



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

June 6, 2016

REPLY TO

ATTENTION OF
Environmental Analysis Branch

SUBJECT: F-2016-0092 - Consistency Determination for the Mamaroneck and Sheldrake Rivers Flood Risk Management Project, Village of Mamaroneck, New York

Mr. Jeffrey Zappieri
Supervisor, Consistency Review and Analysis
Division of Coastal Resources, Department of State
One Commerce Plaza
Suite 1010
99 Washington Ave.
Albany, NY 12231

Dear Mr. Zappieri,

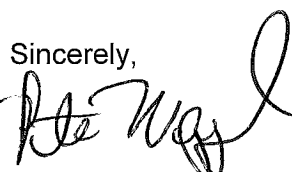
This letter provides the New York State Coastal Management Program Consistency Review Unit with additional information to support the U. S. Army Corps of Engineers, New York District's (District) consistency determination under the Coastal Zone Management Act, Section 307(c) (1) and (2), and 15 CFR 930.35(d), for the proposed construction of the Mamaroneck and Sheldrake Rivers Flood Risk Management Project (Project) in the Village of Mamaroneck, New York.

Please find attached for your review and processing: (1) New York State Coastal Zone Management Program Consistency Determination, (2) Project Description, Formulation, and Alternatives analysis, and (3) Plan Sheets. For further information, the Draft EIS is available for review and can be accessed on the NY District website:

<http://www.nan.usace.army.mil/Missions/CivilWorks/ProjectsInNewYork/MamaroneckandSheldrakeRivers.aspx>.

The District respectfully requests a Consistency Statement for the Mamaroneck and Sheldrake Rivers, Flood Risk Management, General Reevaluation Report, Village of Mamaroneck, New York. The proposed project complies with the Village of Mamaroneck and New York State's Coastal Zone Management Program and will be conducted in a manner consistent with such policies.

I look forward to working with you and your staff on this effort. If you should have any questions, please contact Mr. Matthew Voisine of my staff at 917-790-8718 or matthew.voisine@usace.army.mil.

Sincerely,


Peter Weppeler
Chief, Environmental Analysis Branch

Attachments

VILLAGE OF MAMARONECK, TOWN OF MAMARONECK, AND NEW YORK STATE COASTAL ZONE MANAGEMENT PROGRAM CONSISTENCY DETERMINATION

Project: Mamaroneck and Sheldrake Rivers Flood Risk Management Project, Village of Mamaroneck, New York.

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

Applicable Policies: Based on a review of the Coastal Management Program policies for New York, state policies 2, 4, 5, 8, 9, 11–14, 16–19, 21, 23–25, 33, 37–39, 41, 43 and 44 are applicable. Base on a review of the Coastal Management Program policies for the Village of Mamaroneck, policies 2, 4, 5, 8, 9, 11–14, 17–19, 21, 23, 25, 33, 37–39, 41, and 44 are applicable. These policies are listed below.

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

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

Determination – The Project is not restoring, revitalizing, or redeveloping any deteriorated and underutilized waterfront areas. The policy is not applicable.

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

Determination – The Project involves construction of flood risk management structures along the Mamaroneck and Sheldrake rivers. These improvements 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 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. Most of the river banks currently have some type of retaining wall, rip rap, or other manmade structure protecting the embankments. The constructed retaining walls will be level with the existing landward ground or no higher than 1 foot allowing access to the rivers. This will allow for future recreational development (walkways, fishing areas, etc.) along the riverbank. The Project also will benefit the continued and future water-dependent uses and facilities located within the regional coastal zone area. Therefore, the project is consistent with the Policy.

State Policy 3 – Further develop the state’s major ports of Albany, Buffalo, New York, Ogdensburg, and Oswego as centers of commerce and industry, and encourage the siting, in these port areas, including those under the jurisdiction of state public authorities, of land use and development, which is essential to, or in support of, the waterborne transportation of cargo and people.

Determination – The Project will not affect any of the state’s major ports. The policy is not applicable.

State Policy 4 and Village of Mamaroneck 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.

Determination – The Project will not detract or adversely affect existing traditional and/or desired anticipated uses, or the economic base of the Mamaroneck Harbor community. 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. Most of the river banks currently have some type of retaining wall, rip rap, or other manmade structure protecting the embankments. The constructed retaining walls will be level with the existing landward ground or no higher than 1 foot allowing access to the rivers. This will allow for future recreational development (walkways, fishing areas, etc.) along the riverbank. Therefore, the project is consistent with the Policy.

State Policy 5 and Village of Mamaroneck Policy 5 – Encourage the location of development in areas where public services and facilities essential to such development are adequate.

Determination – The Project will manage flood risk allowing the existing homeowners and businesses to continue to exist within the study area. The Project would not extend new services into unserved areas, nor would it introduce any new residents or permanent workers to the surrounding area. Instead, it would provide benefits to local and regional populations and workforce in the form of improved flood risk management. Therefore, the project is consistent with the Policy.

State Policy 6 and Village of Mamaroneck Policy 6 – Expedite permit procedures in order to facilitate the siting of development activities at suitable locations.

Determination – The responsibility for implementing Policy 6 rests with the various agencies issuing the requisite permits and/or approvals. Therefore, Policy 6 is not applicable to the proposed project.

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

Village of Mamaroneck Policy 7a - The following areas are identified in significant fish and wildlife habitats; and they will be protected, preserved, and where practical, restored so as to maintain their viability as habitats: Delancey Cove, Greacen Point Marsh, Ginsberg Hill (Fusco property), Guion Creek Salt Marsh, Kirstein Cove/Buttenweiser Is./Pops Rocks, Magid Pond, Otter Creek Salt Marsh, and Van Amringe Mill Pond.

Determination – The Project is not located in close proximity to any Significant Coastal Fish and Wildlife Habitats and would not result in adverse impacts to Significant Coastal Fish and Wildlife Habitats designated by the NYSDOS or the Village of Mamaroneck. Therefore, Policy 7 is not applicable to the proposed project.

State Policy 8 and Village of Mamaroneck 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.

Determination – 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 ITT Sealectro site, a state Superfund site, is located on the Sheldrake River within the Project Area. Prior to construction, the District will test for containments 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 Project will have negligible cumulative effects on issues involving HTRW. 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. 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. Therefore, the project would be consistent with Policy 8.

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

Determination – Increasing access to recreational fish and wildlife resources; increasing existing stocks; or developing new resources are not components of this project. However, the project will not impede the future expansion of recreational uses. The constructed retaining walls will be level with the existing landward ground or no higher than 1 foot allowing access to the rivers. This will allow for future recreational development (walkways, fishing areas, etc.) along the riverbank. Therefore, the project is consistent with Policy 9.

State Policy 10 and Village of Mamaroneck Policy 10 – Further develop commercial finfish, shellfish, and crustacean resources in the coastal area by encouraging the construction of new, or improvement of existing on-shore commercial fishing facilities, increasing marketing of the state's seafood products, maintaining adequate stocks, and expanding aquaculture facilities.

Determination – The Project is not related to commercial fishery development activities long island sound waters. Development, maintenance, or marketing of commercial fisheries are not components of the project. Therefore, Policy 10 is not applicable to the proposed project.

State Policy 11 and Village of Mamaroneck 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.

Determination – 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. In addition, Preferred Alternative #1Z includes the potential implementation of non-structural measures (i.e., structural elevation and ringwall construction) for eight residential properties and one nonresidential (industrial) property along the rivers, further improving flood protection for at-risk buildings. The implementation of these measures would be contingent upon owner approval. Therefore, the project would be consistent with Policy 11.

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

Determination – The Project would be constructed on land areas that do not include natural protective features such as beaches, dunes, barrier islands, and bluffs. The Project will provide long-term protection of natural resources and property that have historically been prone to floods, erosion, and flood damage. Construction activities will be limited to segments of the Mamaroneck and Sheldrake rivers located within the Village of Mamaroneck. The rivers have been modified at least twice and most of the river banks contain retaining walls, rip rap, or other manmade structures to control erosion. The project is widening the rivers only a few feet and is not widening everywhere minimizing damage to natural resources. Therefore, Policy 12 is not applicable.

State Policy 13 and Village of Mamaroneck 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.

Determination – The Project design is based on U.S. Army Corps of Engineers (USACE) experience and industry standards for providing long-term flood risk management. The project will control erosion as designed for at least 30 years. USACE project as constructed including the operations and maintenance are designed to perform in perpetuity. The construction of this project along with the operations and maintenance ensure the project to perform as designed in perpetuity. Therefore, the project would be consistent with Policy 13.

State Policy 14 and Village of Mamaroneck Policy 14– Activities and development including the construction or reconstruction of erosion protection structures, shall be undertaken so that there would be no measurable increase in erosion or flooding at the site of such activities or development, or at other locations.

Determination – The Project design is based on USACE experience and industry standards for providing long-term flood risk management. The Project site has been designed to maximize flood and erosion protection for the Village of Mamaroneck and surrounding areas. The project is designed not to increase flooding or erosion within any surrounding areas. Therefore, the project would be consistent with Policy 14.

State Policy 15 – Mining, excavation, or dredging in coastal waters shall not significantly interfere with the natural coastal processes which supply beach materials to land adjacent to such waters and shall be undertaken in a manner which will not cause an increase in erosion of such land.

Determination – The Project will not involve mining, excavation, or dredging in coastal waters. Some excavation of the Mamaroneck and Sheldrake rivers will be required to reduce the flood risk that is currently associated with the Village of Mamaroneck. This policy is not applicable.

State 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.

Determination – Both federal and state funds will be used to complete the Project, which is intended to provide long-term flood risk management to property and human life within the Village of Mamaroneck. The Project will substantially reduce erosion and flooding, and the public benefit outweighs the long-term monetary and other costs associated with flood damages, especially when considered in light of historic flood events, costs associated with flood damages, and loss of human life. Therefore, the project would be consistent with Policy 14.

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

Village of Mamaroneck Policy 17 – Whenever possible, use nonstructural measures to minimize damage to natural resources and property from flooding and erosion. Such measures shall include: (i) the setback of buildings and structures; (ii) the planting of vegetation and the installation of sand fencing and draining; (iii) the reshaping of bluffs; and (iv) the flood proofing of buildings or their elevation above the base flood level.

Determination – The primary flood risk management measures associated with the Project to minimize damage to natural resources and property from flooding and erosion are structural. Sloped grassy banks will be constructed and trees and vegetation will be planted along the embankments for erosion control and for aesthetics. However, Preferred Alternative #1Z also includes the potential implementation of non-structural measures (i.e., structural elevation and ringwall construction), per owner approval, for eight properties selected based on a benefit-cost evaluation. Refer to text for Policy 11. Therefore, the project would be consistent with Policy 11.

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

Determination – The proposed Project will not significantly impair any valuable coastal waters and resources, and is intended to provide flood protection for both man-made and natural coastal resources. The District has held three public meetings allowing the public to input their interests. The public, governmental, and nongovernmental agencies have reviewed and commented on the Environmental Impact Statement through the

NEPA process. 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. Therefore, the project would be consistent with Policy 18.

State Policy 19 – Protect, maintain, and increase the level and types of access to public water-related recreation resources and facilities.

Village of Mamaroneck Policy 19 – Protect, maintain and increase the levels and types of access to public water-related recreation resources and facilities so that these resources and facilities may be fully utilized by all the public in accordance with reasonably anticipated public recreation needs and the protection of historic and natural resources. In providing such access, priority shall be given to public beaches, boating facilities, fishing areas and waterfront parks.

Determination – The project will not impede access to the river for recreational uses. The project will continue to allow access to the rivers through Columbus Park as the park will receive flood management measures yet continuing to allow direct river access. The constructed retaining walls will be level with the existing landward ground or no higher than 1 foot allowing access to the rivers. This will allow for future recreational development (walkways, fishing areas, etc.) along the riverbank. Therefore, the project would be consistent with Policy 19.

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

Determination – The Project does not involve any areas of the publicly-owned foreshore, lands immediately adjacent to the foreshore, or the water's edge that are publicly-owned. Therefore, Policy 20 is not applicable.

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

Village of Mamaroneck Policy 21 – Water-dependent and water-enhanced recreation shall be encouraged and facilitated and shall be given priority over nonwater-related uses along the coast, provided it is consistent with the preservation and enhancement of other coastal resources and takes into account demand for such facilities. In facilitating such activities, priority shall be given to areas where access to the recreation opportunities of the coast can be provided by new or existing public transportation services and to those areas where the use of the shore is severely restricted by existing development.

Determination – The Project will not affect water-dependent or water-enhanced recreational uses. As designed, the project will not prevent future water dependent recreational activities from occurring. With the exception of Columbus Park, private property extends to the riverbanks. The large amount of private property can make access to the rivers difficult, however; the project design will not prevent walkways along the river and fishing access to be implemented in the future if the Village desires. This USACE project is not authorized to construct recreational opportunities where none previously existed. However, local and state authorities will be able to construct recreational opportunities if they choose. Access to the rivers will be maintained at current levels. Therefore, the project would be consistent with Policy 21.

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

Village of Mamaroneck Policy 22 – Development and re-development, when located adjacent to the shore, shall provide for water-related recreation, as a multiple use, whenever such recreational use is appropriate in light of reasonably anticipated demand for such activities and the primary purpose of the development.

Determination – The Project area is not located adjacent to the shore. Therefore, Policy 22 is not applicable

State Policy 23 and Village of Mamaroneck Policy 23 – Protect, enhance, and restore structures, districts, areas of sites that are of significance in history, architecture, archeology, or culture of the State, its communities, or the Nation.

Determination – The Proposed Action will coordinate the implementation of design and siting measures in conjunction with recommendations from the New York State Historic Preservation Office (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, the Village of Mamaroneck, 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. These retaining walls built as part of an earlier effort to manage streambank erosion no longer function as intended and require replacement. USACE will continue to evaluate wall segments to determine if any can be reused and incorporated into the current Project. A draft Memorandum of Agreement has been prepared and is undergoing review by the NYSHPO and other interested parties to mitigate this adverse effect. Through the requirements of Section 106 of the National Historic Preservation Act, efforts to avoid, minimize, or reduce potential adverse impacts were evaluated and appropriate mitigation measures and strategies were developed to offset unavoidable adverse

effects. Although not fully consistent with Policy 23, the compelling need to manage flood risk within the study area necessitates impacts to historic structures.

State Policy 24 and Village of Mamaroneck Policy 25– Prevent impairment of scenic resources of statewide significance.

Determination – 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, trapezoidal channels with grassy slopes, 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. Although not fully consistent with Policy 24, the compelling need to manage flood risk within the study area necessitates impacts to scenic resources.

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

Determination – Short-term temporary impacts to aesthetic and scenic resources are expected to result from the Proposed Action; however, these will be limited to the construction period. Long-term permanent adverse visual impacts will be associated

with the Project area, and these will be mitigated by revegetating exposed banks and disturbed soils with appropriate native plants prior to completion of the Project, and screening of the construction area as feasible during the construction phase of the Project. 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. Therefore, the project would be consistent with Policy 25

State Policy 26 – Conserve and protect agricultural lands in the state’s coastal area.

Determination – The project site is not located on or adjacent to lands meeting NYSDOS criteria for important agricultural lands. Therefore, Policy 26 is not applicable.

State Policy 27 – Decisions on the siting and construction of major energy facilities in the coastal area will be based on public energy needs, compatibility of such facilities with the environment, and the facility's need for a shorefront location.

Determination – The Project does not involve the siting or construction of major energy facilities. Therefore, Policy 27 is not applicable.

State Policy 28 – Ice management practices shall not interfere with the production of hydroelectric power, damage significant fish and wildlife and their habitats, or increase shoreline erosion or flooding.

Determination – The Project does not involve ice management. Therefore, Policy 28 is not applicable.

State Policy 29 – Encourage the development of energy resources on the outer continental shelf, in Lake Erie and in other water bodies, and ensure the environmental safety of such activities.

Determination – The Project does not involve the development of energy resources. Therefore, Policy 29 is not applicable.

State Policy 30 and Village of Mamaroneck Policy 30 – Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to state and national water quality standards.

Determination – The Project will not involve any municipal, industrial, and commercial discharge of pollutants into coastal waters. The ITT Sealectro site, a state Superfund

site, is located on the Sheldrake River within the Project Area. The site will be avoided if at all possible. If not, prior to construction, the District will test for containments 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 Project will have negligible cumulative effects on issues involving HTRW. Industry and best management practices (BMPs) for conducting in-stream work will be implemented to protect water quality. Therefore, the project would be consistent with Policy 30.

State Policy 31 and Village of Mamaroneck Policy 31 – State coastal area policies and management objectives of approved local waterfront revitalization programs will be considered while reviewing coastal water classifications and while modifying water quality standards; however, those waters already overburdened with contaminants will be recognized as being a development constraint.

Determination – The Project will not involve the review of coastal water classifications or the modification of water quality standards. Therefore, Policy 31 is not applicable.

State Policy 32 – Encourage the use of alternative or innovative sanitary waste systems in small communities where the costs of conventional facilities are unreasonably high, given the size of the existing tax base of these communities.

Determination – The Project will not occur in a small community with need of alternative sanitary waste treatment, or affect any local sanitary waste facilities. Therefore, Policy 32 is not applicable.

State Policy 33 and Village of Mamaroneck Policy 33– Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters.

Determination – The Project is designed to attenuate stormwater flows to the Mamaroneck and Sheldrake rivers that could result in, or contribute to flooding. All construction activities will be conducted in accordance with applicable federal, state, and local regulations for erosion and sediment control; a site-specific Storm Water Pollution Prevention Plan and erosion and sediment control plan; and requirements of the NYS Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activity (GP-0-08-001) for ground disturbances involving one or more acres.

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. Therefore, the project would be consistent with Policy 33.

State Policy 34 and Village of Mamaroneck Policy 34– Discharge of waste materials into coastal waters from vessels subject to state jurisdiction will be limited so as to protect significant fish and wildlife habitats, recreational areas and water supply areas.

Determination – The Project will not involve the discharge of waste materials into coastal waters from vessels. Therefore, Policy 34 is not applicable.

State Policy 35 and Village of Mamaroneck Policy 35– Dredging and filling in coastal waters and disposal of dredged material will be undertaken in a manner that meets existing state permit requirements, and protects significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands.

Determination – The Project will not involve dredging or filling in coastal waters or the disposal of dredged material. Therefore, Policy 35 is not applicable.

State Policy 36 and Village of Mamaroneck Policy 36– Activities related to the shipment and storage of petroleum and other hazardous materials will be conducted in a manner that will prevent or at least minimize spills into coastal waters; all practicable efforts will be undertaken to expedite the cleanup of such discharges; and restitution for damages will be required when these spills occur.

Determination – The Project will not involve activities related to the shipment and storage of petroleum and other hazardous materials. Therefore, Policy 36 is not applicable.

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

Determination – Stormwater from the Project will be controlled as described for Policy 33. Approved BMPs for erosion and sediment control will be used during ground-disturbing activities, and the Project will provide for long-term attenuation of stormwater discharges to the Mamaroneck and Sheldrake rivers that could cause or contribute to flooding. Therefore, the project would be consistent with Policy 37.

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

Determination – See text for Policy 33 and 37. The Project would not affect primary or sole source water supplies, and would not adversely affect surface or ground waters. 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. Therefore, the project would be consistent with Policy 38.

State Policy 39 and Village of Mamaroneck Policy 39– The transport, storage, treatment, and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner so as to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources

Determination – All solid wastes generated by the Project would be the responsibility of the contractor and will be transported, stored, treated, and disposed of in accordance with applicable Federal and state policies. 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. Therefore, the project would be consistent with Policy 39.

State Policy 40 – Effluent discharged from major steam electric generating and industrial facilities into coastal waters will not be unduly injurious to fish and wildlife and shall conform to state water quality standards.

Determination – The Project will not involve the discharge of effluent from major steam electric generating and industrial facilities. This policy is not applicable.

State Policy 41 – Land use or development in the coastal area will not cause national or state air quality standards to be violated.

Determination – The Project has been assessed for consistency with national and state air quality standards. Emissions attributable to the Project will be below the General Conformity Rule applicability thresholds. Therefore, the project would be consistent with Policy 41.

State Policy 42 – Coastal management policies will be considered if the state reclassifies land areas pursuant to the prevention of significant deterioration regulations of the Federal Clean Air Act

Determination – The Project will not involve the reclassification of land areas pursuant to the prevention of significant deterioration regulations of the Federal Clean Air Act. This policy is not applicable.

State 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.

Determination – See the text for Policy 41. Therefore, the project would be consistent with Policy 43.

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

Determination – Project impacts to wetlands will be mitigated in accordance with permit requirements received from USACE, New York State Department of Environmental Conservation, and Village of Mamaroneck. Onsite construction mitigation (BMPs) will be implemented as required by USACE, NYSDEC, and Village of Mamaroneck. 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. With these avoidance, minimization, and mitigation measures to be developed and adhered to, the project would be consistent with Policy 44.

REFERENCES

New York State Department of State (NYSDOS). Coastal Management Program, State Coastal Policies (Including Program changes from 1982-2006). 2006.

Village of Mamaroneck, Local Waterfront Revitalization Program. Adopted: Village of Mamaroneck Board of Trustees, November 13, 1984 Approved: NYS Secretary of State Gail S. Shaffer, May 21, 1985 Concurred: U.S. Office of Ocean and Coastal Resource Management, August 12, 1985.

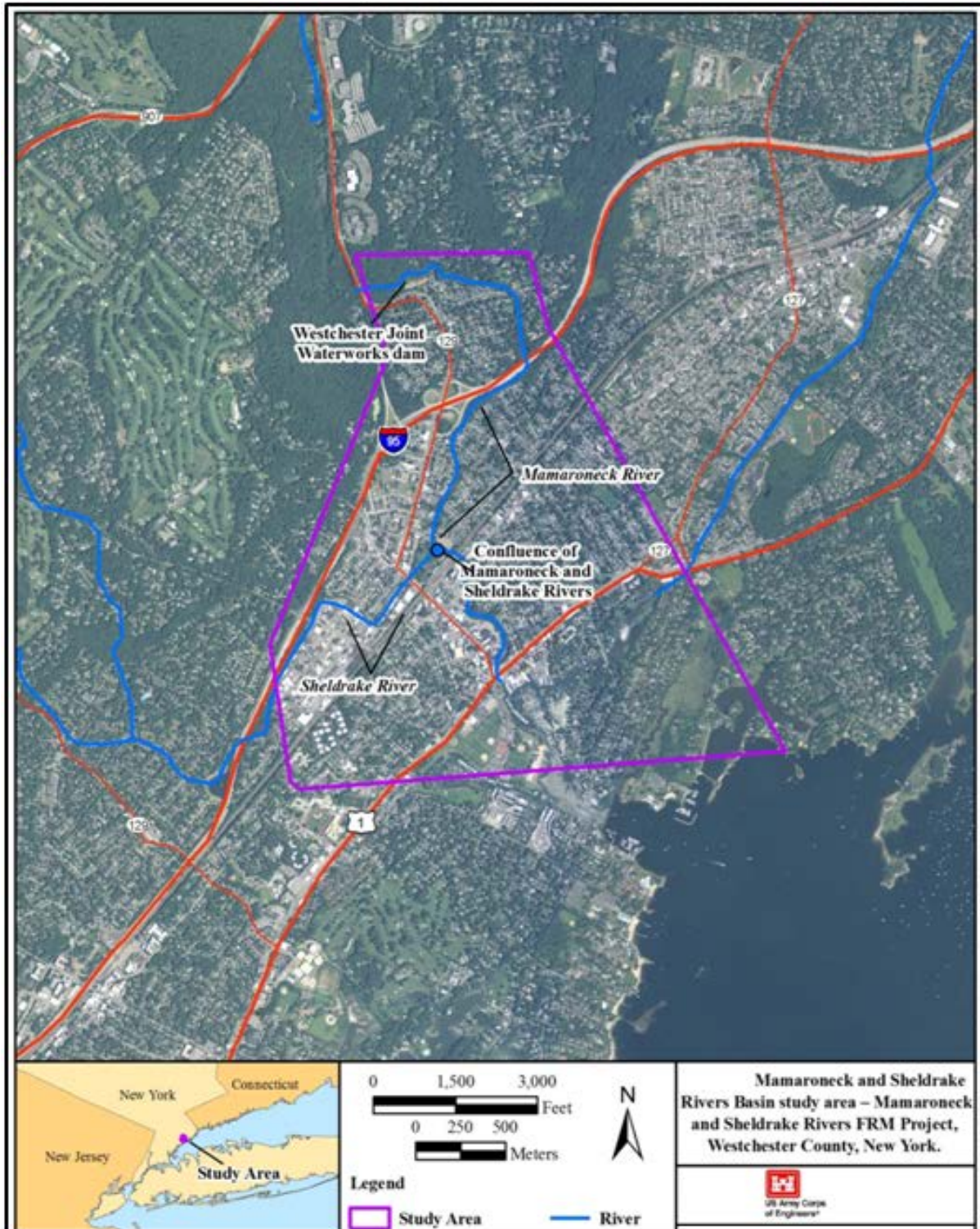


Figure 1: Mamaroneck and Sheldrake Rivers Basin Study Area.

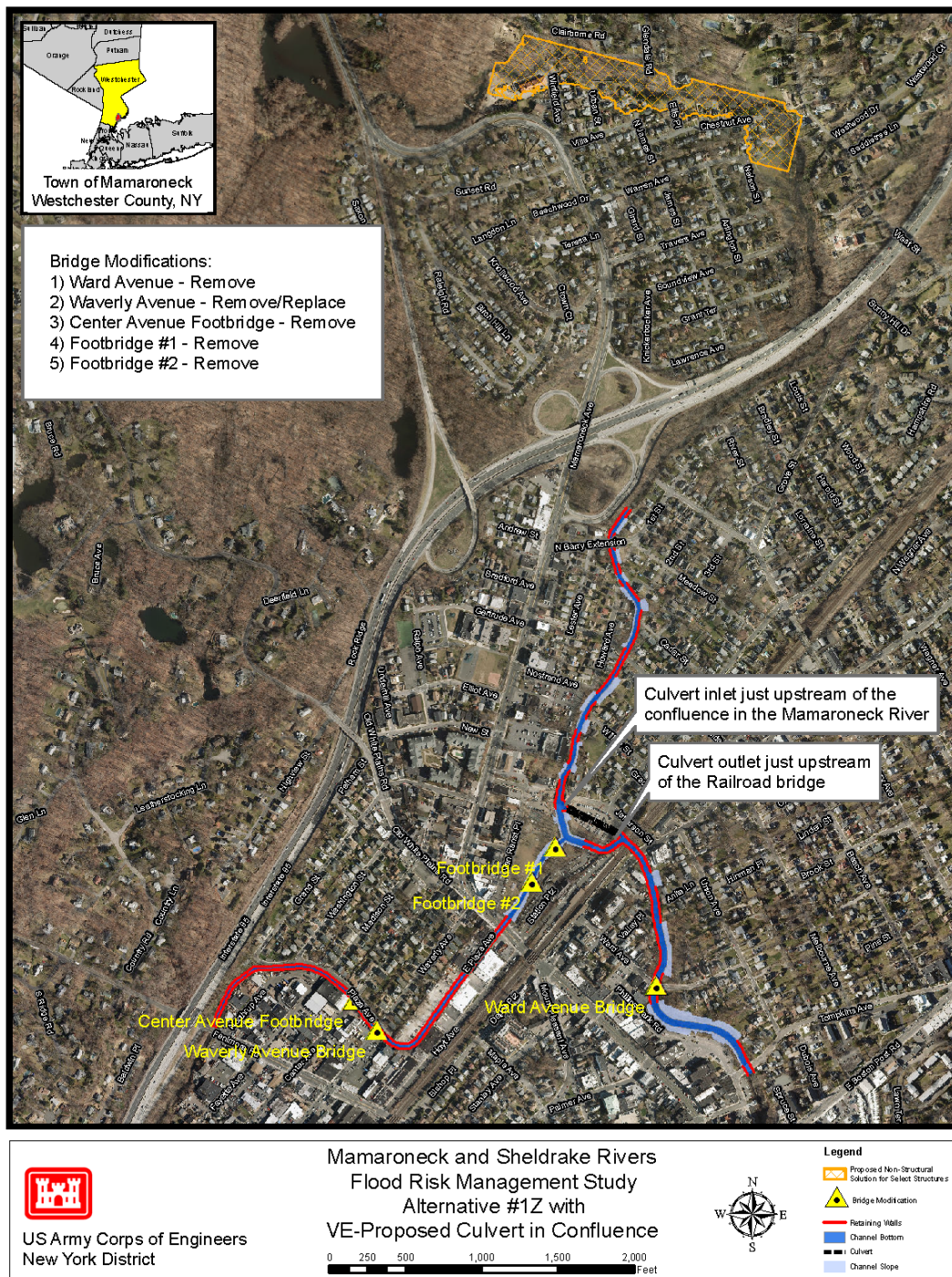


Figure 2: Plan view of alternative 1Z with the VE proposed culvert in confluence

MAMARONECK AND SHELDRAKE RIVERS FLOOD RISK MANAGEMENT PROJECT, VILLAGE OF MAMARONECK, NEW YORK

PLAN DESCRIPTION, FORMULATION, AND ALTERNATIVES ANALYSIS

Introduction

A feasibility-level investigation has been conducted to analyze and formulate a Flood Risk Management (FRM) project for the Village of Mamaroneck, Westchester County, New York. A General Reevaluation Report (GRR) has been prepared to document the economic investigations, engineering analyses, and environmental considerations conducted to formulate a FRM project for the Village of Mamaroneck, which will reduce the damaging effects of severe storms to life and property. The GRR updates the studies performed for the 1977 Feasibility Report and the 1989 General Design Memorandum (1989 GDM) as well as identifies and affirms Federal interest in a solution for flooding in the Village of Mamaroneck.

The study to evaluate flood risk management measures along the Mamaroneck and Sheldrake Rivers in the Village of Mamaroneck, Westchester County, New York was authorized 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. The Project proposed by the U.S. Army Corps of Engineers as a result of these studies under these resolutions was authorized for construction by Section 401(a) of the Water Resources Development Act of 1986 (Public Law 99-662, 99th Congress, 2nd Session) adopted November 17, 1986.

A severe flood risk persists in the Village of Mamaroneck based on the recurrence of flood events and the damages sustained. Approximately 750 homes and businesses are located within the flood plain for the Mamaroneck and Sheldrake Rivers Basin within the Village of Mamaroneck and the Town of Harrison. The largest floods of record resulted from the storms of October 1955, June 1972, September 1975, and April 2007. In addition, there have been 19 significant flood events from July 1889 to present.

Extensive damages and loss of life have occurred during these major flood events. Damages within the Mamaroneck and Sheldrake Rivers Basin for the June 1972 and September 1975 floods alone amounted to approximately \$18M and \$92M, respectively, based on conditions of development at the time and October 2015 price levels. The flood waters from these storms inundated large areas of industrial, commercial, and residential property at the Village of Mamaroneck. Further, during the September 1992 flood, one person drowned when the car he was traveling in was swept away in a flow of water. Additionally, during the April 2007 storm, a person died in a house fire because flood waters prohibited emergency vehicles from responding to the person's home to provide emergency and medical care.

Additionally, people have been continually evacuated from homes, businesses, and vehicles during these damaging floods along both the Mamaroneck and Sheldrake Rivers. For example the April 2007 nor'easter flood, which was estimated to be a 100-

year flood, damaged over 300 residential and 100 commercial structures and disrupted the lives of thousands of people through transportation delays and loss of income.

Project Description

Based on consideration of benefits from an assessment of damages avoided in accordance with economic and environmental USAGE procedures, the NED Plan (Alternative #1 Z) was selected by the District. 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 height of the new channel retaining walls will be 3-17 ft. and the total combined length of new channel retaining walls in the entire Project area will be 8,660 ft. The higher retaining walls are typically near the bridges.

The plan recommended for construction is the National Economic Development Plan (NED Plan) which consists of channel modification along the Mamaroneck and Sheldrake Rivers, with various channel widths, depths and lengths within the Village of Mamaroneck (Alternative 1Z).

The river will be realigned at the confluence with a 25 foot wide by 8 foot high, 350 foot long culvert that will be placed under the railroad station parking lot to alleviate the poor channel alignment. Trapezoidal channel improvements will consist of a natural bed channel with grassy side slopes of one vertical on two and a half horizontal (1:2.5). Concrete retaining walls will be used where space is limited. Removal and replacement of existing retaining walls and utilities will be necessary along the length of the channel. Several small bridges will be removed and one bridge will be replaced. In addition to channel modification along both rivers, the NED Plan will have a nonstructural component along the Mamaroneck and Sheldrake rivers that include structure elevation, ringwall levees, and/or floodproofing.

Rip rap 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 USAGE, NYSDEC, Westchester County, and the Village 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 Fennimore 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 of concrete will be placed along the

bottom of the stream prevent scour under and around the footings of these three bridges. Most bridge footings have existing concrete at the channel bottom. Otherwise the riverbeds will be maintained in a natural state without concrete bottoms.

Channel work on the segment of the Mamaroneck River south of 1-95 and upstream of the confluence with Sheldrake River will total approximately 2,300 ft., 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. 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. with 0.25% slope. The removal and replacement of retaining walls and utilities will be necessary in certain locations including the removal of the Ward Avenue Bridge. The District is currently reevaluating the feasibility of removing and replacing the Ward Avenue Bridge.

Channel work on the Sheldrake River from Fenimore Road to the confluence in Columbus Park will total approximately 2,800 ft. 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 with at least one 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 (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). It should be noted that during the design phase of this project, additional structures may be identified for elevation or wet/dry floodproofing.

Summary of the Recommended Plan – NED Plan, Alternative 1Z

<u>Actions</u>	<u>Alternative 1Z – NED Plan</u>
Bridge Removal	
Ward Avenue	Remove / possibly replace
Waverly Place	Remove / replace
Centre Avenue Footbridge	Remove
Footbridge #1 (near confluence)	Remove / replace
Footbridge #2	Remove / possibly replace
Channel Work Length (ft.)	
Harbor Heights	No action
Mamaroneck Upstream	2,300 ft.
Mamaroneck Downstream	2,408 ft.
Sheldrake	2,800 ft.
Channel Width Size (ft.)	
Harbor Heights	No action
Mamaroneck Upstream	45 ft.
Mamaroneck Downstream	45 ft.
Sheldrake	25-33 ft.
Channel Cut Depth (maximum) (ft.)	
Harbor Heights	No action
Mamaroneck Upstream	2.3 ft.
Mamaroneck Downstream	4.2 ft.
Sheldrake	3.4 ft.
Retaining Walls (height/length) (ft.)	
	3-17ft. / 8,660 ft.
Nonstructural	
	9 structures

Prior Flood Risk Management Improvements

The Village of Mamaroneck has on two (2) occasions received Federal funds for implementing locally-conceived flood management improvements on the Mamaroneck and Sheldrake Rivers. In 1933, using Federal work relief funds, the Village cleared the channels of these streams within its corporate limits. In 1937, using Works Progress Administration (WPA) funds, the channel of the Mamaroneck River was widened to 30 feet and masonry walls were constructed from North Barry Avenue to Jefferson Avenue, a distance of approximately 2,400 feet. The WPA also funded the construction of Hillside Avenue Bridge.

In 1953-1954 the Village of Mamaroneck straightened the Mamaroneck River between Nostrand and Jefferson Avenues and deepened it between Halstead Avenue and a point downstream of the U.S.G.S gaging station weir. The 1977 Feasibility Study noted that this straightening and deepening of the Mamaroneck River resulted in lower stages than would otherwise have prevailed during the substantial floods which have occurred since the completion of this referenced work.

In connection with the construction of the New England Thruway in the early 1950's, the Mamaroneck River channel was improved within the reach of stream extending from the vicinity of the south end of First Street to the Town of Harrison boundary line for a total of 1,800 feet. Wider channels on better alignments were provided and the old low, short-span bridge at North Barry Avenue was replaced with a higher, longer triple-span structure on a new alignment several hundred feet downstream of the old bridge. Also, in connection with the construction of the Thruway, two reaches of channel of the Sheldrake River totaling nearly 3,000 feet in length within the reach of stream extending from the vicinity of Larchmont Gardens Lake to a point 600 feet below Fenimore Road were replaced with wider reaches on better alignments. Additionally, old, low, short-span bridges at Rockland Avenue and Fenimore Road were replaced with higher, longer twin-span structures.

Existing River Conditions

The Village of Mamaroneck experiences significant damage to life and property because of flooding from the Mamaroneck and Sheldrake Rivers caused by runoff during high intensity and volume precipitation from storm events that provides devastating flood conditions within a matter of hours. Primary causes of flooding include small bridge openings, poor channel flow capacity and channel constrictions/bends and high velocities due to steep channels.

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. per mile.

Within the study area, the Mamaroneck River ranges in width from 30 to 50 ft. (water and bank), and in depth from approximately 20 inches (in.) to more than 36 in. 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 Westchester Joint Water Works (WJWW) dam on the northern bank of the river. Works Project Administration-era and other retaining walls have been constructed along most of the Mamaroneck River, further decreasing the riparian habitat. Invasive plant species have developed along the riverbanks. Within the study area, the Sheldrake River ranges in width from 20 to 40 ft. (water and bank), and in depth from approximately 10 in. to more than 36 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. Downstream of

the confluence, the overbank areas are highly vegetated with a large amount of loose rocks.

The project reach on the Mamaroneck River is 2.5 miles in length and contains several major bends. The channel side slopes are moderate and vary from five to 15 ft. in height. The channel bottom has a moderate slope, averaging 12 ft. per mile, and varies in width from 20 ft. at the upstream end to 55 ft. at the mouth. The mouth of the Mamaroneck River is a short steep reach subject to some tidal inundation (up to Tompkins Avenue Bridge). The upstream reaches are subject to fluvial inundation only. The Sheldrake is a major tributary of the Mamaroneck River with its confluence about 3,500 ft. upstream of the mouth of the Mamaroneck River, as shown in Figures 1 and 2.

The Sheldrake River is narrower than the Mamaroneck River with steeper side slopes. The Sheldrake River is not subject to tidal inundation because it discharges into the Mamaroneck River upstream of the tidal reach. The length of the Sheldrake River in the study area is about 1.0 mile.

Plan Formulation

The Plan formulation, evaluation, comparison, tentative selection, and optimization efforts for this general reevaluation study were conducted between the study initiation and this Draft GRR. This section provides the formulation, evaluation, selection, and comparison process that were completed for the identified alternatives to manage flood risk in the study area.

The formulation process used in this study is consistent with the national objectives as stated in the *Planning Guidance Notebook*. In flood risk management plans must contribute to the National Economic Development (NED) account consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders and other Federal planning requirements. Plans to address the needs in the study area must be formulated to provide a complete, effective, efficient, and acceptable plan of coastal storm risk management. These objectives impose general planning constraints within any study area.

- **Completeness** is defined as *“the extent to which a given alternative plan provides and accounts for all necessary investments of other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions of the objective.”*
- **Effectiveness** is defined as *“the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities”.*
- **Efficiency** is defined as *“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”.*

- **Acceptability** is defined as *“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”*.

USACE Planning Process

The USACE Planning Process consists of six (6) steps as follows:

- 1) The first step of the planning process defines study area problems and opportunities, as well as study constraints, goals, and objectives. Because this is a flood risk management study, problems and opportunities are developed to address the Federal objective of National Economic Development (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.
- 2) The second step in the planning process consists of the inventory and forecast of resources within the study area. This evaluation, or inventory step, accounts for the level or amount of a particular resource that currently exists within the study area, i.e., identification of existing conditions. This step also involves forecasting to predict what changes will occur to resources throughout the 50-year period of analysis, assuming no actions are taken to address the problems in the study area. Comparison of the existing and forecast conditions of the study area measures the problems resulting from the change in resources over time. Study area problems are quantified based on this predicted change in resources. This second step also results in the delineation of opportunities that fully or partially address the problems in the study area. An opportunity is a resource, action, or policy that, if acted upon, may alter the conditions related to an identified problem.
- 3) The third step in the planning process is to generate alternative solutions. Alternative plans are formulated across a range of potential scales to demonstrate the relative effectiveness of various approaches at varying scales.
- 4) In the fourth step in the planning process, alternative plans are evaluated for their potential results in addressing the specific problems, needs, and objectives of the study. The evaluation will be conducted by assessing or measuring the differences between each with- and without-project condition and by appraising or weighting those differences. This difference is 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 study planning objectives, compliance with environmental protection requirements, the P&G's four evaluation criteria (completeness, effectiveness, efficiency, and acceptability), and other criteria deemed significant by participating stakeholders. Evaluation of the beneficial and adverse effects of the alternatives will provide a basis to determine which plans should be considered further, dropped, or reformulated.

- 5) In the fifth step of the planning process, plans (including the no action plan) are compared against each other, with emphasis on the outputs and effects that will have the most influence in the decision making process. Beneficial and adverse effects of each plan must be compared. These include monetary and non-monetary benefits and costs. Identification and documentation of tradeoffs will be required to support the final recommendation. The effects include those identified during the evaluation phase and any other significant effects identified in step 5. The output of the comparison step shall be a ranking of plans.
- 6) The sixth and final step in the planning process is the selection of the plan that best meets the study objectives and the four criteria in the Principles and Guidelines: completeness, effectiveness, efficiency, and acceptability.

Using the six-step planning process, a Tentatively Recommended Plan is identified.

Planning Considerations

General, physical/technical, economical, environmental, regional/social and institutional considerations must also be taken into account during alternative screening:

General:

The plan must:

1. Meet the needs and concerns of the public within the study area;
2. Be flexible to accommodate changing economic, social and environmental patterns and changing technologies;
3. Integrate with and be complementary to other related programs in the study area;
4. Be able to be implemented with respect to financial and institutional capabilities and public consensus;
5. Comply with USACE environmental operating procedures.

Physical/Technical:

1. Plans shall represent sound, safe, and acceptable engineering solutions;
2. Plans shall minimize the footprint of structures when possible;
3. Plans shall be designed to be low-maintenance;
4. Plans should avoid and minimize impacts to environmental resources with the potential for enhancement;
5. Plans shall be sustainable, resilient and adaptable;
6. Plans shall take into consideration aesthetics and viewshed.
7. Plans shall be in compliance with USACE regulations;
8. Plans shall be realistic and state-of-the-art while not relying on future research or development;

Economic:

1. Plans must be efficient, make optimal use of resources, and not adversely affect other economic systems;
2. Average annual benefits must exceed the average annual costs.

Environmental:

1. Plans must avoid and minimize environmental impacts to the maximum degree practicable.

Regional and Social:

1. All reasonable opportunities for development within the project scope must be weighed, with consideration of state and local interests;
2. The needs of other regions must be considered, and one area cannot be favored to the detriment of another;
3. Plans must maintain existing cultural resources to the maximum degree possible and produce the least possible disturbance to the community.

Institutional:

1. Plans must be consistent with existing federal, state, and local laws;
2. Plans must be locally supported and signed by local authorities in the form of a Project Partnership Agreement and guarantee for all items of local cooperation including possible cost sharing;
3. The plan must be fair and find overall support in the region and state

Formulation and Evaluation of Alternative Plans

The screening of flood risk management measures includes an assessment of the potential engineering, economic, environmental, public, financial, and institutional feasibility of implementing each measure. Those measures that are not entirely screened out are carried forward for more detailed analysis as alternative plan components. Based on the physical layout of the study area, the flood hydrology, and the profiles of structures at risk, the following flood risk management measures were considered for application to flooding problems in the study area.

The Diversion Culvert Plan (i.e.: the Tunnel Plan): The “Tunnel” plan was the NED Plan identified during the 1977 Feasibility Study and was the authorized plan. Therefore in accordance with ER 1105-2-100, the Tunnel/NED plan cannot be eliminated for re-evaluation.

Levees & Floodwalls: preliminary screening activities eliminated levees and floodwalls due to the high land acquisition costs that would be incurred. Further, levees and floodwalls were not economically justified in the 1977 Feasibility Study and were also eliminated as an alternative. The GRR has been updated to clarify and expands the elimination of levees and floodwalls as a potential solution.

Floodwalls and levees would also result in socio-economic impacts due to the higher and wider levees which require substantial portions of residential, commercial, and industrial property and the extensive raising of bridges and roadways which would severely disrupt the business community during construction. The high levees and floodwalls, which average approximately 7 and 11 feet in height along the Mamaroneck and Sheldrake Rivers as identified in the 1977 Feasibility Report, respectively, would also have an adverse aesthetic impact on the community.

Non-Structural Alternatives: no non-structural measure has been eliminated at this time. Further, non-structural measures will also be evaluated in combination with structural alternative measures. Specifically, the plan selection process will consider the following non-structural measures:

Preservation and/or Creation of Open Space in the Floodplain: there is not an opportunity for preservation or creation of open space within the damage area of the Village. The Village is entirely urbanized and no open space is available nor did future land use investigations reveal and possibility of creation of open space.

Detention: There are several upstream sites within the Mamaroneck and Sheldrake Rivers basin at which flood detention reservoirs are possible. These sites include two areas which are currently occupied, in part, by existing reservoirs which were formerly used for water supply purposes. These facilities, which were used until the 1970s as standby reserves to the supplies obtained from the New York City water supply system, are Larchmont Reservoir #2 along the Sheldrake River, and the Westchester Joint Water Works Reservoir on the Mamaroneck River. Additional sites exist along the Mamaroneck River at Maple Moor Golf Course, and at Silver Lake. However, the development of a flood storage reservoir at each of these sites is not particularly attractive because of excessive costs and/or limited regulation and effectiveness at the downstream areas. The development of flood detention at each of the possible sites is discussed in the following paragraphs.

Larchmont Reservoir #2. Larchmont Reservoir #2 lies along the Sheldrake River, upstream of the damage areas in the Village of Mamaroneck, and upstream of the Sheldrake River's confluence with its East Branch. A flood control reservoir at this site would control a drainage area of 2.63 square miles, constituting 42.7 percent of the entire Sheldrake River watershed. Various schemes for flood risk management at this site were investigated, the most viable of which considered the modification and utilization of the existing dam. As part of this plan, the dam's existing non-overflow section would be increased in elevation, the existing reservoir dewatered, and regulating works constructed. The resulting reservoir would reduce the 100-year discharges along the Sheldrake River at the damage area in the Town of Mamaroneck from Lansdowne Drive upstream to Bonnie Briar Lane by approximately 40 and 7 percent, respectively. However, this improved 100-year discharge is in excess of the bankfull capacity for this reach of stream, and local protection works would still be necessary at this area for protection against a 100-year storm, or greater.

Furthermore, the effect of the reservoir diminishes progressively at downstream areas, and would provide minimal benefits to the Village of Mamaroneck. The costs of modifying the existing dam, including regulating works, would be approximately 25 million dollars (1977 price level) alone, and combined with the costs of the upstream levees required around the reservoir, relocations and easements and local protection works in the Village of Mamaroneck, the plan would be highly cost prohibitive. Additionally, to increase the storage capacity for the reservoir at this site, a new dam would have to be constructed and more

extensive levees constructed around the reservoir. Although such a detention reservoir would provide a higher level of protection at the Town of Mamaroneck, benefits to the areas below the Sheldrake River's confluence with the East Branch would be limited, and the resulting plan also highly cost prohibitive. No other practical reservoir sites exist in the Sheldrake River watershed.

Westchester County Joint Water Works Reservoir. The Westchester County Joint Water Works Reservoir lies on the Mamaroneck River, upstream of the damage areas in the Village of Mamaroneck. A flood control reservoir at this site would control a drainage area of 15.35 square miles, constituting 65 percent of the entire Mamaroneck River watershed. The existing dam at the site was investigated to determine its potential for flood risk management. This evaluation indicated that, even with significant modifications, the existing structure provided no significant reduction in the peak flows.

A number of alternatives were then considered which included a new dam at this site. The most viable of these schemes considered a new dam with a 200-foot long spillway, averaging 35 feet in height, and an 800-foot long earthen non-overflow section averaging 26 feet in height. Such a reservoir would reduce the 100-year flood discharges by approximately 50 and 25 percent, respectively, along the Mamaroneck River at its confluence with the Sheldrake River. However, the improved 100-year discharge is in excess of the bankfull capacity for the Mamaroneck River in the village, and local protection works would be necessary to protect against a 100-year or greater storm.

Furthermore, the cost of the structural works required to provide the flood storage discussed above, far exceeds the flood risk management benefits derived. In addition to the new dam and regulating works, several roads and highways would be raised substantial heights. For example, Mamaroneck Avenue would be raised to heights up to 21 feet, with the length of roadway affected in excess of 8,009 feet. Other roads to be raised would include Union Avenue, portions of the Hutchinson River Parkway, New England Thruway access ramp, and local streets lying from Winfield Avenue to Teresa Lane.

The real estate requirements for such a reservoir at this site would total more than 200 acres, while the total cost, including new dam, road relocations and raising, real estate and local protection works would be in excess of \$150 million dollars (1977 price level). Reservoir schemes which consider lower storage capacities would be less costly at the detention site itself; however, the associated cost of the local protection works that would be required downstream to provide at least a 100-year level of protection would escalate the overall cost and the resulting plan would be highly uneconomical.

Flood Detention at Maple Moor Golf Course. The utilization of the Maple Moor Golf Course and the surrounding area was considered as a possible flood storage site along the Mamaroneck River in response to requests by local interests. The Maple Moor Golf Course lies upstream of the Village of Mamaroneck and the Westchester Joint Water Works Reservoir. A flood risk management reservoir at this site would control a drainage area of 9.4 square

miles, constituting 39.8 percent of the entire Mamaroneck River watershed. An analysis of possible reservoir schemes revealed that even if a reservoir at this site stored the total existing 100-year peak discharge, the incremental flows generated below the Maple Moor Golf Course from local runoff would far exceed bankfull capacity of the Mamaroneck River at downstream areas and severe flooding would still result in the Village of Mamaroneck during a 100-year event. Thus, for such a level of protection, or greater, extensive local protection works would be necessary in the village even if such a reservoir were constructed at Maple Moor. The construction of a reservoir at the Maple Moor site to provide substantial flood storage would affect the Hutchinson River Parkway, and Interchanges 22 and 23 of the Cross Westchester Expressway. The cost of such a dam and reservoir would far exceed the limited flood management benefits it would provide in the Village.

In addition to considering the Maple Moor site individually as a detention reservoir, further consideration was given to a system of storage reservoirs at the Maple Moor Golf Course and the Westchester Joint Water Works site to function in tandem. However, even with such a system, the incremental runoff flows generated below the Westchester Joint Water Works site for a 100-year or greater event would cause flooding at the Village of Mamaroneck. The flood risk management benefits which can be attributed to such a reservoir system clearly cannot support the excessive costs required for construction of the two dams and reservoirs, and downstream local protection works.

Flood Detention at Silver Lake. The use of Silver Lake along the Mamaroneck River was considered as a possible flood detention site in response to requests by local interests. However, a flood control reservoir at this site would control a drainage area of 1.1 square miles, constituting only 4.7 percent of the entire Mamaroneck River watershed. Even if the entire existing 100-year peak discharge at Silver Lake could be retained, the resulting 100-year flow for the Mamaroneck River in the Village would be reduced by less than 5 percent. Silver Lake site lies too far upstream from the damage areas in the Village to be effective for flood risk management purposes.

Alternative #1 – Lower Mamaroneck River and Confluence Area

This plan includes channel deepening and widening along both the Mamaroneck and Sheldrake Rivers from a little above the confluence to the Tomkins Avenue Bridge (tidal limit). Five bridges will be removed and/or replaced including the two Columbus Park pedestrian bridges, Station Plaza, Halstead Avenue, and Ward Avenue. Along the Mamaroneck River, channel work extends from the Tompkins Ave. Bridge to 400 ft. above the Hillside Avenue Bridge, for an approximate length of 4,200 ft. Along the Sheldrake River channel work extends from the confluence to 700 ft. above the Mamaroneck Avenue Bridge, for an approximate length of 1,400 ft. The river will be significantly realigned at the confluence and below the Ward Ave Bridge. 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). Concrete retaining walls will be used where space is limited. The existing channel side slopes range from one vertical on one horizontal (1:1), to one vertical on three horizontal (1:3). The width of the existing channel varies from 30 to 50 ft. for the Mamaroneck River and from 20 to 40 ft.

in the Sheldrake River. The channel bottom will be lowered from two (2) to four (4) ft. The channel bottom has a moderate slope, approximately 12 ft. per mile. Columbus Park will be used as the staging area during construction.

Alternative #2 – Mamaroneck River and Confluence Area

This plan includes Alternative 1 and additional work along the Mamaroneck River up to the Winfield Avenue Bridge. Six bridges will be removed and/or replaced including Hillside Avenue the two Columbus Park pedestrian bridges, Station Plaza, Halstead Avenue, and Ward Avenue. Along the Mamaroneck River, channel work extends from the Tompkins Avenue Bridge to 270 ft. above Winfield Avenue Bridge, for an approximate length of 6,700 ft. Along the Sheldrake River; channel work extends from the confluence to 750ft above the Mamaroneck Avenue Bridge, for an approximate length of 1,500ft. The river will be significantly realigned at the confluence and just below the Ward Avenue Bridge. Trapezoidal channel improvements will consist of a natural bed channel with side slopes of one vertical on two and a half horizontal (1:2.5), with retaining walls where space is limited. Articulated concrete mats block may be used throughout and just downstream of the Winfield Avenue Bridge due to the high stream velocities.

Alternative #3 – Mamaroneck and Sheldrake Rivers

This plan includes Alternative 2 with additional channel deepening along the Sheldrake River. Eight (8) bridges will be removed and/or replaced including Centre Avenue, the two (2) Columbus Park pedestrian bridges, Hillside Avenue, Station Plaza, Halstead Avenue, Valley Place (Anita Lane Sewer Bridge); and Ward Avenue. Along the Mamaroneck River, channel work extends from Tompkins Avenue Bridge to 270 ft. above Winfield Avenue Bridge, an approximate length of 6,700 ft. The Sheldrake River channel work extends from the confluence to 450 ft. above the Rockland Avenue Bridge, for an approximate length of 6,700 ft.; a significant amount of retaining walls will be used for this alternative. The river will be significantly realigned throughout the confluence and just below the Ward Avenue Bridge. Trapezoidal channel modification will consist of a natural bed channel with side slopes of one vertical on two and a half horizontal (1:2.5), and concrete retaining walls will be used where space is limited. Articulated concrete mats will be used throughout and just downstream of Winfield Avenue Bridge due to the high stream velocities. A rectangular channel with concrete retaining walls and channel bottom is needed from the Railroad Bridge to the Halstead Avenue Bridge.

Alternative #4 – and Fenimore Road Tunnel (From the 1989 GDM)

The 1989 GDM river diversion and channel improvements plan consists of a tunnel system running beneath Fenimore Rd. from the Sheldrake River to the West Basin of Mamaroneck Harbor. This 16 ft. wide by 16 ft. high tunnel system which was approximately 4,010 ft. in length, is comprised of an inlet structure, the tunnel works, and the outlet structure. Channel work in the Mamaroneck River includes a trapezoidal channel modification consisting of a natural bed channel, 45 to 60 ft. wide. Side slopes of one vertical on three horizontal (1:3) with concrete retaining walls where space is limited. Sheldrake improvements extend from the Mamaroneck Avenue to I-95 with a

trapezoidal channel with a natural bed channel 30 ft. wide. The 1989 GDM improvements on the Mamaroneck and Sheldrake Rivers were expected to contain the 200-year frequency flood, or 0.5% exceedance probability event.

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 approximately 6,700 ft. In the Sheldrake River, channel work would extend from the confluence to 450 ft. above the Rockland Avenue Bridge for approximately 5,700 ft. Trapezoidal channel improvements would consist of a natural bed channel 30–50 ft. wide along the Mamaroneck and 20–40 ft. wide along the Sheldrake and vertical concrete walls in areas limited by structures and private properties. A diversion tunnel with an ogee spillway approximately 5.3 ft. high and 40 ft. long would be constructed just downstream of the confluence between the Mamaroneck and Sheldrake rivers. The diversion tunnel, of approximately 1,050 ft. in length and 13 ft. 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. upstream of its current location to allow the proposed tunnel to discharge downstream of the bridge.

Alternative #6 – Nonstructural Alternative

Non-structural flood risk management techniques consist of measures such as relocation, acquisition, and/or flood proofing. Non-structural measures were identified and evaluated for structures in the Mamaroneck Sheldrake Area. Measures evaluated included raising buildings (elevation), wet flood proofing, dry flood proofing (sealants and closures), and ring walls/ring levees. Floodplains corresponding to a flood frequency of 2, 10, 100 years were evaluated without considering future sea level rise. The non-structural measures to be considered in the feasibility study of the Mamaroneck and Sheldrake River project includes flood warning, dry flood proof measures, wet flood proofing, raising buildings (elevation), acquisition or purchasing and removing low lying at risk structures (relocation). Two of the measures considered (i.e., flood proofing and raising buildings) maintain residential, commercial and industrial areas, reducing flood damages through modifications of the existing structures. A more invasive non-structural measure is buying and removing low lying high risk properties. These non-structural measures are generally used for the reduction of damages for frequently flooded properties events (i.e., 25 year event or below).

Alternative 7: Combination Plan

This plan was originally intended to combine non-structural features with structural features. The non-federal sponsor requested that an additional alternative be analyzed (Alternative 8). Therefore, Alternative 7 was deleted from analysis.

Alternative #8 – Reservoir and Bridge Plan

This alternative was proposed by NYSDEC and Westchester County (WC). It consists of a combination of detention areas, the realignment of the confluence and bridge removal and/or replacement. The plan was designed to limit the improvements or changes to public lands and thereby avoiding the Real Estate costs associated with purchasing private property. The two primary areas identified for possible detention were the Mamaroneck Reservoir and Sheldrake Lake/Larchmont Reservoir.

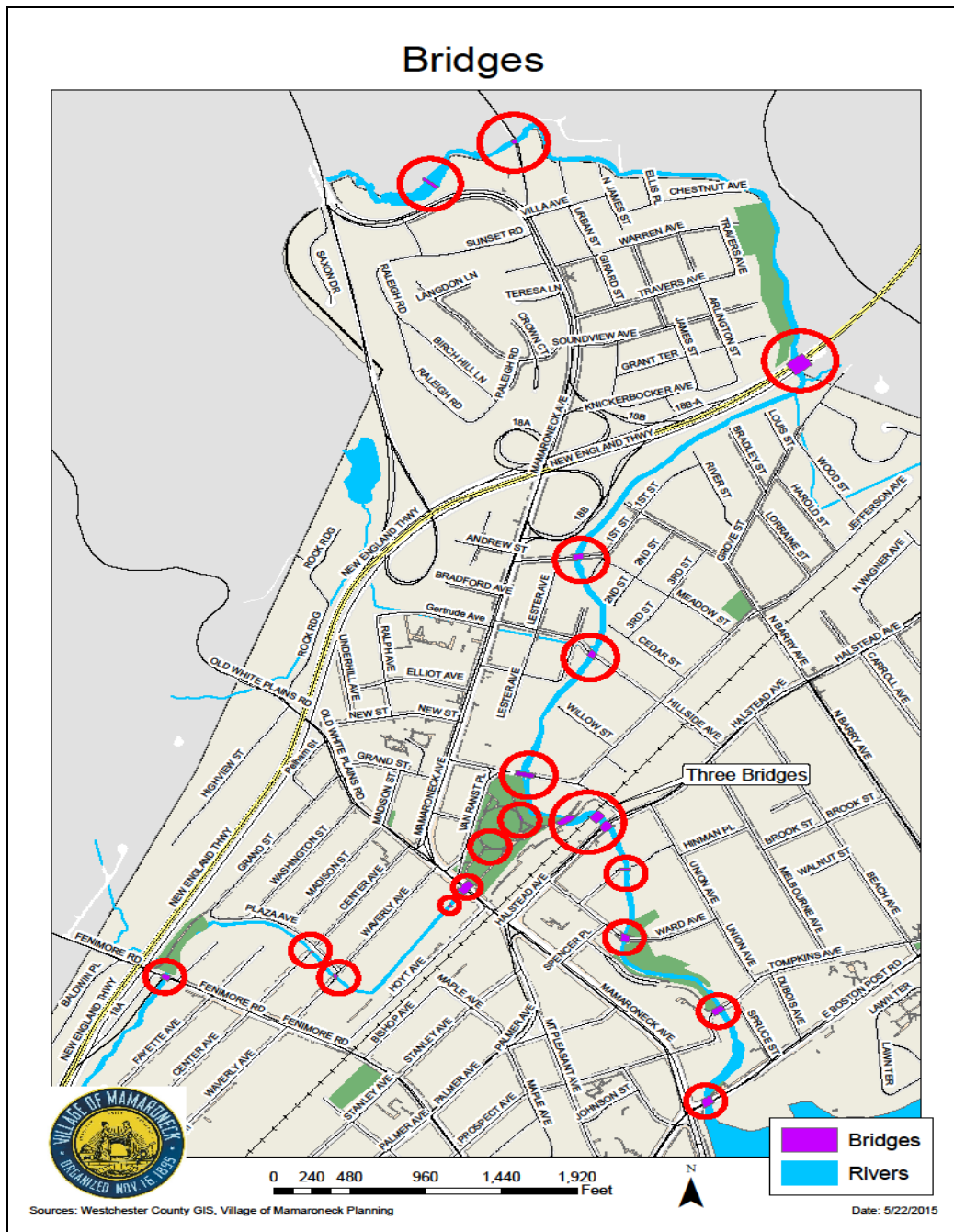
For the Mamaroneck Reservoir, the plan includes the removal of sediment accumulation near Mamaroneck Avenue Bridge, which is a major cause of ineffective or dead storage within Mamaroneck Reservoir. The new slope in this area is 0.0015 ft. In order to maximize storage, which would allow low flow to go through without filling Water Works Dam and Mamaroneck Reservoir, a new lower level outlet design is required.

For the existing Sheldrake Lake/Larchmont Reservoir, the plan includes dredging and sediment removal. This adds approximately 85.4 million gallons of volume capacity approximately a 50% increase in the reservoir volume. The dam will require an additional 30 in. diameter pipe below the existing outlet and 5 ft. above the reservoir is lowest bottom elevation.

Table 1: Summary of Damages, Benefits, and BCRs

Alternative	Stream/Benefit Source	Annual Flood Damages		Annual Benefits	Total Investment Cost	Total Annual cost	Net Excess Benefits	BCR
		Without Project	With Project					
Alt 1	Mamaroneck D/S	\$35,820	\$12,210	\$23,610				
	Sheldrake	\$2,059,220	\$325,890	\$1,733,330				
	Mamaroneck U/S	\$1,315,290	\$397,620	\$917,670				
	Pre Base Year	N/A	N/A	\$0				
	Bridge Replacement	N/A	N/A	\$553,300				
	Emergency	\$94,190	\$30,320	\$63,870				
	<i>Total</i>	\$3,410,330	\$735,720	\$3,291,780	\$54,434,000	\$2,724,300	\$567,500	1.2
Alt 2	Mamaroneck D/S	\$35,820	\$13,030	\$22,790				
	Sheldrake	\$2,059,220	\$367,720	\$1,691,500				
	Mamaroneck U/S	\$1,315,290	\$89,350	\$1,225,940				
	Pre Base Year	N/A	N/A	\$153,230				
	Bridge Replacement	N/A	N/A	\$675,000				
	Emergency	\$94,190	\$22,980	\$71,210				
	<i>Total</i>	\$3,410,330	\$470,100	\$3,839,670	\$72,705,000	\$3,625,400	\$214,300	1.1
Alt 3	Mamaroneck D/S	\$35,820	\$13,280	\$22,540				
	Sheldrake	\$2,059,220	\$37,680	\$2,021,540				
	Mamaroneck U/S	\$1,315,290	\$33,480	\$1,281,810				
	Pre Base Year	N/A	N/A	\$312,590				
	Bridge Replacement	N/A	N/A	\$683,600				
	Emergency	\$94,190	\$12,330	\$81,860				
	<i>Total</i>	\$3,410,330	\$84,440	\$4,403,940	\$95,961,000	\$4,772,100	-\$368,200	0.9
Alt 4	Mamaroneck D/S	\$35,820	\$8,030	\$27,790				
	Sheldrake	\$2,059,220	\$12,700	\$2,046,520				

Alternative	Stream/Benefit Source	Annual Flood Damages		Annual Benefits	Total Investment Cost	Total Annual cost	Net Excess Benefits	BCR
		Without Project	With Project					
Alt 4 (Cont.)	Mamaroneck U/S	\$1,315,290	\$56,340	\$1,258,950				
	Pre Base Year	N/A	N/A	\$478,330				
	Bridge Replacement	N/A	N/A	\$684,800				
	Emergency	\$94,190	\$12,130	\$82,060				
	<i>Total</i>	\$3,410,330	\$77,070	\$4,578,450	\$154,481,000	\$7,715,400	-\$3,137,000	0.6
Alt 5	Mamaroneck D/S	\$35,820	\$7,600	\$28,220				
	Sheldrake	\$2,059,220	\$93,730	\$1,965,490				
	Mamaroneck U/S	\$1,315,290	\$58,260	\$1,257,030				
	Pre Base Year	N/A	N/A	\$153,230				
	Bridge Replacement	N/A	N/A	\$266,600				
	Emergency	\$94,190	\$14,410	\$79,780				
	<i>Total</i>	\$3,410,330	\$159,590	\$3,750,350	\$91,151,000	\$4,529,300	-\$779,000	0.8
Alt 6	Mamaroneck D/S	\$35,820	\$18,690	\$17,130				
Nonstructural	Sheldrake	\$2,059,220	\$442,440	\$1,616,780				
	Mamaroneck U/S	\$1,315,290	\$243,510	\$1,071,780				
	<i>Total</i>	\$3,410,330	\$704,640	\$2,705,690	\$86,082,000	\$4,007,100	-\$1,301,400	0.7
Alt 8	Mamaroneck D/S	\$35,820	\$8,220	\$27,600				
	Sheldrake	\$2,059,220	\$583,740	\$1,475,480				
	Mamaroneck U/S	\$1,315,290	\$544,070	\$771,220				
	Pre Base Year	N/A	N/A	\$68,340				
	Bridge Replacement	N/A	N/A	\$530,100				
	Emergency	\$94,190	\$41,380	\$52,810				
	<i>Total</i>	\$3,410,330	\$1,136,030	\$2,925,550	\$79,178,000	\$3,979,300	-\$1,053,800	0.7



1.

Figure 1 - Mamaroneck River - two 90 degree bends forming "S" shape

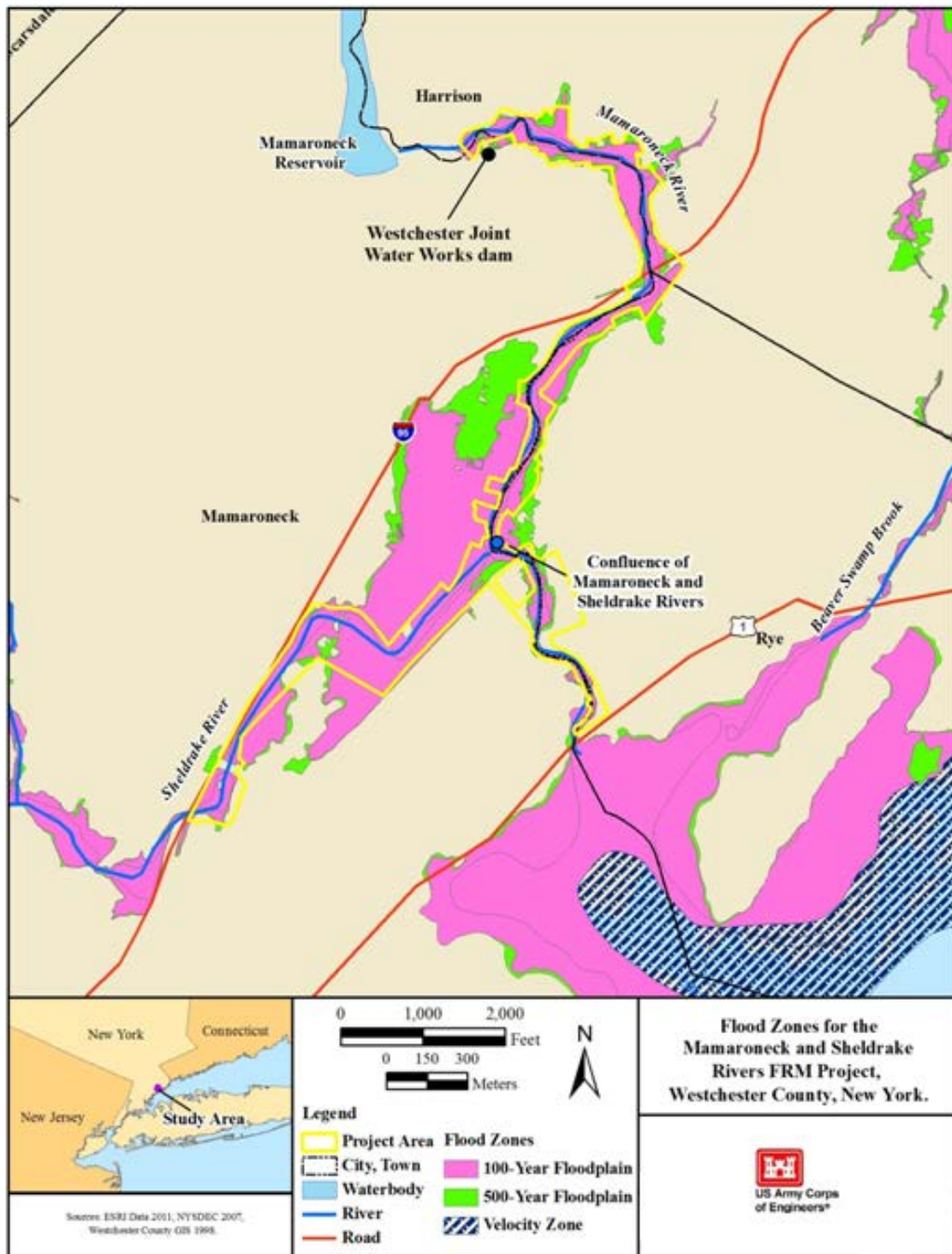
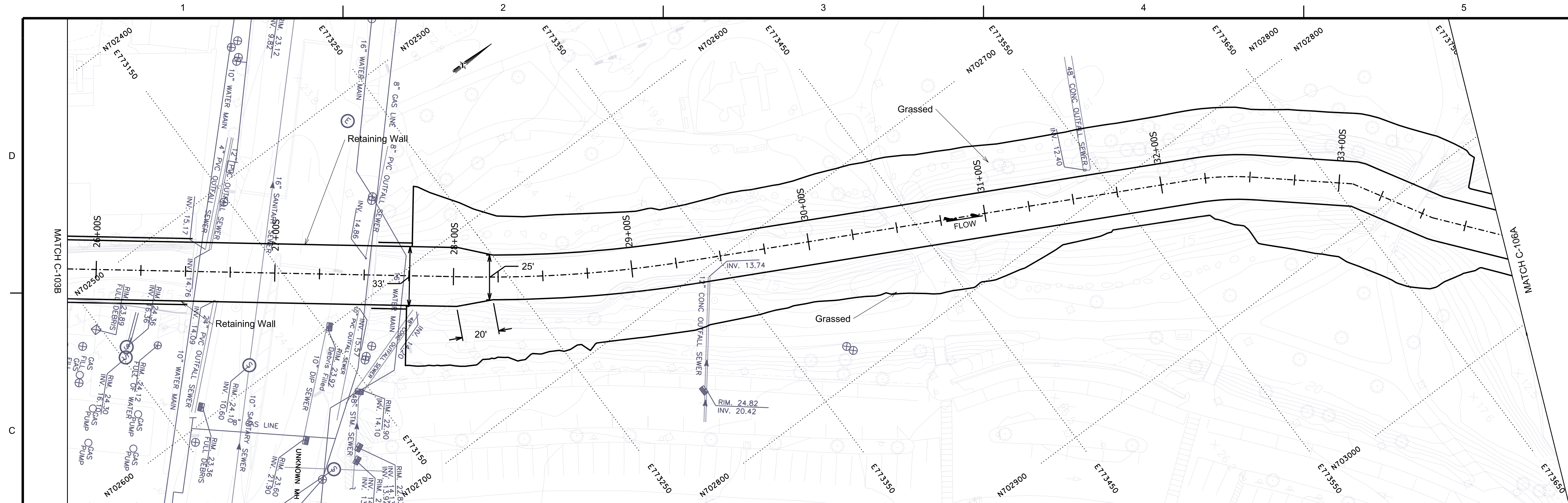
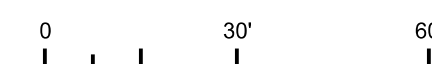


Figure 2 Village of Mamaroneck – 100 and 500 year flood plain map



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



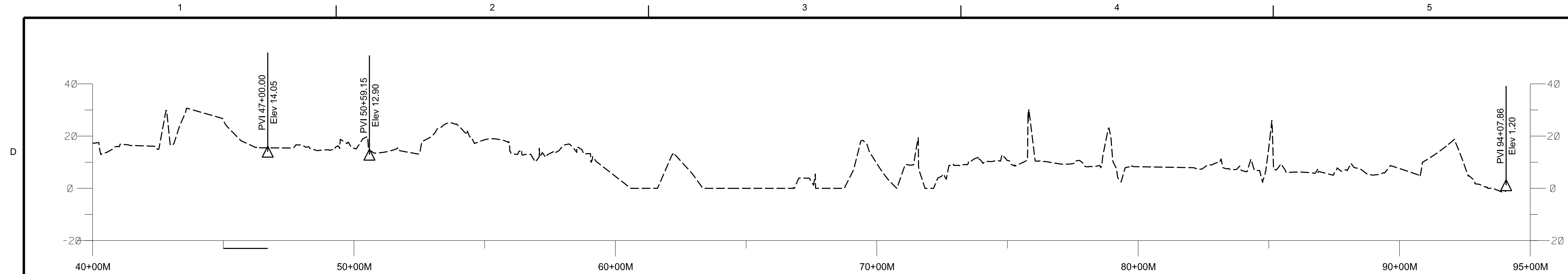
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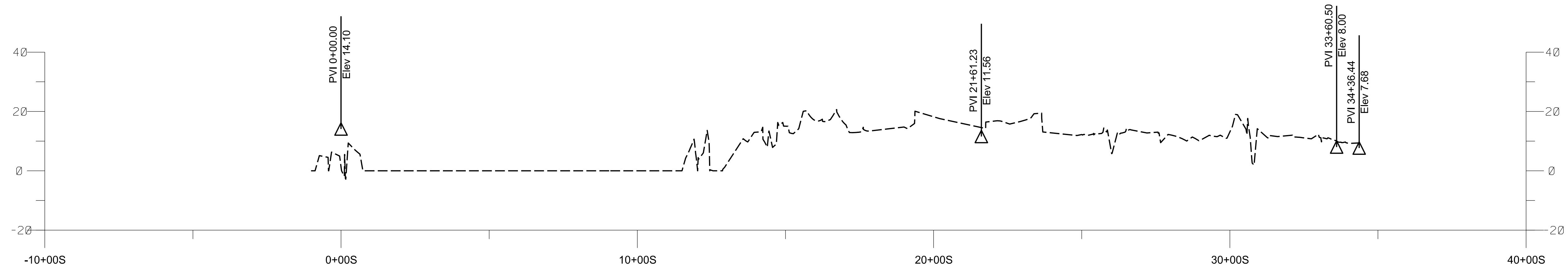
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MAMARONECK AND SHELDRAKE RIVER BASIN
FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VILL. OF MAMARONECK, WESTCHESTER COUNTY, NY
CITY PLAN & SURVEY

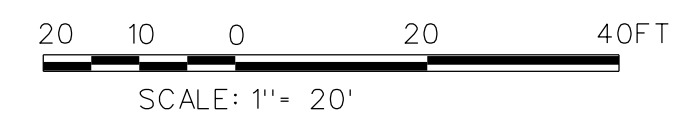
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MAMARONECK RIVER



SHELDRAKE RIVER



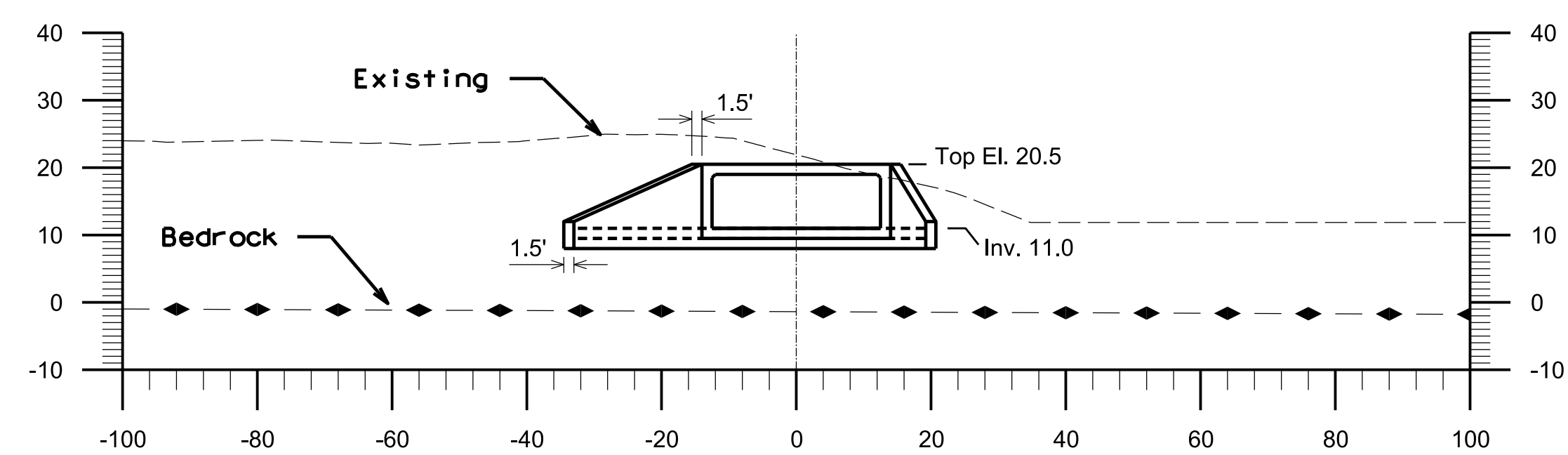
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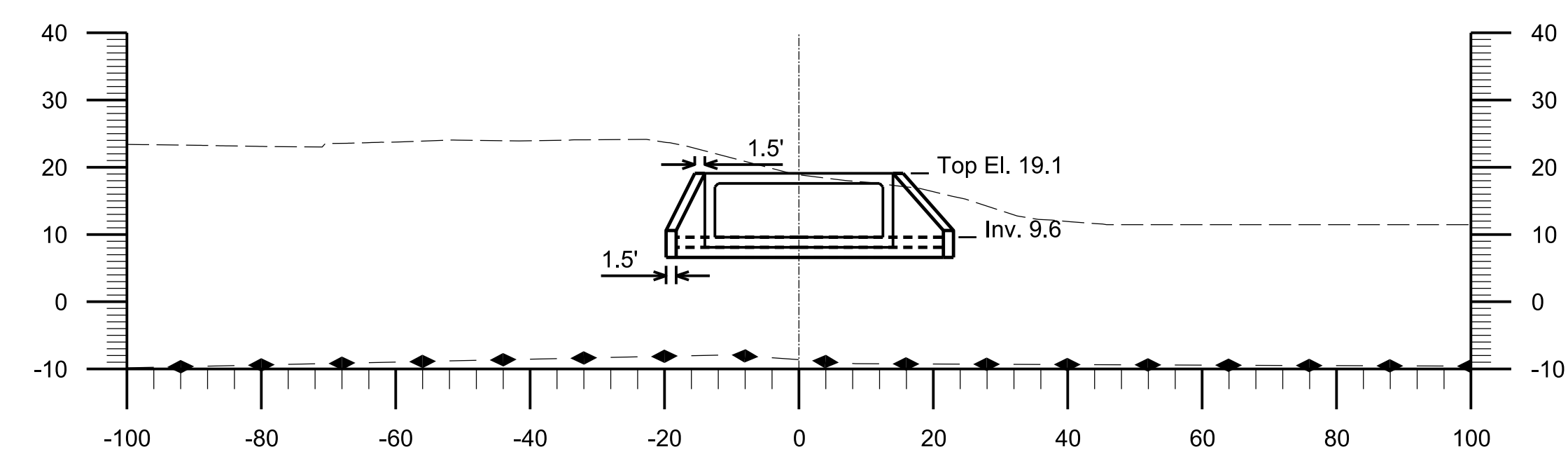
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FLOOD RISK MANAGEMENT
GENERAL RE-EVALUATION STUDY
VIL. OF MAMARONECK, WESTCHESTER COUNTY, NY
MAMARONECK ALT #12
CHANNEL BOTTOM PROFILE

SHEET
IDENTIFICATION
C-201

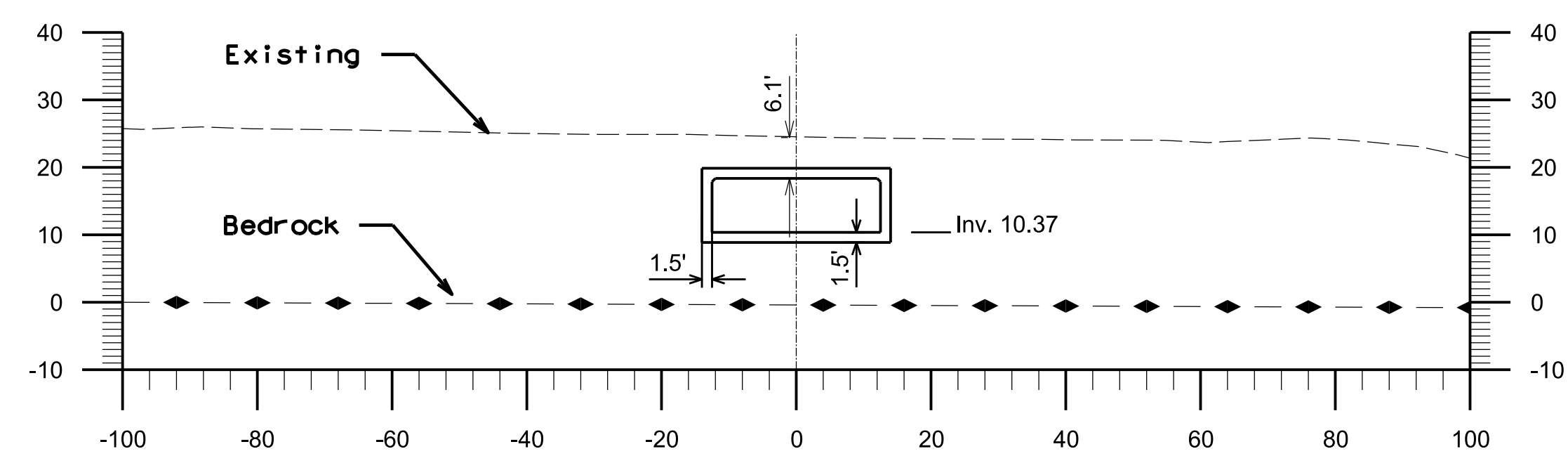
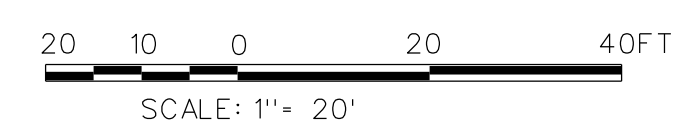


1+26.36M
INLET

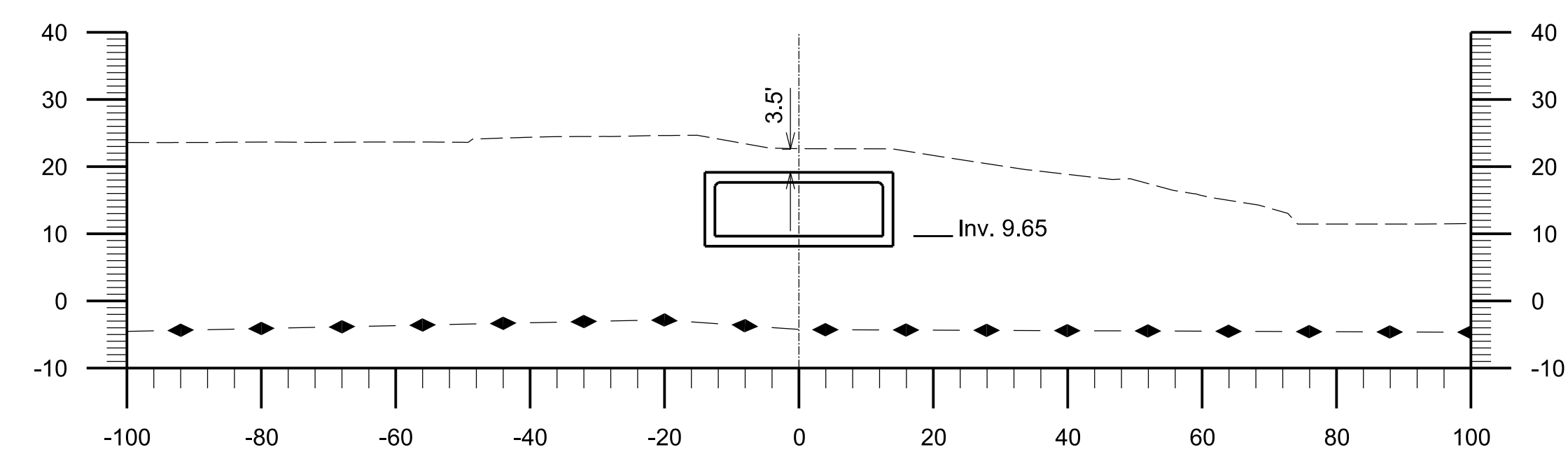


5+14.47M
OUTLET

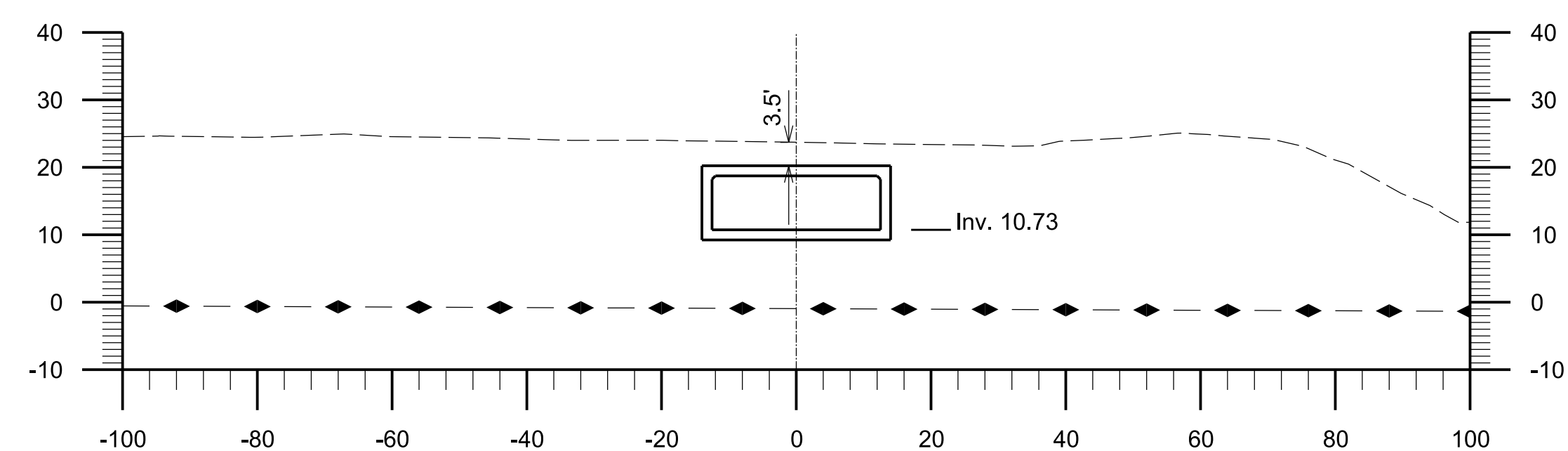
ELEVATION VIEW



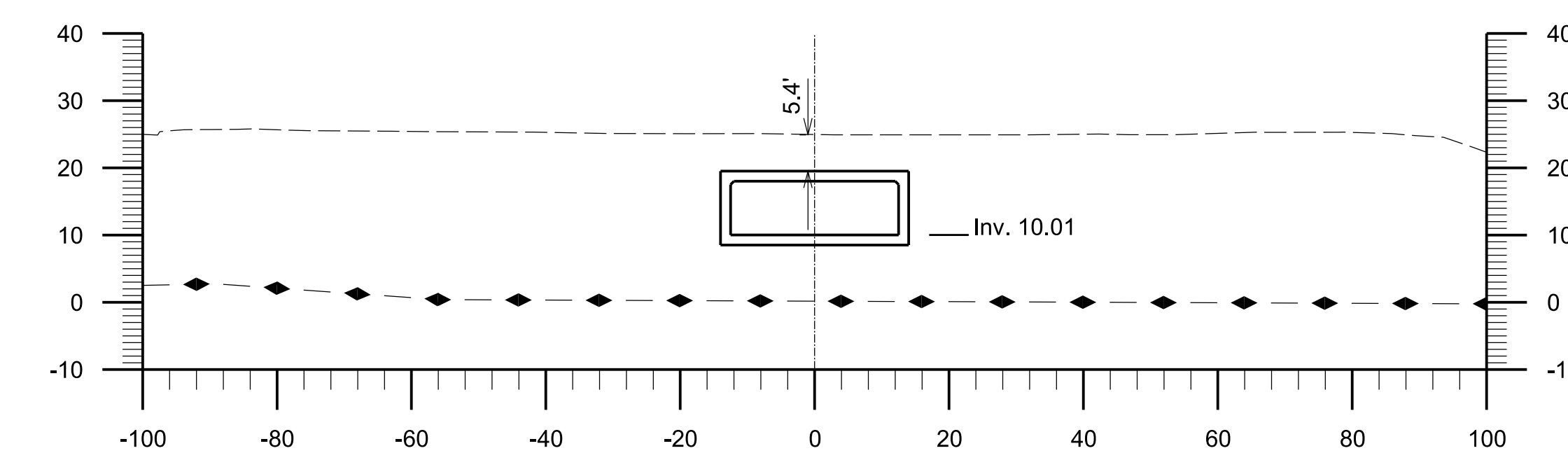
3+00M



5+00M

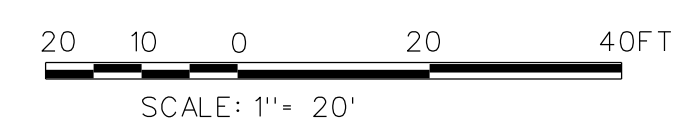


2+00M



4+00M

CROSS-SECTIONS



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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	AS SUBMITTED BY:	FILE NUMBER:
	PILOT SCALE: 1" = 20'	ISSUE DATE: 23 SEP 2015
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MAMARONECK AND SHELDRAKE RIVER BASIN
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GENERAL RE-EVALUATION STUDY
VILL. OF MAMARONECK, WESTCHESTER COUNTY, NY

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IDENTIFICATION
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