	False hop sedge	R	Probable
Carex mitchelliana	Mitchell's sedge	T	Probable
Carex molesta	Troublesome sedge	T	Possible
Carex nigromarginata	Black-edge sedge	E	Probable
Carex retroflexa	Reflexed sedge	E	Probable
Carex seorsa	Weak stellate sedge	T	Probable
Carex straminea	Straw sedge	E	Probable
Carex styloflexa	Bent sedge	E	Probable
Carex typhina	Cat-tail sedge	E	Confirmed

Scientific Name	Common Name	Legal Status[1]	County Occurrence Notes[2]
Carya laciniosa	Big shellbark hickory	T	Possible
Castilleja coccinea	Scarlet Indian-paintbrush	E	Probable
Ceratophyllum echinatum	Prickly hornwort	T	Confirmed
Chamaelirium luteum	Fairy wand	T	Probable
Cheilanthes lanosa	Woolly lip-fern	E	Extirpated
Chenopodium rubrum	Red pigweed	T	Probable
Crassula aquatica	Water pigmyweed	E	Probable
Crotalaria sagittalis	Rattlebox	E	Confirmed
Cyperus echinatus	Globose flatsedge	E	Probable
Cyperus flavescens	Yellow flatsedge	E	Probable
Cyperus retrorsus var. *retrorsus*	Retrorse flatsedge	E	Probable
Cypripedium parviflorum var. *Parviflorum*	Small yellow ladyslipper	E	Extirpated
Desmodium ciliare	Little-leaf tick-trefoil	T	Probable
Desmodium humifusum	Spreading tick-trefoil	E	Probable
Desmodium laevigatum	Smooth tick-trefoil	E	Probable
Desmodium nuttallii	Nuttall's tick-trefoil	E	Possible
Desmodium obtusum	Stiff tick-trefoil	E	Probable
Desmodium pauciflorum	Small-flowered ticktrefoil	E	Possible
Dichanthelium oligosanthes var. *Oligosanthes*	Few-flowered panic grass	E	Probable
Digitaria filiformis	Slender crabgrass	T	Probable
Diospyros virginiana	Persimmon	T	Possible
Draba reptans	Carolina Whitlow-grass	T	Possible
Eleocharis equisetoides	Knotted spikerush	T	Possible
Eleocharis ovata	Ovate spikerush	E	Possible
Eleocharis quadrangulata	Angled spikerush	E	Confirmed
Eleocharis tricostata	Three-ribbed spikerush	E	Probable
Eleocharis tuberculosa	Long-tubercled spikerush	T	Probable
Endodeca serpentaria	Virginia snakeroot	E	Probable
Equisetum palustre	Marsh horsetail	T	Probable
Equisetum pratense	Meadow horsetail	T	Probable
Euonymus americanus	American Strawberry-bush	E	Possible
Fimbristylis castanea	Marsh fimbry	T	Possible
Fuirena pumila	Dwarf Umbrella-sedge	R	Probable

Scientific Name	Common Name	Legal Status[1]	County Occurrence Notes[2]
Gamochaeta purpurea	Purple everlasting	E	Confirmed
Geum vernum	Spring avens	E	Probable
Geum virginianum	Rough avens	E	Probable
Hottonia inflata	Featherfoil	T	Confirmed
Houstonia purpurea var. *purpurea*	Purple bluets	E	Probable
Hylotelephium telephioides	Live-forever	E	Probable
Hypericum prolificum	Shrubby St. John's-wort	T	Confirmed
Iris prismatica	Slender blue flag	T	Probable
Jeffersonia diphylla	Twin-leaf	T	Probable
Lechea pulchella var. *moniliformis*	Bead pinweed	E	Possible
Lechea racemulosa	Illinois pinweed	R	Possible
Lechea tenuifolia	Slender pinweed	T	Confirmed
Lemna perpusilla	Minute duckweed	E	Probable
Lespedeza angustifolia	Narrow-leaved bushclover	R	Probable
Lespedeza frutescens	Violet bush-clover	R	Probable
Lespedeza repens	Trailing bush-clover	R	Probable
Lespedeza stuevei	Velvety bush-clover	T	Probable
Liatris scariosa var. *novae-angliae*	Northern blazing-star	T	Probable
Lilaeopsis chinensis	Eastern grasswort	T	Probable
Limosella australis	Mudwort	R	Confirmed
Linum striatum	Stiff yellow flax	R	Confirmed
Liparis liliifolia	Large twayblade	E	Probable
Lipocarpha micrantha	Dwarf bulrush	E	Possible
Listera convallarioides	Broad-lipped Twayblade	E	Possible
Ludwigia sphaerocarpa	Globe-fruited Ludwigia	T	Probable
Lycopus rubellus	Gypsy-wort	E	Probable
Lysimachia hybrida	Lowland yellow loosestrife	E	Possible
Magnolia virginiana	Sweetbay magnolia	E	Probable
Melanthium virginicum	Virginia bunchflower	E	Possible
Mimulus alatus	Winged monkeyflower	R	Confirmed
Monarda clinopodia	Basil-balm	E	Possible
Najas guadalupensis ssp. *muenscheri*	Hudson river waternymph	E	Probable
Oldenlandia uniflora	Clustered bluets	E	Possible
Oligoneuron rigidum var. *rigidum*	Stiff-leaf goldenrod	T	Confirmed
Onosmodium virginianum	Virginia false gromwell	E	Probable

Scientific Name	Common Name	Legal Status[1]	County Occurrence Notes[2]
Orontium aquaticum	Golden club	T	Probable
Oxalis violacea	Violet wood-sorrel	T	Extirpated
Panicum rigidulum var. *elongatum*	Tall flat panic grass	E	Probable
Paspalum laeve	Field beadgrass	E	Probable
Pinus virginiana	Virginia pine	E	Probable
Platanthera ciliaris	Orange fringed orchid	E	Probable
Platanthera hookeri	Hooker's orchid	E	Probable
Polygala lutea	Orange milkwort	E	Possible
Polygonum douglasii	Douglas' knotweed	T	Probable
Polygonum erectum	Erect knotweed	E	Probable
Polygonum glaucum	Seabeach knotweed	R	Probable
Polygonum tenue	Slender knotweed	R	Probable
Potamogeton diversifolius	Water-thread pondweed	E	Probable
Potamogeton pulcher	Spotted pondweed	T	Confirmed
Pterospora andromedea	Giant pine-drops	E	Possible
Pycnanthemum clinopodioides	Basil mountain-mint	E	Possible
Pycnanthemum muticum	Blunt Mountain-mint	T	Probable
Pycnanthemum torrei	Torrey's mountain-mint	E	Possible
Ranunculus micranthus	Small-flowered crowfoot	T	Probable
Rhynchospora scirpoides	Long-beaked beakrush	R	Confirmed
Sabatia angularis	Rose-pink	E	Possible
Sagittaria montevidensis var. *spongiosa*	Spongy arrowhead	T	Confirmed
Salvia lyrata	Lyre-leaf sage	E	Probable
Scirpus georgianus	Georgia bulrush	E	Probable
Scleria pauciflora var. *caroliniana*	Few-flowered nutrush	E	Probable
Scutellaria integrifolia	Hyssop-skullcap	E	Probable
Sericocarpus linifolius	Flax-leaf whitetop	T	Possible
Silene caroliniana ssp. *pensylvanica*	Wild pink	V	Confirmed
Sisyrinchium mucronatum	Michaux's blue-eyed-grass	E	Probable
Smilax pulverulenta	Downy carrion-flower	E	Possible
Solidago latissimifolia	Coastal goldenrod	E	Possible
Solidago sempervirens var. *mexicana*	Seaside goldenrod	E	Probable
Sporobolus clandestinus	Rough Rush-grass	E	Possible
Suaeda linearis	Narrow-leaf sea-blite	E	Probable

Scientific Name	Common Name	Legal Status[1]	County Occurrence Notes[2]
Symphyotrichum boreale	Northern bog aster	T	Probable
Symphyotrichum subulatum var. *subulatum*	Saltmarsh aster	T	Probable
Trichomanes intricatum	Appalachian bristle fern	E	Probable
Trichostema setaceum	Tiny Blue-curls	E	Possible
Tripsacum dactyloides	Northern gamma grass	T	Probable
Trollius laxus	Spreading globeflower	R	Possible
Utricularia minor	Lesser bladderwort	T	Confirmed
Utricularia radiata	Small floating bladderwort	T	Confirmed
Veronicastrum virginicum	Culver's-root	T	Probable
Viburnum dentatum var. *venosum*	Southern arrowwood	T	Probable
Viburnum nudum var. *nudum*	Possum-haw	E	Extirpated
Viola brittoniana	Coast violet	E	Probable
Viola hirsutula	Southern wood violet	E	Probable
Viola primulifolia	Primrose-leaf violet	T	Probable
Vitis vulpina	Winter grape	E	Confirmed

[1] E = Endangered Species: listed species are those with
1) 5 or fewer extant sites, or
2) fewer than 1,000 individuals, or
3) restricted to fewer than 4 U.S.G.S. 7 1/2 minute topographical maps, or
4) species listed as endangered by the U. S. Department of Interior, as enumerated in the Code of Federal
1. Regulations 50 CFR 17.11.

T = Threatened: listed species are those with
1) 6 to fewer than 20 extant sites, or
2) 1,000 to fewer than 3,000 individuals, or
3) restricted to not less than 4 or more than 7 U.S.G.S. 7 1/2 minute topographical maps, or
1) listed as threatened by the U. S. Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

R = Rare: listed species have
1) 20 to 35 extant sites, or
2) 3,000 to 5,000 individuals statewide.

V = Exploitably vulnerable: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

U = Unprotected

[2] Confirmed = the plant is currently known within the county.

Probable = the plant was last documented by a specimen more than 30 years ago.

Possible = it is possible that the plant occurs in the county because there have been unconfirmed reports of its existence (*i.e.,* oral report, plant list, literature citation).

Extirpated = the plant was once present but no longer believed to exist within the county.

Source: NYSDEC (New York State Department of Environmental Conservation). 2014. List of Endangered, Threatened, and Special Concern Fish & Wildlife Species of New York State. Available online: http://www.dec.ny.gov/animals/7494.html. Accessed June 5, 2014.

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APPENDIX B

Traffic and Transportation Supporting Documentation

- **Table B-1. Material and Truck Trip Estimation**
- **Table B-2. Traffic Volumes and Estimated LOS – Existing**
- **Project Construction Traffic Management Plan [Example]**

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Table B-1. Material and Truck Trip Estimation

Material Densities				
Wet Concrete		145		pcf
Dry Concrete		150		pcf
Crushed Concrete		89		pcf
Dry Asphalt		140		pcf
Crushed Asphalt		95		pcf
Base Aggregate		140		pcf
Drainage Aggregate		112		pcf
Truck Capacities				
Concrete Truck Capacity		10		cy
Dump Truck Capacity		25		tons
Days of Work		300		days per year
Project Duration		1		year
Item	**Quantity**			
Rock excavation	8,500.00	cy	16,065	tons
Soil Excavation	115,000.00	cy	173,880	tons
Fill	10,000.00	cy	15,120	tons
Riprap 12"	8,400	cy	10,773	tons
Riprap 24"	1,500.00	cy	1,924	tons
Riprap 36"	800	cy	1,026	tons
Crushed stone base	5,000.00	cy	9,450	tons
Total	149,200	cy	228,238	tons
Number of Trucks			9,130	trucks
Number of Trucks			**30.4**	**trucks/day**
Length		6,000	feet	
Height		12.5	feet	
Thickness		1.5	feet	
Volume		112,500	cubic feet	
Volume		4,167	cubic yards	
Number of Trucks		417	trucks	
Number of Trucks		**1.4**	**truck(s)/day**	
Length		7,000	feet	
Width		50	feet	
Percent Foliage		50%	percent (%)	
Area Cleared		4.0	acres	
Clearing Rate		0.25	acre/day	
Days of Clearing		16.1	days	
Number of Trucks Per Acre		6	trucks	
Number of Trucks		64.6	trucks	
Number of Trucks		**0.2**	**truck(s)/day**	
Number of Job Sites		4	sites	
Delivers Per Site		2	deliveries/site	
Number of Trucks		2,400	trucks	
Number of Trucks		**8.0**	**truck(s)/day**	
TOTAL TRUCKS PER DAY		**40.0**	**truck(s)/day**	

Table B-2. Traffic Volumes and Estimated LOS – Existing

Roadway	AADT	Number of Lanes	One-Way Peak Hour Volume (V) [vph]	Volume to Capacity Ration (V/C)	Estimated Level of Service (LOS)
I-95	114,849	6	4,135	2.43	F
Mamaroneck Avenue	28,032	4	1,514	0.89	E
Old White Plains Road	6,086	4	329	0.19	B
Palmer Avenue	9,836	4	531	0.31	C
Halstead Avenue	8,654	4	467	0.27	C

Source: ITE 2003, ITE 2010

References:

ITE (Institute of Transportation Engineers). 2003. Transportation Engineers Trip Generation Manual. 7th Edition. Institute of Transportation Engineers, Washington, DC.

_____. 2010. Transportation Engineers Parking Generation Manual. 4th Edition. Institute of Transportation Engineers, Washington, DC.

[Example]

CONSTRUCTION TRAFFIC MANAGEMENT PLAN

FOR

PROJECT NAME

PROJECT ADDRESS

DATE

PROJECT ACTIVITIES

Briefly describe your proposed activities

Contractor: ***Estimated Start Date:***
Address: ***Estimated Completion Date:***
City, State, Zip: ***Working Hours:***
Telephone Number:
Fax Number:

Name of on-site superintendent:
Cell Phone Number:

Contract Responsibilities:

Describe how and what will be constructed or demolished; include equipment to be used

Truck Route:

Describe the route that will be used by trucks (please attach drawing if necessary) - include the number of trucks and staging location.

Material Storage Location

Describe the location for material storage (if needed)

Site Access

Will this operation require access to areas that are privately owned? If so has the owner been contacted, access waiver obtained and scheduling conducted.

Construction Trailer

Will a construction trailer be used? If so where will it be located?

Traffic Control

Will this operation require the occupation of any traffic lanes, parking lanes, parkways or any other public right-of way? If so has the town been contacted, access waiver obtained and scheduling conducted.

Parking

Indicate the number of workers and the areas where their vehicles will be parked through the duration of this phase of the project

Clean-up

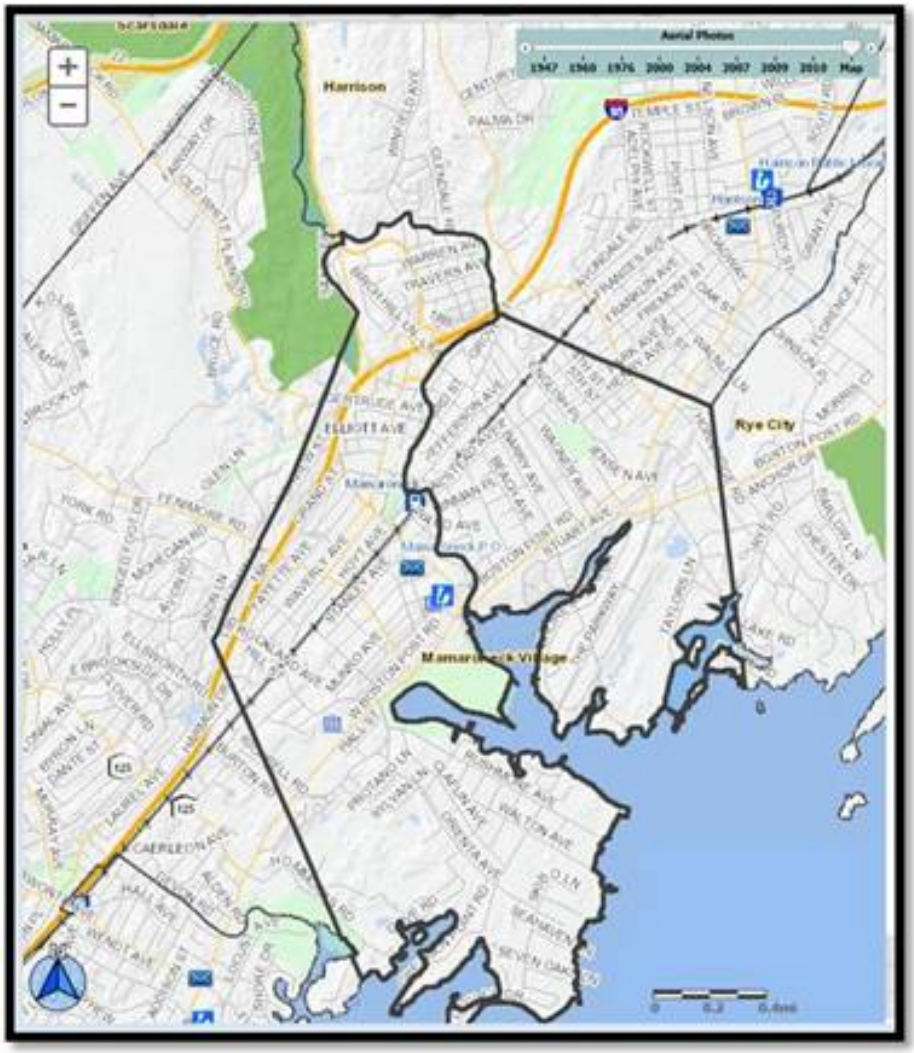
Describe the measures that will be taken to ensure that the work site and public right-of-way will be maintained (including dust control)

Mitigation

Indicate which mitigation measures would be implemented to reduce impacts to traffic.

- Physical barriers and channelizing devices.
- Temporary reduced speed limit.
- Flashing arrow signs
- Pavement markings.
- Alternate/Detour routes.
- Signal adjustments.
- Temporary parking and turn restrictions.
- Truck restrictions

TRUCK ROUTE



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APPENDIX C

Agency Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

August 13, 2015

Mr. Peter M. Weppler
Chief, Environmental Analysis Branch
New York District
U.S. Army Corps of Engineers
26 Federal Plaza, Rm 2151
New York, NY 10278-0090

Attn: Mr. Matthew Voisine

Dear Mr. Weppler:

In accordance with the Scope of Work (SOW) submitted to the U.S. Army Corps of Engineers (Corps) on April 23, 2015, enclosed is the U.S. Fish and Wildlife Service's (Service) draft report entitled, "Draft Fish and Wildlife Coordination Act 2(b) Report, Flood Risk Management General Reevaluation Report Mamaroneck and Sheldrake Rivers, Village of Mamaroneck," for your review. Please forward any comments on the draft report by September 11, 2015, as indicated in the SOW, or at your earliest convenience. Comments and revisions provided by your office will be addressed in the final version of this document. Copies of this draft report will also be submitted to the New York State Department of Environmental Conservation, New Paltz, NY, and the National Oceanic and Atmospheric Administration-Fisheries Office, Highlands, NJ, for their review.

If you have any questions or require additional information, please contact Terra Gulden-Dunlop of the Long Island Field Office at (631) 286-0485.

Sincerely,

David A. Stillwell
Field Supervisor

Enclosure

cc: NYSDEC, New Paltz, NY (T. Kerpez and M. Flaherty)
NOAA-F, Highlands, NJ (M. Alvarez)

DRAFT
Fish and Wildlife Coordination Act Section 2(b) Report
Flood Risk Management General Re-Evaluation Report
Mamaroneck and Sheldrake Rivers
Village of Mamaroneck

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I. Executive Summary

This is the U.S. Fish and Wildlife Service's (Service) Draft Fish and Wildlife Coordination Act Report for the U.S. Army Corps of Engineers' (Corps) proposed project entitled, "Flood Risk Management, Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, NY." Pursuant to the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.), the Corps consulted with the Service to ensure that there was equal consideration for fish and wildlife resources during the planning of the Corps' proposed General Reevaluation Report. The Corps' tentatively selected plan involves channel deepening and widening along both the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, Westchester County, NY. Within the Sheldrake River, the Corps has proposed channel deepening and widening along 3,470 linear feet (ft), as well as the replacement of the Waverly Place Bridge, and the removal of the Centre Avenue Footbridge and two smaller footbridges. Within the Mamaroneck River, the Corps has proposed channel deepening and widening along 3,740 linear ft of the upstream reach and 2,400 linear ft of the downstream reach. The proposed project also includes the construction/reconstruction of concrete retaining walls, the installation of a culvert, and the placement of stone riprap along the bottom of the both rivers.

The Service has determined that the proposed project will adversely affect riverine, palustrine, and terrestrial ecosystems of the Sheldrake and Mamaroneck Rivers due to decreases in habitat availability and quality, as well as biodiversity. Channelization will have lasting impacts to the river channels and the riparian systems by altering the hydrological dynamics and restricting the biological, chemical, and physical connection between the rivers and upland areas.

Summary and Recommendations

The Service has recommended mitigation measures to avoid, minimize, or compensate for impacts, resulting from implementation of the proposed project, to Service trust resources, including migratory birds, wetlands, and inter-jurisdictional fish. The Service has also recommended monitoring measures to assess the success of measures to survey, enhance or improve species and their habitats regarding fish and wildlife opportunities and planning objectives established in this report.

The recommended mitigation measures include:

- Incorporation of nonstructural measures into the project design;
- Incorporation of best management practices to minimize erosion and sedimentation during the construction phase and to minimize adverse effects of channelization;
- Implementation of time-of-year restrictions to avoid critical life history stages for trust resources;
- Rehabilitation of riparian habitat by removing non-native species and planting native vegetation; and
- Improvement of habitat diversity and value by incorporating in-river and riparian construction techniques to emulate natural features.

Recommended monitoring measures include:

- Biological surveys to determine presence of specific species; and

- Development of a post-construction monitoring and management plan to ensure the success of the project's biological goals and objectives;

Accordingly, the Service believes that, with the incorporation of the recommended mitigation measures, the proposed action will not significantly impact fish and wildlife resources.

Service Position

The proposed alternative for the Mamaroneck and Sheldrake Rivers includes the channelization of a total of 9,610 linear ft of river habitat, reconstruction of the Waverly Place Bridge, the removal of several bridges, the installation of a culvert and retaining walls and the placement of stone riprap along the river bottom.

Although the proposed actions have the potential to impact fish and wildlife resources, the Service recognizes that the proposed project area has been previously disturbed. It is the Service's position that implementation of the mitigation measures will reduce the potential adverse impacts and meet the Service's mitigation policy goal which was established for the proposed project.

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II. Project Purpose, Scope, and Authority

A. Purpose

The U.S. Army Corps of Engineers' (Corps) General Reevaluation Report (GRR) (U.S. Army Corps of Engineers 2015b) discusses the issue of severe flooding in the Village of Mamaroneck (Village) due to a combination of factors, including low channel capacity, small bridge openings, developmental encroachment, urbanization, and poor flow conveyance. The Corps' proposed alternative [identified as 1M – locally preferred plan (LPP)] is designed to alleviate the effects of flooding through mainly structural measures including channelization, reconstruction and construction of retaining walls, removal or reconstruction of bridges, placement of riprap along the river bed, and the installation of a bypass culvert which will divert flow from the upper Mamaroneck River into the downstream channel (U.S. Army Corps of Engineers 2015a).

B. Description of the Proposed Project Area

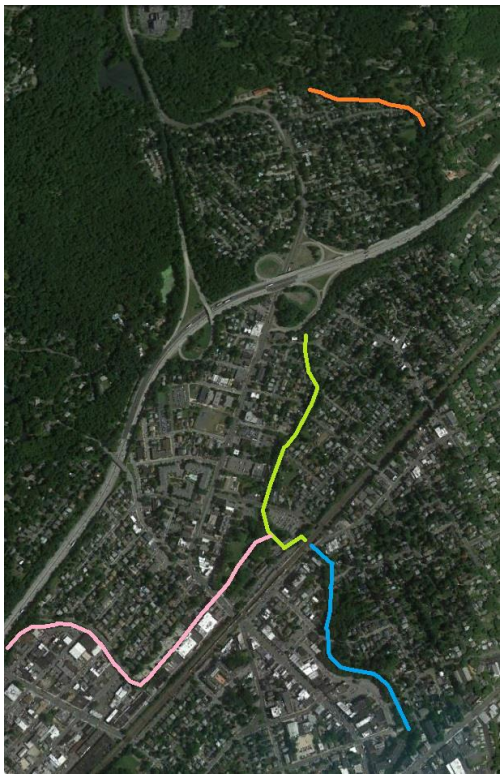
The proposed project area is characterized as suburban and is located entirely within the Village. The Village was incorporated in 1895 with a population of roughly 1,500 people. By 2000, the population had increased to almost 19,000 people (Village of Mamaroneck 2015b). The area around the Mamaroneck River has been developed to meet the needs of the growing population.

The Mamaroneck and Sheldrake Rivers have a combined drainage area of 23.6 square miles (sq. mi.), and discharge into Long Island Sound through Mamaroneck Harbor. Approximately 2.25 mi. of the Mamaroneck River and 1.15 mi. of the Sheldrake River run through the Village (Village of Mamaroneck 2011). Much of the proposed project area is characterized by residential, commercial, and industrial developments, which have impacted natural riverine processes. The rivers are generally steeply sloped and have been stabilized. Portions of the rivers are adjacent to roadways, train tracks, and parking lots, with limited riparian areas.

The Corps' GRR study limits are defined by river flood damage areas located in the Village, exclusive of coastal flooding along the Long Island Sound shoreline. Along the Mamaroneck River, the area extends from below the Route 1 Bridge to above the Westchester County Joint Water Works Dam. On the Sheldrake River, the area extends from the confluence with the Mamaroneck River to the Village boundary at the New England Thruway (I-95) Bridge.

The Corps identified four distinct areas or reaches of the rivers for planning purposes. These include the Lower Mamaroneck, Upper Mamaroneck, Harbor Heights, and Sheldrake Reaches. The Lower Mamaroneck Reach is the section of the Mamaroneck River south of the Rail Road Bridge and is bordered by residential and commercial development. The Upper Mamaroneck Reach is the section of the Mamaroneck River north of the Rail Road Bridge and south of the New England Thruway (I-95) Bridge and is bordered by residential development, a municipal parking lot, and a train station. The Harbor Heights Reach is the section of the Mamaroneck River north of the I-95 Bridge. The Sheldrake Reach extends from Fenimore Avenue to the confluence located at Columbus Park, and is bordered by commercial and light industrial developments (see U.S. Army Corps of Engineers 2015a and 2015b) (Figure 1).

Figure 1. Aerial Photo Showing the Corps' Project Reaches. Pink – Sheldrake River, Blue – Lower Mamaroneck, Green – Upper Mamaroneck, and Orange – Harbor Heights.



C. Authority

The project was authorized by section 401(a) of the Water Resources Development Act of 1986 (Public Law 99-662; WRDA). The General Reevaluation study was approved by the Corps' North Atlantic Division, Brooklyn, NY, on April 14, 2008 (U.S. Army Corps of Engineers 2015b).

D. Past Local Projects and Studies/Corps' Planning and Service Studies in the Proposed Project Area

Over the last 100 years, the Mamaroneck River and its banks have been altered by retaining walls and bridges. A dam located upstream of Mamaroneck Harbor was constructed for a factory but was later removed in 1854 (Village of Mamaroneck 2015b). Retaining walls were built intermittently, stabilizing the banks, reducing the riparian zone, and resulting in the almost total loss of the natural floodplain within the proposed project area.

These alterations have likely affected the river's capacity to transport floodwaters resulting in increased potential for flooding (see U.S. Geological Survey 2003). Between the late 1800's and 1960, the Village experienced 81 flood events. From 1961 to 2007, another 15 flood events occurred, prompting federal, state, and local governments to develop actions to alleviate the effects of severe flooding within the Village (Table 1) (U.S. Army Corps of Engineers 2014).

Table 1. History of U.S. Army Corps of Engineers Involvement in the Proposed Project Area.

Year	Action
1977	Feasibility Study Completed.
1986	Project Authorized for Construction in the Water Resources Development Act (WRDA) of 1986.
1989	General Design Memorandum (detailed design) Finalized.
2010	Initiation of General Reevaluation Study

The U.S. Fish and Wildlife Service (Service) prepared a Planning Aid Report in 1989 entitled, *"An Assessment of the Impact of the U.S. Army Corps of Engineers' Flood Control Project for the Sheldrake River, Town of Mamaroneck, Westchester County, New York."* The Service stated that it did not support the project as proposed, stating that proper stream maintenance, along with other measures, could alleviate some portion of the stream flooding. The Service recommended stream cleaning as an alternative to the Corps' proposed channel modifications.

The Corps completed a Feasibility Report in October 1977 and a General Design Memorandum in 1988 (http://www.nan.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/11241/Article/487646/fact-sheet-mamaroneck-sheldrake-rivers-village-of-mamaroneck-ny.aspx).

Local interest in the project was rekindled after property damages from the April 2007 Nor'easter flood exceeded $50 million dollars (U.S. Army Corps of Engineers 2014).

1. Recent Local Flood Protection and Habitat Restoration Measures

The Village has completed several dredging projects within the proposed project area in the recent past. For example, in 2010, the Village dredged both sides of Fenimore Bridge due to silt damming and narrowing of the Sheldrake River, and removed a large boulder from the river (Village of Mamaroneck 2010; Sarnoff 2015). During 2010 and 2012, additional dredging took place at North Barry Avenue Extension, Grove Street, the confluence by Columbus Park, and

between Anita Lane and Valley Place (Village of Mamaroneck 2010, 2012; Sarnoff 2015). The Village has also discussed the removal of Glendale Road as a means to alleviate flooding in the Village. This action has not occurred and is included as part of the locally preferred alternative proposed by the Corps.

Other local governments have also taken action in recent years to restore the watershed. Westchester County has completed a number of habitat restoration projects throughout the county, including a restoration project within the proposed project area at Columbus Park along the Sheldrake River. The project included the re-vegetation of the river banks to stabilize the banks and provide wildlife habitat, reinforcement of bridge pilings with stonework to prevent soil erosion during high water, and the reconstruction of a weir which added riffles to the river (Westchester County Soil and Water Conservation District 2015). Other restoration project undertaken by Westchester County along the banks of the Sheldrake and Mamaroneck Rivers include those at: (1) Sheldrake River at Bonnie Briar Country Club; (2) Mamaroneck River at Maple Moor Golf Course; (3) Carpenter's Pond in Sheldrake River; and (4) Mamaroneck River at Saxon Woods Park Gardens Lake in Sheldrake River.

In 2015, the Village, along with volunteers and workers, removed nearly three tons of garbage from the rivers and streams in an effort to improve habitat conditions and water quality. The amount of garbage that was removed in 2015 was substantially lower than the 10-15 tons of waste that was removed in 2009 (Village of Mamaroneck 2015a). Additional efforts to improve water quality were carried out by the Village in coordination with Save the Sound, New Haven, Connecticut. That effort was focused on identifying and reducing the discharge of raw sewage into stormwater drains, and resulted in lower bacteria levels as reported by the Westchester County Health Department (Village of Mamaroneck 2014).

III. Fish and Wildlife Resource Concerns and Planning Objectives

The purpose of consultation between the Corps and the Service under the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.) is to ensure equal consideration of fish and wildlife resources in the planning of water resource development projects. The Service's emphasis in this regard is to identify means and measures to mitigate the potential adverse impacts of the proposed project and to make positive contributions to fish and wildlife resource problems and opportunities.

From the Service's perspective, a desired output of the proposed project is to avoid and minimize further losses of habitat value.

The Service applied and incorporated our Mitigation Policy (January 23, 1981, Federal Register v. 46 n 15, pp. 7644-7663) in addressing criteria necessary to support the proposed project.

The applied criteria include:

- The projects are ecologically sound;
- The least environmentally damaging alternative is selected;
- Every reasonable effort has been made to avoid or minimize damage or loss of fish and wildlife resources and uses;
- All mitigation recommendations have been adopted with guaranteed implementation to satisfactorily compensate for unavoidable damage or loss consistent with the appropriate mitigation goal; and

- For wetlands and shallow water habitat, the proposed activity is clearly water dependent and there is a demonstrated public need.

In developing mitigation recommendations, the Service also relied on professional experience, literature searches, and local, state, and federal conservation plans (*e.g.*, bird conservation plans and local, state, and federal land and water conservation plans) to derive appropriate recommendations for mitigation and fish and wildlife enhancement opportunities.

IV. Evaluation Methods

The Corps' planning schedule and funding limitations precluded the Service from conducting extensive field surveys and investigations for Service trust resources in the proposed project area. Service biologists conducted a single site inspection on June 23, 2015. In addition to the observations made during the June inspection, descriptions of natural resources are based on previous studies for this and similar projects, relevant grey and peer-reviewed literature, local, state, and federal fish and wildlife reports and plans, and personal communications with knowledgeable biologists, planners, coastal geologists, and engineers.

As discussed in more detail in the following section, this report discusses fish and wildlife resources which use the three major ecological systems (riverine, palustrine, and terrestrial) found in the proposed project area.

V. Description of Fish and Wildlife Resources

A. Community, Habitat, and Ecosystem Classifications

1. Physical Processes and Habitat Formation

The proposed project area contains rivers within a mix of residential, commercial, and light industrial development. In its natural state, watersheds, and more specifically, the rivers and associated floodplains, are a complex, dynamic system with different hydrological, geomorphological, and ecological characteristics (Gurnell *et al.* 2007). The balance between these characteristics influences the ecosystem services provided by stream and riparian systems including the cycling of water, energy, and material; water storage; biodiversity; nutrient retention; thermal buffering; bank stability; and sources of habitat (Bukaveckas 2007). Habitat creation is dependent on the disturbance and recovery of the channel and riparian system (Gurnell *et al.* 2007), which is constantly in flux. During high flows, for instance, the channels may be cleared of sediment and debris which is carried downstream.

Urban development and the associated alterations to rivers drastically change the form and function of these systems, ultimately restricting the ecosystem services, limiting habitat availability and habitat quality by homogenizing the flow and depth of the water and decreasing the biodiversity (Jungwirth *et al.* 1995).

Erosion, sediment transport, and sedimentation are the channel processes that form the rivers and influence the width and depth of the channel, as well as the creation of specialized habitats like

riffles and pools. Within alluvial streams, equilibrium within a river is achieved by balancing the sediment discharge, sediment particle size, streamflow, and stream slope. These variables strive to be in equilibrium and if one variable changes, another will respond until equilibrium is reached (Federal Interagency Stream Restoration Working Group 1998).

The flow regime of a river connects the river laterally to the floodplain and longitudinally connects the upstream to the downstream. High flows physically reconnect the channel and floodplains, which are used as spawning and nursery habitat for fish and foraging waterfowl while low flows allow plant communities to grow and colonize the floodplain and river banks (Federal Interagency Stream Restoration Working Group 1998). The stream flow influences formation of sediment shoals and riffles. Channel processes and flow regime work together to create a variety of habitats for riverine species, which require different habitat types to complete their life cycle (Federal Interagency Stream Restoration Working Group 1998). Riverine species utilize different substrate, flow velocities, and depths for foraging, migration, and reproduction.

The Mamaroneck and Sheldrake River corridors are limited by existing development, and largely exhibit the characteristics of an urbanized river. The characteristics of urban watersheds are different from forested, rural, or agricultural watersheds (Federal Interagency Stream Restoration Working Group 1998) in that urban river hydrological systems are transformed by urban development, primarily the construction of impervious surfaces and stormwater drainage systems (Gurnell *et al.* 2007; U.S. Geological Survey 2003). These alterations affect the rivers' ability to transport floodwaters, can contribute to increased flooding during storm events or high river flow, and can affect the establishment of plant communities, as well as the distribution and abundance of wildlife.

Within the proposed project area, riverine and palustrine systems were identified using *"Ecological Communities of New York State Second Edition"* (Reschke 2014), and observations of flora and fauna which were made during the Service's June 23, 2015, field visit of the proposed project area.

2. Plant, Fish, and Wildlife Species of the Riverine Ecosystem

Riverine systems are non-tidal waters with a discrete channel with persistent emergent vegetation sparse or lacking, but may include areas with abundant submerged or floating-leaved aquatic vegetation (Reschke 2014). Both the Mamaroneck and Sheldrake River sections in the proposed project area could be described as a medium-sized streams, which have average widths from about 3 to 30 meters (m) (10 feet [ft] to 100 ft) (see Reschke 2014).

The Mamaroneck and Sheldrake Rivers have been altered by human activity and have been classified as riverine cultural by Reschke (2014). Both the Mamaroneck and Sheldrake Rivers could be further classified as the subsystem riverine submerged structure; a community associated with introduced structures such as retaining walls and bridge abutments, which provides habitat for some riverine species (Reschke 2014).

Despite the development along the river corridors, the proposed project area maintains several remnant communities of a riverine and palustrine nature. During the Service's June 23, 2015, site visit, finer-scale habitats, including riffles and pools, were observed in the lower Mamaroneck Reach. A riffle is a part of the stream that is shallow and has a comparatively fast current; the water surface is disturbed by the current and may form standing waves (*i.e.*, it is

"turbulent"). A pool is a part of the stream that is deep and has a comparatively slow current; the water surface is calm unless disturbed by wind (Reschke 2014).

The Service did not undertake any systematic surveys for aquatic resources in the rivers of proposed project area, but noted the following aquatic plant and fish resources during the June site visit: submerged aquatic vegetation, unknown emergent grass species, redbreast sunfish (*Lepomis auritus*), and carp (*Cyprinus* spp.). A more comprehensive but dated list of fish species found during surveys of the proposed project area can be found in U.S. Fish and Wildlife Service (1989). Tessellated darter (*Etheostoma olmstedi*), white sucker (*Catostomus commersonii*), American eel (*Anguilla rostrata*), redbreast sunfish, and Eastern blacknose dace (*Rhinichthys atratulus*) were identified in the project area as numerically dominant species based on survey results of New York State Department of Environmental Conservation (NYSDEC) (New York State Department of Environmental Conservation 2010). Species found in lower abundances in that survey included creek chub (*Semotilus atromaculatus*), brown bullhead (*Ameiurus nebulosus*), banded killifish (*Fundulus diaphanus*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*) (Table 2).

Table 2. Summary Table of Reproductive Requirements of Fresh Water Fish Present within Mamaroneck River.

Fish Species	**Substrate/Spawning**	**Time of Year**
Tessellated darter	Rubble, gravel, and sand Usually on bottom of rock (Lane *et*	Spring; 13° C - 19° C (Lane *et al.* 1996)

	al. 1996)	
White sucker	Rubble, gravel, and sand (Lane *et al.* 1996)	Spring; April - June (Werner 1980)
Redbreast sunfish	Rubble, gravel, and sand (Thorp 1988)	June - Mid-August (New York State Department of Environmental Conservation 2004)
Eastern blacknose dace	Riffle, gravel, and rubble (Kraft *et al.* 2006)	April - June (Werner 1980)
Creek chub	Gravel (Kraft *et al.* 2006)	Spring (Kraft *et al.* 2006)
Brown bullhead	Conceal eggs in cavities, logs, tree roots, and debris (Lane *et al.* 1996)	Spring; 14° C - 29° C (Lane *et al.* 1996)
Banded Killifish	Eggs adhered to vegetation (Lane *et al.* 1996)	Spring - Summer; 21° C - 32° C
Bluegill (non-native to study area)	Gravel, sand, and silt (Kraft *et al.* 2006)	May - July (New York State Department of Environmental Conservation 2004)
Largemouth bass (non-native to study area)	Rubble, gravel, sand, silt, and clay (Lane *et al.* 1996)	Spring; 14° C - 21° C (Lane *et al.* 1996)

As summarized in Table 2, the fish present in the study area primarily prefer rubble, gravel, and sand as the substrate used for spawning, which occurs in spring and summer or when temperatures are between 13° C and 32° C.

One of the species identified in the project area is the American eel. In 2011, the Service determined that the American eel may warrant protection under the Endangered Species Act (ESA) and initiated a status review. The species is faced with numerous challenges including access to estuaries and freshwater habitats during the glass eel, elver, and yellow eel phases (Atlantic States Marine Fisheries Commission 2000).

The American eel is a catadromous fish (migrates from freshwater to spawn in the sea), which uses different habitats throughout its life stages (U.S. Fish and Wildlife Service 2011). Eels spawn in the Sargasso Sea where the eggs hatch into larvae and are transported on the currents towards the coast of the United States. As they drift, the larvae mature into glass eels which are 2-3 inches (in.) long and transparent. Glass eels begin to arrive into the estuaries and mature into elvers which are greater than 4 in. in length and begin to develop pigmentation. Elvers migrate into brackish waters and continue to develop while some migrate into streams, lakes, ponds, and rivers. Before the eels sexually mature, they are called yellow eels. It may take the eels another 3-40 years to reach maturation before they head back to the Sargasso Sea (U.S. Fish and Wildlife Service 2011).

Within the Long Island Sound Watershed, eels migrate into the estuaries and freshwater streams and rivers in the spring (March through June) and, once sexually mature, begin migrating to natal waters from late August/September to November (Hoffmann 2015). Surveys conducted by the NYSDEC in the Hudson River from 2008 and 2013 found glass eels present in the Hudson River as early as March 4 (New York State Department of Environmental Conservation 2014).

During the Service's June 23, 2015, field visit, carp and sunfish were observed within the restored habitat area of the Sheldrake River and within the Mamaroneck River near Columbus

Park. Carp are native to Asia and were first introduced to the U.S. in the late 1800's as a source of food. They have since become ubiquitous in freshwater bodies throughout the U.S. and have a negative impact on the health of these water bodies. Parkos *et al.* (2003) found that systems with carp were characterized by highly turbid, nutrient-rich water with very few aquatic plants and low numbers of macroinvertebrate predators, many zooplankton grazers, and high numbers of phytoplankton. Waterbodies without carp were characterized by clear water, with extensive aquatic macrophyte structure, numerous macroinvertebrate predators, and small-bodied zooplankton grazers (Parkos *et al.* 2003). Carp directly reduced macrophytes through ingestion of plant matter and/or uprooting during feeding activity. Macrophytes play a critical role in the ecosystem by providing stabilization of sediment through their root structures, competing directly with phytoplankton for light and nutrients and providing habitat for zooplankton which in turn keeps the phytoplankton population down (Parkos *et al.* 2003).

Macroinvertebrate studies were conducted by the NYSDEC in 1999, 2003, 2008, and 2009. One of survey sites along the Mamaroneck River is within the Corps' study area. Dominant species recorded in the Mamaroneck River during all 4 survey years include: *Stenelmis* spp., *Polypedilum flavum*, *Cheumatopsyche* spp., *Gammarus* spp. and *Hydropsyche betteni* (Duffy 2015).

The Corps conducted surveys at a single location within the study area in both the Mamaroneck and Sheldrake Rivers in 2011. The dominant species in the Mamaroneck River identified by the Corps are consistent with those identified by the NYSDEC in previous survey years. The dominant species observed in the Sheldrake River included *Cheumatopsyche* spp., *Cricotopus bicinctus*, and unidentified species from the Naididae family.

3. Plant, Fish, and Wildlife Species of the Palustrine Ecosystem

Palustrine systems are defined as non-tidal, perennial wetlands with emergent vegetation. These systems are distinguished by their hydrologic regime, substrate material, and vegetation composition (Reschke 2014). Finer-scale habitats associated with this system include shallow emergent marsh, deep emergent marsh, and floodplain forest (Reschke 2014). At least two sites located in the Harbor Heights Reach provided a limited palustrine floodplain.

Cattail (*Typha latifolia*), pickerel weed (*Pontederia cordata*), skunk cabbage (*Symplocarpus foetidus*), rice cutgrass (*Leersia orzoides*), and various emergent grass species consistent with the deep emergent marsh subsystem were observed by the Service near the Fenimore Bridge at the north end of the Sheldrake River at Columbus Park. Species indicative of a shallow emergent marsh that were observed included awl-fruited sedge (*Carex stipata*), blue flag iris (*Iris versicolor*), and red twig dogwood (*Cornus sericea*) (Reschke 2014) were observed at the north end of the Sheldrake River at Columbus Park. Both of these areas have experienced some degree of human disturbance or intervention in recent years. The Fenimore Bridge location was dredged by the Village in 2010/2011. The Sheldrake location was a part of the ongoing Westchester County stream rehabilitation efforts, which involved the planting of native riparian species such as red twig dogwood, witch hazel (*Hamamelis virginiana*), ninebark (*Physocarpus opulifolius*), riverbank wild rye (*Elymus riparius*), Virginia wild rye (*Elymus virginicus*), blue flag iris, awl-fruited sedge, rice cutgrass, switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), and Indian grass (*Sorghastrum nutans*) (Kvinge 2015).

A floodplain forest system was observed in the northern reach of the Mamaroneck River, and is often found on low terraces of floodplains and experience annual flooding (Reschke 2014). The vegetation observed was consistent with this system: maple spp. (*Acer* spp.), ash spp. (*Fraxinus* spp.), poison ivy (*Toxicodendron radicans*), sycamore (*Platanus occidentalis*), jewelweed (*Impatiens capensis*), and spicebush (*Lindera benzoia*).

4. Plant and Wildlife Species of the Terrestrial Ecosystem

a) Vegetation

The terrestrial system consists of upland habitats, exhibiting well-drained soils that are dry to mesic, and vegetative cover that is never predominantly hydrophytic, even if the soil surface is occasionally or seasonally flooded or saturated (Reschke 2014). Overall, the terrestrial system is a broadly defined system of various habitats excluding aquatic, wetland, and subterranean communities.

Due to the developed nature of the proposed project area, the steep river banks provide limited terrestrial habitat for plants and wildlife. Native vegetation in these habitats is often out-competed by non-natives which readily colonize these disturbed areas. Dominant vegetation observed along the terrestrial zones of both rivers during the June 23, 2015, field visit included: Norway maple (*Acer platanoides*), sycamore, red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), and tree-of-heaven (*Ailanthus altissima*) in the overstory; Japanese knotweed

(*Polygonum cuspidatum*) and multiflora rose (*Rosa multiflora*) in the understory; and mugwort (*Artemisia vulgaris*), garlic mustard (*Alliaria petiolata*), and Virginia creeper (*Parthenocissus quinquefolia*) in the herbaceous layer. Many of the species identified are non-native, invasive, and ubiquitous throughout the proposed project area and include: Norway maple, tree-of-heaven, mugwort, oriental bittersweet (*Celastrus orbiculatus*), multiflora rose, wineberry (*Rubus phoenicolasius*) and bamboo (*Bambusa* spp.). These plants are of great concern as they out-compete native vegetation and degrade the riparian zone (Davenport *et al.* 2004).

b) Avian Species

The Migratory Bird Treaty Act (16 U.S.C. 703-712; MBTA) implements four treaties that provide for international protection of migratory birds. The MBTA prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Bald and golden eagles are afforded additional legal protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). Unlike the ESA (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.), neither the MBTA nor its implementing regulations at 50 Code of Federal Regulations (CFR) Part 21, provide for permitting of "incidental take" of migratory birds.

The Service did not undertake any systematic seasonal surveys for avian species in the terrestrial, riverine, or palustrine zones in the proposed project area. However, avian species were noted and recorded during the June 23, 2015, field visit. The Service observed osprey (*Pandion haliaetus*) (which were observed nesting on a tower near the Fenimore Bridge), house sparrow

(*Passer domesticus*), grackle (*Quiscalus quiscula*), mallard (*Anas platyrhynchos*), rock pigeon (*Columbia livia*), Baltimore oriole (*Icterus galbula*), barn swallow (*Hirundo rustica*), red wing blackbird (*Agelaius phoeniceus*), and northern cardinal (*Cardinalis cardinalis*). The Service's Information for Planning and Conservation (IPaC) website (http://ecos.fws.gov/ipac/) identified 26 species of migratory birds that may be found in the proposed project area utilizing the habitat year round, for breeding or wintering purposes (Appendix 1). Of the 26 species identified by using the IPaC system, one is designated as state-endangered - short eared owl (*Asio flammeus*); five are state-threatened - upland sandpiper (*Bartramia longicauda*), pied-billed grebe (*Podilymbus podiceps*), least tern (*Sterna antillarum*), least bittern (*Ixobrychus exilis*), and the bald eagle (*Haliaeetus leucocephalus*); and five are listed as special concern - American bittern (*Botaurus lentiginosus*), black skimmer (*Rynchops niger*), cerulean warbler (*Dendroica cerulean*), golden-winged warbler (*Vermivora chrysoptera*), and the seaside sparrow (*Ammodramus maritimus*). The proposed project area is included in the 2000-2005 NYS Breeding Bird Atlas block number 6053C. Records for this block indicate a total of 86 species, with 5 possible, 10 probable, and 71 confirmed breeders.

c) Mammals

Thirty species of mammals have been identified in, and in the vicinity of, the proposed project area (U.S. Fish and Wildlife Service 1989). Some of these mammals include, but are not limited to, the eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), raccoon (*Procyon lotor*), and eastern gray squirrel (*Sciurus carolinensis*). The Service did not undertake

any systematic seasonal surveys for mammalian species in the terrestrial, riverine, or palustrine zones in the proposed project area. However, two mammalian species, the eastern gray squirrel (black morph) and eastern chipmunk were noted and recorded during the June 23, 2015, field visit.

d) Reptiles and Amphibians

Eastern box turtle (*Terrapene carolina carolina*), eastern garter snake (*Thamnophis sirtalis*), American toad (*Anaxyrus americanus*), common snapping turtle (*Chelydra serpentine*), marbled salamander (*Ambystoma opacum*), and northern dusky salamander (*Desmognathus fuscus*) have been known to occur in the proposed project area (U.S. Fish and Wildlife Service 1989). This list would need to be updated with recent surveys, in order to accurately characterize reptile and amphibian species in the proposed project area.

5. Threatened and Endangered Species

The ESA directs all federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the ESA. Section 7 of the ESA, called "Interagency Cooperation," is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the continued existence of any listed species.

Under section 7, federal agencies must consult with the Service when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species. This process usually begins as informal consultation. A federal agency, in the early stages of project planning, approaches the Service and requests informal consultation. Discussions between the two agencies may include what types of listed species may occur in the proposed action area, and what effect the proposed action may have on those species.

If it appears that the agency's action may affect a listed species, that agency may then prepare a biological assessment or evaluation to assist in its determination of the project's effect on a species. If the agency, after discussions with the Service, determines that the proposed action is not likely to affect any listed species in the project area, and if the Service concurs, the informal consultation is complete and the proposed project moves ahead.

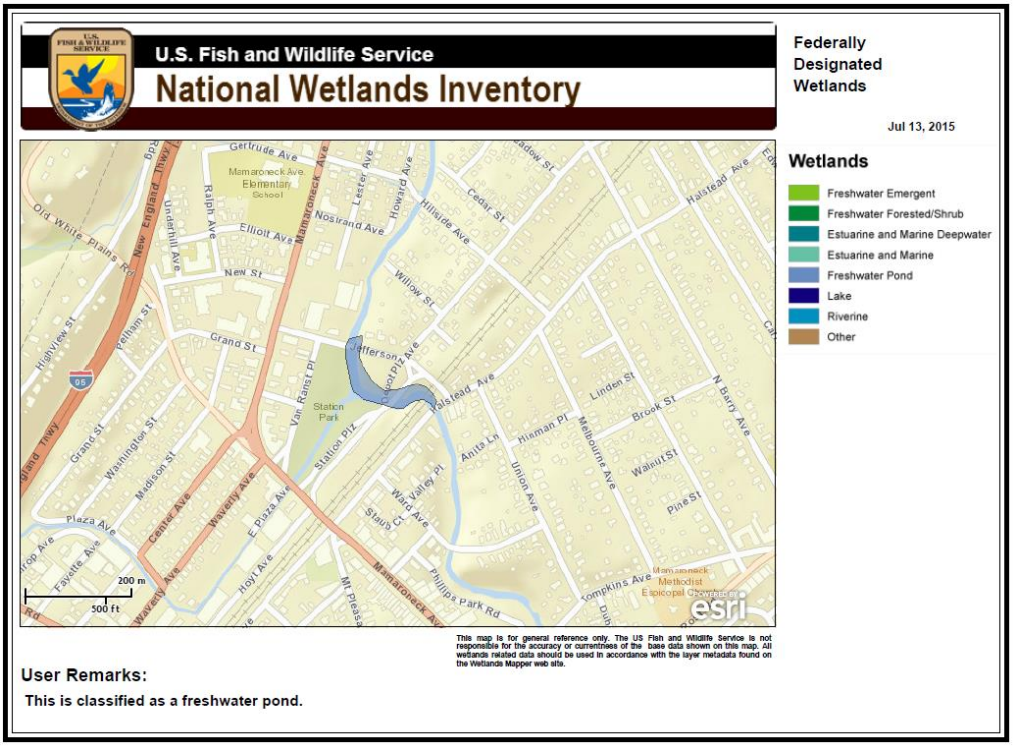
There are no federally-listed or proposed species that are identified as having the potential to occur in the project area. In addition, there is no federally-designated critical habitat within the proposed project area.

One candidate species was identified in the IPaC report, the New England Cottontail (*Sylvilagus transitionalis*), a medium-sized rabbit which prefers a very specific habitat and is usually associated with early successional habitat, native shrub lands with sandy soils, wetlands, or "forests associated with small scale disturbances" (U.S. Fish and Wildlife Service 2015). Due to the suburban quality of habitat and the absence of the preferred habitat of the New England cottontail, it is unlikely that this species would be found in the proposed project area. No further coordination is required for this species.

6. Wetland Habitats

The confluence of the Mamaroneck and Sheldrake Rivers contains a federally-designated wetland, and is classified as a freshwater pond (Figure 2) by the Service's National Wetland Inventory program.

Figure 2. Federally-designated Wetlands Present in the Proposed Project Area.



7. Water Quality

The Mamaroneck River is listed on the NYS 2010 section 303 (d) list of impaired waters and is considered to be impaired by low dissolved oxygen, nutrient loads, and silt and sediment due to urban stormwater runoff and other nonpoint sources. The Sheldrake River is also listed on the NYS 2010 section 303 (d) list of impaired waters due to pesticide levels in contaminated sediment and silt; and sediment due to urban stormwater runoff and other nonpoint sources. Floatables were observed during the Service's June 23, 2015, field visit in both rivers.

The Mamaroneck and Sheldrake Rivers are classified as Class C Rivers (New York State Department of Environmental Conservation 2010). A Class C waterbody is defined as supporting fisheries and suitable for non-contact activities (New York State Department of Environmental Conservation 2010). Due to the limited accessibility to the Sheldrake River and the pesticide contamination in the sediment, the river does not support a high quality recreational fishery. Additionally, high levels of pesticides have been recorded in various fish species found in the Sheldrake River (Spodaryk *et al.* 1999). Levels of dieldrin and chlordane found in fish exceed the Food and Drug Administrations (FDA) limit, and, as a result, fish advisories are in effect for the Sheldrake River (Table 3).

Table 3. NYSDEC's Hudson Valley Region Fish Advisories for the Sheldrake River.

Category	**Goldfish**	**American Eel**	**Other Fish**
Women < 50 and Children < 15	Do not consume	Do not consume	Do not consume

Men > 15 and Women > 50	1 Meal/month	Never	4 Meals/month

VI. Description of Selected Plan

A. Description of the Locally Preferred Plan

The Corps' tentatively selected plan is the locally-preferred plan (termed Alternative 1M and referred to as the LPP) and involves the channel deepening and widening along both the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, Westchester County, NY (U.S. Army Corps of Engineers 2015a). In addition to the LPP, the Corps is analyzing the National Economic Development Plan (termed Alternative 1F and referred to as the NED). In brief, the differences between these alternatives are the changes in channel widths, the inclusion of non-structural measures, and the exclusion of channel modifications to the Harbor Height Reach in the NED (U.S. Army Corps of Engineers 2015a). However, the Corps has indicated that they anticipate implementing the LPP (Alternative 1M) (Voisine 2015) and therefore this report analyzes the potential impacts of the LPP on the fish and wildlife trust resources within the project area. The Corps provided the following description for the LPP (U.S. Army Corps of Engineers 2015a):

In the Sheldrake River Reach, the Corps proposes channel deepening and widening along 3,740 ft of the river. Side slopes would be 1 horizontal (H):2.5 vertical (V), or rectangular where needed (*i.e.*, upstream of Mamaroneck Avenue Bridge). Channel bottom width would vary in

proposed project area with 20 ft from the confluence to Mamaroneck Avenue Bridge; 33 ft from Mamaroneck Avenue Bridge to 1000 ft downstream and 30 ft rectangular and semi-trapezoidal to Fenimore Avenue Bridge. The slope of the channel would also be varied with a 1.0 percent slope from the confluence to 390 ft upstream and then 0.1 percent grade to Fenimore Road. The project would also include the removal and replacement of utilities in certain locations.

This alternative also includes the replacement of the Waverly Place Bridge, and removal of the Centre Avenue Footbridge and footbridges No. 1 and No. 2.

In the Mamaroneck River, the proposed work will encompass 3,740 linear ft of the upstream reach and 2,400 linear ft of the downstream reach. In the upstream reach, channel deepening and widening are proposed. The side slopes would be 1H:2.5V and channel bottom width would be variable: 25 ft wide from 200 ft upstream of Glendale Avenue and 35 ft wide for the next 650 ft downstream of Glendale Avenue. Slopes would vary from 0.6 percent and 0.2 percent for approximately 1,340 feet. Upstream of the confluence the river would be 45 ft wide with a 0.25 percent slope for about 2,400 feet. The removal and replacement of the retaining wall and utilities will be necessary in certain locations.

In the Mamaroneck River, Downstream Reach, channel deepening and widening are proposed, with 1H:2.5V slopes. The channel bottom width would be maintained at 45 ft from the confluence to just downstream of Tompkins Avenue Bridge, with a slope 0.25 percent. Retaining wall and utilities removal and replacement will be necessary in certain locations.

Additionally, the Corps has included the construction/reconstruction of retaining walls and the placement of riprap along the bottom of the rivers. The pre-existing retaining wall will be replaced as needed and new retaining walls will be constructed where space is limited. The

Corps is proposing the placement of 1,200 linear ft of riprap along the bottom of the Mamaroneck and Sheldrake Rivers. The Corps provided the following information regarding the riprap (U.S. Army Corps of Engineers 2015a):

> "About 500 feet of riprap will be located roughly 200 feet both upstream and downstream of the North Barry Ave Extension Bridge over the Mamaroneck River and 700 ft of riprap will be placed at the 90 degree turn in the Sheldrake River located downstream of the Fenimore Road Bridge. Also, due to high velocities and structural considerations along the Mamaroneck River from the Station Plaza Bridge to just downstream of the Halstead Avenue Bridge, 300 linear ft of concrete is proposed along the bottom of the stream to prevent scour under and around the footings of these three bridges.
>
> All the riprap evaluated for the Mamaroneck and Sheldrake River consists of a 12 inch thick layer of riprap applied over a 6 inch stone bedding layer. If a geo-textile material is used instead of a 6 inch granular bedding layer for the bottom riprap a non-woven or geo-web product will be specified. The riprap on the side slopes will be extended to the top of the riverbank. A series of velocities from the 1 year to the 100 years where used to determine the necessary riprap stone sizes."

The Corps has not provided a schedule for the proposed work at this time; however, correspondence with the project's biologist indicates that the Corps will conduct tree removal to avoid impacts to most nesting birds and roosting bats (Voisine 2015).

VII. Future without Project Conditions

As described by the Corps (2015a), future trends do not indicate a significant decrease in land use or rainfall and as such continued and future flooding is an on-going concern for the Village. The proposed project area is surrounded by extensive development which limits or precludes the natural riverine processes. The river has undergone numerous shore hardening modifications, and dredging activities and the water quality is degraded by the upland uses. The natural processes are altered by submerged structures such as the bridge abutments and retaining walls found throughout the proposed project area. The upland is heavily-developed with impervious structures, which have multiple effects on the river. Impervious structures prevent the infiltration of water and reduce the amount of recharge entering the ground water. The water runs along the impervious structures, raising the water temperature and picking up sediment and pollutants, and enters the river. In brief, these structures increase runoff and the stormflow (Federal Interagency Stream Restoration Working Group 1998). Due to ongoing development and the continued use of the upland, the effects of urbanization will continue to compromise the condition of the rivers. The ongoing habitat protection and restoration efforts of the local governments will restore some degree of natural processes and provide areas of restored habitat. But, based on the extensive development extending throughout the proposed project area, flood damage protection efforts are likely to continue into the future.

VIII. Description of Impacts on Fish and Wildlife Resources

The Corps' tentatively selected plan does not include any environmental features specific to enhancing or restoring fish and wildlife habitat in the Mamaroneck and Sheldrake Rivers. The tentatively selected plan also does not include measures that would avoid, minimize, or

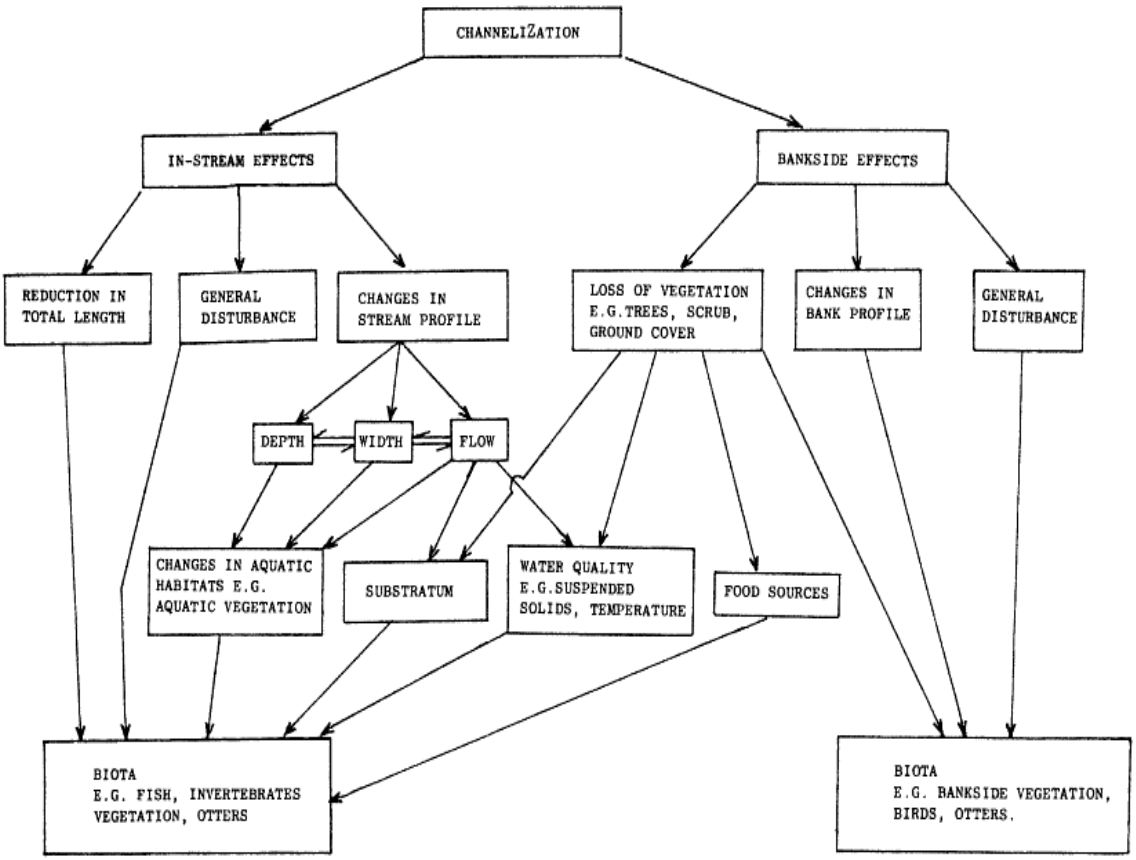
compensate for impacts to fish and wildlife resources, except for time-of-year restrictions for certain fish species. Direct, indirect, and cumulative impacts of the proposed project on the fish and wildlife resources are anticipated and include habitat loss, modification, and reduction in functional values due to channelization, and shoreline and bottom hardening, and the resultant increases in turbidity of the water column, sedimentation, and visual and sound stimuli associated with construction activities.

A. Direct and Indirect Effects

1. Channelization

Channelization of rivers involves several engineering practices to control flooding, drain wetlands, improve river channels for navigational purposes, control stream bank erosion, and modify river alignments (Brooker 1985). A direct effect of the project will be a change in river morphology due to channelization, which will significantly alter the depth, width, and slope of the rivers. The indirect effects of this include implications for the chemical, physical, and biological properties of the river channel and banks, affecting river bottom, water column, and riparian habitats. These effects are summarized in Figure 3 (from Brooker 1985).

Figure 3. The Potential Effects of Channelization on In-stream and Bankside Biota. From Brooker (1985).



Channelization alters the channel processes and flow regimes which are the driving force within the stream ecosystem. These processes, along with flow regime, are responsible for the varied habitats available to riverine species. A loss of flow variability will likely lead to homogenization of habitat (Kennedy and Turner 2011) and a subsequent decrease in species' numbers and diversity (Jungwirth *et al.* 1995). The resulting homogenization from channelization will likely decrease the variety of habitat and reduce the connectivity between the channel and the flood plain, thereby reducing the nursery habitat for juvenile fish species. Creation of a river channel with uniform depth will also reduce finer-scale habitats like riffles and pools. Loss of bankside vegetation may result in altered water temperatures; decreased

allochthonous organic material (material found somewhere other than where it was formed); and reduced habitat for animals (Brooker 1985). Kennedy and Turner (2011) noted that channelized reaches exhibited 50 percent lower density and taxonomic richness of aquatic invertebrates in the aquatic terrestrial transition zone compared to non-channelized reaches. Decreases in density and richness may be attributed to the loss of area, nutrient input, and decreased food availability. These factors act synergistically to decrease reproductive success (Kennedy and Turner 2011) of many riverine species.

2. Turbidity

Turbidity, or increases in the concentration of suspended sediments in the water column, along with increases in sediment transport, will likely occur during the removal and construction of bridges and retaining walls, removal of trees and bankside vegetation, dredging, placement of riprap and concrete retaining walls throughout the construction phase of the project and if water flows increase as a result of the proposed project.

Turbidity is considered the most important factor limiting fish habitat according to fishery biologists (Henley *et al.* 2000). Increases in turbidity will have negative effects on both benthic organisms and fish populations. Suspended solids can affect fish species at all stages of their life history, including breeding, spawning, and hatching of fish eggs. Severe turbidity can suffocate eggs and aquatic insect larvae, fill in the pore space between bottom cobbles used by fish for reproduction (Federal Interagency Stream Restoration Working Group 1998), and reduce primary production. Increased turbidity and sedimentation can bury sediments utilized for

spawning, delay hatch time of eggs (Schubel and Wang 1973), and can result in suffocation due to coating or abrasion of fish gills (O'Connor *et al.* 1976). Sedimentation may also result in the loss of specific substrate types required by species for reproduction.

Turbidity is a significant contributor to declines in aquatic organisms and is associated with trophic cascades and community changes due to alterations between predator–prey interactions, mortality, reduced physiological function and avoidance, and primary productivity (Henley *et al.* 2000; Chivers *et al.* 2012). Additionally, high sediment transport loads can have an abrasive quality and can scour periphyton, resulting in reduced abundance of periphyton (Henley *et al*. 2000).

Sediment transport may carry polluted sediments downstream (Federal Interagency Stream Restoration Working Group 1998). The Sheldrake River has fish consumption advisories in effect due to chlordane residue levels found in fish (Spodaryk *et al.* 1999). Dieldrin and chlordane are persistent organopesticides that were banned from use and maybe present in the sediment. According to the NYSDEC, the Sheldrake River is impaired by pesticide levels in contaminated sediment and silt. Construction activities may result in resuspension of contaminated pesticides.

3. Habitat Loss and Modification

Habitat modification and loss is considered one of the top five drivers of biodiversity loss (*e.g.*, Chivers *at al.* 2012) and will result from riprap and concrete channelization of the rivers. Indirectly, these will also contribute to a decrease in functional value of the riverine, palustrine

and terrestrial ecosystems in the proposed project area. The construction of concrete retaining walls and placement of riprap along the riverbank and riverbed will alter/modify the habitat, and result in decreased infiltration of surface runoff, increased flow velocities as well as decreased opportunity for habitat development, and loss of edge (Federal Interagency Stream Restoration Working Group 1998), and riverbed habitats. As mentioned previously, Kennedy and Turner (2011) found that non-channelized reaches had higher density and taxonomic richness of aquatic invertebrates in the transition zone and a greater abundance of predaceous macroinvertebrates.

Channelization of rivers results in the loss of riverine features that create specific habitat required by aquatic species (Brooker 1985). Species must have access to high quality habitats that satisfy specific needs. Channelization decreases habitat diversity by creating a more uniform environment resulting in overall decreased biodiversity. Riverine fish utilize wide range of habitats and may exhibit habitat preference during a portion of their life or throughout their lives (Pretty *at al.* 2003). Brooker (1985) reported that channelized reaches of rivers have fewer fish species than unmanaged reaches and this effect was credited to loss of space, loss of distinct habitat patches (*i.e.* riffles and pools), decreased habitat diversity, loss of stable substrate and greater fluctuations of water temperature.

Stabilization impacts associated with the use of riprap include the alteration of stream evolution processes, riparian succession, sedimentation processes, habitat, and biological community interactions (Fischenich 2003). The proposed placement of the riprap is along the river bed and river banks. Most studies report on the effects of riprap placement along the shore, with only a limited amount of information available concerning the effects of riprap placed along the river bottom. White *et al.* (2010) found that when used in small areas along the river bank, riprap results in increased abundance and biomass of habitat generalists. However, large-scale

alterations result in decreased habitat availability, decreased biotic integrity, and reduced growth and abundance of fish (White *et al.* 2010).

During spawning, fish prefer specific habitat with the appropriate water velocity, substrate, vegetation, and temperature (Wootton 1998). Fish prefer a variety of habitats; some species select substrate that is free of boulders, low in fine sediment and high in gravel, while others may prefer debris, muddy bottoms, or vegetation (Hamilton and Bergersen 1984). As summarized in Table 2, many of the fish found within the proposed project area prefer riffle habitats comprised of rubble, pebbles, gravel, and sand during reproduction. The blacknose dace prefers sand, gravel, and cobble smaller than 2.5 centimeters (cm) (Trial *et al.* 1983), creek chub prefer well-defined riffles to make their gravel nests (McMahon 1982), bluegill prefer fine gravel and sand (Stuber *et al.* 1982), and the white sucker uses riffles to spawn on 2-16 millimeters (mm) sized gravel (Twomey *et al.* 1984). Throughout their various life stages, these fish utilize different areas of the river based on their temperature, velocity, and food requirements. The replacement of these critical patch habitats with a uniform layer of riprap along the river bottom may result in the loss spawning habitat for the freshwater fish found in the proposed project area.

4. Visual and Auditory Impacts from Construction Activities

Fish and wildlife may be disturbed due to the visual and sound stimuli associated with construction activities. For example construction may result in the following behavioral responses of migratory birds:

- Flushing an adult or juvenile from an active nest during the reproductive period;

- Precluding adult feeding of the young for a daily feeding cycle; and
- Precluding feeding attempts of the young during part of multiple feeding cycles.

These responses may then result in decreased survival or reproductive success.

5. Cumulative Impacts

The structural measures proposed in the Corps' LPP will have a negative impact to the in-stream ecology through the channelization of 3,470 ft of the Sheldrake River and 6,140 ft of the Mamaroneck River. Disruption to life history events, alteration to river profile, loss of habitat, and mortality associated with increased turbidity are likely to have negative effects on the Mamaroneck and Sheldrake River ecosystems. While both rivers exhibit characteristics of urbanized rivers associated with riparian degradation due to non-native species and armoring structures; this project will create a more uniform environment that will likely result in further deterioration of the riverine and riparian ecosystem. The goal of channelization is to facilitate the conveyance of floodwaters. The structural measures proposed by the Corps will result in the loss of habitat, the decrease of habitat quality, and the loss of biodiversity.

IX. Recommended Mitigation Measures and Fish and Wildlife Enhancement Measures

A. Service Mitigation Policy

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act (42 U.S.C. § 4321 *et seq*.) regulations to include: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the actions; and (e) compensation for the impact by replacing or providing substitute resources or environments.

The Service's Mitigation Policy (Policy) (U.S. Fish and Wildlife Service 1981) was developed to guide our preparation of recommendations on mitigating the adverse impacts of land and water developments on fish, wildlife, their habitats, and uses thereof. It assists both the Service and Corps by assuring consistent and effective recommendations, outlining policy for the levels of habitat mitigation needed, and the various methods for accomplishing mitigation for habitat losses associated with such projects. Overall, it allows federal action agencies to anticipate Service recommendations and to assist in preparation of mitigation measures early, thus avoiding delays and assuring equal consideration of fish and wildlife resources with other project features and purposes (Fish and Wildlife Coordination Act 16 USC 661-667[e]).

The Service's Policy instructs us to evaluate the habitat that may be adversely impacted and to determine whether it is of: 1) high value for evaluation species and is unique and irreplaceable on a national basis or in the eco-region; for which our goal would be no loss of existing habitat value, because these one-of-a-kind areas cannot be replaced; 2) high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the eco-region section; for which our goal is no net loss of in-kind habitat value; 3) high to medium value for evaluation species and is relatively abundant on a national basis; for which our goal would be no net loss of

habitat value, while minimizing loss of in-kind habitat value; or 4) medium to low value for evaluation species; for which our goal would be to avoid or minimize losses of habitat value.

The habitats present in the proposed project area are characterized by the Service as Category 4 due to the steep river bank slopes, the presence of river bank armoring, the proximity to paved roadways and commercial development, and the presence of non-native and invasive vegetation. Based on this determination, the Service has proposed measures that will avoid or minimize losses to this resource category. If losses are likely to occur, then the Service will recommend ways to immediately rectify, reduce, or eliminate them over time. If losses remain likely to occur, then the Service may make a recommendation for compensation, depending on the significance of the potential loss.

B. Recommended Mitigation Measures

The National Research Council (1992) noted that the cornerstone of modern floodplain restoration and integrated floodplain management rests on the understanding that "…rivers and their floodplains are so intimately linked that they should be understood, managed, and restored as integral parts of a single system." To underscore the importance of floodplains as an integral part of the river ecosystem, Executive Order 11988 on floodplain management states that federal agencies should avoid undertaking actions that directly or indirectly adversely affect natural floodplain functions and values. The above authorities' direct agencies to take advantage of every opportunity to protect, improve, and restore wetland habitat in the study area and enhance regional fish and wildlife resources.

More recently, scientific recognition of our changing climate has led to greater considerations of effects of climate change on federal infrastructure investment and planning. In 2012, the Department of the Interior added policy guidance to its manual to address climate change in project planning. Among the policies are: 1) Promote landscape-scale ecosystem-based management approaches to enhance resilience and sustainability of linked human and natural systems; 2) Protect diversity of habitat communities and species; 3) Protect and restore core, unfragmented habitat areas and the key habitat linkages among them; and 4) Maintain key ecosystem services (U.S. Fish and Wildlife Service 2013).

Based on a consideration of the above, the Service has developed the following mitigation measures that the Corps should incorporate into the project design to avoid and/or minimize the proposed project's adverse effects, facilitate floodplain management, and promote landscape level approach to resiliency planning.

1. Improved Public Access

The Village of Mamaroneck (2011) identifies the lack of public access available to the rivers and suggests the development of a river walk to enhance public access. The incorporation of green infrastructure into the project design will provide opportunities to enhance public access and provide the public with the opportunity to view wildlife found along the river corridor. The Service recommends that the Corps evaluate the possibility of adopting green infrastructure features such as open space, green space, and greenways into the project plan to increase public access.

2. **Nonstructural Measures**

The Service recommends the implementation of nonstructural measures to address flooding related impacts as supplemental to the structural measures being proposed. Nonstructural measures can include: (1) reduction of impervious features in areas adjacent to river where practical, (2) incorporation of pervious materials into the design of parking lots and walkways, and (3) elevation and other flood-proofing measures of buildings within flood prone areas.

3. **Best Management Practices**

Guidelines for channel renovation/design principles (Nunnally 1978) should be considered as best management practices and include the following:

- Straighten the channel and increase the slope as little as possible;
- Promote bank stability by leaving as many trees as possible, minimizing channel reshaping, early seeding of vegetation in disturbed areas, and judicious placement of riprap; and
- Emulate nature in designing channel form; existing meanders should be maintained.

4. **Surveys**

In the event that vegetation clearing cannot occur between September and January, breeding bird surveys should be conducted. This time-of-year restriction was developed utilizing data obtained from the NYSDEC Breeding Season Table (1980-1985). While most raptors may begin nesting in March, the great horned owl may lay eggs as early as late January. Should the Corps wish to refine this time-of-year restriction, the Service recommends nesting surveys be conducted prior to construction to identify raptor breeding activities and nest locations in the vicinity of the proposed project area. Once breeding areas have been identified, the Corps and the Service would assess which nests would be directly impacted by project activities and which nests would likely be rendered unproductive because of the proximity of the proposed project. The assessment of nest activity would take into account circumstances such as landforms and surrounding land uses that would factor into the assessment of direct project related activities to the species. Construction buffers may be incorporated into the project activities to avoid the take of migratory birds, their nests, eggs, or young.

5. **Time-of-Year Restrictions**

The Service also recommends conducting in-water and stream bank construction activities from November to March to avoid the spawning season of freshwater fish species and the migration of American eels. The freshwater species (white sucker, blacknose dace, tessellated darter, etc.) identified within the proposed project area spawn in spring and summer (April to mid-August) or when water temperatures are between 13° C and 32° C (Werner 1980; Lane *et al.* 1996;

http://www.dec.ny.gov/animals/94473.html accessed August 10, 2015; Kraft *et al.* 2006). As noted in Section VI, eels may begin migrating into brackish and fresh waters between March and June as juveniles and migrate into the marine environment to reproduce between August and November (Hoffmann 2015). The Atlantic States Marine Fisheries Commission (2000) recommends that federal and state agencies mitigate (when practical) the effects of construction hazards to the migration of American eel.

At this time, the Service recommends cutting trees between September and January for the protection of breeding birds, and recommends avoiding any in-stream activities during March-November for the protection of spawning freshwater fish and migrating American eels. The Corps may opt to conduct specific seasonal surveys for avian and fish species to better delineate the time periods of species activity in the proposed project area. Should the Corps be interested in pursuing potential alternative mitigation measures, in lieu of time-of-year restrictions, such as the construction of fish passageways for aquatic resources, further coordination with the Service is recommended.

6. **Rehabilitation of Riparian Habitat**

The removal of native stream bank vegetation should be minimized and total removal and grubbing of non-native/invasive species should occur with native plantings occurring as soon as possible to reduce erosion and avoid increased turbidity of the water column. The removal of non-native vegetation and the seeding/planting of native species will improve habitat conditions,

while increasing ecosystem diversity and storm damage protection. The planting of woody vegetation on the river banks may: a) increase shading and decrease water temperature; b) increase dissolved oxygen solubility; and c) improve habitat suitability for aquatic species, songbirds, wading birds, and waterfowl (Federal Interagency Stream Restoration Working Group 1998).

Many entities within Westchester County are dedicated to the restoration and cleanup of the Mamaroneck and Sheldrake Rivers and overall use and enjoyment of the rivers. Towards this end, the Village has taken measures to improve the water quality by targeting discharge of raw sewage and hosting an annual river cleanup. Specifically, the Westchester Soil and Water Conservation District (District) 2015 plan outlines the District's priorities to advance the aquatic restoration program as follows: (1) restoring, protecting, managing natural resources; (2) installing and retrofitting stormwater management facilities to improve water quality and mitigate flooding; (3) controlling erosion and sedimentation and polluted stormwater by advocating best management practices through professional training and watershed-based analyses and recommendations; and (4) promoting sound soil and water resources conservation techniques and natural resources stewardship through public outreach and education.

Due to the experience of Westchester County in undertaking restoration projects in the proposed project area, the Service recommends that the Corps coordinate with Westchester County regarding priorities and approaches in restoring the habitat within the proposed project study area and utilizing similar methods and materials.

7. Improvements for Habitat Diversity and Value

Channelization results in the loss of habitat diversity and functionality. As discussed above, loss of habitat diversity results in decreased abundance and species richness. We recommend making natural stream design features part of the engineering design rather than solely proposing a series of measures to mitigate for adverse effects. Provided below are measures that may be taken to avoid the negative impacts of the study or to restore the habitat post construction.

Structural measures can be incorporated into the engineering design to improve habitat suitability for invertebrates, aquatic vegetation, and fish species in the riverine ecosystem. As described above, many riverine species require varied habitat requirements to complete their life history. The white sucker and blacknose dace prefer shallow riffles and gravel bottom for spawning. This habitat is preferred by numerous other fish species but mud bottoms, deep weed beds, and sandy bottoms are also utilized by species during specific life stages. Measures could be implemented to create shallow riffles, gravel bottom, and deep pools. Creating varied habitat can be achieved by placing structures or boulders within the channel. Additional structures that create habitat include wing deflectors, which protrude from either stream bank but do not extend across the river. These structures deflect flows away from the bank and scour pools by constricting the river and accelerating flow (Federal Interagency Stream Restoration Working Group 1998). Pretty *et al.* (2003) found that wing deflectors increased the flow heterogeneity resulting in varied channel depth, which increased localized abundance and numbers. These measures must be utilized in areas where the velocity of the water is substantial enough to transport material and form riffle and pool habitats.

In order to improve water quality, structural measures may be incorporated into the project design to reduce sediment and debris from entering the river during storm events and ultimately improve water quality. These measures may include (See Environmental Protection Agency 2012 for complete list of Stormwater Management Best Practices):

> Bioretention Cells or Rain Gardens: A depressed area with porous backfill (material used to refill an excavation) under a vegetated surface. These areas often have an underdrain to encourage filtration and infiltration, especially in clayey soils. Bioretention cells provide groundwater recharge, pollutant removal, and runoff detention. Bioretention cells are an effective solution in parking lots or urban areas where green space is limited (Environmental Protection Agency 2012).
>
> Curb and Gutter Elimination: Curbs and gutters transport flow as quickly as possible to a stormwater drain without allowing for infiltration or pollutant removal. Eliminating curbs and gutters can increase sheet flow and reduce runoff volumes. Sheet flow, the form runoff takes when it is uniformly dispersed across a surface, can be established and maintained in an area that does not naturally concentrate flow, such as parking lots. Maintaining sheet flow by eliminating curbs and gutters and directing runoff into vegetated swales or bioretention basins helps to prevent erosion and more closely replicate predevelopment hydraulic conditions. A level spreader, which is an outlet designed to convert concentrated runoff to sheet flow and disperse it uniformly across a slope, may also be incorporated to prevent erosion (Environmental Protection Agency 2012).

Green Parking Design: Refers to several techniques that, applied together, reduce the contribution of parking lots to total impervious cover. Green parking lot techniques include: setting maximums for the number of parking lots created; minimizing the dimensions of parking lot spaces; utilizing alternative pavers in overflow parking areas; using bioretention areas to treat stormwater; encouraging shared parking; and providing economic incentives for structured parking (Environmental Protection Agency 2012).

Stormwater Planters: Are small landscaped stormwater treatment devices that can be placed above or below ground and can be designed as infiltration or filtering practices. Stormwater planters use soil infiltration and biogeochemical processes to decrease stormwater quantity and improve water quality, similar to rain gardens and green roofs but smaller in size — stormwater planters are typically a few square feet of surface area compared to hundreds or thousands of square feet for rain gardens and green roofs. Types of stormwater planters include contained planters, infiltration planters, and flow-through planters (Environmental Protection Agency 2012).

As discussed above, American eel are catadromous fish which requires migration upstream in order to mature. Access for catadromous/diadromous fish is essential to the success of the population. American eel are faced with numerous challenges, one of which is lack of access to current and historical habitats from barriers (Atlantic States Marine Fisheries Commission 2000). The Atlantic State Marine Fisheries Commission's Interstate Fishery Management Plan for American eel (2000) recommends:

> "In areas where residential and commercial development is adjacent to American eel habitat, state marine fisheries agencies should coordinate efforts with their inland fisheries/wildlife agencies and others (for example, state agencies with responsibility for soil and water conservation and water quality) to implement remedial actions to restore habitat. State marine fisheries agencies should also coordinate with their state water quality agencies responsible for developing and implementing river basin and wetland restoration plans, to ensure that American eel habitat is identified and considered in these plans, and that these plans are implemented. Also, state marine fisheries agencies should coordinate their concerns with the Army Corps of Engineers since they have authority to investigate, study, modify, and construct projects for habitat restoration, under Section 1135(b) of the Water Resources Development Act of 1986, and also under Section 206 of this same Act. State marine fisheries agencies should coordinate with their state inland fisheries/wildlife agencies to identify migration times, through site-specific data collection and monitoring."

While this is geared toward state agencies, it may prove to be prudent for the Corps to consider these recommendations and implement as appropriate into their project design.

Non-structural measures may be taken to restore the habitat within the project area. As discussed in Section VI, carp have a significant effect on the riverine ecosystem resulting in degraded systems. The Service recommends the consideration of a carp removal/eradication program in order to improve the habitat quality. The Service recommends coordination with the Service, NYSDEC, and local entities to explore the possibility of a carp removal/control program in order to improve and maintain habitat value.

Bioengineering

The use of bioengineering along steeply-sloped banks will stabilize the river bank and reduce turbidity and suspended particles in the river while also providing riparian and edge habitat, decreasing flow velocities, and increasing the capacity of the river to accumulate/store/filter materials, sediment, and energy (Federal Interagency Stream Restoration Working Group 1998). The Service understands that the feasibility of these measures may be limited due to steep slopes and high river velocities, but recommends that these techniques be implemented where practical. These techniques are described as follows and have been recommended for similar Corps' projects (*i.e.*, Westchester County Center and Yonkers Avenue Streambank and Shoreline Erosion Protection Projects):

> Articulated Concrete: This technique utilizes concrete mats with spaces to allow for vegetation growth within the mats. This technique was successfully used to stabilize the eroding Gulf Intracoastal Waterway shoreline on the Texas Gulf Coast within the Aransas National Wildlife Refuge (U.S. Army Corps of Engineers 2005).
>
> Brush Layering: This technique is generally used to stabilize slope areas above the flowline of streambanks. It involves the use of long branches that are placed with cut ends into the slope on bulldozed terraces and the tops protruding outside the finished slope (Urban Soil Erosion and Sediment Control Committee 1991).

Brush Matting: This method uses hardwood brush layered along a stream bank as a mattress and anchored in place with a grid of stakes and wire. The toe below the waterline is anchored by rock. This living blanket acts as mulch for seedlings and plantings established in the bank (Urban Soil Erosion and Sediment Control Committee 1991).

Live Cribwall: This is a combination of vegetation and structural elements generally used along streams where flowing water is a hazard. Layers of logs are alternated with long branches protruding out between them. The logs are spiked together and anchored into the bank with earthfill behind them to create a wall. The live stems help tie the logs together and screen the wall (Urban Soil Erosion and Sediment Control Committee 1991).

Live Staking: These are large stakes or poles sharpened at the bottom end and forced vertically into the soft earth along the waterline about 1 foot apart. The poles will grow into a thick barrier (Urban Soil Erosion and Sediment Control Committee 1991).

Vegetated Gabions: This method involves wire-mesh rectangular baskets filled with small to medium size rock and soil which are laced together to form a structural toe. Live branch cuttings are placed on each consecutive layer between the rock filled baskets to take root, consolidate the structure, and bind it to the slope (Federal Interagency Stream Restoration Working Group 1998).

Wattling: This technique uses bundles of branches which are staked into shallow trenches, then covered with soil. They are oriented along the contour and are placed in

multiple rows to help stabilize the slope (Urban Soil Erosion and Sediment Control Committee 1991).

8. Post-Construction Monitoring and Management

The Corps should develop and implement a post-construction monitoring and management plan to ensure the success of the completed project and to ensure conservation benefit to the proposed project area. As an integral part of the proposed project, the monitoring plans should be developed with the Service to establish the monitoring time-frame and specific biological goals and objectives. The plan should include: invasive species monitoring, habitat monitoring to ensure success of increased habitat value and management of water quality with regards to pollution.

X. Service Position

The proposed alternative for the Mamaroneck and Sheldrake Rivers, General Reevaluation Report includes the channelization of 9,610 linear ft of river, reconstruction of the Waverly Avenue Bridge, removal of several bridges, the installation of a culvert and retaining walls, and the placement of riprap along the river bottom.

Although the proposed actions have the potential to impact fish and wildlife resources, the Service recognizes that the study area has been previously disturbed. It is the Service's

recommendation that the Corps implement all practicable mitigation measures provided in an effort to retain and/or improve the current resource values within the project area.

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Appendix 1: IPaC Report

U.S. Fish & Wildlife Service

My project

IPaC Trust Resource Report

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US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

My project

PROJECT CODE

R62X2-K4O5N-EO5HM-6T26H-YSMWDY

LOCATION

Westchester County, New York

DESCRIPTION

No description provided

U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

New York Ecological Services Field Office
3817 Luker Road
Cortland, NY 13045-9349
(607) 753-9334

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967
(631) 286-0485

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an Official Species List from the regulatory documents section.

Mammals

New England Cottontail Sylvilagus transitionalis Candidate

MANAGED BY
New York Ecological Services Field Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A09B

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Oystercatcher Haematopus palliatus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008

Black Skimmer Rynchops niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EO

Black-billed Cuckoo Coccyzus erythropthalmus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — Bird of conservation concern
Season: Breeding

Canada Warbler Wilsonia canadensis — Bird of conservation concern
Season: Breeding

Cerulean Warbler Dendroica cerulea — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G4

Gull-billed Tern Gelochelidon nilotica — Bird of conservation concern
Season: Breeding

Hudsonian Godwit Limosa haemastica — Bird of conservation concern
Season: Migrating

Kentucky Warbler Oporornis formosus — Bird of conservation concern
Season: Breeding

Least Bittern Ixobrychus exilis — Bird of conservation concern
Season: Breeding

Least Tern Sterna antillarum — Bird of conservation concern
Season: Breeding

Pied-billed Grebe Podilymbus podiceps — Bird of conservation concern
Year-round

Prairie Warbler Dendroica discolor — Bird of conservation concern
Season: Breeding

Purple Sandpiper Calidris maritima — Bird of conservation concern
Season: Wintering

Rusty Blackbird Euphagus carolinus — Bird of conservation concern
Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus — Bird of conservation concern
Season: Breeding

Seaside Sparrow Ammodramus maritimus — Bird of conservation concern
Year-round

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula — Bird of conservation concern
Season: Breeding

Upland Sandpiper Bartramia longicauda — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HC

Wood Thrush Hylocichla mustelina — Bird of conservation concern
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — Bird of conservation concern
Season: Breeding

Appendix 2. Avian Species observed in NYSDEC Breeding Bird Atlas Block 6053c (2000-2005).

Swans, Geese, and Ducks (Anatidae)

Canada Goose (*Branta canadensis*)

Mute Swan (*Cygnus olor*)

American Black Duck (*Anas rubripes*)

Mallard (*Anas platyrhynchos*)

Partridges, Grouse, and Turkeys (Phasianidae)

Ring-necked Pheasant (*Phasianus colchicus*)

Wild Turkey (*Meleagris gallopavo*)

Bitterns, Herons, and Allies (Ardeidae)

Least Bittern (*Ixobrychus exilis*)

Green Heron (*Butorides virescens*)

Black-crowned Night-Heron (*Nycticorax nycticorax*)

Yellow-crowned Night-Heron (*Nyctanassa violacea*)

Kites, Eagles, Hawks, and Allies (Accipitridae)

Osprey (*Pandion haliaetus*)

Red-tailed Hawk (*Buteo jamaicensis*)

Rails, Gallinules, and Coots (Rallidae)

Clapper Rail (*Rallus longirostris*)

King Rail (*Rallus elegans*)

Virginia Rail *(Rallus limicola*)

Plovers and Lapwings (Charidriidae)

Killdeer (*Charadrius vociferus*)

Oystercatchers (Haematopodidae)

American Oystercatcher (*Haematopus palliatus*)

Sandpipers, Phalaropes, and Allies (Scolopacidae)

American Woodcock (*Scolopax minor*)

Skuas, Gulls, Terns, and Skimmers (Laridae)

Common Tern (*Sterna hirundo*)

Forster's Tern (*Sterna forsteri*)

Great Black-backed Gull (*Larus marinus*)

Herring Gull (*Larus argentatus*)

Pigeons and Doves (Columbidae)

Rock Pigeon (*Columba livia*)

Mourning Dove (*Zenaida macroura*) -

Cuckoos, Roadrunners, and Anis (Cuculidae)

Yellow-billed Cuckoo (*Coccyzus americanus*)

Typical Owls (Strigidae)

Eastern Screech-Owl (*Megascops asio*)

Great Horned Owl (*Bubo virginianus*)

Swifts (Apodidae)

Chimney Swift (*Chaetura pelagica*)

Hummingbirds (Trochilidae)

Ruby-throated Hummingbird (*Archilochus colubris*)

Kingfishers (Alcedinidae)

Belted Kingfisher (*Megaceryle alcyon*)

Woodpeckers and Allies (Picidae)

Red-bellied Woodpecker (*Melanerpes carolinus*)

Downy Woodpecker (*Picoides pubescens*)

Hairy Woodpecker (*Picoides villosus*)

Northern Flicker (*Colaptes auratus*)

Tyrant Flycatchers (Tyrannidae)

Eastern Wood-Pewee (*Contopus virens*)

Willow Flycatcher (*Empidonax traillii*)

Eastern Phoebe (*Sayornis phoebe*)

Great Crested Flycatcher (*Myiarchus crinitus*)

Eastern Kingbird (*Tyrannus tyrannus*)

Vireos (Vireonidae)

White-eyed Vireo (*Vireo griseus*)

Warbling Vireo (*Vireo gilvus*)

Red-eyed Vireo (*Vireo olivaceus*)

Jays, Magpies, and Crows (Corvidae)

Blue Jay (*Cyanocitta cristata*)

American Crow (*Corvus brachyrhynchos*)

Fish Crow (*Corvus ossifragus*)

Swallows (Hirundinidae)

Purple Martin (*Progne subis*)

Tree Swallow (*Tachycineta bicolor*)

Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)

Barn Swallow (*Hirundo rustica*)

Chickadees and Titmice (Paridae)

Black-capped Chickadee (*Poecile atricapillus*)

Tufted Titmouse (*Baeolophus bicolor*)

Nuthatches (Sittidae)

White-breasted Nuthatch (*Sitta carolinensis*)

Wrens (Troglodytidae)

Carolina Wren (*Thryothorus ludovicianus*)

House Wren (*Troglodytes aedon*)

Winter Wren (*Troglodytes troglodytes*)

Marsh Wren (*Cistothorus palustris*)

Old World Warblers and Gnatcatchers (Sylviidae)

Blue-gray Gnatcatcher (*Polioptila caerulea*)

Thrushes (Turdidae)

Eastern Bluebird (*Sialia sialis*)

Wood Thrush (*Hylocichla mustelina*)

American Robin (*Turdus migratorius*)

Mockingbirds, Thrashers, and Allies (Mimidae)

Gray Catbird (*Dumetella carolinensis*)

Northern Mockingbird (*Mimus polyglottos*)

Brown Thrasher (*Toxostoma rufum*)

Starlings & Allies (Sturnidae)

European Starling (*Sturnus vulgaris*)

Waxwings (Bombycillidae)

Cedar Waxwing (*Bombycilla cedrorum*)

Wood Warblers (Parulidae)

Blue-winged Warbler (*Vermivora pinus*)

Yellow Warbler *(Dendroica petechia*)

American Redstart (*Setophaga ruticilla*)

Common Yellowthroat (*Geothlypis trichas*)

Towhees, Buntings, Sparrows, and Allies (Emberizidae)

Eastern Towhee (*Pipilo erythrophthalmus*)

Chipping Sparrow (*Spizella passerina*)

Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*)

Seaside Sparrow (*Ammodramus maritimus*)

Song Sparrow (*Melospiza melodia*)

Swamp Sparrow (*Melospiza georgiana*)

Grosbeaks and Buntings (Cardinalidae)

Northern Cardinal (*Cardinalis cardinalis*)

Rose-breasted Grosbeak (*Pheucticus ludovicianus*)

Indigo Bunting (*Passerina cyanea*)

Blackbirds (*Icteridae*)

Red-winged Blackbird (*Agelaius phoeniceus*)

Common Grackle (*Quiscalus quiscula*)

Brown-headed Cowbird (*Molothrus ater*)

Orchard Oriole (*Icterus spurius*)

Baltimore Oriole (*Icterus galbula*)

Finches (Fringillidae)

House Finch (*Carpodacus mexicanus*)

House Sparrow (*Passer domesticus*)

American Goldfinch (*Carduelis tristis*)

Old World Sparrows (Passeridae)

Appendix 3: Photographs of Sheldrake and Mamaroneck Rivers.

Figure 4. The Harbor Heights Reach: Looking Upstream (West) from Winfield Avenue.

Figure 5. The Harbor Heights Reach: Looking Upstream (West).

Figure 6. The Sheldrake River Reach: Looking Downstream (North) towards Fenimore Bridge.

Figure 7. The Sheldrake River Reach: Looking Downstream (North) towards Fenimore Bridge.

Figure 8. The Upper Mamaroneck Reach: Looking at the Confluence (North).

Figure 9. The Upper Mamaroneck Reach: Looking Downstream from the Confluence (East).

Figure 10. The Lower Mamaroneck Reach: Looking Downstream (East).

Figure 11. The Lower Mamaroneck Reach: Looking Upstream (West).

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

REPLY TO ATTENTION OF

Environmental Analysis Branch

17 June 2014

NY Natural Heritage Program - Information Services
NYS DEC
625 Broadway, 5th Floor
Albany, NY 12233-4757

RE: Mamaroneck and Sheldrake Rivers Flood Risk Management Project, Village of Mamaroneck, Westchester County, NY

The U. S. Army Corps of Engineers, New York District (District) along with the New York State Department of Environmental Conservation is conducting a study and NEPA compliance to identify potential flood risk management measures along the Mamaroneck and Sheldrake rivers in the Village of Mamaroneck, Westchester County, NY. The District is asking for your assistance in identifying any documentation of rare species or significant natural communities within the project area.

The project will provide flood risk management measures along parts of the Mamaroneck and Sheldrake rivers within the Village of Mamaroneck, through channel deepening and widening, retaining wall work, and bridge replacement and modifications. The project will occur at the confluence of the Mamaroneck and Sheldrake Rivers in Columbus Park, and continue up the Mamaroneck River just above I-95 and up the Sheldrake River to Rockland Ave.

The project area is highly urbanized, with a large population density and an industrial area in the northwest part of the Village. The project area is developed land dominated by structures, roads, and other impermeable surfaces. Many structures, backyards, roads, and developed areas (e.g., parking or storage areas) are constructed or maintained up to the edge of the streambanks. The Mamaroneck and Sheldrake river channels provide a narrow band of water that flows through the mostly developed residential and commercial areas.

If you have any questions, you can contact me at matthew.voisine@usace.army.mil or 917-790-8718.

Sincerely

Matthew Voisine, Project Biologist

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • **Fax:** (518) 402-8925
Website: www.dec.ny.gov

Joe Martens
Commissioner

July 30, 2014

Matthew Voisine
U.S. Army Corps of Engineers, New York District
26 Federal Plaza, Room 2151
New York, NY 10278

Re: Mamaroneck and Sheldrake Rivers Flood Risk Management Project, Village of Mamaroneck
Town/City: Harrison, Mamaroneck, Rye. County: Westchester.

Dear Matthew Voisine :

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

We have no records of rare or state-listed animals or plants, or significant natural communities, at your site or in its immediate vicinity.

The absence of data does not necessarily mean that rare or state-listed species, natural communities or other significant habitats do not exist on or adjacent to the proposed site. Rather, our files currently do not contain information which indicates their presence. For most sites, comprehensive field surveys have not been conducted. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other resources may be required to fully assess impacts on biological resources.

This response applies only to known occurrences of rare or state-listed animals and plants, significant natural communities and other significant habitats maintained in the Natural Heritage Data bases. Your project may require additional review or permits; for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Sincerely,

Andrea Chaloux

Andrea Chaloux
Environmental Review Specialist
New York Natural Heritage Program

679

Dated: July 21, 2010.

Jessie H. Roberson,

Vice Chairman.

[FR Doc. 2010–18298 Filed 7–22–10; 11:15 am]

BILLING CODE 3670–01–P

DEPARTMENT OF DEFENSE

Corps of Engineers

Department of the Army: Intent to Prepare a Draft Environmental Impact Statement for the General Re-Evaluation Report for the Mamaroneck and Sheldrake Rivers Flood Damage Risk Reduction Project Village of Mamaroneck, Westchester County, NY

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The U.S. Army Corps of Engineers, New York District (District), is preparing a Draft Environmental Impact Statement (DEIS) to ascertain compliance with and to lead to the production of a National Environmental Policy Act (NEPA) document in accordance with the President's Council of Environmental Quality (CEQ) Rules and Regulations, as defined and amended in 40 Code of Federal Regulations (CFR), Parts 1500–1508, Corps principles and guidelines as defined in Engineering Regulation (ER) 1105–2–100, and other applicable Federal and State environmental laws for the proposed Mamaroneck and Sheldrake Rivers Flood Damage Risk Reduction Project. The study area consists of the Mamaroneck and Sheldrake Rivers Basin, which lies entirely within Westchester County, New York and contains portions of the Village and Town of Mamaroneck, the Cities of New Rochelle and White Plains, the Towns of Harrison and North Castle, and the Village of Scarsdale. The EIS process will identify the potential social, economic, cultural, and environmental affects through the implementation of the alternative plans. The District will work as part of a team to include the New York State Department of Environmental Conservation and possibly the County of Westchester, and the Village and/or Town of Mamaroneck.

ADDRESSES: U.S. Army Corps of Engineers, New York District, Planning Division, Environmental Analysis Branch, 26 Federal Plaza, Room 2151, New York, NY 10278–0090.

FOR FURTHER INFORMATION CONTACT: Matthew Voisine, Project Biologist, at *matthew.voisine@usace.army.mil* or 917.790.8718.

SUPPLEMENTARY INFORMATION:

1. It is anticipated that a DEIS will be made available for public review in May 2013.

2. Public information meeting(s) will be held during the DEIS process and comments and issues will be incorporated into the document.

3. When the date(s) and time(s) for the public meeting(s) are identified, they will be posted on the Districts website at *http://www.nan.usace.army.mil*

4. Individuals interested in obtaining a copy of the DEIS for review should contact Matthew Voisine (*see* **ADDRESSES**).

5. All federal agencies interested in participating as a Cooperating Agency are requested to submit a letter of intent to COL John R. Boulé II, P.E., District Engineer, U.S. Army Corps of Engineers, 26 Federal Plaza, Room 2109, New York, NY 10278–0090 .

Dated: July 15, 2010.

Nancy Brighton.

Chief, Watershed Section, U.S. Army Corps of Engineers, New York District.

[FR Doc. 2010–18197 Filed 7–23–10; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army

Board of Visitors, Defense Language Institute Foreign Language Center

AGENCY: Department of the Army, DoD.

ACTION: Notice of open meeting.

SUMMARY: Under the provisions of the Federal Advisory Committee Act of 1972 (5 U.S.C., Appendix, as amended), the Government in the Sunshine Act of 1976 (5 U.S.C. 552b, as amended) and 41 CFR 102–3.150, the Department of Defense announces that the following Federal advisory committee meeting will take place:

Name of Committee: Board of Visitors, Defense Language Institute Foreign Language Center.

Date: August 10 and 11, 2010.

Time of Meeting: Approximately 8 a.m. through 4:30 p.m.. Please allow extra time for gate security for both days.

Location: Defense Language Institute Foreign Language Center and Presidio of Monterey (DLIFLC & POM), Building 614, Conference Room, Monterey, CA 93944.

Purpose of the Meeting: The purpose of the meeting is to provide a general orientation to the DLIFLC mission and functional areas. In addition, the meeting will involve administrative matters.

Agenda: Summary—August 10—The Board will be briefed on DLIFLC mission and functional areas. August 11—Board administrative details to include parent committee introduction, board purpose, operating procedures review, and oath. DLIFLC functional areas will be discussed.

Public's Accessibility to the Meeting: Pursuant to 5 U.S.C. 552b and 41 CFR 102–3.140 through 102–3.165, and the availability of space, this meeting is open to the public. Seating is on a first-come basis. No member of the public attending open meetings will be allowed to present questions from the floor or speak to any issue under consideration by the Board. Although open to the public, gate access is required no later than five work days prior to the meeting. Contact the Committee's Designated Federal Officer, below, for gate access procedures.

Committee's Designated Federal Officer or Point of Contact: Mr. Detlev Kesten, ATFL–APO, Monterey, CA 93944, *Detlev.kesten@us.army.mil*, (831) 242–6670.

SUPPLEMENTARY INFORMATION: Pursuant to 41 CFR 102–3.105(j) and 102–3.140 and section 10(a)(3) of the Federal Advisory Committee Act of 1972, the public may submit written statements to the Board of Visitors of the Defense Language Institute Foreign Language Center in response to the agenda. All written statements shall be submitted to the Designated Federal Officer of the Board of Visitors of the Defense Language Institute Foreign Language Center, and this individual will ensure that the written statements are provided to the membership for their consideration. Written statements should be sent to: Attention: DFO at ATFL–APO, Monterey, CA, 93944 or faxed to (831) 242–6495. Statements must be received by the Designated Federal officer at least five work days prior to the meeting. Written statements received after this date may not be provided to or considered by the Board of Visitors of the Defense Language Institute Foreign Language Center until its next meeting.

FOR FURTHER INFORMATION CONTACT: Mr. Detlev Kesten, ATFL–APO, Monterey, CA 93944, *Detlev.kesten@us.army.mil*, (831) 242–6670.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 2010–18212 Filed 7–23–10; 8:45 am]

BILLING CODE 3710–08–P

CENAN-PL-PF June 25, 2010

MEMORANDUM FOR RECORD

SUBJECT: Mamaroneck-Sheldrake GRR Study Public Kickoff and NEPA Scoping Meeting

1. A Public Kickoff and NEPA scoping meeting was held on June 22, 2010 at the Emelin Theater 153 Library Lane Mamaroneck, New York 10543. Two meetings (Meeting 1 and 2) were held during the day one from 3PM to 5PM and another from 7PM to 9PM at the above location. The purpose of the meeting was to discuss with the general public and interested parties the Mamaroneck and Sheldrake River Basin Flood Risk Management General Reevaluation Study.
2. Representatives from the US Army Corps of Engineers (USACE) included Jodi McDonald, Karen Ashton, Carrie McCabe, Matthew Voisine, Nancy Brighton, and Angela Sabet from Planning Division: John Beldin-Quinones from Programs and Project Management Division; and Ray Schembri from Engineering Division. The New York State Department of Environmental Conservation (NYSDEC), Westchester County Planning Department, Village of Mamaroneck, Town of Mamaroneck and Town of Harrison were present during the meetings, as well as representatives from Rep. Nita Lowey's office.

The list of non federal sponsor attended the meeting: New York State Department of Environmental Conservation, Village of Mamaroneck, Westchester County Planning and the Town of Harrison

The format of the presentation included a 30 minute welcoming with team members and an opportunity to informally describe the study as presented on poster boards

3. The presentations conducted at 3:30pm and 7:30pm covered the following topics:

- Background on previous studies completed for the Mamaroneck and Sheldrake River, what the previous studies plan included for construction and why the project did not constructed.
- Definition of Flood Risk Management.
- Map of the project area and previous design details.
- Photos of flooding impact of the Village and Town of Mamaroneck.
- Discussion of why the project needs to be reevaluated and restudied.
- Discussion of who the key players are and how the money to complete the study was received.
- Components of a GRR Engineering Studies, Environmental Studies and Economic studies.
- Definition of NEPA, what it is and why it is completed.
- Discussion of what will be included in the Study.
- Example project overviews including cross sections of tunnels, photos of vegetated banks, channel improvement photos.
- Review of time frame on mile stones and critical path items for the study. Major point that the study will take 5 years to complete.
- Contact information for any questions that the public may have.

4. After each presentation the public asked questions for one hour. **Meeting 1 (3PM to 5PM):**

- Why will the study take 5 years?
- Why the money from the study cannot be used to employ local persons?
- What will happen if monies for the project are not matched by a local sponsor?
- How many projects that are studies by the USACE get built?
- In the process of the study can the Village complete any improvements to correct flooding issues?

- Will USACE pay for home costs rising?
- What is the difference between a study and a project? Will any construction occur during the study?
- What area of the river is the main problem for the flooding?
- Can the USACE provide advice for improvements to the river now, before study is complete?
- Why does the study cost 6.5 million?
- How much funding does the local sponsor need to come up with?
- Does the water table have a significant impact to flooding?
- How do the storm sewers affect flooding in the town?

- General statements from the public included:
- Tidal influence from the Long Island Sound is affecting more inland areas than expected. During full moon, flooding in the Village appeared higher.
- Cost associated with flooding is hurting the community.
- Landscape has changed significantly since the first study was complete.
- Bridges in the area need to be improved, raised or removed.
- .

Meeting 2 (7PM to 9PM):

- How is the study area defined?
- Explain the cost benefit analysis.
- Why can't the design of the Bluebelt be applied here?
- How many more studies will be conducted before construction of a project?
- Will the study evaluate the entire watershed?
- Will the study include upstream impacts and upstream causes of flooding?
- Can the USACE hold upstream land owners accountable for flooding? Can the USACE tell land owners what to do with their property?
- What will happen if the state does not match the federal funds?
- Who will partner with USACE in the future construction costs: the Village or the State?
- Will we have more public meetings?
- What stopped the last study?
- What was the cost of the last flooding event?

- General statements from the public included:
- The Village can and will begin to make improvements now.
- The Village will start to upgrade or remove some of the 15 bridges that run across the Mamaroneck River.

5. Tasks for the PDT.

Task to be completed in GIS: 1) mapping of the watershed 2) map impacted areas of Mamaroneck by residential areas 3) major infrastructure locations in and around the Mamaroneck (i.e. bridges and dams).

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

12 March, 2012

REPLY TO
ATTENTION OF
Planning Division

Mr. David Stilwell
Field Office Supervisor
U.S. Fish and Wildlife Service
New York Field Office
3817 Luker Rd
Cortland, NY 13045

RE: Mamaroneck and Sheldrake Rivers, General Reevaluation Report, County of Westchester, Village of Mamaroneck

Dear Mr. Stilwell:

Pursuant to the Fish and Wildlife Coordination Act (48 Sta. 401, as amended; 16 U.S.C. 661 et seq.), the U.S. Army Corps of Engineers, New York District (District) is requesting a Fish and Wildlife Coordination Act Report (FWCAR) for the above referenced project.

The District along with its partners, the New York State Department of Environmental Conservation, County of Westchester, and the Village of Mamaroneck, are conducting a flood risk management study along the Mamaroneck and Sheldrake Rivers. The study is a reevaluation of a previously authorized plan developed in 1989. At that time, the Service provided a Planning Aid Report. I am enclosing a disc containing the 1989 Planning Aid Report as well as other pertinent documents about the current plans. I am also enclosing a draft Scope of Work for your review. The District will provide you with copies of more documents if necessary, to assist in the completion of the FWCAR.

If you have any questions or comments please contact Mr. Matthew Voisine, Biologist at (917)-790-8718. The District looks forward to continued coordination with you on this project.

Sincerely,

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

From:	Papa, Steve
To:	Steve Sinkevich
Cc:	Voisine, Matthew NAN02
Subject:	[EXTERNAL] Fwd: Mamaroneck Sheldrake FWCAR (UNCLASSIFIED)
Date:	Thursday, 26 February, 2015 9:11:56 AM
Attachments:	FWCAR SOW Jan 2015.doc Mamaroneck_Sheldrake_Alt.pdf

Hi Matt,

We are working in the Mamaroneck. Steve S will take over from here. Please coordinate with him in the future.

Thanks

Steve

Steven T. Papa
U.S. Fish and Wildlife Service
Long Island Field office
340 Smith Rd
Shirley, NY 11967
(631) 286-0485 (tel)
631) 286-4003 (fax)
Steve_Papa@fws.gov

"I only wish that besides protecting the songsters...we also protect the birds of the seashore..."
- T. Roosevelt

---------- Forwarded message ----------
From: Voisine, Matthew NAN02 <Matthew.Voisine@usace.army.mil>
Date: Mon, Jan 26, 2015 at 11:56 AM
Subject: Mamaroneck Sheldrake FWCAR (UNCLASSIFIED)
To: "Papa, Steve" <steve_papa@fws.gov>, "david_stilwell@fws.gov" <david_stilwell@fws.gov>, "Cole, Patricia" <patricia_cole@fws.gov>
Cc: "Voisine, Matthew NAN02" <Matthew.Voisine@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

As discussed with Pete, I am resending an updated FWCAR scope of work for the Districts Mamaroneck and Sheldrake Rivers General Revaluation Report. This is a reevaluation of a report from 1977. If you need any other documents or further descriptions of the study please contact me.

I have attached the scope of work and a map of the project area.

Thank you

Matthew Voisine
Biologist
USACE- NY District
26 Federal Plaza
Room 2151
NY, NY 10278
917.790.8718 voice
702.271.0496 mobile

DRAFT

MEMORANDUM OF AGREEMENT
AMONG
THE U. S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT,
THE NEW YORK STATE OFFICE OF PARKS, RECREATION, and HISTORIC PRESERVATION
REGARDING
THE MAMARONECK AND SHELDRAKE RIVERS FLOOD RISK MANAGEMENT PROJECT,
VILLAGE OF MAMARONECK, WESTCHESTER COUNTY, NEW YORK

WHEREAS, the U. S. Army Corps of Engineers, New York District (District), is proposing to undertake a flood risk management project in the Town and Village of Mamaroneck and the Town of Harrison, Westchester County, New York, and has, in coordination with the New York State Department of Environmental Conservation, Westchester County, and the Village of Mamaroneck, have identified a plan consisting of channel modification, bridge removal and replacement, the replacement of retaining walls, non-structural alternatives, including floodproofing for nine structures, and the installation of a culvert under the confluence of the Mamaroneck and Sheldrake Rivers at Station Plaza (Undertaking; Figure 1); and

WHEREAS, the Area of Potential Effect (APE) includes: the areas of the channel modification, including 1.82 miles along both the Mamaroneck River and Sheldrake Rivers; the removal of the Ward Avenue Bridge, the Central Avenue footbridge, and two footbridges in Columbus Park; the removal and replacement of the Waverly Place Bridge; and the installation of a water diverter on the Metro-North Railroad Bridge (see Figure 1 and Appendix A); and

WHEREAS, the Stone Retaining Walls thematic district, the Metro-North Railroad Bridge and the Ward Avenue Bridge are eligible for the National Register of Historic Places under Criterion A, for their association with the long-standing tradition of stone wall and bridge building in Westchester County, and, because of their association with the Works Progress Administration, the Stone Retaining Walls and the Ward Avenue Bridge are also eligible under Criterion C, for their design or construction value as outstanding examples of their type; and

WHEREAS, the Stone Retaining Walls District boundary is defined by the political boundaries of the Village of Mamaroneck in the Town of Mamaroneck, and of the Town of Rye in Westchester County and includes all stone retaining walls on both sides of the Rivers and excludes any concrete walls and rip-rap; and

WHEREAS, the District has determined that the Undertaking will have an adverse effect or have the potential to have on the Stone Retaining Walls thematic district, the Metro-North Bridge and the Ward Avenue Bridge in the Village of Mamaroneck, Westchester County, New York; and

WHEREAS, the District has not finalized which structures will be included in the non-structural alternative as part of the proposed plan; and

WHEREAS, the District is consulting with the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), the Mamaroneck Historical Society, Westchester County, the Village of Mamaroneck, pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the District is consulting with the Stockbridge-Munsee Community Band of Mohicans, the Delaware Nation, the Delaware Tribe of Indians, and the and the Advisory Council on Historic Preservation,

NOW, THEREFORE, the District and the NYSOPRHP agree that the undertaking shall be administered in accordance with the following stipulations to satisfy the District's Section 106 responsibility for this undertaking. The adverse effect caused as a result of this project will be mitigated though the following stipulations:

STIPULATIONS

I. The District shall ensure that the following measures are carried out:

A. <u>Stone Retaining Wall Thematic Historic District</u>

1. The District shall document the history of the Stone Retaining Walls through photography and background research, mapping out each continuous segment of stone retaining wall and documenting, where possible, its construction history. This work will include interviewing those in the community who have knowledge pertaining to the walls' construction as well as carrying out documentary research. The resulting report will include photography that will document the current condition of the walls and their construction and development over time. The walls' construction history will also be placed within the larger Works Progress Administration (WPA) historic context, linking these structures to the larger national program. Also included in the report will be a site plan that will show the layout of the walls throughout the project area and the relationship between their variable segments. This research will result in a digital and paper publication for public distribution to appropriate local historical societies, museums and libraries. A list of appropriate repositories will be generated by the District and will be provided to the NYSOPRHP for review and approval. The final report in either paper or digital format will be distributed to the repositories on the approved list.

2. Based upon the report prepared as part of Stipulation I.A.1, the District, in consultation with the NYSOPRHP and interested parties shall explore alternative designs for the new walls that will in some way reflect the aesthetic of the original stone retaining walls but will also meet the necessary engineering requirements for the project. One of the alternatives to be considered will include reuse of the stone in the final design specifically in areas of the project that are highly visible to the public and that are to historic bridges, some of which are NRHP eligible.

3. During the dismantling of any of the Stone Retaining Walls archaeologist and

architectural historian shall be on site to photograph and create drawings of the walls to document their construction. This documentation will be incorporated into the overall publication documenting the stone walls.

4. The District and the NYSOPRHP shall consider the views of the public or interested parties in carrying out recordation and selecting a design alternative.

5. All work, under Stipulations I.A 1-3 will be performed by a professional(s) who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44738-9) and who is experienced in preservation and documentation of engineering-historical structures.

B. Ward Avenue Bridge

1. The Ward Avenue Bridge will be recorded in accordance with the Historic American Engineering Record (HAER). The District will consult with the National Park Service HAER unit to determine the level of documentation and format. At a minimum it will include addition research, completion of drawings and photographs.

2. Documentary research will be conducted to provide the history and construction of the bridge to include the identification of original drawings, maps, photographs, etc. The information gathered as part of the archival research will be synthesized and used to build a historic context within which the circumstances surrounding the construction and use of the Ward Avenue Bridge can be understood. This information will also be presented in the report. This information will be included and incorporated into the discussion of the stone walls and included in that report and documentation.

3. Documentation will also include drawings, to include but not be limited to, an elevation of the bridge, detailed drawings of bridge elements, and other relevant drawings will be prepared.

4. During the demolition of the bridge, an architectural historian will be on site to photograph and/or create drawings of the bridge. This documentation will be incorporated into the overall publication documenting the bridge.

5. All work, under Stipulations I.B 1-4 will be performed by a professional(s) who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44738-9) and who is experienced in preservation and documentation of engineering-historical structures.

6. This work will result in a digital and paper publication for public distribution to appropriate local historical societies, museums and libraries. A list of appropriate repositories will be generated by the District and will be provided to the NYSOPRHP for review and approval. The final report in either paper or digital format will be distributed to the repositories on the approved list.

C. Metro-North Railroad Bridge

1. As plans and specifications for a water diverter are being developed, the effect of this structure on the bridge will be evaluated in coordination with the NYSHPO. Recommendations for changes to the structure, how it may be connected to the bridge and other aspects of the design will be provided to the District Engineering Division.

2. If, as designed, the water diverter is determined to have an adverse effect on the bridge, the District, in coordination with the NYSHPO and interested parties, will develop a plan to mitigate for this adverse effect. Activities that are a part of this plan may include, but not be limited to, the documentation of the bridge.

D. Non-structural Element

1. The District will determine which structures will be included in the Non-Structural element and evaluate the structures to determine if they are eligible or listed on the National Register.
2. The District will coordinate these determinations with the NYSHPO and interested parties for their review.
3. If it is determined the non-structural element will have an adverse effect on historic properties, the District, in consultation with the NYSHPO and interested parties, shall determine if the adverse effect can be avoided. If the adverse effect cannot be avoided, the District in consultation with the NYSHPO and interested parties, will develop a plan to mitigate for that adverse effect.
4. The District, in consultation with the NYSHPO and the interested parties, will prepare and implement a treatment plan for each historic property for which there will be an adverse effect. Any resulting reports, documentation, etc., regarding the historic properties will be coordinated with the NYSHPO and the interested parties for review and, once finalized be made available to the public.

II. ADMINISTRATIVE TERMS

A.UNANTICIPATED DISCOVERY
During the construction of this project and during the implementation of any other project features, including but not limited to those associated with the secondary impacts and impact areas described in this Agreement, the District will treat unanticipated discoveries in a manner that is in accordance with 36 CFR Part 800.13 "Post Review Discoveries" and in the case of the discovery of human remains, treatment shall follow the "Human Remains Discovery Protocol" of the NYSOPRHP.

B.TERMINATION
Any signatory to this MOA may terminate it by providing thirty days written notice to the other parties, provided that the parties will consult during the period prior to termination by certified mail to seek agreement on amendments or other actions that would avoid termination.

C. SUNSET CLAUSE
This MOA will continue in full force and effect until the construction of the Project is complete

and all terms of this MOA are met, unless the Project is terminated or authorization is rescinded.

D. AMENDMENT
This MOA may be amended upon agreement in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the Council.

E. ANTI-DEFICIENCY ACT
All requirements set forth in this MOA requiring expenditure of funds by the New York District are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. 1341). No obligation undertaken by the New York District under the terms of this MOA shall require or be interpreted to require a commitment to extend funds not appropriated for a particular purpose. If the New York District cannot perform any obligation set forth in this MOA because of unavailability of funds, that obligation must be renegotiated among the New York District and the SHPO as necessary.

F. DISPUTE RESOLUTION
Should any signatory to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, District shall consult with such party to resolve the objection. If the District determines that such objection cannot be resolved, the District will:

1. Forward all documentation relevant to the dispute, including the District's proposed resolution, to the ACHP. The ACHP shall provide the District with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the District shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories and concurring parties, and provide them with a copy of this written response. The District will then proceed according to its final decision.

2. If the ACHP does not provide its advice regarding the dispute within the thirty (30) calendar day time period, the District may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the District shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories and concurring parties to the MOA, and provide them and the Council with a copy of such written response.

3. The District's responsibilities to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged.

Execution and implementation of this MOA evidences that the District has satisfied its Section 106 responsibilities for all individual undertakings of the Undertaking, and that the District has afforded the Council and the NYSOPRHP an opportunity to comment on the undertaking and its effects on historic properties.

NEW YORK STATE HISTORIC PRESERVATION OFFICE

By: _____ Date: _____
Ruth Pierpoint,
Deputy Commissioner and Deputy State Historic Preservation Officer

U.S. ARMY CORPS OF ENGINEERS

By: _____ Date: _____

David A. Caldwell
District Engineer, New York District

ENCLOSURE 1

NEW YORK STATE PARKS & RECREATION Agency Building 1 Empire State Plaza Albany, New York 12238 Information 518 474-0456
Orin Lehman Commissioner

3176

April 12, 1977

Mr. J.A. Weiss
Chief, Engineering Division
New York District, Corps of Engineers
26 Federal Plaza
New York, N.Y. 10007

Re: Reconnaissance Level Survey of Cultural Resources Mamaroneck River Basin and Byram River Basin Flood Control Projects

Dear Mr. Weiss:

This letter will serve to provide the comments of the State Historic Preservation Officer on the survey report for the above referenced project. The State Historic Preservation Officer is in agreement with the conclusions of the report that the project will have no effect on cultural resources listed on, or eligible for the National Register of Historic Places. We understand from your letter of January 31, 1977, that the Corps will implement recommendations presented by the consultant for protecting the Mamaroneck Waterworks building, the DeLancy House and structures along the east side of the Mamaroneck River between station 80+00 and 90+00, should any of these structures at any time appear to be effected by the project.

Please consult the project review staff at 518-474-3176 should you desire to discuss this comment.

Sincerely,

F.L. Rath, Jr.
Deputy Commissioner for
Historic Preservation

New York State Office of Parks, Recreation and Historic Preservation
The Governor Nelson A. Rockefeller Empire State Plaza
Agency Building 1, Albany, New York 12238-0001

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE
Orin Lehman
Commissioner

November 23, 1988

Mr. Richard J. Maraldo, P.E.
Acting Chief, Planning Division
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 10278-0090

Dear Mr. Maraldo:

Re: ARMY
Flood Control on Sheldrake River
Mamaroneck, Westchester County

The State Historic Preservation Officer (SHPO) has reviewed the above project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the Advisory Council on Historic Preservation's Regulations, 36 CFR 800/801.

Based upon this review, it is the opinion of the SHPO that this project will have no effect upon archeological resources included in or eligible for inclusion in the National Register of Historic Places.

If you have any questions, please contact the Project Review staff at (518) 474-3176.

Sincerely,

Julia S. Stokes
Deputy Commissioner for
Historic Preservation

JSS/VJD:tr
#15 (1/87)

An Equal Opportunity/Affirmative Action Agency
Historic Preservation Field Services Bureau
National Register and Statewide Survey 518-474-0479
Technical Services 518-474-7750
Project Review 518-474-3176

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

October 31, 1988

REPLY TO ATTENTION OF

Environmental Analysis Branch

Mr. Bruce Fullem
Senior Scientist
New York State Office of Parks, Recreation
and Historic Preservation
Historic Preservation Field Services Bureau
Agency Building 1
Empire State Plaza
Albany, New York 12238

Dear Mr. Fullem:

The New York District, Corps of Engineers is completing plans for a flood control project on the Sheldrake River, Village of Mamaroneck, Westchester County, New York. Your office provided us with Section 106 comments in 1977, concluding that the project will have no effect on cultural resources eligible for or listed on the National Register of Historic Places (Enclosure 1).

Since that correspondence, project plans have been slightly modified to include clearing and snagging of the banks of the channel 1550 feet southwest of the downstream limit of channel improvement at Rockland Avenue (Enclosure 2). The new project section follows the Sheldrake River under the New York State Thruway to the Larchmont Gardens Dam and Lake (Enclosures 3 and 4). Clearing and snagging will be accomplished by the construction contractor and will cause subsurface disturbance by removing trees and other vegetation to prevent debris from falling into the channel and inhibiting flow.

The report on the Reconnaissance Level Survey of Cultural Resources (Zuckerman and Rothschild 1977) prepared for this project and reviewed by your office, found that the adjacent area between Fenimore Road and Rockland Avenue was extensively disturbed by the construction of the New York Thruway in the 1950's. In a recent pedestrian survey of the new project section, the District Archaeologist found indications that the new project section was similarly disturbed. The area's proximity to the New York Thruway, and recent construction near Larchmont Gardens Lake make it unlikely that intact archaeological sites remain in the vicinity. The only historic structure observed near the project area was the Larchmont Garden Dam which is not listed on the National Register of Historic Places (NRHP). The Dam, which will not be impacted by the project, is very deteriorated (Enclosure 4) and does not appear to meet the criteria for eligibility for listing on the NRHP.

On the basis of this information, the Corps has determined that the proposed modification in the project will have no effect on historic

properties listed on or eligible for listing on the NRHP. Please review this information and forward Section 106 comments so that we may proceed with project planning. If we do not receive an objection from your office within 15 days, we will assume your concurrence with our determination of no effect, as pursuant to 36 CFR Part 800.5(b). Thank you for your cooperation.

Sincerely,

Richard J. Maraldo, P. E.
Acting Chief, Planning Division

Enclosures

New York State Office of Parks, Recreation and Historic Preservation

Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189

518-237-8643

www.nysparks.com

David A. Paterson
Governor

Carol Ash
Commissioner

November 08, 2010

Carissa Scarpa
US Army Corps of Engineers/Planning Division/EAB
Jacob K. Javits Federal Building
New York, New York 10278-0090

Re: CORPS
Archaeological Review
Mamaroneck and Sheldrake Rivers Flood Damage Reduction
Towns of Harrison and Mamaroneck, Village of Mamamroneck, Westchester County, NY
10PR06990

Dear Ms. Scarpa:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/ Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

We have reviewed the material you submitted via e-mail this morning and the 1977 Cultural Resource Survey prepared by Zuckerman and Rothschild. In reviewing that work we noted that the testing interval utilized was typically 100 feet. It should be noted that since 1995, the standard testing interval in New York has been 50 feet, however, since the majority of the project area was found to be previously disturbed, we area willing to accept the previous testing as sufficient for all those areas previously considered. One thing which was missing from the original report, which would be helpful in documenting the current condition of the APE, is photos along the project corridors. As you prepared the updated assessment please be sure to include photos which document the various previously disturbed areas discussed in the text from 1977. SHPO is otherwise willing to accept that report as sufficient to address any current archaeological review for those areas covered by that report. If changes have added any areas that were not addressed in the original report, please be sure to address them in your current work.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above. Please contact me at extension 3291, or by e-mail at douglas.mackey@oprhp.state.ny.us, if you have any questions regarding these comments.

Sincerely

Douglas P. Mackey
Historic Preservation Program Analyst
Archaeology

An Equal Opportunity/Affirmative Action Agency

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New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

August 17, 2011

Carissa Scarpa
US Army Corps of Engineers/Planning Division/EAB
Jacob K. Javits Federal Building
New York, New York 10278-0090

Re: CORPS
Mamaroneck and Sheldrake Rivers Flood
Damage Reduction
Towns of Harrison And Mamaroneck,
Village Of Mamaroneck, Westchester County
10PR06990

Dear Ms. Scarpa:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. The SHPO has reviewed the Phase 1A Cultural Resources Study prepared by Hartgen Archeological Associates, Inc. Jue 2011. Based on this review, we concur with the recommendations presented for Phase 1B Archaeological Testing.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above. Please contact me at extension 3291, or by e-mail at douglas.mackey@oprhp.state.ny.us, if you have any questions regarding these comments.

Sincerely

Douglas P. Mackey
Historic Preservation Program Analyst
Archaeology

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New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

August 22, 2011

Carissa Scarpa
US Army Corps of Engineers/Planning Division/EAB
Jacob K. Javits Federal Building
New York, New York 10278-0090

Re: CORPS
Mamaroneck and Sheldrake Rivers Flood
Damage Reduction
//HARRISON, WestchesterMAMARONECK,
Westchester County
10PR06990

Dear Ms. Scarpa:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning your project's potential impact/effect upon historic and/or prehistoric cultural resources. Our staff has reviewed the documentation that you provided on your project. Preliminary comments and/or requests for additional information are noted on separate enclosures accompanying this letter. A determination of impact/effect will be provided only after ALL documentation requirements noted on any enclosures have been met. Any questions concerning our preliminary comments and/or requests for additional information should be directed to the appropriate staff person identified on each enclosure.

In cases where a state agency is involved in this undertaking, it is appropriate for that agency to determine whether consultation should take place with OPRHP under Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law. In addition, if there is any federal agency involvement, Advisory Council on Historic Preservation's regulations, "Protection of Historic and Cultural Properties" 36 CFR 800 requires that agency to initiate Section 106 consultation with the State Historic Preservation Officer (SHPO).

When responding, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Ruth L. Pierpont

Ruth L. Pierpont
Acting Deputy Commissioner for Historic Preservation

An Equal Opportunity/Affirmative Action Agency

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REQUEST FOR ADDITIONAL INFORMATION
BUILDINGS/STRUCTURES/DISTRICTS

PROJECT NUMBER 10PR06990

(Mamaroneck and Sheldrake Rivers Flood Damage Reduction///T/HARRISON /T/MAMARONEC K /V/MAMARONECK)

In order for us to complete our evaluation of the historic signification of all buildings/structures/districts within or adjacent to your project area we will need the following additional information

- ☐ Full project description showing area of potential effect.
- ☐ Clear, original photographs of buildings/structures 50 years or older.
  - ☐ within or ☐ immediately adjacent to the project area
  - *** key all photographs to a site map*
- ☐ Clear, original photographs of the surroundings looking out from the project site in all direction, *keyed to a site map.*
- ☐ Date of construction.
- ☐ Brief history of property.
- ☐ Clear, original photographs of the following:
- ☑ Other:

  In the table on pp 39 - 45 (255 buildings/structures inventoried, please add a column (or somehow clarify) in which MCD each building/structure is located.

Please provide only the additional information checked above. If you have any question concerning this request for additional information, please call Nancy Todd at 518-237-8643. ext 3262

PLEASE BE SURE TO REFER TO THE PROJECT NUMBER NOTED ABOVE WHEN RESPONDING TO THIS REQUEST

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau • Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643
www.nysparks.com

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

September 30, 2011

Carissa Scarpa
US Army Corps of Engineers/Planning Division/EAB
Jacob K. Javits Federal Building
New York, NY 10278-0090

Re: **CORPS**
Mamaroneck & Sheldrake Rivers
Flood Damage Reduction
Harrison & Mamaroneck,
Westchester County
10PR06990

Dear Ms. Scarpa:

The State Historic Preservation Office (SHPO) has received a Phase 1Cultural Resources Study for this project. We are reviewing the information in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland and may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the National Environmental Policy Act and/or the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8).

Enclosed, please find a Resource Evaluation that officially determines three bridges and the stone river retaining walls as being eligible for inclusion in the National Register of Historic Places. Based on our review of the proposed project impacts upon historic resources, the demolition/removal of these features (Hillside, Ward, & Valley Place bridges and the river retaining walls) will result in adverse effects upon those features. We request that these features either be incorporated into the project or avoided so that they survive the proposed flood improvement project. More specific plans that help explain how and why the identified features require removal should be submitted to our office for continued review. Before we can concur with the proposed demolitions we will also have to review an analysis of alternatives that includes retaining the identified historic elements.

Please forward the requested information as soon as it becomes available so that we can work toward a complete project resolution. If you have any questions regarding this letter or your project, please feel free to contact me. Ext. 3273.

Sincerely,

Kenneth Markurlas
Historic Sites Restoration Coordinator

Attachment: Resource Evaluation

An Equal Opportunity/Affirmative Action Agency

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RESOURCE EVALUATION

Date:	9/29/2011	Staff:	Nancy Todd
Property:	Mamaroneck and Sheldrake Rivers Stone Retaining Walls Historic District	MCD:	T/HARRISON, T/Mamaroneck, V/Mamaroneck, T/Rye
Address:	Mamaroneck and Sheldrake Rivers	County:	Westchester
Project Ref. No.:	**10PR06990**	USN:	Multiple

I. ☐ Property is individually listed on SR/NR :

Name of listing :

☐ Property is a contributing component of a SR/NR district:

Name of District:

II. ☑ Property meets eligibility criteria

☑ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☑ Post SRB: ☐ SRB Date

Criteria for inclusion in the National Register.

A ☑ **Associated** with events that have made a significant contribution to the broad patterns of our history;

B ☐ **Associated** with the lives of persons significant in our past;

C ☑ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose component may lack individual distinction;

D ☐ **Have** yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The three bridges (Hillside Avenue Bridge, Ward Avenue Bridge, and the Bridge over the Mamaroneck northeast of Valley Place) that are proposed for removal are National Register elible, as is the Mamaroneck and Sheldrake Rivers Stone Retaining Walls Historic District. SHPO staff agrees with the sponsor's findings that many nearby properties are probably NRE, but concurs that the project, as proposed, will have no adverse effect on them.

If you have any questions concerning this Determination of Eligibility, please call Nancy Todd at 518-237-8643. ext 3262

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

Reply to
Environmental Analysis Branch

March 15, 2012

Ruth Pierpont, Director
New York State Office of Parks, Recreation & Historic Preservation
Historic Preservation Field Service Bureau
Peebles Island, P.O. Box 189
Waterford, New York 12188-0189

Re: CORPS
Mamaroneck and Sheldrake Rivers Flood Damage Reduction
Towns of Harrison and Mamaroneck, Village of
Mamaroneck, Westchester County, NY
10PR06990

Dear Ms. Pierpont:

The U.S. Army Corps of Engineers, New York District (Corps) is continuing to carry out Section 106 consultation with your office regarding the *Mamaroneck and Sheldrake Rivers Flood Risk Management General Re-Evaluation Study*. A draft Phase IA level report was reviewed by your staff in August of 2011. Your staff concurred with the findings of the report which identified four new resources, three bridges and the stone retaining walls in the study area as eligible for the National Register of Historic Places. A determination of eligibility was provided on September 30, 2011. The Corps is working to develop alternatives that might reduce or avoid adverse impacts to these resources. Consultation with your office shall be ongoing over the coming months as these alternatives are analyzed.

Additionally, on September 17, 2011 your staff concurred with the recommendation that archaeological testing be carried out in two areas that were determined sensitive for cultural resources. Testing was carried out from November 1 through 3, 2011. No archaeological sites or significant cultural resources were recovered as a result of the testing. Therefore it is the Corps recommendation that no further archaeological testing is required within the study area provided the area of potential effect does not change. A report detailing this fieldwork is enclosed for your review (Enclosure 1).

We would appreciate receiving any Section 106 comments that you may have regarding the enclosed report and, of course, an indication of your concurrence with our recommendations. Thank you for your assistance in the Section 106 process. If you or your staff require additional

information or have any questions, please contact Carissa Scarpa, Project Archaeologist, at (917)790-8612.

Sincerely,

Leonard Houston,
Chief, Environmental Analysis Branch

Enclosure

New York State Office of Parks, Recreation and Historic Preservation

Division for Historic Preservation
P.O. Box 189, Waterford, New York 12188-0189
518-237-8643

Andrew M. Cuomo
Governor

Rose Harvey
Commissioner

April 19, 2012

Carissa Scarpa
US Army Corps of Engineers/Planning Division/EAB
Jacob K. Javits Federal Building
New York, New York 10278-0090

Re: CORPS
Mamaroneck and Sheldrake Rivers Flood Damage Reduction
Towns of Harrison And Mamaroneck,
Village Of Mamaroneck, Westchester County
10PR06990

Dear Ms. Scarpa:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources. The SHPO has reviewed the Phase 1B Cultural Resources Study prepared by for this project in March 2012. Based on this review, we concur with the recommendations and have no further archaeological concerns. Please continue to consult with our technical review staff on other outstanding issues..

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above. Please contact me at extension 3291, or by e-mail at douglas.mackey@oprhp.state.ny.us, if you have any questions regarding these comments.

Sincerely

Douglas P. Mackey
Historic Preservation Program Analyst
Archaeology

An Equal Opportunity/Affirmative Action Agency

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RESOURCE EVALUATION

Date:	2/12/2013	Staff:	Nancy Todd
Property:	Mamaroneck and Sheldrake Rivers Flood Damage Reduction	MCD:	multiple
Address:	various	County:	Westchester
Project Ref. No.:	**10PR06990**	USN:	Multiple

I. ☐ Property is individually listed on SR/NR :

Name of listing :

☑ Property is a contributing component of a SR/NR district:

Name of District: Stone Retaining Walls Historic District

II. ☐ Property meets eligibility criteria

☑ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☑ Post SRB: ☐ SRB Date

Criteria for inclusion in the National Register.

A ☑ **Associated** with events that have made a significant contribution to the broad patterns of our history;

B ☐ **Associated** with the lives of persons significant in our past;

C ☑ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose component may lack individual distinction;

D ☐ **Have** yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

AMENDMENT TO Resource Evaluation of 9/29/11: The FOUR bridges (Tompkins Avenue Bridge, Hillside Avenue Bridge, Ward Avenue Bridge, and the Bridge near Valley Place) that are proposed for removal are National Register eligible, as is the Mamaroneck and Sheldrake Rivers Stone Retaining Walls Historic District. SHPO staff agrees with the sponsor's findings that many nearby properties are probably NRE, but concurs that the project, as proposed, will have no adverse effect on them.

If you have any questions concerning this Determination of Eligibility, please call Nancy Todd at 518-237-8643. ext 3262

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

REPLY TO
Environmental Analysis Branch

April 3, 2013

Dr. Brice Obermeyer, Director
Delaware Tribe Historic Preservation Office
Roosevelt Hall Room 212
1200 Commercial Street
Emporia, Kansas 66801

Dear Dr. Obermeyer,

The U.S. Army Corps of Engineers, New York District (District), in partnership with the New York Department of Environmental Conservation (NYDEC) and Westchester County, is undertaking a project in the Town and Village of Mamaroneck and the Town of Harrison, New York which is an area of interest to the Delaware Tribe of Indians. In accordance with the National Environmental Policy Act the District is preparing an Environmental Impact Statement (EIS) for the project. A copy of the draft EIS will be provided to you when it is circulated for review. In accordance with Section 106 of the National Historic Preservation Act two surveys have been undertaken to identify significant cultural resources within the project Area of Potential Effect (APE) (Enclosure 1). The survey reports are entitled *Phase IA Cultural Resources Study, Mamaroneck and Sheldrake Rivers Flood Risk Management General Re-Evaluation Study* and *Phase IB Archaeological Investigation Addendum to the Phase IA Cultural Resources Study Flood Risk Management General Re-Evaluation Study of the Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, Towns of Mamaroneck and Harrison, Westchester County, NJ* (Enclosure 2). The surveys included background historical research, architectural survey and archaeology.

The Phase IA survey resulted in the identification of six properties that are within the project's area of potential effect and are eligible for the National Register of Historic Places. These are the Mamaroneck Train Station, the Tompkins Avenue Bridge, the Ward Avenue Bridge, the Hillside Avenue Bridge, the bridge over the Mamaroneck River northeast of Valley Place, and the stone retaining walls. No archaeological sites were identified as a result of the Phase IB survey and there are no known archaeological sites within the current area of potential effect for the project. At this time the District is developing project alternatives and will be assessing the impacts of the selected alternative.

Pursuant to Section 106 of the National Historic Preservation Act, the District is transmitting these studies to provide your office with the opportunity to review and submit any comments or questions you may have regarding the project or the studies' findings. Should you

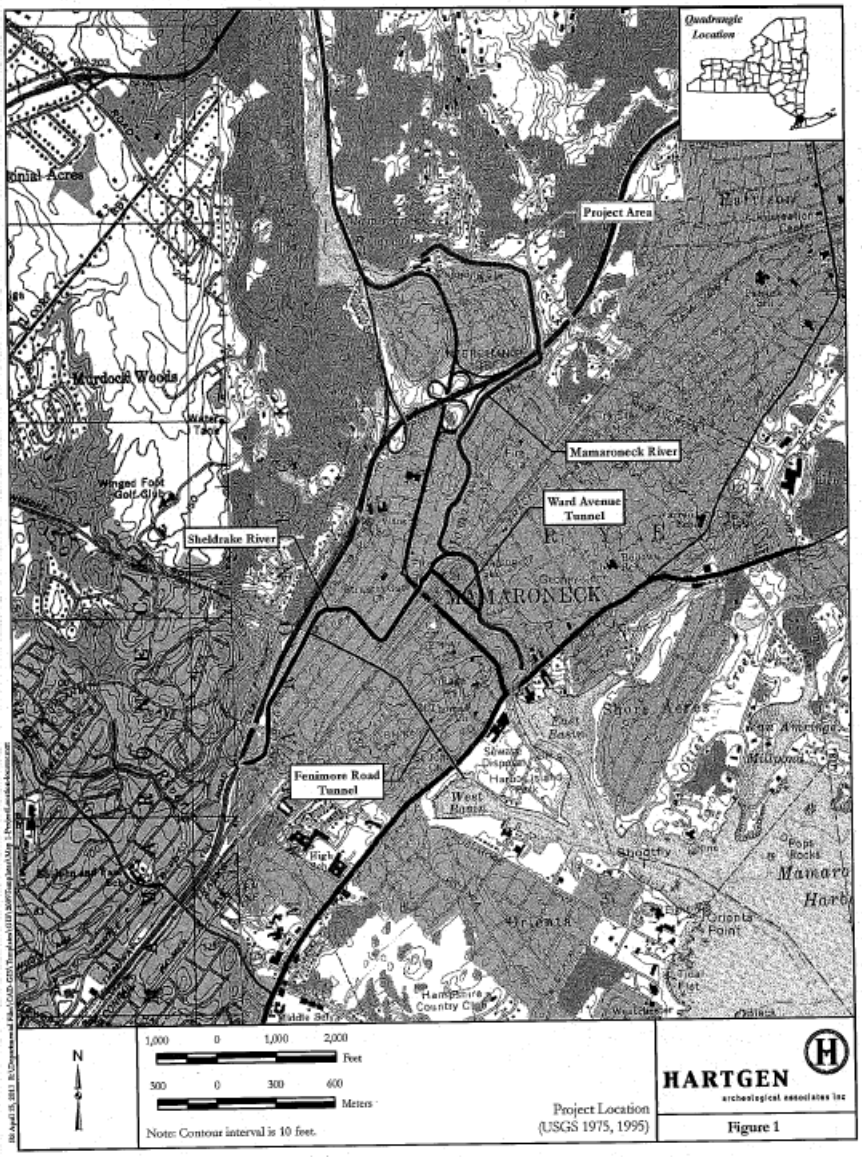
have any questions or require additional information about this project please contact the Project Archaeologist, Carissa Scarpa, (917) 790-8612.

Sincerely,

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

Mamaroneck and Sheldrake Rivers Flood Damage Risk Reduction Project, General Re-evaluation Study, Westchester County, NY
Phase IA Archeological Sensitivity Assessment and Structure Inventory



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

REPLY TO
Environmental Analysis Branch

April 3, 2013

Tamara Francis
Cultural Preservation Director
Delaware Nation
NAGPRA/Cultural Preservation
P.O. Box 825
Anadarko, OK 73005

Dear Ms. Francis,

The U.S. Army Corps of Engineers, New York District (District), in partnership with the New York Department of Environmental Conservation (NYDEC) and Westchester County is undertaking a project in the Town and Village of Mamaroneck and the Town of Harrison, New York which is an area of interest to the Delaware Nation. In accordance with the National Environmental Policy Act the District is preparing an Environmental Impact Statement (EIS) for the project. A copy of the draft EIS will be provided to you when it is circulated for review. In accordance with Section 106 of the National Historic Preservation Act two surveys have been undertaken to identify significant cultural resources within the project Area of Potential Effect (APE) (Enclosure 1). The survey reports are entitled *Phase IA Cultural Resources Study, Mamaroneck and Sheldrake Rivers Flood Risk Management General Re-Evaluation Study* and *Phase IB Archaeological Investigation Addendum to the Phase IA Cultural Resources Study Flood Risk Management General Re-Evaluation Study of the Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, Towns of Mamaroneck and Harrison, Westchester County, NJ* (Enclosure 2). The surveys included background historical research, architectural survey and archaeology.

The Phase IA survey resulted in the identification of six properties that are within the project's APE and are eligible for the National Register of Historic Places. These are the Mamaroneck Train Station, the Tompkins Avenue Bridge, the Ward Avenue Bridge, the Hillside Avenue Bridge, the bridge over the Mamaroneck River northeast of Valley Place, and the stone retaining walls. No archaeological sites were identified as a result of the Phase IB survey and there are no known archaeological sites within the current area of potential effect for the project. At this time the District is developing project alternatives and will be assessing the impacts of the selected alternative.

Pursuant to Section 106 of the National Historic Preservation Act, the District is transmitting a copy of these studies to provide your office the opportunity to review and submit any comments or questions you may have regarding the project or the studies' findings. Should

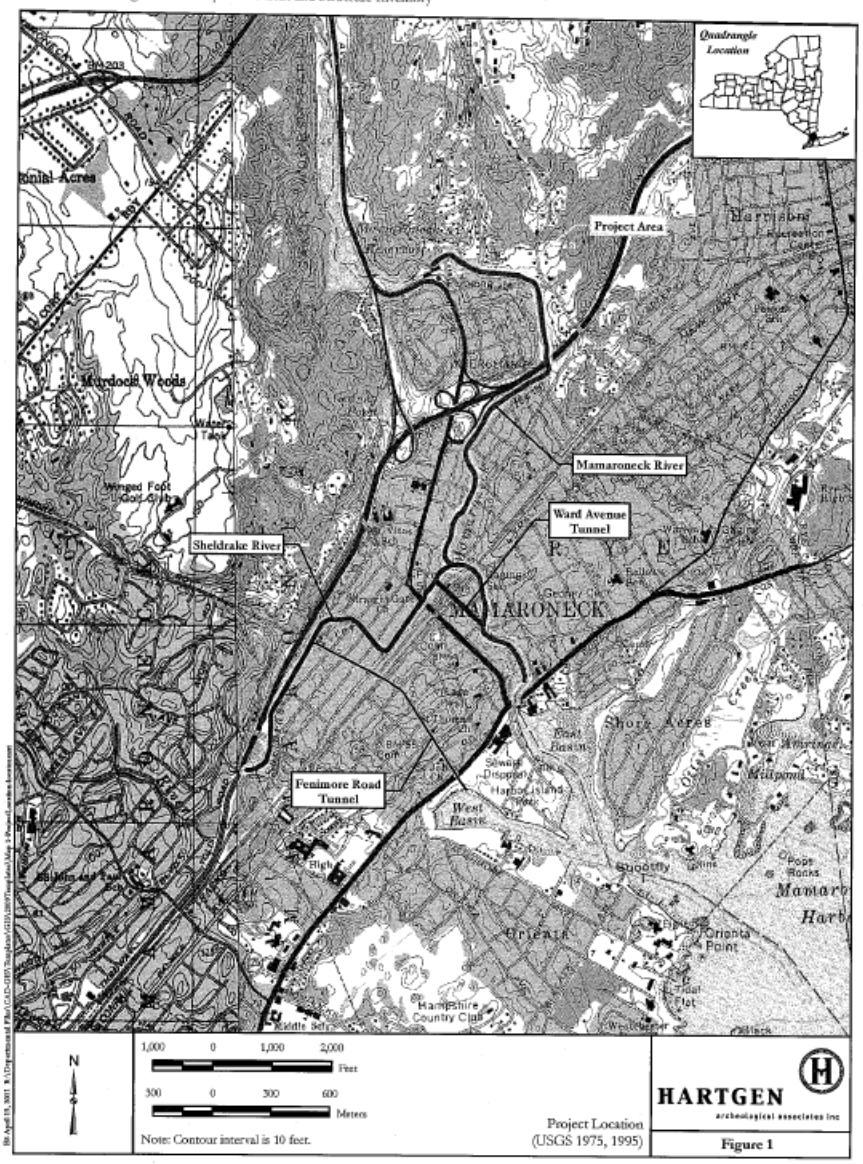
you have any questions or require additional information about this project please contact the Project Archaeologist, Carissa Scarpa, (917) 790-8612.

Sincerely,

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

Mamaroneck and Sheldrake Rivers Flood Damage Risk Reduction Project, General Re-evaluation Study, Westchester County, NY
Phase IA Archeological Sensitivity Assessment and Structure Inventory



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

REPLY TO
Environmental Analysis Branch April 3, 2013

Sherry White
Cultural Resource Officer
Stockbridge-Munsee Community
Band of Mohican Indians
N8476 Moh He Con Nuck Road
P.O. Box 70
Bowler, Wisconsin 54416

Dear Ms. White,

The U.S. Army Corps of Engineers, New York District (District) in partnership with the New York Department of Environmental Conservation (NYDEC) and Westchester County is undertaking a project in the Town and Village of Mamaroneck and the Town of Harrison, New York which is an area of interest to the Stockbridge-Munsee Community. In accordance with the National Environmental Policy Act the District is preparing an Environmental Impact Statement (EIS) for the project. A copy of the draft EIS will be provided to you when it is circulated for review. In accordance with Section 106 of the National Historic Preservation Act two surveys have been undertaken to identify significant cultural resources within the project Area of Potential Effect (APE) (Enclosure 1). The survey reports are entitled *Phase IA Cultural Resources Study, Mamaroneck and Sheldrake Rivers Flood Risk Management General Re-Evaluation Study* and *Phase IB Archaeological Investigation Addendum to the Phase IA Cultural Resources Study Flood Risk Management General Re-Evaluation Study of the Mamaroneck and Sheldrake Rivers, Village of Mamaroneck, Towns of Mamaroneck and Harrison, Westchester County, NJ* (Enclosure 2). The surveys included background historical research, architectural survey and archaeology.

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Pursuant to Section 106 of the National Historic Preservation Act, the District is transmitting these studies to provide your office with the opportunity to review and submit any comments or questions you may have regarding the project or the studies' findings. Should you

have any questions or require additional information about this project please contact the Project Archaeologist, Carissa Scarpa, (917) 790-8612.

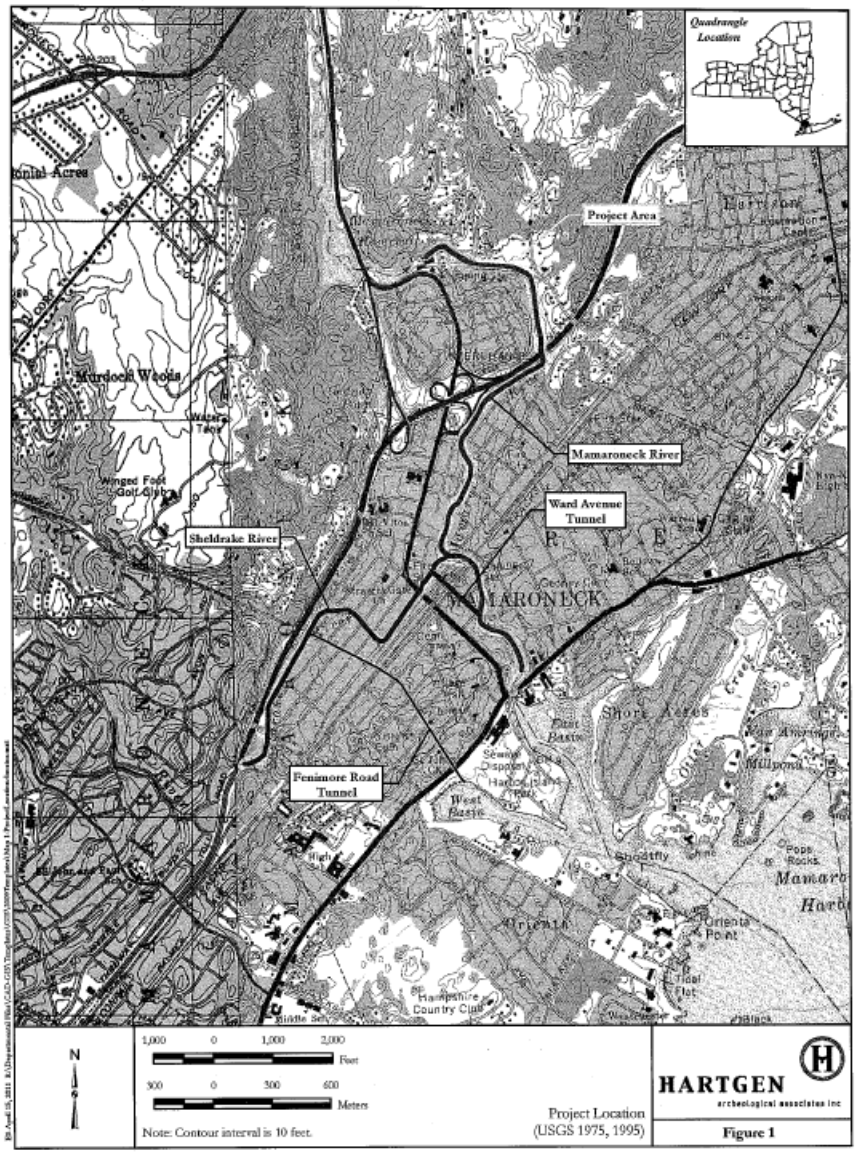
Sincerely,

L Houston

Leonard Houston
Chief, Environmental Analysis Branch

Enclosures

Mamaroneck and Sheldrake Rivers Flood Damage Risk Reduction Project, General Re-evaluation Study, Westchester County, NY
Phase IA Archeological Sensitivity Assessment and Structure Inventory


Quadrangle Location
Project Area
Mamaroneck River
Ward Avenue Tunnel
Sheldrake River
Fenimore Road Tunnel
Murdock Woods
Winged Foot Golf Club
MARONECK
Shore Acres
Orienta
Orienta Point
Tidal Flat
Hampshire Country Club
Shoatfly
Pops Rocks
Mamaro
Harb
Bullpond
Tidal Basin
West Basin
Sewage Disposal
Harbor Island Park
Hurricane Lake
Mamaroneck Beach
Winsor Farm
Wayne Terr
Cedar Cliff
Cedar Lake
Rockwood
Hillside Sch
Blind Brook
Cook Ave
Rye Lake Ave
Boston Post Rd
Weaver St
Mill Pond
Mamaroneck Ave
Fenimore Rd
Hillside Ave
Palmer Ave
Rockwood Ave
Cedar Lake Ave
Old Post Rd
Harbor Island Rd
Shore Acres Dr
Orienta Ave
Tuckahoe Rd
Pine Ridge Rd
Hillside Ave
Palmer Ave
Rockwood Ave
Cedar Lake Ave
Old Post Rd
Harbor Island Rd
Shore Acres Dr
Orienta Ave
Tuckahoe Rd
Pine Ridge Rd
Mill Pond Rd
Mamaroneck Ave
Fenimore Rd
Weaver St
Boston Post Rd

Stockbridge-Munsee Tribal Historic Preservation Office

Sherry White - Tribal Historic Preservation Officer
W13447 Camp 14 Road
P.O. Box 70
Bowler, WI 54416

Date 5/2/13
Project Number Town and Village of Mamaroneck
TCNS Number
Company Name Department of the Army

We have received your letter for the above listed project. Before we can process the request we need more information. The additional items needed are checked below.

Additional Information Required:

___ Site visit by Tribal Historic Preservation Officer
___ Archeological survey, Phase 1
___ Colored maps
___ Pictures of the site
___ Any reports the State Historic Preservation Office may have
___ Review fee of $300.00 must be included with letter
___ Has site been previously disturbed, please explain what the use was and when it was disturbed

After reviewing your letter:

___ We are in the process of gathering more information on this site and will respond to your project request once all information has been gathered.
___ This project has the potential to affect a Mohican cultural site, please contact us
___ This project is not within Mohican area of interest
X This project is within Mohican territory, but we are not aware of any cultural site within the project area.

Additional comments

Should this project inadvertently uncover a Native American site, we require you to halt all construction and notify the Stockbridge-Munsee Tribe immediately.

Please do not resubmit projects for changes that are not ground disturbance

Sherry White
Sherry White, Tribal Historic Preservation Officer

(715) 793-3970

Email: sherry.white@mohican-nsn.gov

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APPENDIX D

New York State Department of State, Coastal Management Program: State Coastal Policies

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NEW YORK STATE DEPARTMENT OF STATE'S STATE COASTAL POLICIES EVALUATION

To facilitate the coastal zone consistency determination process, the 44 New York State Department of State (NYSDOS) State Coastal Policies were reviewed. The area of potential effect for the Proposed Action is located within the Village of Mamaroneck, located on Long Island Sound in Westchester County, New York. The Project is located within the Mamaroneck and Sheldrake watersheds, and includes construction within both of these rivers. The southern-most end of the Proposed Action area, at the Tompkins Avenue Bridge, is located approximately 850 feet (ft) (250 meters [m]) upstream of the mouth of the Mamaroneck River at Mamaroneck Harbor. The proposed Project would not be expected to impact development policies associated with waterfront areas or programs, or the state's major ports (Policy 1, 3, and 6); or result in or encourage incompatible development (Policy 5). The proposed Project would not affect significant coastal fish and wildlife habitats (Policy 7, 9, and 10), or involve mining, excavating or dredging in coastal waters (Policy 15). The proposed Project would not impact public access (Policy 19 and 20), or impact recreational policies (Policy 21 and Policy 22). The proposed Project does not contain agricultural lands (Policy 26), does not include energy or ice management actions (Policy 27–29), and would not affect water and resource policies (Policy 30–32, Policy 34–36, Policy 40, and Policy 42).

The intended purpose of the proposed Project is to provide long-term flood protection to the Village of Mamaroneck. Twenty (20) policies were found to be applicable to the Proposed Action, as identified and described below. These include policies 2, 4, 8, 11–14, 16, 18, 23–25, 33, 37–39, 41, 42, and 43. Determinations for the consistency of the Proposed Action Alternative with these 20 policies, and mitigation measures that would effectively mitigate potential impacts and maintain conformance with State Coastal Policies, are presented below.

Policies 2 and 4 – Development Policies

Policy 2 – Facilitate the siting of water-dependent uses and facilities on or adjacent to coastal waters. Policy 2 instructs state agencies to avoid undertaking, funding, or approving non-water dependent uses when such uses would preempt the reasonably foreseeable development of water-dependent uses. Furthermore, this policy instructs agencies to utilize appropriate existing programs to encourage water-dependent activities. In addition to water-dependent uses, those uses that are enhanced by a waterfront location should be encouraged to locate along the shore, though not at the expense of water-dependent uses. If there is no immediate demand for a water-dependent use in a given area, but a future demand is reasonably foreseeable, temporary non-water-dependent uses should be considered preferable to a non-water-dependent or enhanced use which involves an irreversible or nearly irreversible commitment of land (NYSDOS 2001).

Policy 4 – Strengthen the economic base of smaller harbor areas by encouraging the development and enhancement of those traditional uses and activities which have provided such areas with their unique maritime identity. Policy 4 encourages development, particularly large-scale development, in the coastal area, "to be located within, contiguous to, or in close proximity to, existing areas of concentrated development where infrastructure and public services are adequate, where topography, geology, and other environmental conditions are suitable for and able to accommodate development" (NYSDOS 2001). In doing so, this policy is

intended to strengthen existing residential, industrial, and commercial centers; foster an orderly pattern of growth; increase the productivity of existing public services and lessen the need to provide new public services in outlying areas; preserve sufficient amounts of open space where desirable; and, foster energy conservation by encouraging proximity between home, work, and leisure activities (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.7 Socioeconomics and 4.9 Coastal Zone Management, the Proposed Action will be consistent with Policy 2 and Policy 4. This Project involves construction of flood risk reduction structures along the Mamaroneck and Sheldrake rivers that are necessary to address the substantial flood risk that is present within the Village of Mamaroneck. The flood risk management Project is compatible with adjacent uses and will provide for protection of coastal resources. The Project also will benefit the continued and future water-dependent uses and facilities located within the regional coastal zone. The Project will benefit the economic vitality and enhance development opportunities within the area of Mamaroneck Harbor by providing improved flood protection for the Village of Mamaroneck and vicinity. The Project will not detract or adversely affect existing traditional and/or desired anticipated uses, or the economic base of the Mamaroneck Harbor community.

Policy 8 – Fish and Wildlife Policy

Policy 8 – Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bio-accumulate in the food chain or which cause significant sublethal or lethal effect on those resources. Policy 8 encourages the protection of fish and wildlife resources from hazardous wastes and other pollutants. Hazardous wastes are generally characterized as the flammable, corrosive, reactive, or toxic unwanted byproducts of manufacturing and construction processes; a more specific definition can be found in Environmental Conservation Law [S27-0901(3)]. Other pollutants are conventional wastes that are generated from point and nonpoint sources and controlled through other New York laws. New York strictly regulates the handling (i.e., storage, transport, treatment, and disposal) of hazardous materials to prevent their entry into the environment, particularly into New York's air, land, and waters. Controls should therefore be implemented that "effectively minimize possible contamination of and bio-accumulation of New York's coastal fish and wildlife resources at levels that cause mortality or create physiological and behavioral disorders" (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.2 HTRW, 4.4.1.2 Surface Water, 4.6.1.1 Shellfish, and 4.9 Coastal Zone Management, the Proposed Action will be consistent with Policy 8. Potentially hazardous materials typically used during construction activities that could pose a health risk to the environment if not properly stored and handled include motor fuel and oils used for vehicles and equipment. All handling of hazardous materials will be conducted in accordance with applicable Army, Federal, state, and local solid and hazardous waste management policies and regulations throughout implementation of the Project. The Project will not involve any municipal, industrial, and commercial discharge of pollutants into coastal waters. Stormwater from the Project site (both during and after construction) will be managed in accordance with applicable Federal and state policies and regulations. Sediments that will be disturbed to complete the Project are not expected to contain pollutants that would affect fish and coastal resources. Over the long-term, the Project is expected to improve water quality within

reaches of the Mamaroneck and Sheldrake rivers located within the Project area, as well as improve the water quality of waters discharging from the Mamaroneck River into Mamaroneck Harbor. None of the construction materials that will be used to support operation (i.e., stone and riprap materials) of the Project are considered hazardous. If all applicable policies and guidelines are followed, no adverse impacts on fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants are anticipated.

Policies 11, 12, 13, 14, 16, and 17 – Flooding and Erosion Hazards Policies

Policy 11 – Buildings and other structures will be sited in the coastal area so as to minimize damage to property and the endangering of human lives caused by flooding and erosion. Policy 11 identifies setback and structure requirements within coastal hazard areas. On coastal lands identified as coastal erosion hazard areas, buildings and similar structures shall be set back from the shoreline a distance sufficient to minimize damage from erosion unless no reasonable prudent alternative site is available as in the case of piers, docks and other structures necessary to gain access to coastal waters to be able to function. The extent of the setback will be calculated, taking into account the rate at which land is receding due to erosion and the protection provided by existing erosion protection structures, as well as by natural protective features such as beaches, sandbars, spits, shoals, barrier islands, bay barriers, nearshore areas, bluffs and wetlands. The only new structure allowed in coastal erosion hazard areas is a moveable structure as defined in 6NYCRR Part 505.2(x). Prior to its construction, an erosion hazard areas permit must be approved for the structure. Existing, nonconforming structures located in coastal erosion hazard areas may be only minimally enlarged (NYSDOS 2001).

In coastal lands identified as being subject to high velocity waters caused by hurricane or other storm wave wash - a coastal high hazard area - walled and roofed buildings or fuel storage tanks shall be sited landward of mean high tide; and no mobile home shall be sited in such area. In coastal lands identified as floodways, no mobile homes shall be sited other than in existing mobile home parks.

Where human lives may be endangered by major coastal storms, all necessary emergency preparedness measures should be taken, including disaster preparedness planning.

Policy 12 – Activities or development in the coastal area will be undertaken to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands, and bluffs. Policy 12 identifies requirements for activities located within coastal areas to minimize damage to natural resources, such as beaches, dunes, barrier islands, bluffs, and other natural protective features that help safeguard coastal lands and property from damage, as well as reduce the danger to human life, resulting from flooding and erosion. Excavation of coastal features, improperly designed structures, inadequate site planning, or other similar actions which fail to recognize their fragile nature and high protective values, lead to the weakening or destruction of those landforms. Activities or development in, or in proximity to, natural protective features must ensure that all such adverse actions are minimized. Primary dunes will be protected from all encroachments that could impair their natural protective capacity (NYSDOS 2001).

Policy 13 – The construction or reconstruction of erosion protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least 30 years as demonstrated in design and construction standards and/or assured maintenance or replacement programs. Policy 13 helps ensure the reduction of damages or losses to development due to erosion that resulted from the improper design, construction, or maintenance of erosion protection structures (NYSDOS 2001).

Policy 14 – Activities and development, including the construction or reconstruction of erosion protection structures, shall be undertaken so that there will be no measurable increase in erosion or flooding at the site of such activities or development, or at other locations. Policy 14 attempts to minimize and ideally prevent any adverse effects of erosion or flooding that result from human actions, including damage to or loss of property and the endangerment of human lives. Such actions include "the use of erosion protection structures such as groins, or the use of impermeable docks which block the littoral transport of sediment to adjacent shorelands, thus increasing their rate of recession; the failure to observe proper drainage or land restoration practices, thereby causing run-off and the erosion and weakening of shorelands; and the placing of structures in identified floodways so that the base flood level is increased causing damage to otherwise hazard-free areas" (NYSDOS 2001).

Policy 16 – Public funds shall only be used for erosion protective structures where necessary to protect human life, and new development which requires a location within or adjacent to an erosion hazard area to be able to function, or existing development; and only where the public benefits outweigh the long term monetary and other costs including the potential for increasing erosion and adverse effects on natural protective features. Policy 16 identifies restrictions on the use of public funds, except where necessary to protect human life, and new development that requires a location in proximity to the coastal area or in adjacent waters to be able to function. It also recognizes the adverse impacts of such activities and development on the rate of erosion and on natural protective features and requires that careful analysis be made of such benefits and long-term costs prior to expending public funds (NYSDOS 2001).

Policy 17 – Non-structural measures to minimize damage to natural resources and property from flooding and erosion shall be used whenever possible. Policy 17 recognizes the costs of structural protection measures against flooding and erosion hazards that are related to the planning, siting, and design of proposed activities and development. As a result, it encourages the use of nonstructural measures within coastal erosion hazard areas (e.g., planting appropriate vegetation to strengthen coastal landforms) and flood hazard areas including "(a) the avoidance of risk or damage from flooding by the siting of buildings outside the hazard area, and (b) the flood-proofing of buildings or their elevation about the base flood level" (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.4 Water Resources and 4.9 Coastal Zone Management, the Proposed Action will be consistent with Policies 11, 12, 13, 14, 16, and 17. The flood risk management Project will provide improved flood and erosion protection for buildings and other structures located within the 100-year and 500-year floodplains of the Project area and the Village of Mamaroneck. The Project will reduce the risk of flooding and erosion in the area, thereby reducing flood and erosion damages to property and reducing the endangerment of human lives within the coastal hazard area associated with the region. The flood risk

management Project also will provide long-term protection of natural resources and property that have historically been prone to floods, erosion, and flood damage. The Project is expected to provide flood and erosion protection to the Village of Mamaroneck for a minimum of 50 years. The Project area does not contain any beaches, dunes, barrier islands, bluffs, or other natural coastal protective features. Construction activities will be limited to segments of the Mamaroneck and Sheldrake rivers located within the Village of Mamaroneck.

In addition, the NED Plan (Preferred Alternative 1F) includes the potential implementation of nonstructural measures for nine properties selected by the U.S. Army Corps of Engineers (USACE) New York District based on a benefit-cost evaluation. Eight of these are residential properties in the Harbor Heights neighborhood along the Mamaroneck River, which are candidates for structural elevation or "raising," and one is a nonresidential (industrial) property just south of the Sheldrake River, which is a candidate for ringwall construction. The implementation of these measures, which is contingent upon owner approval, would further improve flood protection for at-risk buildings in the Project area.

The Project design is based on USACE experience and industry standards for providing long-term flood damage reduction and reduction of flood risks, and has been designed to maximize flood and erosion protection for the Village of Mamaroneck and surrounding areas. Both Federal and state funds will be used to complete the Project, which is intended to provide long-term protection to property and human life within the Village of Mamaroneck. The Project includes measures to substantially reduce erosion and flooding, and the public benefit outweighs the long-term monetary and other costs associated with flood risks, especially when considered in light of historic flood events.

Policy 18 – General Policy

Policy 18 – To safeguard the vital economic, social, and environmental interests of New York and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards, which New York has established to protect valuable coastal resource areas. Policy 18 protects New York's coastal waters and resources from proposed major actions, which "must take into account the social, cultural, economic and environmental interests of New York and their citizens in such matters that would affect natural resources, water levels and flows, shoreline damage, hydro-electric power generation, and recreation" (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.3 Land Use, Cover, and Zoning; 4.7 Socioeconomics; 4.8 Cultural Resources; and 4.11 Recreation the Proposed Action will be consistent with Policy 18. The proposed Project will not significantly impair any valuable coastal waters or natural resources, water levels and flows, shorelines, or hydroelectric power generators. Short-term minor adverse impacts to recreation will occur during construction of the Project, due to the use of Columbus Park as a staging area; however, these impacts would be temporary, and limited to the timeline for construction of the Project. The proposed Project is intended to provide flood protection for both human-made and natural coastal resources, and will provide a long-term benefit to recreation, the local economy, and environmental interests because of the reduced risk of flooding and improved water quality that will be realized.

Policies 23, 24, and 25 – Historic and Scenic Resources Policies

Policy 23 – Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archaeology or culture of New York, its communities or the nation. Policy 23 provides for the protection of historic and scenic resources that are both within the New York-designated coastal zone area, as well as historic and scenic resources that have a coastal relationship (NYSDOS 2001). Such historic and scenic resources include resources "on, or nominated to be on, or determined eligible to be on the NRHP" (NYSDOS 2001). Consistency of a project with this policy would include measures to "prevent a significant adverse change to such significant structures, districts, areas or sites," including measures to prevent the implementation of projects "within 500 feet of the perimeter of the property boundary of [a] historic, architectural, cultural, or archaeological resource and all actions within an historic district that would be incompatible with the objective of preserving the quality and integrity of the resource," particularly in a manner that would make the visual and locational relationship of the project incompatible with the "special character of the historic, cultural, or archaeological resource" (NYSDOS 2001). Measures to ensure consistency with this policy include ensuring the compatibility of the visual and locational relationship of the project with these historic and scenic resources by designing the general appearance of the project to reflect such qualities as the architectural style, design material, scale, proportion, composition, mass, color, setback, landscaping, and lighting of the historic and scenic resources to the maximum extent possible (NYSDOS 2001).

Policy 24 – Prevent impairment of scenic resources of New York significance. Policy 24 addresses the impacts of a project in areas that have been identified as SASS within a New York-designated coastal zone area. These evaluations consider whether the project would impair a SASS through activities such as the addition of structures to a scenic area "which because of scale, form or materials, would diminish the scenic quality of an identified resource" (NYSDOS 2001). Consistency of a project with this policy would incorporate guidelines identified in this policy, including "siting structures…back from shorelines, or in other inconspicuous locations to maintain the attractive quality of the shoreline and to retain views to and from the shore," "orienting structures to retain views, [and] save open space," "adding vegetation to…blend structures into the site, and obscure unattractive elements," "using appropriate materials, in addition to vegetation, to screen unattractive elements," and "using appropriate scales, forms and materials to ensure that…structures are compatible with…the landscape" (NYSDOS 2001).

Policy 25 – Protect, restore or enhance natural and man-made resources which are not identified as being of New York significance, but which contribute to the overall scenic quality of the coastal area. Policy 25 ensures that even if a proposed action may not affect a SASS, development activities must still protect, restore, or enhance a coastal area's overall scenic quality. Activities that could impair or degrade scenic quality are the same as those listed under Policy 24, but the effects would not be considered as serious. Also, greater emphasis may need to be placed on the removal of existing elements, particularly those that degrade coastal areas, and on the addition of new elements or other changes that enhance scenic quality (e.g., removal of vegetation at to improve views of coastal waters) (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.8 Cultural Resources and 4.10 Aesthetics and Scenic Resources, the Proposed Action will be consistent with Policies 23, 24 and 25. The Proposed Action will be consistent with Policy 23 through the implementation of design and siting measures in conjunction with recommendations from the NYSHPO and the NYSDOS that will avoid, minimize, or mitigate significant adverse impacts on historic and scenic resources within the Project area. USACE is in consultation with the NYSHPO, interested parties and federally-recognized Tribes, regarding the Project, and will implement any recommendations that will avoid potential adverse impacts on cultural resources. The Proposed Action will have adverse effects to eligible historic properties, including the Ward Avenue Bridge and the stone retaining walls thematic district. A draft Memorandum of Agreement has been prepared and is undergoing review by the NYSHPO and other interested parties to mitigate this adverse effect (see Appendix C).

Short-term temporary and long-term permanent adverse impacts to aesthetic and scenic resources are expected to result from the Proposed Action. In the short-term, the presence of construction equipment and active construction activities throughout the Project area will result in minimal temporary impacts to each construction area's immediate aesthetics and scenic resources. Columbus Park, in particular, will be aesthetically impacted in the short-term due to its use as a staging area during construction, though temporary fencing will be erected to minimize these impacts. Other temporary visual impacts, sustained only during the construction phase, will include modifications to the riverbanks (i.e., regrading and reshaping, the removal of retaining walls) as well as the muddying of water downstream and in Mamaroneck Harbor resulting from construction-related increases in suspended solids.

In the long term, channel modifications under the Proposed Action will require the removal of trees and vegetation along and close to the riverbanks. The greatest visual impacts will be sustained by the residential, commercial, and industrial landowners located closest to the proposed river channel modifications, though park visitors also will notice a reduction in greenery around the modified river channels. However, these visual impacts will be minimized through riparian habitat restoration, including revegetation and other efforts to restore the Project area to pre-construction conditions. An additional long-term impact is the replacement, in some stream segments, of natural riverbed channels and old stone retaining walls with concrete retaining walls, which people generally find less visually appealing.

The Project will not involve the modification, destruction, or removal of structures that are significant to scenic quality; and it will not add structures that will diminish scenic quality. The Project does include modification of geologic forms.

Vegetation removal will be required. To protect, restore, and enhance natural and human-made resources, appropriate best management practices (BMPs) and native vegetation landscape restoration will be implemented to prevent erosion and sedimentation. Adverse impacts to visual resources resulting from implementation of the Project with proposed mitigation measures will not be significant.

Policies 33, 37, 38, 39, 41, and 43 – Water and Air Resources Policies

Policy 33 – Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters. Policy 33 encourages the use of "best management practices" to avoid "pollution [of coastal waters] caused by the discharge of stormwater runoff and combined sewer overflows" (NYSDOS 2001). Consistency with this policy is encouraged through the development of structural methods, where economically feasible, as well as nonstructural methods to avoid any adverse water quality impacts that may result from a project (NYSDOS 2001).

Policy 37 – Best management practices will be utilized to minimize the non-point discharge of excess nutrients, organics, and eroded soils into coastal waters. Policy 37 focuses on water and air resources, and encourages the minimization of nonpoint discharges or excess nutrients, organics, and eroded soils into waters within New York-designated coastal zone areas (NYSDOS 2001). Consistency with this policy is encouraged through the use of BMPs for a project that requires soil erosion control and surface drainage control (NYSDOS 2001).

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. Policy 38 stresses the protection of surface and groundwater since they are the principal sources of drinking water in New York (NYSDOS 2001).

Policy 39 – The transport, storage, treatment, and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources. Policy 39 encourages the legal and responsible handling and disposal of solid wastes at solid waste management facilities, which can include resource recovery facilities, sanitary landfills, and solid waste reduction facilities. Solid wastes are defined in New York's Solid Waste Management Act (Environmental Conservation Law, Article 27) and include "sludge from air or water pollution control facilities, demolition and construction debris, and industrial and commercial wastes" (NYSDOS 2001), as well as hazardous wastes (see Policy 8). Policy 39 is particularly concerned with the contamination of water resources associated with improper disposal and treatment of solid wastes (the most common problem), the filling of wetlands and littoral areas with solid wastes, atmospheric loading, and the degradation of scenic resources (NYSDOS 2001).

Policy 41 – Land use or development in the coastal area will not cause national or New York air quality standards to be violated. Policy 41 encourages the identification and elimination of toxic discharges into the atmosphere resulting from land use or development in the coastal area. New York's CMP incorporates the air quality policies and programs developed for New York by the New York State Department of Environmental Conservation (NYSDEC) pursuant to New York laws on air quality and the Federal Clean Air Act, which represents the minimum air quality control requirements applicable within the coastal area. The State Implementation Plan should, to the extent possible, be consistent with coastal land and water use policies and, conversely, coastal management guidelines and program decisions should reflect an assessment

of their compliance with the air quality requirements of the State Implementation Plan (NYSDOS 2001).

Policy 43 – Land use or development in the coastal area must not cause the generation of significant amounts of acid rain precursors: nitrates and sulfates. Policy 43 reflects the New York CMP's incorporation of New York's policies on acid rain and assistance in New York's efforts to control acid rain, which "will enhance the continued viability of coastal fisheries, wildlife, agricultural, scenic and water resources" (NYSDOS 2001).

Determination – Based on the analyses in Sections 4.1 Topography and Geology, 4.2 HTRW, 4.4 Water Resources, 4.5 Vegetation, 4.10 Coastal Zone Management, and 4.13 Air Quality, the Proposed Action will be consistent with Policies 33, 37, 38, 39, 41, and 43. All project construction activities will be conducted in accordance with applicable Federal, state, and USACE regulations for erosion and sediment control, stormwater runoff, protection of water quality during construction, and air quality. Project activities will comply with the requirements of the New York SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002) for ground disturbances involving 1 or more acres (0.4 or more hectares).

A site-specific stormwater pollution prevention plan (SWPPP) will be prepared in accordance with NYSDEC standards, and New York SPDES permit requirements for construction sites disturbing 1 acre (0.4 hectare) or more to have an erosion and sediment control plan (ESCP). Therefore, prior to the start of Project construction, preparation of an ESCP is required in accordance with the NYSDEC *Standards and Specification for Erosion and Sediment Control* (NYSDEC 2005). The ESCP will be included in the site-specific SWPPP prepared for the Project, and will identify site conditions and temporary and permanent erosion, sediment, and stormwater risk management measures. Any erosion protection structures deemed necessary in the plan for long-term erosion control in and around the Project site will be designed, constructed, and maintained according to NYSDEC and United States Environmental Protection Agency standards. Temporary measures that may be implemented during construction include stabilized construction entrances, stormwater inlet protection, silt fence, and erosion control blankets.

If all applicable policies and guidelines are followed, no adverse impacts on natural resources and property from flooding and erosion are anticipated to result from the implementation of the Proposed Action.

Operation of the Project is expected to improve water quality within the study area by reducing erosion and sedimentation, resulting from channel improvements and streambank stabilization activities that will occur because of the flood risk management improvements associated with the Proposed Action. The Project has been designed to reduce the potential for flood risks within the study area for a 100-year flood event. Short-term minor adverse and long-term beneficial effects on water resources are expected from implementing the Proposed Action, though any potential adverse impacts to surface water will be minimized by using appropriate site-specific BMPs and by complying with all applicable regulations for stormwater management and in-stream work.

Construction activities will be designed to reduce the potential for hazardous material spills; however, if a hazardous material spill does occur, USACE will report, contain, and remediate the

affected area in accordance with Army and NYSDEC regulations, and the Project-specific SWPPP and ESCP. Under the Proposed Action, all solid wastes and construction debris generated by the Project will be transported, stored, treated, and disposed of in accordance with applicable Federal and New York policies. No significant adverse impacts on groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources are anticipated to result from implementation of the Proposed Action.

The Project has been assessed for consistency with national and New York air quality standards. Emissions attributable to the project will be below the General Conformity Rule applicability thresholds. No adverse impacts on air quality are anticipated to result from implementation of the Proposed Action.

Policy 44 – Wetlands Policy

Policy 44 – Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas. Tidal wetlands include the following ecological zones: coastal fresh marsh; intertidal marsh; coastal shoals, bars and flats; littoral zone; high marsh or salt meadow; and formerly connected tidal wetlands. These tidal wetland areas are officially delineated on NYSDEC's Tidal Wetlands Inventory Map. Freshwater wetlands include marshes, swamps, bogs, and flats supporting aquatic and semi-aquatic vegetation and other wetlands so defined in the New York State Freshwater Wetlands Act and the New York State Protection of Waters Act. Benefits derived from the preservation of tidal and freshwater wetlands include but are not limited to: habitat for wildlife and fish, including a substantial portion of New York's commercial finfish and shellfish varieties, and contribution to associated aquatic food chains; erosion, flood and storm control; natural pollution treatment; groundwater protection; recreational opportunities; educational and scientific opportunities; and aesthetic open space in many of the otherwise densely developed areas.

Determination – Based on the analyses in Section 4.4 Water Resources, the Proposed Action will be consistent with Policy 44. Project impacts to wetlands will be mitigated in accordance with permit requirements received from USACE and NYSDEC. On-site construction mitigation (BMPs) will be implemented as required by USACE and NYSDEC. Impacts will be minimized during construction by employing standard industry BMPs for construction work within wetlands and restoration of the riparian areas after work is completed. Following construction, temporary workspaces would be stabilized and revegetated by planting native trees and shrubs in forested wetlands.

Permanent impacts to wetlands (fill) will be mitigated in accordance with permit requirements, and will include on-site and/or off-site compensatory mitigation. Most of the permanently impacted wetlands will include the small pockets of palustrine scrub-shrub wetlands and possibly some amount of palustrine-forested wetlands located within and immediately adjacent to the river channels.

Sources:

NYSDEC (New York State Department of Environmental Conservation). 2005. New York State Standards and Specification for Erosion and Sediment Control. Prepared by the NYS Soil and Water Conservation Committee for the NYSDEC Division of Water. Albany, NY. Available online: http://www.dec.ny.gov/chemical/29066.html (Accessed August 23, 2013).

NYSDOS (New York State Department of State). 2001. State Coastal Policies. NYSDOS Coastal Management Program. Albany, New York. Available online: http://www.dos.ny.gov/communitieswaterfronts/pdfs/CoastalPolicies.pdf (Accessed August 23, 2013).

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APPENDIX E

Clean Air Act Emissions Calculations and Compliance Documentation

- **Table E-1. Construction Equipment Use**
- **Table E-2. Construction Equipment Emission Factors (lbs/hour)**
- **Table E-3. Construction Equipment Emissions (tons)**
- **Table E-4. Emissions from Heavy Trucks**
- **Table E-5. Particulates from Surface Disturbance**
- **Table E-6. Emissions from Construction Worker Commutes**
- **Table E-7. Total Construction Emissions (tons per year)**
- **Record of Non-Applicability (RONA)**

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RECORD OF NON-APPLICABILITY

In Accordance with the Clean Air Act-General Conformity Rule
for the
Mamaroneck and Sheldrake Rivers Flood Risk Management Project, Village of Mamaroneck,
Westchester County, New York

December 22, 2015

The US Army Corps of Engineers, New York District proposes to construct a flood risk management project along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, Westchester County, New York. The proposed project will include channel modification, the installation of a culvert underneath a parking lot in Columbus Park, the removal and/or replacement of bridges and the flood-proofing of approximately nine structures. As a result of action, the proposed project would generate new direct and indirect emissions from construction of the proposed project. Westchester County is designated as a moderate ozone (8-hour) non-attainment area in the ozone transport region and a non-attainment area for $PM_{2.3}$ therefore NO_x, VOC, SO_2 and $PM_{2.3}$ thresholds apply.

General Conformity under the Clean Air Act, Section 176, has been evaluated according to the requirements of Title 40 of the Code of Federal Regulations, Part 93, Subpart B. The requirements of this rule are not applicable to this action because:

> The highest total annual direct and indirect emissions from the Preferred Alternative has been estimated at 52.9 tons of nitrogen oxides (NO_x), 6.8 tons of volatile organic compounds (VOCs), 2.9 tons of $PM_{2.5}$ and 10.9 tons of SO_2, which is below the applicability threshold values of 50 tons (45.4 metric tons), VOCs and 100 tons (90.7 metric tons) for NO_x, $PM_{2.5}$, and SO_2.

Westchester County is in attainment for all other criteria pollutants and therefore not subject to a further general conformity analysis. Supporting documentation and emission estimates:

(**X**) Are Attached (E1-E7)

( ) Appeared in the National Environmental Policy Act documentation

( ) Other (not necessary)

_____

Peter Weppler
Chief, Environmental Analysis Branch
Planning Division
US Army Corps of Engineers, New York District

Table E-1. Construction Equipment Use

	Number of Units							
Equipment Type	**Clearing**	**Grading**	**Cut and Fill**	**Concrete**	**Bridge Construction**	**Total**	**Hours Per Day**	**Operating Hours**
Excavators		1	2		1	4	12	14,400
Rollers		1				1	6	1,800
Rubber Tired Dozers	1	1	2			4	12	14,400
Plate Compactors		1				1	6	1,800
Air Compressors				2		2	6	3,600
Cement Mixers				2	1	3	6	5,400
Cranes	1				1	2	6	3,600
Loaders/Backhoes	1		2	2	1	6	12	21,600
Off-Highway Trucks	1		2		1	4	6	7,200
Other Construction Equipment	2	1	2	2	1	8	6	14,400

Table E-2. Construction Equipment Emission Factors (lbs/hour)

Equipment	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Excavators	0.5828	1.3249	0.1695	0.0013	0.0727	0.0727	119.6
Rollers	0.4341	0.8607	0.1328	0.0008	0.0601	0.0601	67.1
Rubber Tired Dozers	1.5961	3.2672	0.3644	0.0025	0.1409	0.1409	239.1
Plate Compactors	0.0263	0.0328	0.0052	0.0001	0.0021	0.0021	4.3
Air Compressors	0.3782	0.7980	0.1232	0.0007	0.0563	0.0563	63.6
Cement Mixers	0.0447	0.0658	0.0113	0.0001	0.0044	0.0044	7.2
Cranes	0.6011	1.6100	0.1778	0.0014	0.0715	0.0715	128.7
Loaders/Backhoes	0.4063	0.7746	0.1204	0.0008	0.0599	0.0599	66.8
Off-Highway Trucks	0.8499	2.7256	0.2730	0.0027	0.0989	0.0989	260.1
Other Construction Equipment	0.4504	1.1575	0.1215	0.0013	0.0503	0.0503	122.8

Source CARB 2011

Table E-3. Construction Equipment Emissions (tons)

Equipment	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Excavators	4.1965	9.5393	1.2205	0.0095	0.5237	0.5237	861.0
Rollers	0.3907	0.7746	0.1195	0.0007	0.0541	0.0541	60.3
Rubber Tired Dozers	11.4916	23.5238	2.6237	0.0177	1.0144	1.0144	1721.6
Plate Compactors	0.0237	0.0296	0.0046	0.0001	0.0019	0.0019	3.9
Air Compressors	0.6807	1.4364	0.2218	0.0013	0.1014	0.1014	114.5
Cement Mixers	0.1208	0.1775	0.0304	0.0003	0.0120	0.0120	19.6
Cranes	1.0820	2.8981	0.3201	0.0025	0.1288	0.1288	231.6
Loaders/Backhoes	4.3885	8.3653	1.3004	0.0084	0.6467	0.6467	721.5
Off-Highway Trucks	3.0595	9.8123	0.9826	0.0096	0.3561	0.3561	936.5
Other Construction Equipment	3.2426	8.3341	0.8748	0.0091	0.3625	0.3625	884.0
Total	28.7	64.9	7.7	<0.1	3.2	3.2	5,554.4

Table E-4. Emissions from Heavy Trucks

Number of Trucks	40.0						
Number of Trips	2						
Miles Per Trip	30						
Days of Construction	19						
Total Miles	46,041						
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Emission Factor (lbs/mile)	2.2E-02	2.4E-02	3.0E-03	2.6E-05	8.6E-04	7.4E-04	2.7E+00
Total Emissions (lbs)	896.8	968.9	122.3	1.0	35.0	30.2	111,113.2
Total Emissions (tons)	0.45	0.48	0.06	0.0005	0.02	0.02	55.6

Source: CARB 2011

Table E-5. Particulates from Surface Disturbance

TSP Emissions	8.0	lb/acre				
PM_{10}/TSP	0.45					
$PM_{2.5}$/PM_{10}	0.15					
Period of Disturbance	30	days				
Capture Fraction	0.5					
Roadways/Bridges	Area [acres]	TSP [lbs]	PM_{10} [lbs]	PM_{10} [tons]	$PM_{2.5}$ [lbs]	$PM_{2.5}$ [tons]
All Construction	8.0	19,200	8,640	4.32	648	0.32

Source: USEPA 1995 and 2005

Table E-6. Emissions from Construction Worker Commutes

Number of Workers	70						
Number of Trips	2						
Miles Per Trip	30						
Days of Construction	300						
Total Miles	243,600						
Pollutant	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Emission Factor (lbs/mile)	1.1E-02	1.1E-03	1.1E-03	1.1E-05	8.5E-05	5.3E-05	1.1E+00
Total Emissions (lbs)	13,291	1,390	1,360	14	107	67	1,385,411
Total Emissions (tons)	6.65	0.69	0.68	13.5	<0.1	<0.1	693

Source: CARB 2011

Table E-7. Total Construction Emissions (tons per year)

Activity/Source	**CO**	**NO_x**	**VOC**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**CO_2**
Heavy Equipment	28.68	64.89	7.70	0.0590	3.20	3.20	5,554.4
Painting	0.51	0.55	0.07	0.0006	0.02	0.02	62.6
Delivery of Equipment	0.00	0.00	0.00	0.0000	0.44	0.03	0.0
Surface Disturbance	1.28	0.13	0.13	2.6181	0.01	0.01	133.9
Worker Commutes	30.5	65.6	7.9	2.7	3.7	3.3	5,750.9
Total Emissions (NED Plan)	28.6	52.9	6.8	10.9	6.1	2.9	5,042

Source: CARB 2011, SCAQMD 1993, USEPA 1995

References:

CARB (California Air Resources Board). 2011. EMFAC Emission Rates Database. Available online: http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/rateSelectionPage_1.jsp (Accessed September 2012).

SCAQMD (South Coast Air Quality Management District). 1993. CEQA Air Quality Handbook. South Coast Air Quality Management District, Diamond Bar, CA.

USEPA (U.S. Environmental Protection Agency). 1995. Compilation of Air Pollutant Emission Factors, AP-42, 5th edition, Vol. I: Stationary Point and Area Sources. Available online: http://www.epa.gov/ttnchie1/ap42/ (Accessed September 2012).

USEPA. 2005. Methodology to Estimate the Transportable Fraction (TF) of Fugitive Dust Emissions for Regional and Urban Scale Air Quality Analyses. Available online: http://www.epa.gov/ttnchie1/emch/dustfractions/transportable_fraction_080305_rev.pdf (Accessed September 2012).

APPENDIX F
Clean Water Act Section 404(B)(1) Guidelines Evaluation

SECTION 404 (b) (1) GUIDELINES EVALUATION MAMARONECK & SHELDRAKE RIVERS FLOOD RISK MANAGEMENT GENERAL REEVALUATION REPORT MAMARONECK, NEW YORK

INTRODUCTION

This document presents an evaluation of the Mamaroneck and Sheldrake Rivers, Flood Risk Management, General Reevaluation Report Mamaroneck, NY (Study) pursuant to the Clean Water Act section 404 (b)(1) guidelines. Specifically, this document evaluates the proposed construction of channel modifications, retaining walls, bridge removal and replacement, and trapezoidal cuts along the Mamaroneck and Sheldrake rivers in Mamaroneck, NY.

404(b) (1) EVALUATION

I PROJECT DESCRIPTION

A) Location

The Study area is located in the Village of Mamaroneck, Westchester County, NY. The project area is in and along the Mamaroneck and Sheldrake Rivers. Specifically, the study area is defined by the flood damage areas located in the Village of Mamaroneck and the Town of Harrison, NY. On the Mamaroneck River, the damage area extends from below Tompkins Avenue upstream to the Westchester County Joint Water Works Dam. On the Sheldrake River damages occur from the confluence with the Mamaroneck River upstream to the Village line at the New England Thruway (I-95) Bridge.

B) General Description

The NED Plan (Alternative #1 Z) was selected by the District based on consideration of benefits from an assessment of damages avoided in accordance with economic and environmental USACE procedures. It involves channel modifications, retaining walls, bridge removal and replacement, a culvert under the railroad parking lot, and trapezoidal cuts along the Mamaroneck and Sheldrake rivers, as well as nonstructural measures potentially applied to a maximum of eight residences and one non-residential building. The NED Plan includes approximately 1.82 miles of channel work in the Mamaroneck and Sheldrake rivers. The average height of the new channel retaining walls will be 8.5 ft and the total combined length of new channel retaining walls in the entire Project area will be 4,360 ft.

Riprap and concrete was selected to protect the banks of the Mamaroneck and Sheldrake Rivers from erosion. This solution will stabilize the stream bank using techniques consistent with the requirements of the USACE, NYSDEC, Westchester County and the Town of Mamaroneck. The size and gradation of the riprap was determined following Corps of Engineers' procedures and methodology presented in EM 1110-2-1601, 1 July 1991, revised 30 June, 1994. Approximately 1,200 linear feet of riprap (i.e.; 13,000 square feet, 600 cubic yards) will be used for the Mamaroneck and Sheldrake Rivers. About 500 feet of riprap will be located roughly 200 feet both upstream

and downstream of the N. Barry Ave Extension Bridge over the Mamaroneck River and 700 feet of riprap will be placed at the 90 degree turn in the Sheldrake River located downstream of the Fenimore Rd. Bridge. Also, due to high velocities and structural considerations along the Mamaroneck River from the Station Plaza Bridge to just downstream of the Halstead Ave Bridge, 300 LF concrete will placed along the bottom of the stream prevent scour under and around the footings of these three bridges.

Channel work on the segment of the Mamaroneck River south of I-95 and upstream of the confluence with Sheldrake River will total approximately 2,400 ft (732 m), and channel work on the segment stretching from south of the confluence to just downstream of the Tompkins Avenue Bridge also will total approximately 2,400 ft (732 m). In both segments, the river channel will be deepened and widened to 1:2.5 side slopes, and the channel bottom will be widened to 45 ft (14 m) with 0.25% slope. The removal and replacement of retaining walls and utilities will be necessary in certain locations including the removal/replace of the Ward Avenue Bridge.

Channel work on the Sheldrake River from Fenimore Road to the confluence in Columbus Park will total approximately 3,470 ft (1,058 m). The river channel will be deepened and widened to 33 feet wide and 3.4 ft cut with 0.25% slope. Rectangular channel modification will be executed, upstream of Mamaroneck Avenue Bridge. The removal and replacement of retaining walls and utilities will be necessary in certain locations including the removal/replacement of Waverly Avenue Bridge and the removal of the Center Avenue footbridge. Two footbridges in Columbus Park (footbridge #1, near the confluence, and footbridge #2, closer to the southern edge of the park across from Station Plaza) also will be removed and not replaced.

Near the confluence of the rivers, an overflow diversion culvert under the commuter parking lot located on the left bank (north side) of the river will be constructed. The culvert will start just downstream of the Jefferson Ave Bridge and discharge almost directly into the Rail Road Bridge opening.

The culvert will be about 390 feet long with a slope of 0.36 feet per 100 feet, 25 feet wide, 8 feet high, will be about 3 feet above the proposed bottom of the river and about 3.5 feet under the finish grade of the parking lot. The culvert will be (high and) dry during normal flows but it will divert a portion of the Mamaroneck River flows for a one year event or greater.

In addition to channel modifications along both rivers, the NED Plan will have a nonstructural component along the Mamaroneck and Sheldrake rivers. A total of nine (9) structures were selected based on a benefit-cost evaluation. Eight of these are residential properties in the Harbor Heights neighborhood just south of the Mamaroneck River, all of which are candidates for structure elevation, or raising). The ninth structure is a nonresidential property in the Village's industrial area along Fenimore Road and just south of the Sheldrake River, which is a candidate for the construction of a ringwall. All nonstructural actions are contingent upon owner approval and will adhere to construction standards outlined in Village Code Chapter 186-5 that apply to the improvement of structures located in areas of special flood hazard (Village of

Mamaroneck 1987).

C) **Authority and Purpose**

The Federal government authorized the study of the water resource problems and potential solutions along the Mamaroneck and Sheldrake rivers in the Village of Mamaroneck, Westchester County, New York under resolutions adopted September 14, 1955 and November 14, 1955 by the United States Senate Committee on Public Works, and a resolution adopted June 13, 1956 by the United States House of Representatives Committee on Public Works (USACE New York District 2011a).

D) **General Description of Fill Material**

1) *Characteristics of Material*

The riprap consists of a 12-inch thick layer of riprap applied over a 6-inch stone bedding layer. If a geo-textile material is used instead of a 6-inch granular bedding layer for the bottom, riprap a non-woven or geo-web product will be specified.

2) *Quantity of Material*

Approximately 1,200 linear feet of riprap (i.e.; 13,000 square feet, 600 cubic yards) will be used mainly on the bottom of the Mamaroneck and Sheldrake Rivers. About 500 feet of riprap will be located roughly 200 feet both upstream and downstream of the N. Barry Ave Extension Bridge over the Mamaroneck River and 700 feet of riprap will be placed at the 90 degree turn in the Sheldrake River located downstream of the Fenimore Rd. Bridge. Also, due to high velocities and structural considerations along the Mamaroneck River from the Station Plaza Bridge to just downstream of the Halstead Ave Bridge, 300 LF concrete will placed along the bottom of the stream prevent scour under and around the footings of these three bridges.

3) *Source of Material*

Sources for fill material may include on-site and off site substrate dependent upon the composition of soils at the site-specific locations. Rocks and concrete materials will be obtained from commercial sources proximal to the site.

E) **Description of the Proposed Discharge Sites**

1) *Location*

The Study area location is described in I (a), above.

2) *Size*

The size/dimensions of the hurricane and storm damage reduction measures are described in I (d), above.

3) *Type of Site*

The project area is urbanized in nature bounded by houses on both sites.

4) *Types of Habitat*

Highly urbanized rivers with human induced bank alterations in the form of stone and concrete walls, bridge crossings, and rip rap.

5) *Time and Duration of Disposal*

Construction is scheduled to begin in February 2018 and ended in February 2020.

6) *Description of Disposal Method*

Excavated material will be reused on site as backfill material for shoreline stabilization structures. Any excess excavated material will be disposed of in an approved landfill. Clean fill material will be obtained from a suitable source.

II FACTUAL DETERMINATION

A) Physical Substrate Determinations

1) *Substrate Evaluation and Slope*

The substrate is about 10 NGVD with a moderate slope of 12 ft. per mile.

2) *Sediment Type*

Both rivers consist of cobble, boulder, and lesser amounts of sand. A bedrock layer exists 10-20 feet below the river bottom.

3) *Dredged/Fill Material Movement*

Material is not anticipated to move.

4) *Physical Effects on Benthos*

Some benthic invertebrates may be buried or smothered. However, long-term adverse effects to benthic communities are not anticipated. Beneficial impacts on the benthic community include stabilizing the existing stream banks to prevent future erosion and decrease water quality. Recolonization is expected after construction with recruitment from nearby, unaffected areas.

5) *Other Effects*

No major impacts are anticipated.

6) *Actions Taken to Minimize Impacts*

The Selected Plan was specifically designed to minimize impacts and to fill areas necessary for a comprehensive flood damage reduction plan. Best management practices will be utilized to minimize the impacts due to construction, such as silt fencing, hay bales, and other erosion and sediment control measure.

B) Water, Circulation, Fluctuations and, Salinity Determinations

1) *Salinity*

No effect

2) *Water Chemistry*

No effect

3) *Clarity*

Water clarity may be slightly impacted during construction activities; No long-term effect is anticipated.

4) *Color*

Minor short-term changes are possible due to turbid water resulting from the suspended solids during excavation

5) *Odor*

No effect

6) *Taste*

No effect

7) *Dissolved Gas Levels*

Potential short-term localized decrease in dissolved oxygen could occur if organic material is suspended in the water column

8) *Nutrients*

No effects

9) *Eutrophication*

No effect

10) *Others as Appropriate*

No other adverse impacts are anticipated from the project.

C) **Current Patterns and Circulation**

1) *Current Patterns and Flow*

No impacts are anticipated.

2) *Velocity*

The placement of the fill materials, revetments, terminal groins, levees, and floodwalls are not anticipated to have significant impacts to current velocity.

3) *Stratification*

No effect.

4) *Hydrologic Regime*

Peak flow will increase downstream of channel improvements and will decrease downstream of the culvert.

5) *Normal Water Level Fluctuations*

Water fluctuations are not anticipated fluctuate then current conditions.

6) *Salinity Gradients*

The project is not expected to affect the salinity gradients.

7) *Actions Taken to Minimize Impacts*

Best management practices will be used during construction to minimize impacts on clarity, color, dissolved gas levels, and eutrophication.

D) **Suspended Particulate/Turbidity Determinations**

1) *Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Sites*

There are no anticipated affects on turbidity and suspended sediment concentrations. If any increases occur, they will be highly localized, temporary, and readily dissipated by the currents.

2) *Effects on Chemical/Physical Properties of the Water Column:*

(a) Light Penetration

No reduction in light penetration is anticipated. If any were to occur, localized reductions will fall within the range of conditions that normally occur following heavy precipitation.

(b) Dissolved Oxygen

The project is not anticipated to have any impact on the basic chemical, dissolved oxygen, and nutrient attributes. Potential short-term, localized decrease in dissolved oxygen could occur if organic material is suspended into the water column.

(c) Toxic Metals and Organics

Excavation during construction may dislodge toxic metals and organics in the sediment. The USACE will conduct surveys to ensure that project activities will not impact contaminated areas. Should a contaminated area be unavoidable, the USACE will coordinate with all appropriate agencies and respond appropriately.

(d) Pathogens

Excavation during construction may dislodge pathogens in the sediment. The USACE will conduct surveys to ensure that Project activities will not impact contaminated areas. Should a contaminated area be unavoidable, the USACE will coordinate with all appropriate agencies and respond appropriately.

(e) Aesthetics

Temporary increase in turbidity may affect water clarity in the rivers. However, completion of the proposed Project will preserve and attract fish and wildlife species.

(f) Others as Appropriate

Not applicable

3) *Effects on Biota*

(a) Primary Production, Photosynthesis

Potential short-term disruption during construction. No major impacts are anticipated.

(b) Suspension/ Filter Feeders

Short-term disruption during construction are expected, however, no major impacts are anticipated.

(c) Sight Feeders

Fish and mobile invertebrates are generally capable of avoiding areas of degraded water quality. Therefore, no major impacts are anticipated.

4) *Actions Taken to Minimize Impacts*

Best management practices such as silt fences and hay bales will be utilized during construction to minimize potential impacts on existing and nearby nekton and benthic species.

E) Contaminant Determinations

All fill material will be clean and will not pose a risk. No known hazardous or toxic waste is known to be present on the site

F) Aquatic Ecosystem and Organism Determinations

1) *Effects on Plankton*

No significant effects

2) *Effects on Benthos*

Change or loss of substrate is expected to be temporary and localized. Re-colonization of the area is anticipated after project construction.

3) *Effects on Nekton*

The project is unlikely to have any significant, widespread, or long lasting effects on these highly mobile organisms. Due to their mobility, these organisms will avoid the site when conditions are unsuitable.

4) *Effects on Aquatic Food Web*

No long-term adverse effects are anticipated. However, excavation will cause a temporary shortage in food sources for nekton species. Nekton species are expected to relocate to nearby, unaffected portions of the rivers to seek food sources.

5) *Effects on Special Aquatic Sites*

(a) Sanctuaries and Refuges

Not applicable

(b) Wetlands

No impacts

(c) Mudflats

Not applicable

(d) Vegetated Shallows

Not applicable

(e) Coral Reefs

Not Applicable

(f) Riffle and Pool Complexes

Not applicable

6) *Threatened and Endangered Species*

The American eel is currently under consideration for listing by the U.S. Fish and Wildlife Service. The project is not anticipated to impact the eel. There are no other threatened or endangered species within the project area.

7) *Other Wildlife*

The project will not have any significant long-term impacts on the waterfowl, birds, reptiles, amphibians, or mammals in the project area. Due to the mobility of wildlife, many will avoid the site if conditions are temporarily unsuitable.

8) *Actions to Minimize Impacts*

Best management practices will be employed.

G) Proposed Disposal Site Determinations

1) *Mixing Zone*

Not applicable

2) *Determination of Compliance with Applicable Water Quality Standards*

Any exceedance of state water quality standards would be temporary and only during the construction phase of the Project.

3) *Potential Effects on Human Use Characteristic*

(a) Municipal and private water supplies

The project is not expected to impact municipal and private water supplies.

(b) Recreational and Commercial Fisheries

The project is not expected to have any adverse impacts to recreational or commercial fisheries.

(c) Water Related Recreation

The project is not expected to have any adverse impacts to water related recreation, as access to the water is difficult water is shallow and fish species are low.

(d) Aesthetics

The aesthetics of the project area have already been somewhat degraded due to the eroding shoreline and the presence. The proposed project will prevent further impairment of the embankments through the installation of new stabilization features. Removal of any vegetation will be replaced with native species.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

Not Applicable

(f) Determination of Cumulative Effects on the Aquatic Ecosystem

No cumulative effects from this project are expected on the aquatic ecosystem.

(g) Determination of Secondary Effects on the Aquatic Ecosystem

No secondary effects on the aquatic ecosystem are expected from this project.

III FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

- No significant adaptation of the Section 404(b) (1) guidelines was made relative to this evaluation.
- The objective of flood risk management necessitates channelization and bank stabilization.
- The proposed activity will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.
- The proposed disposal operations will not harm any endangered species or its critical habitat under the Endangered Species Act of 1973 or Essential Fish Habitat under the Magnuson Stevens Fisheries Conservation and Management Act.
- The proposed discharge of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be significantly affected.
- Appropriate steps to minimize potential adverse impacts of the discharge of fill material include the implementation of an erosion and sediment control plan and judicious engineering practices

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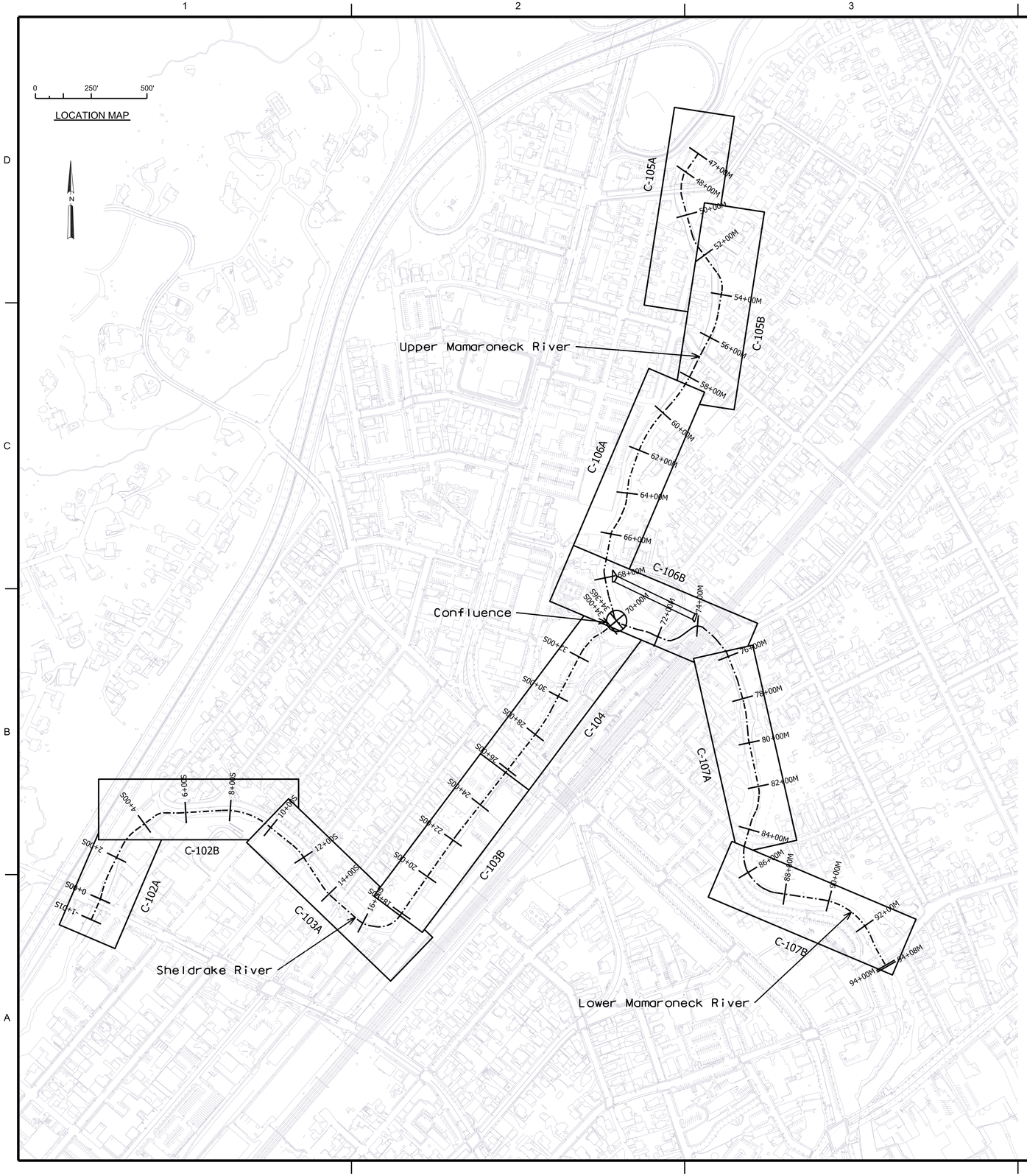
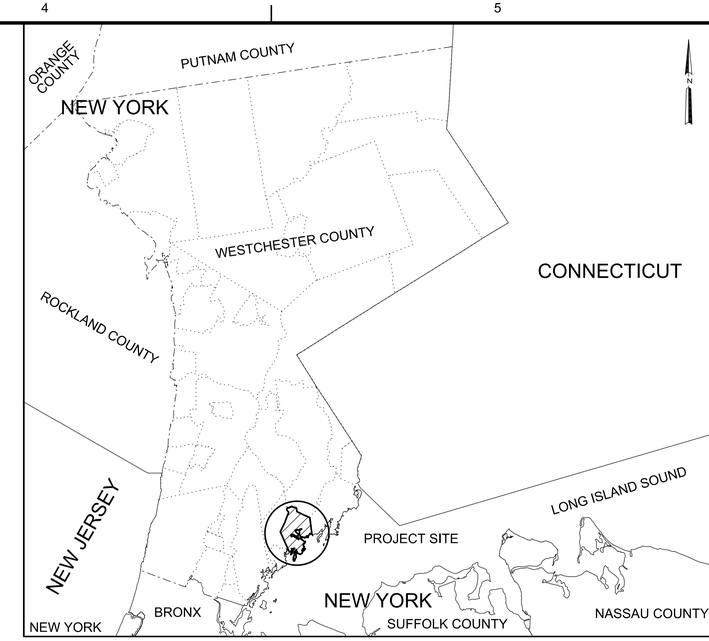
APPENDIX G

Project Plan Sheets





VICINITY MAP
NTS

ALTERNATIVE #1Z

CHANNEL	AREA	WIDTH	STA. BEGIN	STA. END
Mamaroneck	Upper/Lower	45'	47+00M	94+07.86M
Sheldrake	n/a	30'	0+00S	14+10S
Sheldrake	n/a	transition 30' - 33'	14+10S	14+30S
Sheldrake	n/a	33'	14+30S	28+00S
Sheldrake	n/a	transition 33' - 25'	28+00S	28+20S
Sheldrake	n/a	25'	28+20S	34+36.44S

GENERAL NOTES

1. EXISTING SURVEY DATA AS SHOWN ON THESE DRAWINGS WAS PREPARED BY ROGERS SURVEYING, PLLC (STATEN ISLAND, NY) IN 2013.
2. THE HORIZONTAL CONTROL IS BASED ON SURFACE COORDINATES APPLIED TO THE NEW YORK STATE EAST STATE PLANE COORDINATE SYSTEM (NAD83).
3. THE VERTICAL CONTROL IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. THE BORING LOCATIONS AND ELEVATIONS WERE COLLECTED FROM THE GENERAL DESIGN MEMORANDUM, FLOOD CONTROL PROJECT FOR THE MAMARONECK AND SHELDRAKE RIVERS BASIN IN THE VILLAGE OF MAMARONECK, NY, VOLUME 3 OF 6, APPENDIX C, GEOLOGICAL AND SOILS INVESTIGATIONS, JANUARY 1989. THE BORING LOCATIONS WERE REPROJECTED TO THE 2013 SURVEY HORIZONTAL CONTROL DATA. HOWEVER, THE ELEVATION ERRORS ARE UNDEFINED AND CANNOT BE FULLY QUANTIFIED.

US Army Corps of Engineers®
New York District

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

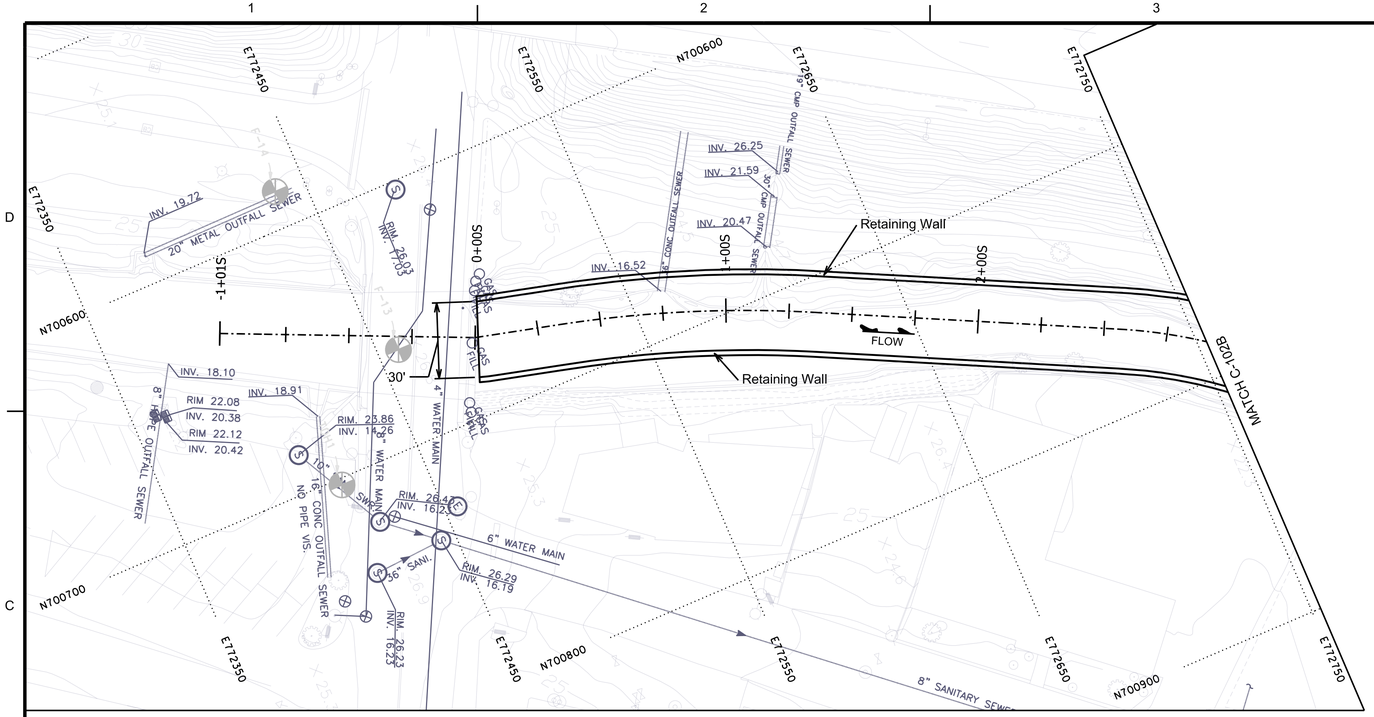
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
NEW YORK, NEW YORK

DESIGNED BY:
DWN BY: NAS
CKD BY:
SUBMITTED BY: NAS
PLOT SCALE: 1=250'
PLOT SIZE: ANSI D
DATE: 23 SEP 2015
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
ISSUE DATE: 23 SEP 2015
FILE NAME: MAMSHELESC-CF101XXX.dgn

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

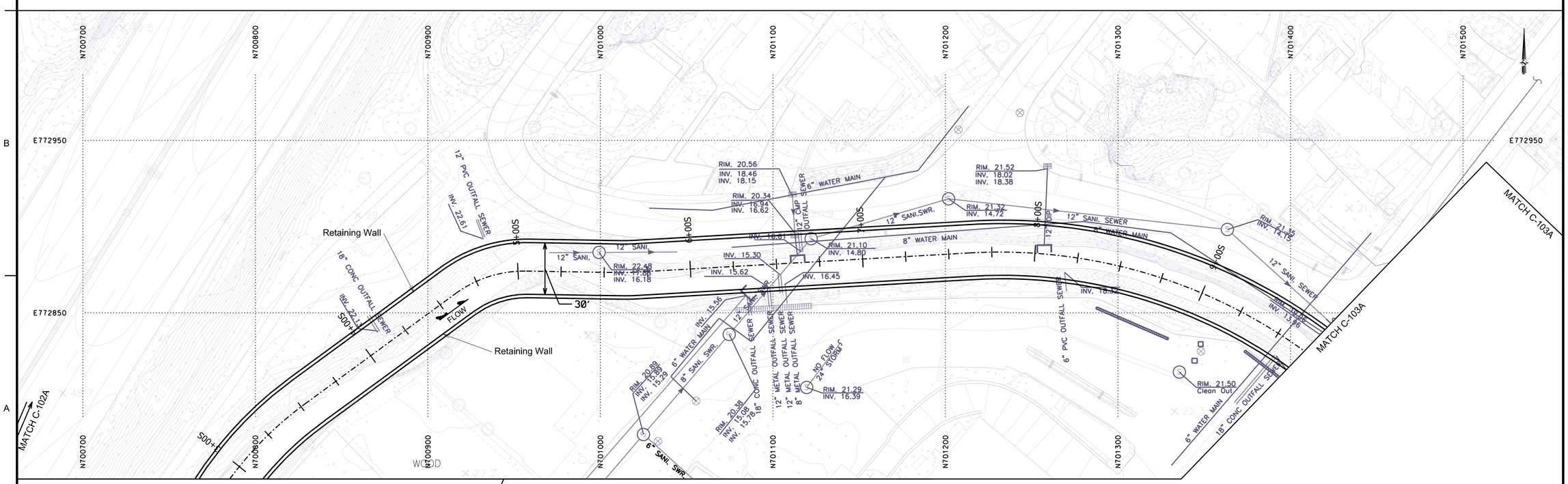
GENERAL SITE PLAN

SHEET IDENTIFICATION
C-101



PLAN VIEW C-102A

0 30' 60'



PLAN VIEW C-102B

0 30' 60'

Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

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New York District

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NEW YORK DISTRICT
NEW YORK, NEW YORK

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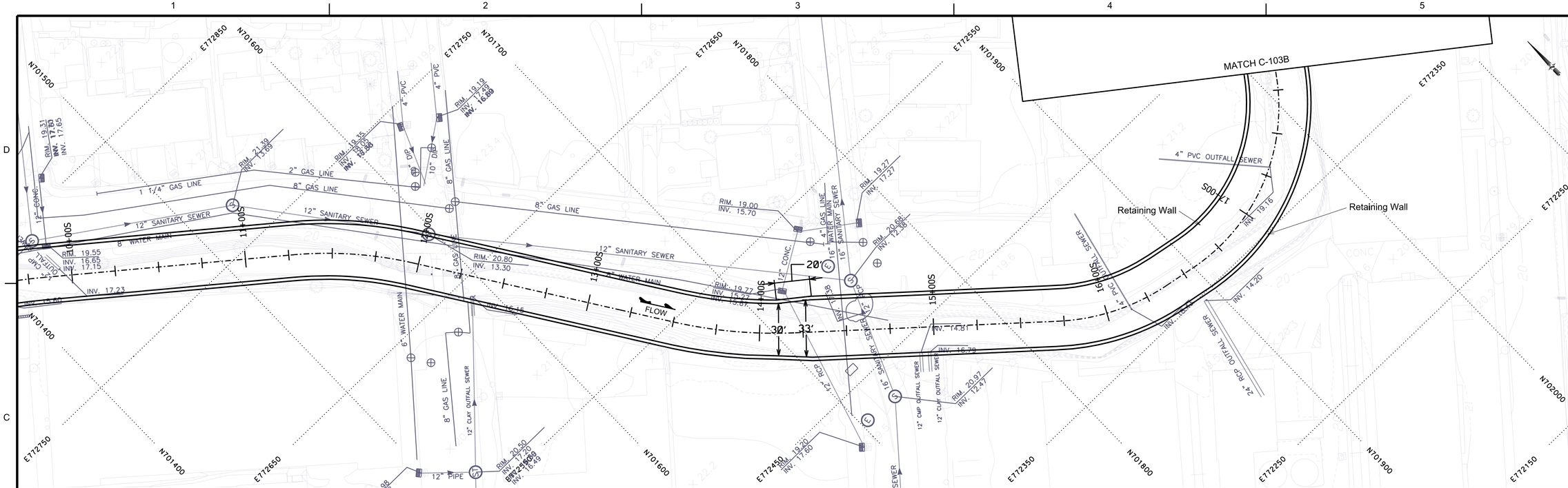
DWN BY: NAS	CKD BY:
SOLICITATION NO.:	
SUBMITTED BY: NAS	CONTRACT NO.:
PLOT SCALE: 1=50'	ISSUE DATE: 23 SEP 2015
FILE NUMBER:	
SIZE: ANSI D	FILE NAME: MAMSHELF-C-102XXX.dgn

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

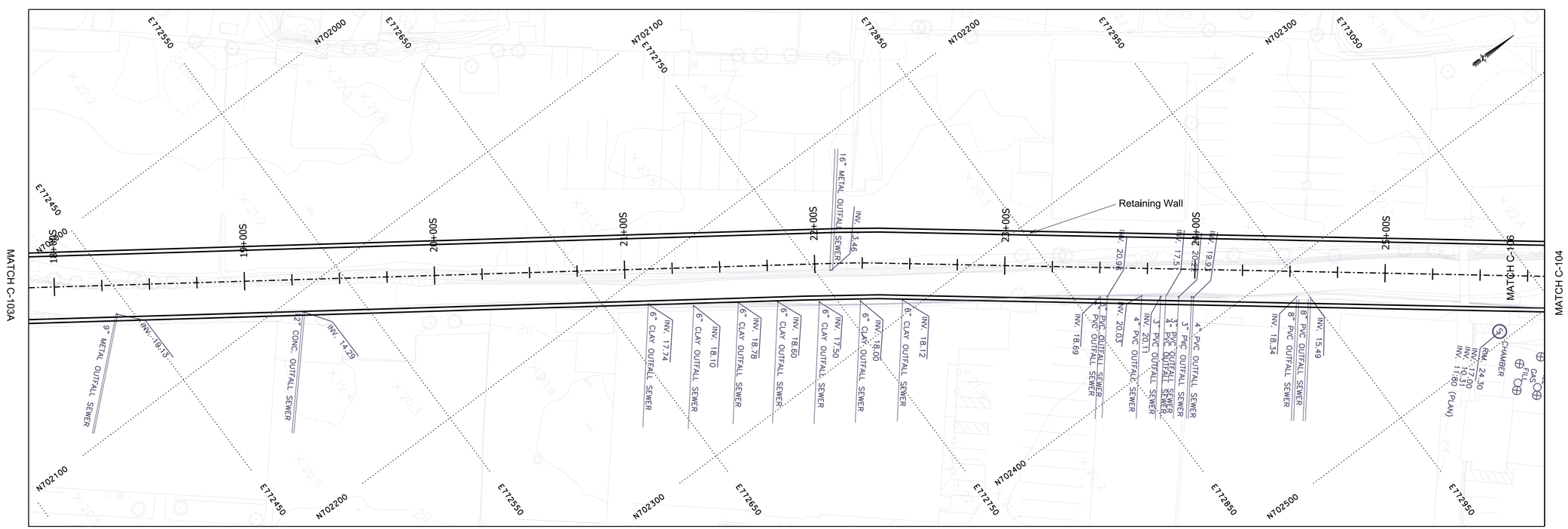
SITE PLAN - SHELDRAKE
0+00S to 9+50S

SHEET IDENTIFICATION
C-102



PLAN VIEW C-103A

0 30' 60'



PLAN VIEW C-103B

0 30' 60'

Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

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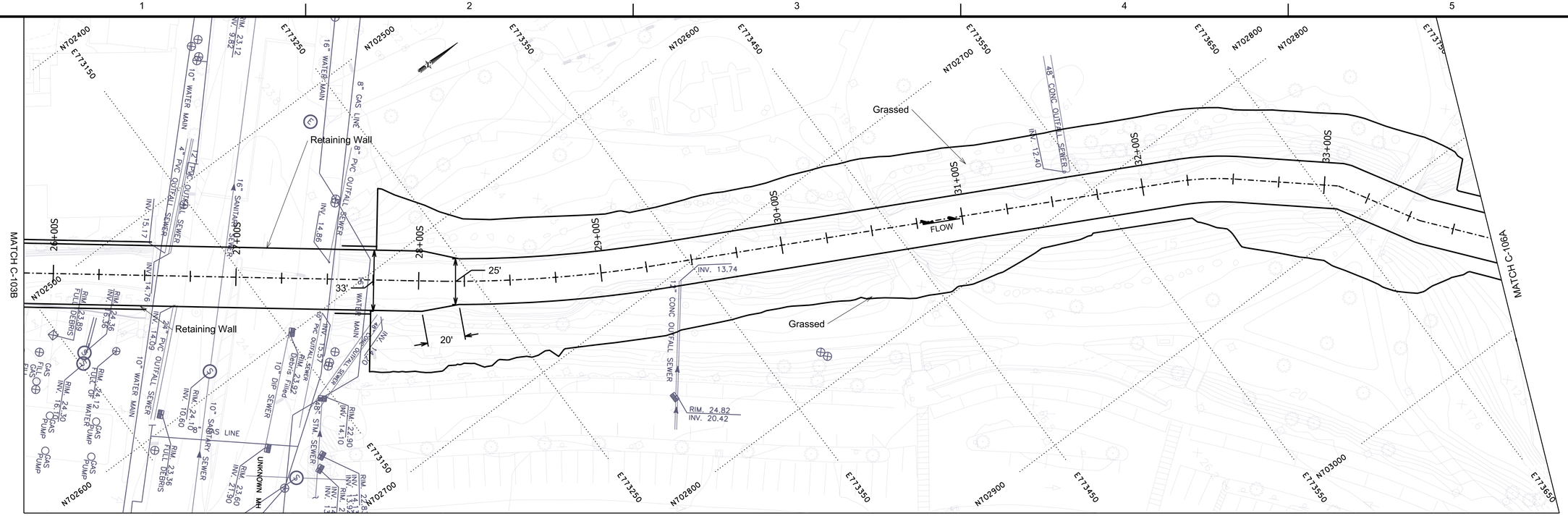
DWN BY: NAS	CKD BY:	SOLICITATION NO.:
SUBMITTED BY: NAS		CONTRACT NO.:
PLOT SCALE: 1=50'	ISSUE DATE: 18 SEP 2015	FILE NUMBER:
SIZE: ANSI D	FILE NAME: MAMSHELFC-C104.dgn	

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

SITE PLAN - SHELDRAKE
9+75S to 25+75S

SHEET IDENTIFICATION
C-103



Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

PLAN VIEW C-104

0 30' 60'

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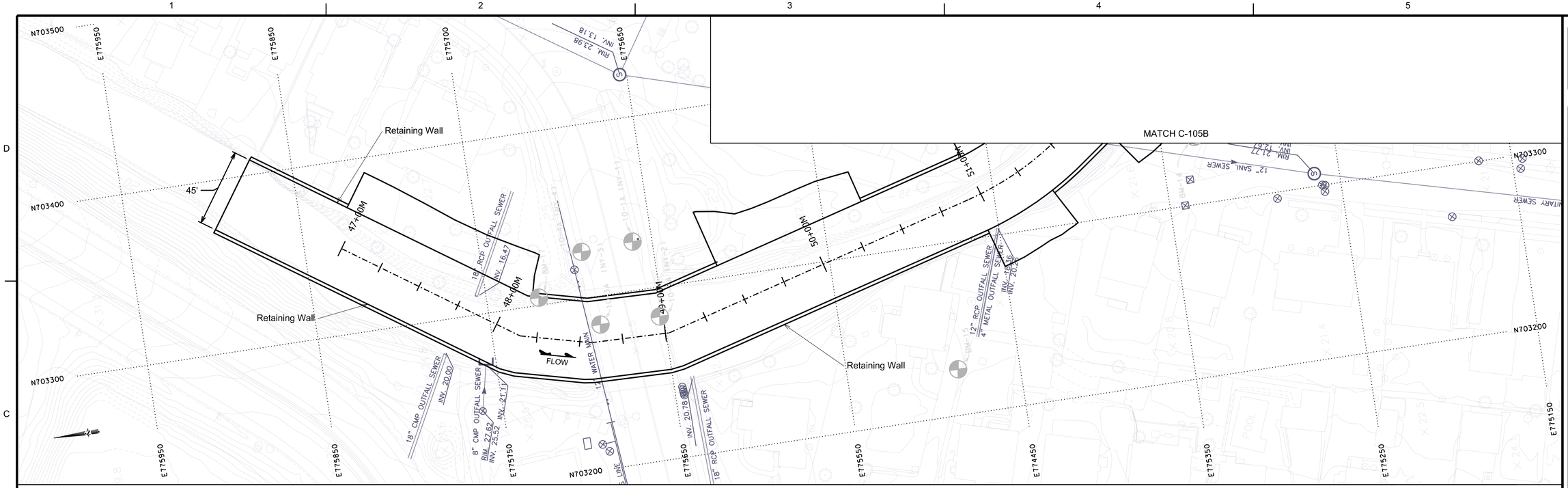
SOLICITATION NO.:
SUBMITTED BY: NAS
CONTRACT NO.:
PLOT SCALE: 1" = 30'
ISSUE DATE: 23 SEP 2015
FILE NUMBER:
SIZE: ANSI D
FILE NAME: MAMSHELFC-C106.dgn

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

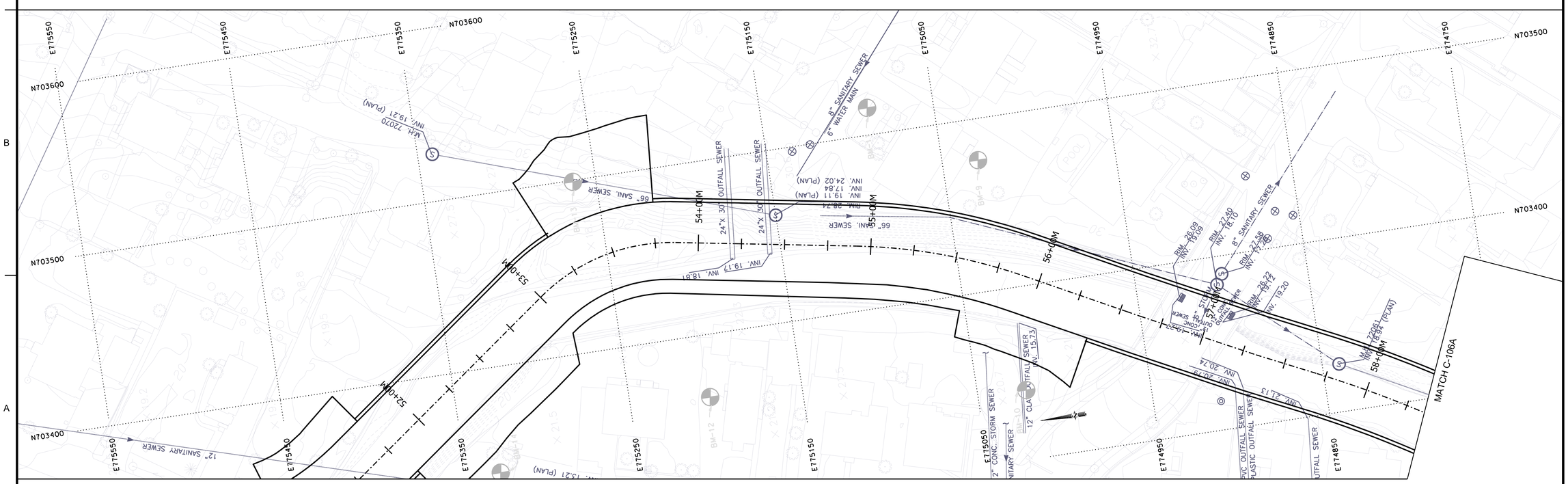
SITE PLAN - SHELDRAKE
26+00S to 33+75S

SHEET IDENTIFICATION
C-104



PLAN VIEW C-105A

0 30' 60'



PLAN VIEW C-105B

0 30' 60'

Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

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PLOT SCALE: 1:50	ISSUE DATE: 23 SEP 2015	FILE NUMBER:	
SIZE: ANSI D	FILE NAME:		

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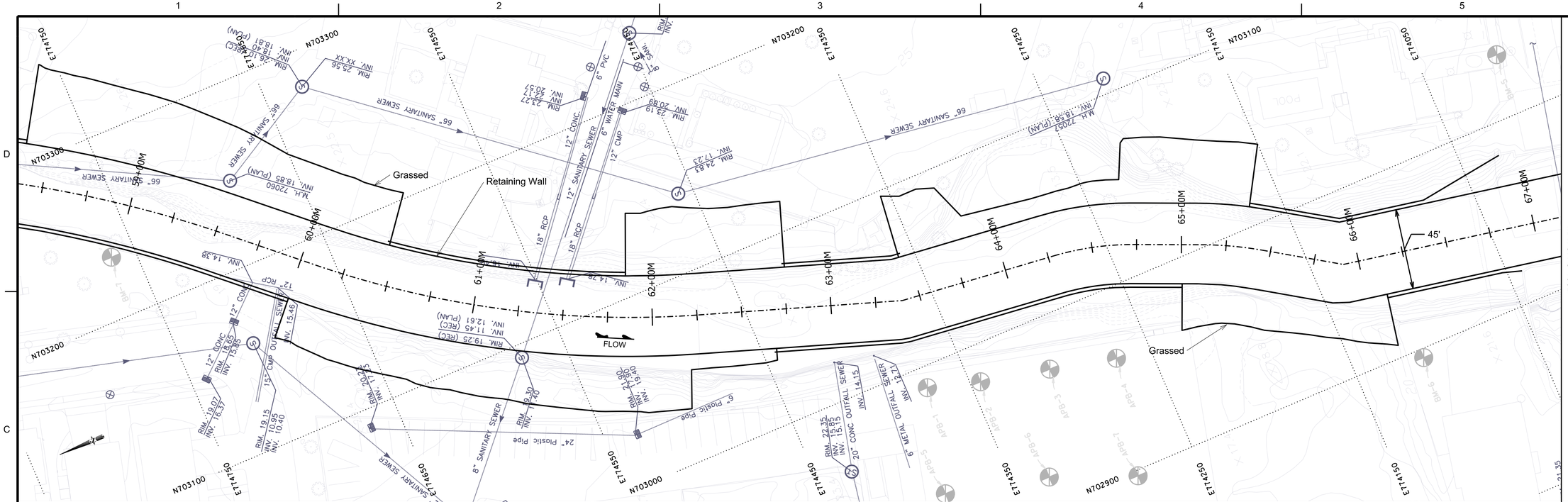
MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

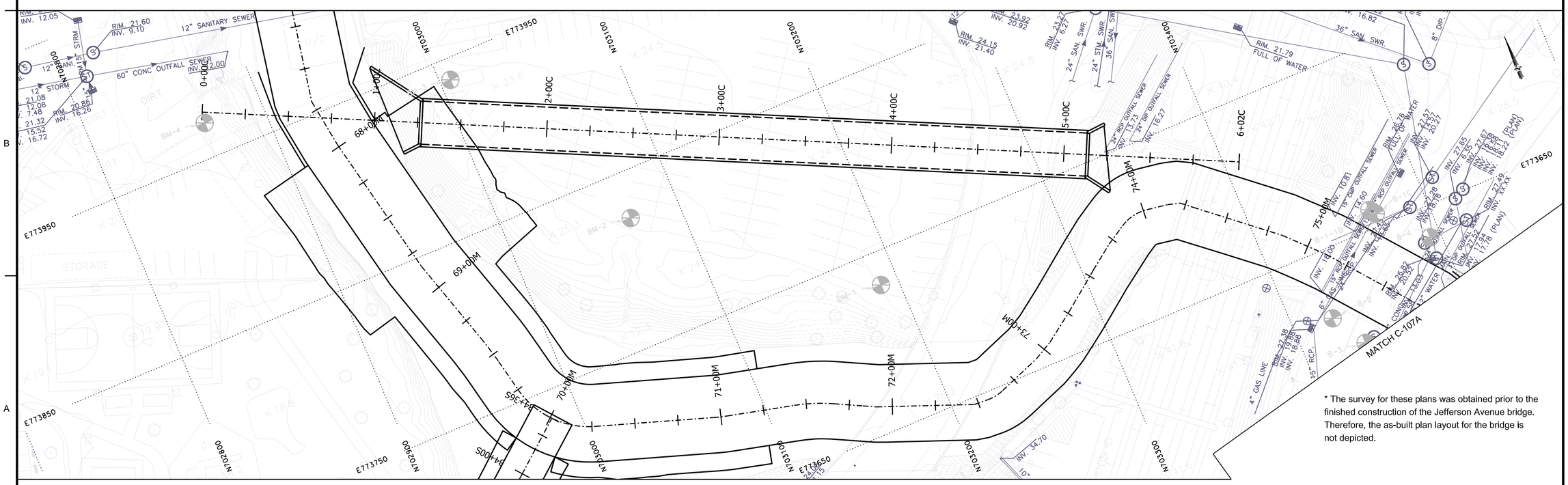
SITE PLAN - MAMARONECK
47+00M to 58+50M

SHEET IDENTIFICATION
C-105



PLAN VIEW C-106A

0 30' 60'



PLAN VIEW C-106B

0 30' 60'

* The survey for these plans was obtained prior to the finished construction of the Jefferson Avenue bridge. Therefore, the as-built plan layout for the bridge is not depicted.

Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

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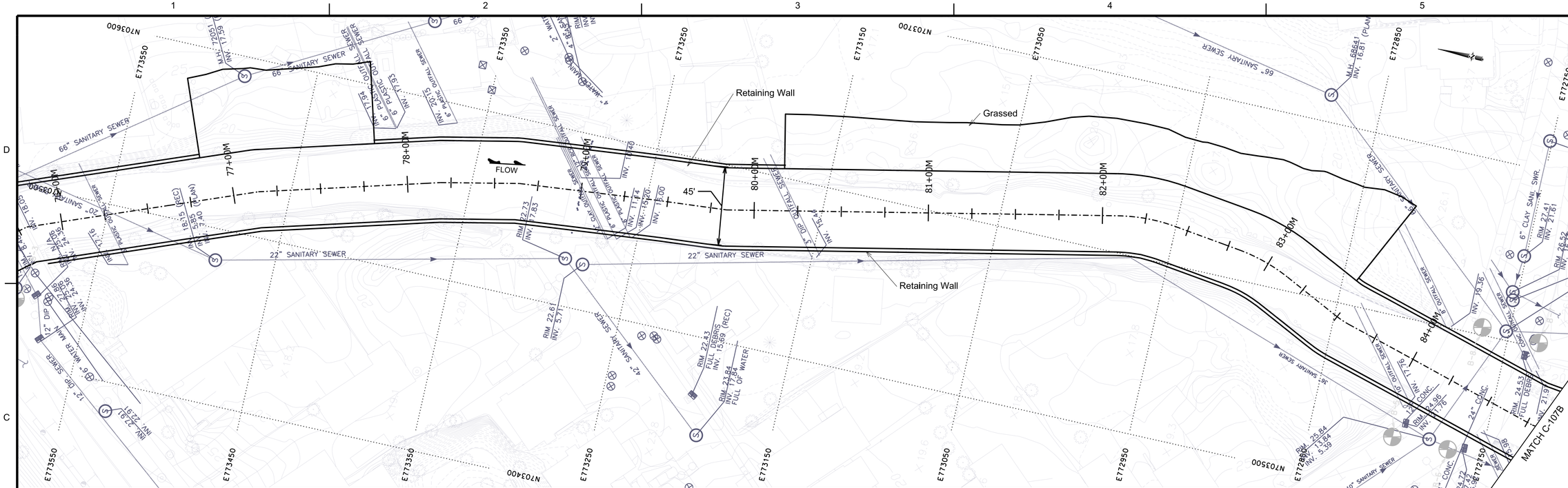
FILE NUMBER:	
SIZE: ANSI D	FILE NAME: MAMSHELFSC-C111XXX.dgn

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

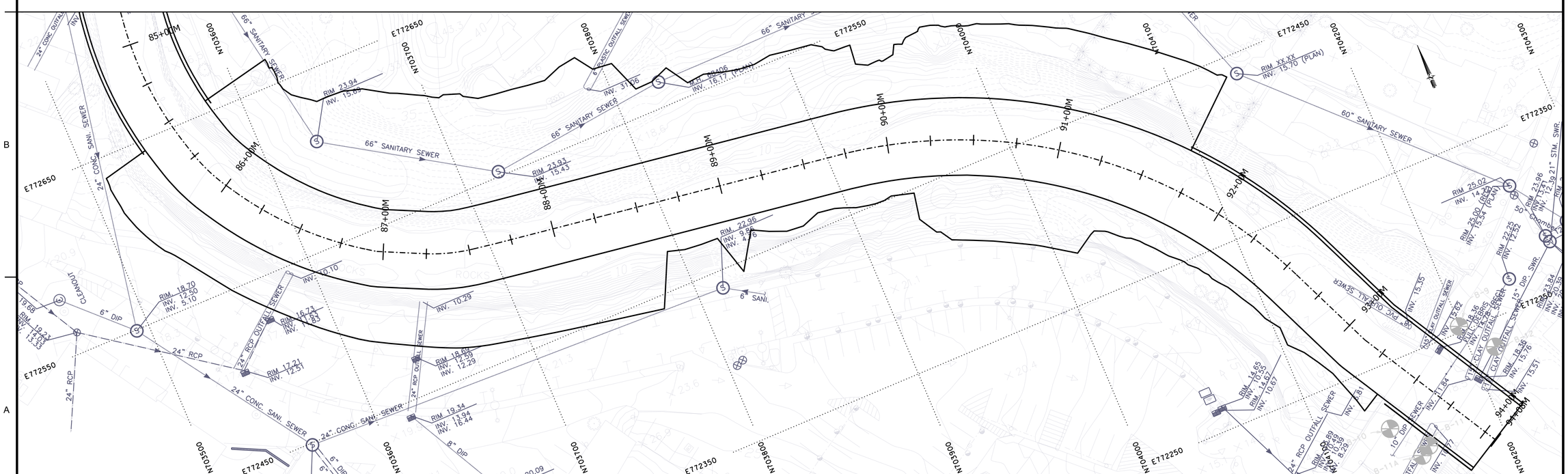
SITE PLAN - MAMARONECK
58+50M to 75+50M

SHEET IDENTIFICATION
C-106



PLAN VIEW C-107A

0 30' 60'



PLAN VIEW C-107B

0 30' 60'

Note: All utilities impacted by the project must be thoroughly accounted for to either Quality Level A or Quality Level B as defined per ASCE 38-02, STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. Coordination must be effected with all utility owners involved as to the relocation and/or replacement of the particular utility.

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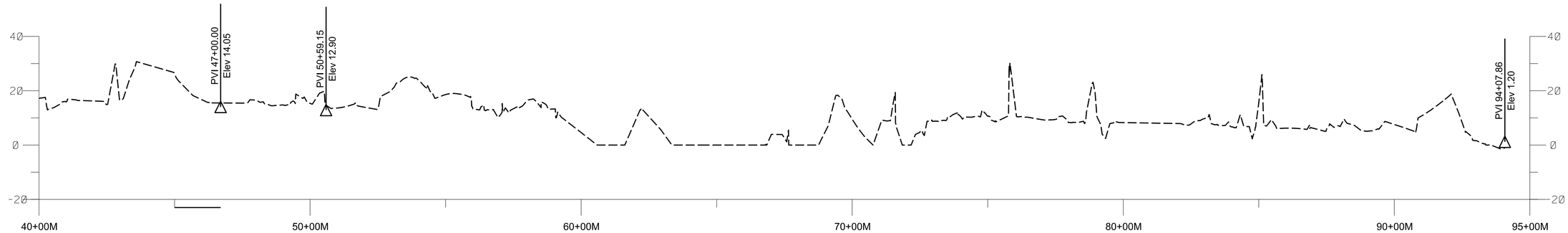
PLOT DATE: 23 SEP 2015
SIZE: ANSI D
DATE: 23 SEP 2015
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
ISSUE DATE: 23 SEP 2015
FILE NAME: MAMSHELFSC-C113XXX.dgn

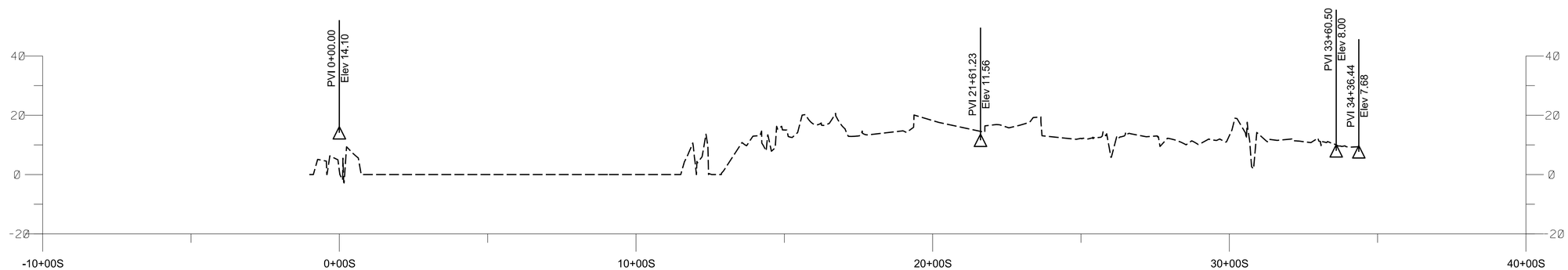
MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

SITE PLAN - MAMARONECK
75+75M to 94+08M

SHEET IDENTIFICATION
C-107



MAMARONECK RIVER



SHELDRAKE RIVER

20 10 0 20 40FT
SCALE: 1"= 20'

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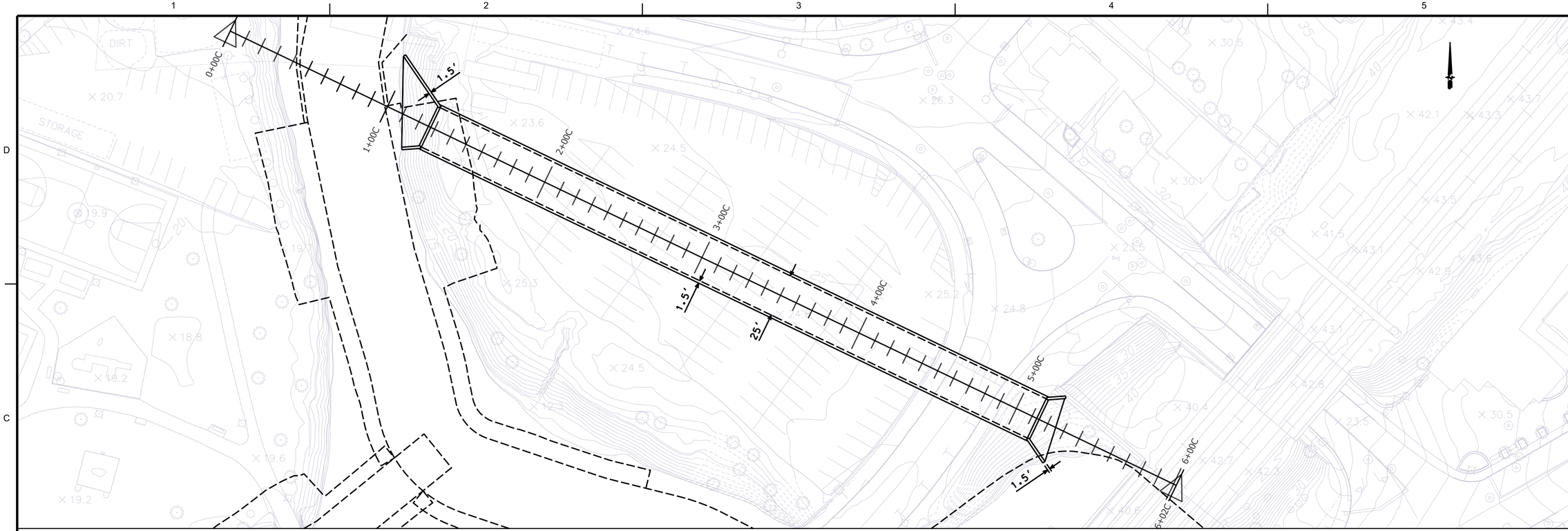
MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

MAMARONECK ALT#1Z
CHANNEL BOTTOM PROFILE

SHEET IDENTIFICATION
C-201

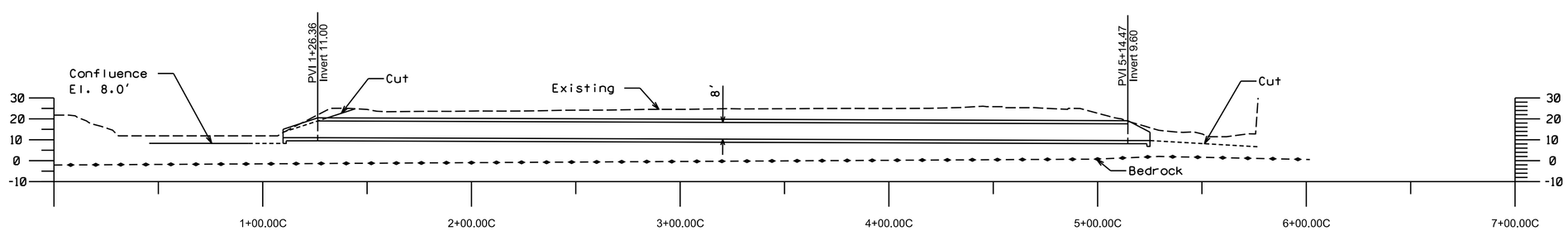


BOX CULVERT PLAN VIEW

30 15 0 30 60FT
SCALE: 1"= 30'

Notes:

1. Current as-built conditions for the Jefferson Ave bridge were non-existent at the time survey was performed.



BOX CULVERT PROFILE

30 15 0 30 60FT
SCALE: 1"= 30'

Notes:

1. Bedrock profile is derived from geotechnical information in Appendix C of the General Design Memorandum dated January 1989. Elevation errors in the bedrock profile are undefined and cannot be fully quantified.

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DATE: 23 SEP 2015
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE: 1" = 30'
PLOT DATE: 23 SEP 2015
ISSUE DATE: 23 SEP 2015
FILE NUMBER:
SIZE: ANSI D
FILE NAME: MAMSHELFSC-C201XXX.dgn

U.S. ARMY CORPS OF ENGINEERS
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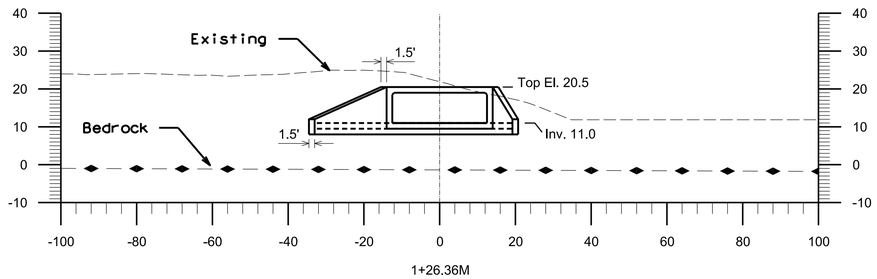
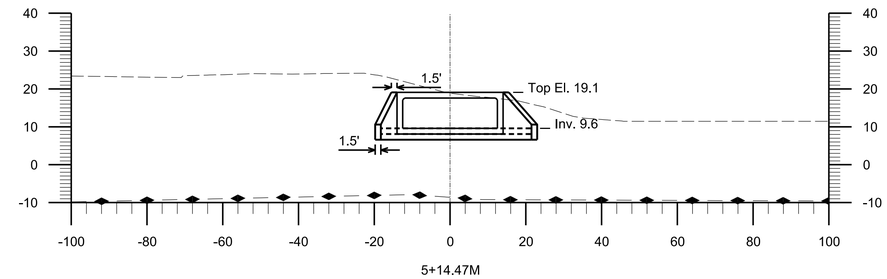
MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

CULVERT PLAN AND PROFILE

SHEET IDENTIFICATION
CU201



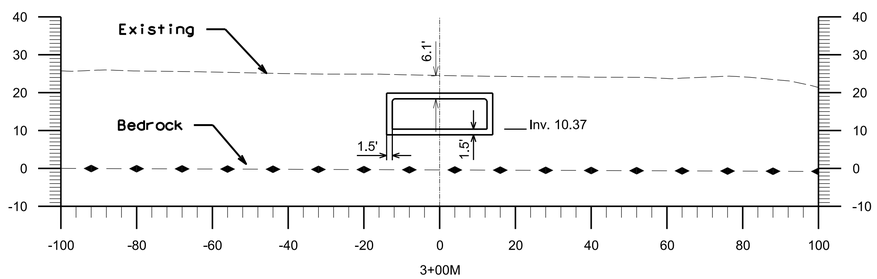
INLET

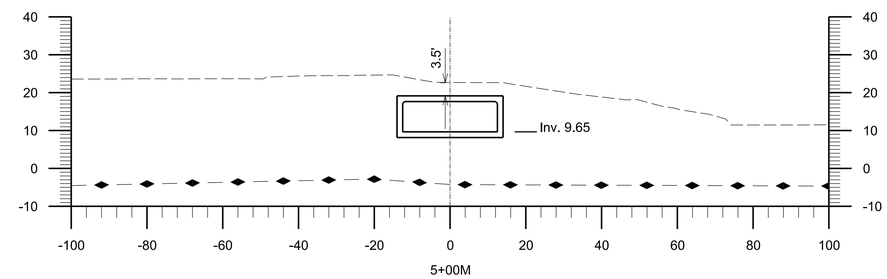


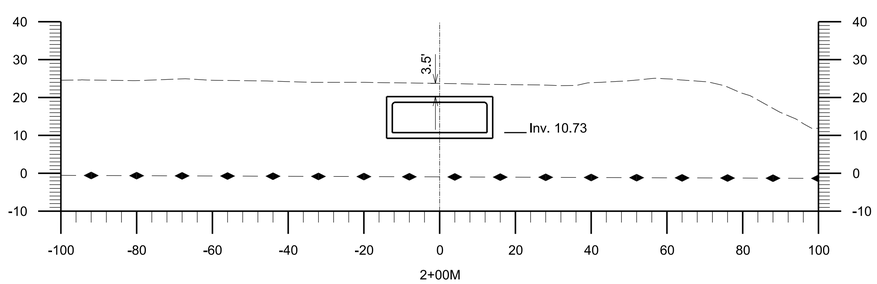
OUTLET

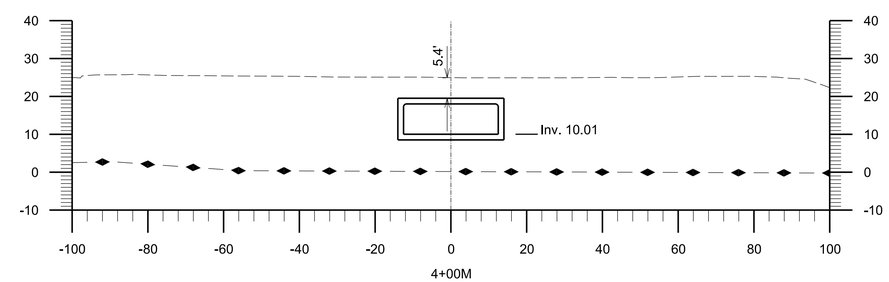
ELEVATION VIEW

20 10 0 20 40FT
SCALE: 1"= 20'









CROSS-SECTIONS

20 10 0 20 40FT
SCALE: 1"= 20'

Notes:

1. Bedrock profile is derived from geotechnical information in Appendix C of the General Design Memorandum dated January 1989. Elevation errors in the bedrock profile are undefined and cannot be fully quantified.

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SIZE: ANSI D | FILE NAME: MAMSHELFSC-C301XXX.dgn

MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY

CULVERT SECTIONS

SHEET IDENTIFICATION
CU301