

**Blind Brook, City of Rye
Flood Risk Management Study
Federal Interest Determination**



New York District
US Army Corps of Engineers
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INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New York District has prepared this Federal Interest Determination to document Federal Interest in a flood risk management project to address flooding from the Blind Brook in the City of Rye, Westchester County, New York as requested by the City of Rye in a letter dated August 19, 2019¹. This Federal Interest Determination is consistent with Army policies as outlined in Section F-10.e(1) of ER 1105-2-100, the Planning Guidance Notebook (Appendix F, Amendment #2 dated 31 January 2007). This Federal interest investigation is based on a preliminary appraisal using existing, readily available data provided by state and local government sources.

STUDY AUTHORITY

The Continuing Authorities Program (CAP) is a group of 10 legislative authorities under which the Secretary of the Army, is authorized to plan, design, and implement certain types of water resources projects without additional project specific congressional authorization. The legislated authority for this project is Section 205 of the Flood Control Act. This Federal Interest Determination (FID) is prepared under Section 205 of the Continuing Authorities Program (CAP) which provides for small Civil Works projects to address Flood Risk Management.

This study was initiated under Section 205 of the Flood Control Act of 1948 (33 USC 701r) for flood risk management based on reports of flooding in the City of Rye. Section 205 of the Flood Control Act approved 30 June 1948, as amended, authorizes the USACE to study, design, and construct small flood control projects that have not been specifically authorized by Congress, in partnership with non-Federal entities. It states:

The Secretary of the Army is authorized to allot from any appropriations heretofore or hereafter made for flood control... for the construction of small projects for flood control and related purposes not specifically authorized by Congress, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable...

Per the Water Resources Reform and Development Act (WRRDA) of 2014, the Federal limit for each Section 205 project is \$10,000,000 (approximately \$15,000,000 total) for study, design, and construction. The total amount is cost shared 65% Federal and 35% Non-Federal.

STUDY PURPOSE

The purpose of this initial assessment is to determine whether there is sufficient justification and a federal interest in further investigation of a project to reduce flood risk to communities surrounding Blind Brook in the City of Rye, New York. The objective of this report is to identify at least one policy compliant solution of a scope appropriate for the CAP and determine whether future Federal interest in a feasibility study is warranted. If justified, USACE will pursue negotiation of a Project Management Plan (PMP) and execution of a feasibility cost-sharing agreement (FCSA) with New York State Department of Environmental Conservation (NYSDEC), the non-federal sponsor, for further study. Pending a positive feasibility

¹ Letters of request can be found in Attachment 1 to this Federal Interest Determination.

recommendation, the District and sponsor will negotiate and execute a Project Partnership Agreement (PPA) for design and implementation of the project.

This Federal Interest Determination determines whether a project meets program criteria and provides a basis for determining scope and cost of a feasibility study. It addresses 1) is the scope of the problem in federal interest, 2) is there a viable solution, and 3) is this solution within the scope of the CAP authority. This FID describes the problem and identifies possible management alternatives, outputs, and impacts.

As part of this Federal Interest Determination, detailed evaluation of the environmental consequences and real estate impacts have not been considered. Plan effects will be considered in the feasibility study, as plans are developed and formulated. At this FID effort, it would be premature to speculate on the environmental or real estate consequences of the plan. Impacts associated with the construction process, such as noise and air quality issues, are to be expected yet temporary in duration. Any impacts from alternatives considered during the feasibility study would be fully evaluated in the associated National Environmental Policy Act (NEPA) document. Coordination with regulatory agencies and NEPA compliance will also occur upon further study. Following study approval, a Project Management Plan (PMP) will be developed for the feasibility study, tasks will include characterization of the environmental setting and coordination with the resource agencies. Coordination with the local sponsor, New York State of Environmental Conservation (NYSDEC) on plan formulation and alternatives development will occur early in the process to identify any regulatory constraints that need to be considered in planning efforts. The PMP will also identify the real estate that would be impacted and required for each of the plan alternatives.

LOCATION OF PROJECT

The City of Rye is located in Westchester County on the Long Island Sound (see Figure 1 below). The area hosts natural features such as tree-lined streets, beaches, and the Blind Brook tributary. The Blind Brook originates near the Westchester County Airport in the City of White Plains, Westchester County, New York. The City of Rye is located at the bottom of the Blind Brook's 13.6 square mile watershed that drains through the City of Rye and into Long Island Sound. The Blind Brook flows approximately nine miles south through multiple communities before emptying into the Long Island Sound at Milton Harbor in the City of Rye. The Blind Brook watershed (Figure 2) drains thru several municipalities and nearby areas that would attract development by a major construction project including the City of Rye, Town of Harrison, Village of Rye Brook, Village of Port Chester, and Town of Greenwich, Connecticut. The majority of the watershed consists of suburban development and denser, urban areas in the southern and eastern portions.

According to US Census data, as of July 2019, the City of Rye has a population of approximately 15,695 people, who live primarily in single family homes and low-density multifamily housing. The median household income in Rye is \$180,958 (2018 dollars) with a poverty rate of 4.3%. Owner occupied housing rate is 75.3% and the median value of owner-occupied homes is \$1.2 million.²

² Retrieved 28 August 2020: <https://www.census.gov/quickfacts/ryecitynewyork>

PROJECT AREA MAP

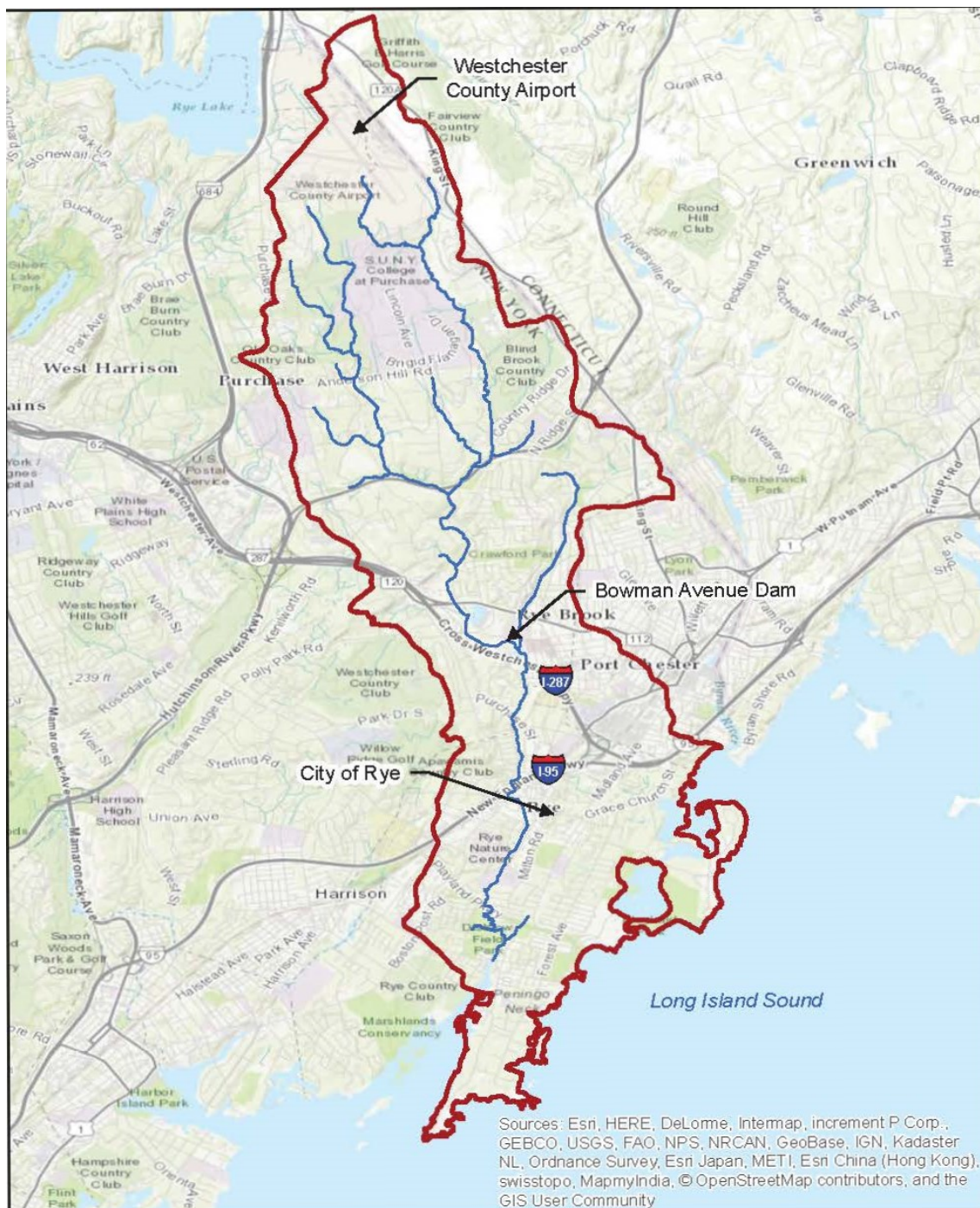


Figure 1 City of Rye - Blind Brook Watershed

Blind Brook Watershed

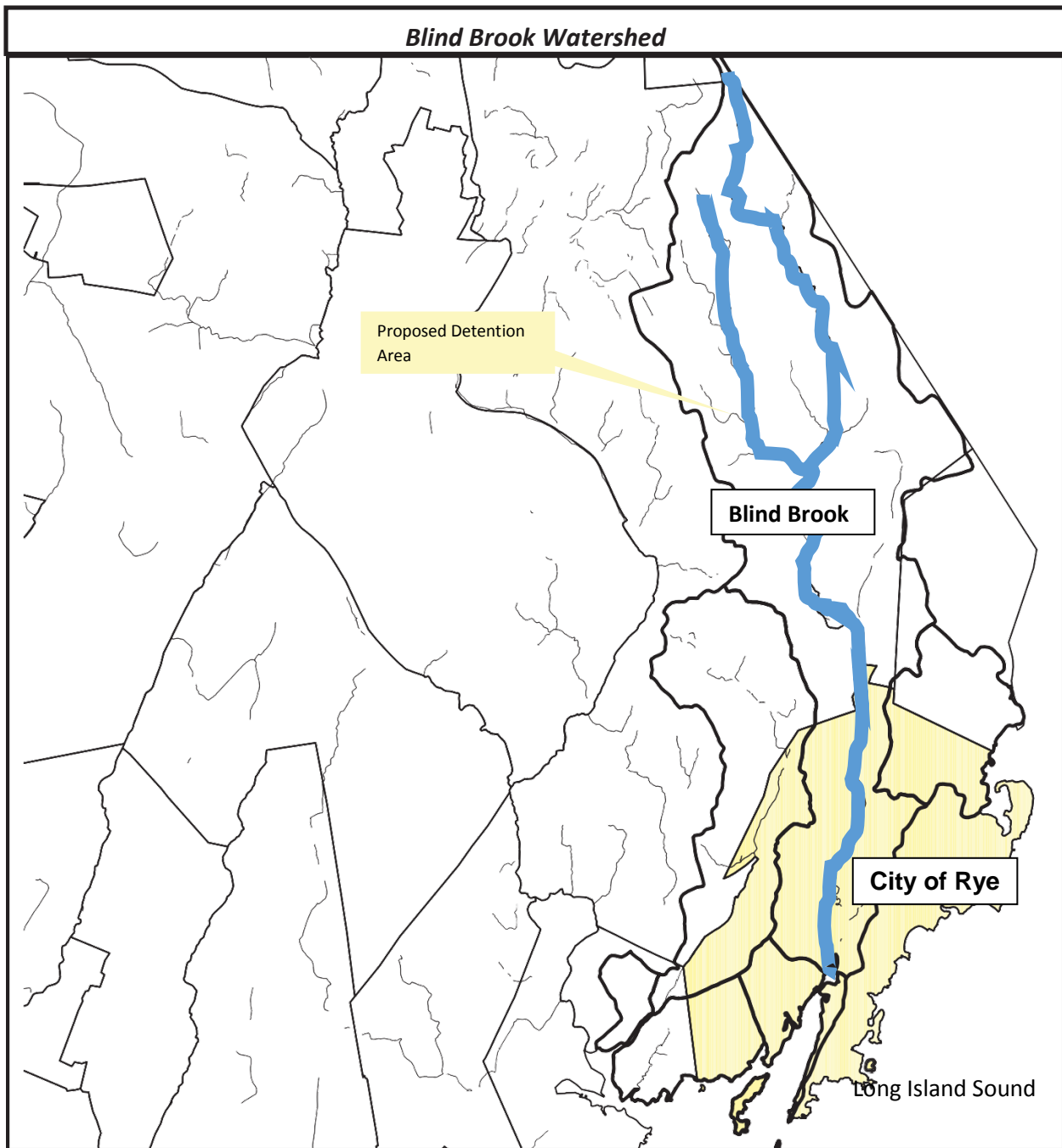


Figure 2 City of Rye - Blind Brook Watershed – Proposed Detention Area

- Blind Brook
- Municipal Limits City of Rye

Source: City of Rye, New York Geographic Information System

PRIOR STUDIES AND REPORTS

This Federal Interest Determination draws upon information from multiple reports and studies that have been conducted in the area for characterization of existing conditions and potential flood risk management measures. These include:

- Blind Brook and Tributaries, Westchester County, New York, Flood Plain Information Study; Westchester County, NY and U.S. Army Corps of Engineers, January 1965
- Flood Mitigation Study, Bowman Avenue Dam Site and Lower Pond; Chas. H. Sells, Inc., March 2008
- Blind Brook Watershed Management Plan; U.S. Army Corps of Engineers, March 2009
- Hydrologic and Hydraulic Analysis Report, Blind Brook Watershed Study; City of Rye and Parson Brinckerhoff, August 2014
- Upper Bowman Pond Modifications Study; Governor's Office of Storm Recovery and O'Brien & Gere Engineers, Inc., March 2017
- Rye Flood Resiliency Projects; Governor's Office of Storm Recovery and O'Brien & Gere Engineers, Inc., August 2018

A USACE team met with representatives from the City of Rye and the New York Department of Environmental Conservation (NYSDEC) on February 8, 2019 and July 23, 2019 to discuss flooding issues related to the Blind Brook. The Trip Report from this meeting can be found as an appendix to this document.

PLAN FORMULATION

Given the scope of the FID, this report relies heavily on information that has been developed in prior reports, in order to identify if there is a plan that would fit within the framework of the CAP 205 program authority. There are recognized limitations in this approach. In meetings with the City of Rye, they communicated that their efforts have not fully integrated the hydraulics and hydrology of the entire Blind Brook River basin, and in their analysis they have not considered the interconnectedness of the upper, middle, and lower Blind Brook. This means that the system-wide solutions, and response is not reflected when adopting these analyses.

More importantly, the efforts undertaken by the City of Rye have focused on flood risk management measures that primarily address the upper portion of the Blind Brook with the creation and enhancement of natural storage. Solely utilizing this information does not consider other potential causes of flooding within the watershed, which would warrant other treatment methods, such as limited channel capacity, and hydraulic constrictions in the middle Blind Brook, which is an area of concentrated damages. Given the scope of this effort, further consideration of structural measures was not considered, but non-structural measures were.

Recognizing the limitations used in this analysis, it should be emphasized that as this study proceeds into feasibility-level analysis, that a more complete H&H analysis of the existing and without project future conditions would be required, as well as further consideration of structural and nonstructural measures that address the contributors of flooding, throughout the entire watershed. Coordination with the regulatory agencies and National Environmental Policy Act (NEPA) compliance will also occur should a feasibility study be approved

IDENTIFIED PROBLEMS

The City of Rye has historically been impacted by storms and most recently by Hurricane Irene in 2011 and Hurricane Sandy in 2012. The area experiences fluvial flooding from the Blind Brook and coastally influenced flooding from the Long Island Sound. Flood and storm events result in damages to infrastructure, structures and contents. An opportunity exists to prevent damages and provide protection to public and private assets and infrastructure to ensure community resilience when faced with risks associated with storms and floods.

EXISTING & FUTURE CONDITIONS

The most likely future scenario for the City of Rye is continued flooding by fluvial and coastal sources. The historical context of storm impacts describes what the future will look like if no new action to correct the problems and realize the opportunities identified. This is the basis for comparison of alternatives considered for the determination. The specific problem identified is that the community within the City of Rye experiences significant damages from fluvial flooding and coastal storms including tropical storms, hurricanes, and nor'easters.

Several factors throughout the watershed may be influencing the flooding along Blind Brook, including insufficient storage in the Upper Bowman pond, inadequate dam height and sluice gate operation at the Bowman Avenue Dam, runoff from (and undersized retention pond) for the Westchester County Airport, low lying roadway bridges and culverts (constricting the flow), inadequate channel capacity, and hydraulic constrictions within the middle Blind Brook, and significantly shoaled channel located at Milton Harbor and rising sea levels. Without a significant effort to solve the problem, flooding will continue and the local facilities, homeowners, and the environment will remain at risk.

The most significant flood mitigation project undertaken by the City of Rye has been the construction in June 2013 of a sluice gate at the Bowman Avenue Dam. Prior to this project being implemented, there was no operable sluice gate on the dam. This project was undertaken so the City could operate the dam, in order to reduce downstream flows during storm events. The City of Rye has indicated that they are working on implementing various non-structural measures such as such as regulation of the existing land use and future development in the floodplain, advance flood-warning systems, and emergency response planning. Several structures in the Indian Village section have already been elevated and the local YMCA has flood proofed interiors and exteriors. Based on the 2009 Blind Brook Management Plan, approximately 467 unique structures were identified to be in the FEMA 1% flood plain within the City of Rye. Should this FID progress to feasibility phase investigations, a structure inventory update would be necessary to reflect the most recent structure count, and account for structures at-risk within the floodplain located outside the city limits.

City of Rye residents have historically been exposed to the impact of fluvial flooding along the Blind Brook Watershed. Upper reaches of the Blind Brook Watershed are subject to riverine flooding while the middle and lower reaches are subject to riverine flood events with tidal influences from the Long Island Sound. In the period from 2000 to 2014, the number of insurance claims in Rye are increased during years with major storm events. Table 1 presents NFIP claims by area along the Blind Brook in Rye for years 2000 to 2014. The highest claims correspond with years where hurricane or major storms were recorded.

Hurricanes Irene and Tropical Storm Lee occurred in year 2011 when 245 total insurance claims were recorded and in year 2007, 295 claims were registered corresponding with 2 major storms that year. 143 claims were made in year 2012 corresponding with Superstorm Sandy whose impact caused waves and tidal flooding that devastated waterfront assets.

Table 1 NFIP Claims by Area

Year	Blind Brook North	Blind Brook Middle	Beaver Swamp Brook	Blind Brook Milton Harbor	Long Island Sound	Outside of Flood Zone	Total
2000				1			1
2001	1	1	1	1	1	1	6
2002		1		2	2	2	7
2003				1			1
2004	40	13	2	5	2	3	65
2005				2	2		4
2006				1	3		4
2007	114	71	8	79	16	7	295
2008					1		1
2009							0
2010	2	2		21	14	2	41
2011	88	60	4	70	18	5	245
2012	3	2		76	61	1	143
2013					1		1
2014	3						3

This table is reproduced from data provided by New York State's Westchestergov.com

This FID evaluation draws on the USACE 2009 Blind Brook Watershed Plan report. This report conducted a flood damage assessment based solely on riverine flooding along the main stem of Blind Brook. It did not consider flood damages due to coastal flooding. Flood damage assessment was conducted only for structures within the municipal limits of the City of Rye and not for the entire watershed (see Figure 2), so that the potential damages avoided are underreported. Additionally, the analysis contained in this report is based upon current conditions, and did not forecast increased flooding in the future, which would further increase damages. Expected annual damages represent the severity of the existing flood problem. The 2009 study reported \$7,720,000 (FY08) in average annual damages for the existing condition which would equate to \$11,132,000 at year 2020 price levels. Damages would be considerably higher had all structures within the entire watershed were accounted for, the tidal influence of the Long Island Sound been incorporated into the hydraulic and hydrologic analysis, as well as evaluation of future conditions.

ENVIRONMENTAL SETTING³

As stated above, a complete environmental analysis has not been conducted for this report. The analysis for this report concentrated on environmental areas that may be impacted by the creation or

³ Information regarding the environmental setting have been garnered from the "Planning Base Studies Village of Rye Brook, New York" report prepared by the Westchester County Department of Planning, May 2012

enhancement of water storage, modifications to the waterways, and nonstructural measures. Efforts undertaken by the City of Rye have focused on flood risk management measures that primarily address the upper portion of the Blind Brook with the creation and enhancement of natural storage. Possible environmental impacts with the creation or enhancement of water storage would be due to the dredging of an existing waterbody or by creating a storage area. Dredging an existing waterbody could impact benthic resources, wetlands, fishes, waterfowl, and water dependent mammals such as beaver.

Nonstructural alternatives focus on reducing the consequences of flooding such as raising a house. Therefore, nonstructural measures would potentially have minimal if any environmental impacts.

The Blind Brook is classified "C" under the Protection of Waters Program of the NYSDEC. All waters of the state are provided a class and standard designation based on existing or expected best usage of each water or waterway segment. Classification C is for waters supporting fisheries and suitable for non-contact activities. Several segments and waterbodies within the Blind Brook watersheds have been identified by the state as threatened, stressed, or impaired by nonpoint source pollution. Several reaches of Blind Brook are listed on the NYS Section 303(d) List of Impaired/Total Maximum Daily Load (TMDL) Waters due to pollution from nutrients, urban runoff, and construction activities. Waters along the coastline in Long Island Sound are impaired due to pathogens, nutrients, and dissolved oxygen. The watershed is also located on or near a Principal Aquifer.

Per the Village's Wetland and Watercourses Law, Chapter 245 of the Village Code, wetlands are defined in one of two ways: (1) those areas that meet criteria specified in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989), or (2) those areas that meet the definition of wetlands included in the New York State Freshwater Wetlands Act. Although the NYSDEC regulates only those wetlands that are identified on its Freshwater Wetlands Maps, the Village regulates all freshwater wetlands, regardless of size, as long as they meet one or both criteria noted above. Due to its inland location, no tidal wetlands exist within the Village of Rye Brook however many tidal wetlands exist in neighboring Rye, NY. They can be found at Edith G. Reed Natural Park and Wildlife Sanctuary, Marshlands Conservancy, and Otter Creek Preserve.

One NYSDEC designated wetland, numbered G-3, exists in the Village of Rye Brook. It totals approximately 18.6 acres and is a forested wetland flanking Blind Brook immediately north of Anderson Hill Road, between the State University of New York at Purchase and Reckson Executive Park on the border of Rye Brook and Harrison. The NYSDEC has classified this wetland, per the New York State Freshwater Wetlands Act, as Class II. The single State-designated wetland (palustrine (system), forested (class), and broad-leaved deciduous (subclass) wetland, with a special modifier of non-tidal/seasonally flooded) in Rye Brook is the largest in the Village. Palustrine wetlands most found in Westchester County include inland marshes and swamps, with the former dominated by perennial or herbaceous vegetation and the latter dominated by shrubs and trees. Other, smaller wetlands have also been identified and mapped as part of the National Wetland Inventory (NWI). The NWI-mapped wetlands total approximately 42 acres, which includes part of the State-designated wetland and some segments of the main stem and East Branch of Blind Brook. The NWI-mapped wetlands include freshwater ponds totaling approximately 23 acres, freshwater forested/shrub wetlands (swamps) totaling approximately 15 acres, and freshwater emergent wetlands (marshes) totaling approximately four acres.

Rye Brook is in NYSDEC's Manhattan Hills ecological zone. The vegetation is predominantly pioneer hardwoods and oaks. The most highly vegetated areas are located near the Blind Brook and the BelleFair

residential community. The Village of Rye Brook has close to 3,000 acres of open space, which may be found in public parks and schools, along parkways and natural waterways, at privately-owned country clubs, and within housing developments and corporate parks. These areas are variably designated for both active and passive recreation, open or limited access, or for natural resource conservation. Neighboring Rye has over 450 acres of parklands many along the coast consisting of tidal wetlands. Many of the parks and open spaces in both Rye and Rye Brook has been restored since 2000, removing invasive vegetation and planting native species. The New York Natural Heritage Program identifies Significant Natural Communities which are of rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. New York Natural Heritage calls these different types of habitats or ecosystems “natural ecological communities.” New York Natural Heritage documents only those locations of natural communities where the community type is rare in New York State; or, for more common community types, where the community at that location is a high-quality example and meets specific, documented criteria for state significance in terms of size, undisturbed and intact condition, and the quality of the surrounding landscape. The marine rocky intertidal areas along the coast is one of these Significant Natural Communities.

Wildlife typical of suburban areas included coyotes, skunks, raccoons, squirrels, mice, deer, and rabbits. State and federal listed threatened and endangered species have been observed in rye or Rye Brook. They include Indiana bat (*Myotis sodalis*), long-eared bat (*Plecotus auratus*), roseate tern (*Sterna dougallii*), common tern (*Sterna hirundo*), sedge wren (*Cistothorus stellaris*), seaside sparrow (*Ammodramus maritimus*), bald eagle (*Haliaeetus leucocephalus*), king rail (*Rallus elegans*), least bittern (*Ixobrychus exilis*), annual saltmarsh aster (*Symphyotrichum subulatum*), wild pink (*Silene caroliniana*), , American featherfoil (*Hottonia inflata*), small swollen bladderwort (*Utricularia radiata*), green screwstem (*Bartonia paniculate*), long-beaked sedge (*Carex spregelii*), and narrow-leaved pinweed (*Lechea tenuifolia*).

Probable federal, state, and local environmental rules, regulations, and laws applicable in the Blind Brook watershed include:

- Village of Rye Brook tree ordinance that protects trees on both public and private property. Permits are required for removing trees over a certain size on public and private property.
- The City of Rye has adopted a Local Waterfront Redevelopment Plan
- The Migratory Birds Treaty Act of 1918.
- The Bald and Golden Eagle Protection Act of 1940.
- The Fish and Wildlife Act
- The Magnuson-Stevens Act Fishery Conservation and Management Act
- National Environmental Policy Act of 1969
- Prime and Unique Farmlands
- Wild and Scenic Rivers Act
- FAA Advisory Circular 150/5200-33B and the MOA with FAA to address aircraft- wildlife strikes
- Clean Air Act of 1977
- Clean Water Act of 1977
- Endangered Species Act of 1973
- Executive Order 11988 Floodplains Management
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Executive Order 11990, Protection of Wetlands

- Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks
- Executive Order 13112, Invasive Species
- New York State Water Quality Certificate
- New York Erosion and Sediment Control Regulation

CULTURAL RESOURCES

Historic Properties

Section 106 of the National Historic Preservation Act of 1966, as amended, requires all federal agencies to coordinate with the State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer(s) (THPO), for proposed actions that may impinge upon properties with cultural or Native American significance, or listed in, or eligible for listing in, the National Register of Historic Places (NRHP). Accordingly, during the feasibility study, the USACE will submit an assessment to the local SHPO and THPO.

A Phase I Cultural Resources Survey will be conducted to identify potential cultural resources at the project area. If cultural resources are found, a Phase II cultural resources survey may be necessary to further identify the type and extent of cultural resources that may be impacted by the project. The results of the cultural resources surveys will be used to avoid selection of project sites that would negatively impact cultural resources.

Within the study area, there are ten archaeological sites, with five ineligible for the NRHP, and five have an undetermined eligibility status. There is one New York State Museum Site within the study area and 29 other, undefined museum sites. The single identified archaeological resource is the Blind Creek site (5480), while according to the NY SHPO data, about 1/3 of the study area is sensitive for Precontact archaeological sites.

Initial review of the study area demonstrated that there are approximately 230 USN recorded structures and one historic district, SUNY College at Purchase (USN# 11905.000067), within the study boundaries (15 resources are listed on the NRHP, 17 resources are eligible for the NRHP, 23 resources are not eligible for the NRHP and 175 are undetermined). There have been two building surveys within the study area: Anderson Hill Road Site Phase 1A Literature Review and Sensitivity Analysis & Phase 1B Archaeological Field Reconnaissance Survey (Survey ID 16025) and SUNY Purchase (Survey ID 16525). Within 500 feet of the project area, there are three NYSM sites: 5216, 5209, and 5216 and 21 USN structures. Of these structures, two are listed on the NRHP (Square House/Widow Haviland's Tavern and Milton Cemetery), two are eligible for the NRHP (Rye Free Reading Room and Nature Preserve Park Road Bridge over Blind Creek), one is not eligible for the NRHP (Westerleigh Road Bridge over Blind Brook), and 16 are undetermined.

Of all of these resources, the NRHP eligible 'Nature Preserve Park Road Bridge over Blind Creek' is most likely to be impacted by proposed alternatives. This is due to its close proximity to Blind Brook and the potential constriction in the flow of the stream. Additional resources likely to be impacted are the NRHP listed Square House/Widow Haviland's Tavern, Milton Cemetery, and Rye Free Reading Room, as well as the SUNY College at Purchase, situated at the northern end of the project area.

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Hazardous, Toxic, and Radioactive Waste (HTRW) is defined by USACE Engineering Regulation (ER) 1165-2-132 as those hazardous substances listed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 United States Code 9601 et seq. CERCLA regulated substances include hazardous wastes listed under the Resource Conservation and Recovery Act, hazardous substances and hazardous air pollutants listed under Section 112 and 311 of the Clean Air Act, toxic pollutants listed under Section 307 of the Clean Water Act, and imminently hazardous chemical substances or mixtures of which the United States Environmental Protection Agency (USEPA) is taking action under Section 7 of the Toxic Substance Control Act.

Readily available records of reported HTRW contaminated sites and associated site details are maintained in online databases by the USEPA for federally listed sites and by the New York State Department of Environmental Conservation (NYSDEC) for state listed sites. No federally listed site and at least 17 state listed sites were identified within the vicinity of the Blind Brook.

The nearest state listed site is the Westchester County Airport (Brownfield Cleanup Program, Site Code C360174), located at the northernmost extent of Blind Brook. Several individual contaminated sites are present at the Westchester County Airport including the Texaco Hangar (State Superfund Program, Site Code 360037), Former NYANG Septic Field (Voluntary Cleanup Program, Site Code V00499), Former Hangar B Septic Field (Voluntary Cleanup Program, Site Code V00611), Harrison Subresidency (State Superfund Program, Site Code 360035), and the Former DPW Staging Area (Voluntary Cleanup Program Site Code V00652).

Two additional state listed sites are present in the nearby vicinity of Blind Brook, located in the City of Rye. These sites are identified as the Former French Touch Dry Cleaner (State Superfund Program, Site Code 360097) located at 1004 Boston Post Road and Belle Cleaners (State Superfund Program, Site Code 360086) located at 38-40 Purchase Street. Both sites are within approximately 150 to 300 feet east of Blind Brook. The remaining 14 state listed sites identified in the study area are found to be more than 0.25 mile from the Blind Brook.

While project related impacts are not anticipated at this time, a more detailed HTRW review will be conducted during the feasibility study to further assess potential impacts of any new and/or existing federal and state listed contaminated sites in the vicinity of the alternative plans.

ALTERNATIVE PLANS

As highlighted above, the following alternatives have been identified from a survey of previous studies as within the purview of potential Federal involvement under the CAP 205 authority. It is recognized that the alternatives listed below are not a comprehensive consideration of the possible measures to address flooding but are sufficient to demonstrate Federal Interest. Studies reviewed included improvements to the Bowman Avenue Dam, including modifications to sluice gate and its operations. Please note that because of current USACE guidelines, measures involving dam modifications would be beyond the scope of this investigation, in terms of effort and cost, of a Section 205 CAP project. Accordingly, measures involving dam modifications can be found in the reference literature for this FID but are not considered

as part of the plan formulation for this effort. There are other viable options for flood risk management within the Blind Brook basin, including:

1) Stormwater pond upstream of Anderson Hill Road

The pond would function as an off-channel detention basin that collects and detains flood flows for release after the storm at a controlled rate until the basin empties into the Blind Brook watershed. In addition to the basin a diversion culvert would be constructed to divert flows above the 1-year peak flow to the pond. The 2009 report proposed pond dimensions of 17.5 acres at a depth of 13 feet for flood risk management, a feasibility study would determine dimensions within the scope of an authorized study (see Figure 3).

2) Nonstructural measures

These measures are intended to reduce exposure to a flood hazard without altering the natural plain or extent of flooding hazard and can include:

- Elevation of a structure to an elevation which is at least equal to or greater than the 1% annual chance flood elevation.
- Wet floodproofing which requires that all construction and finishing materials are water resistant and all utilities must be elevated above the design flood elevation.

The detention basin and nonstructural measures are the focus in the FID because there have been prior investigations of these two measures. It is acknowledged that should this FID result in a feasibility phase study, additional flood control measures such as levees, floodwalls, and diversion culverts could also be considered, as appropriate.

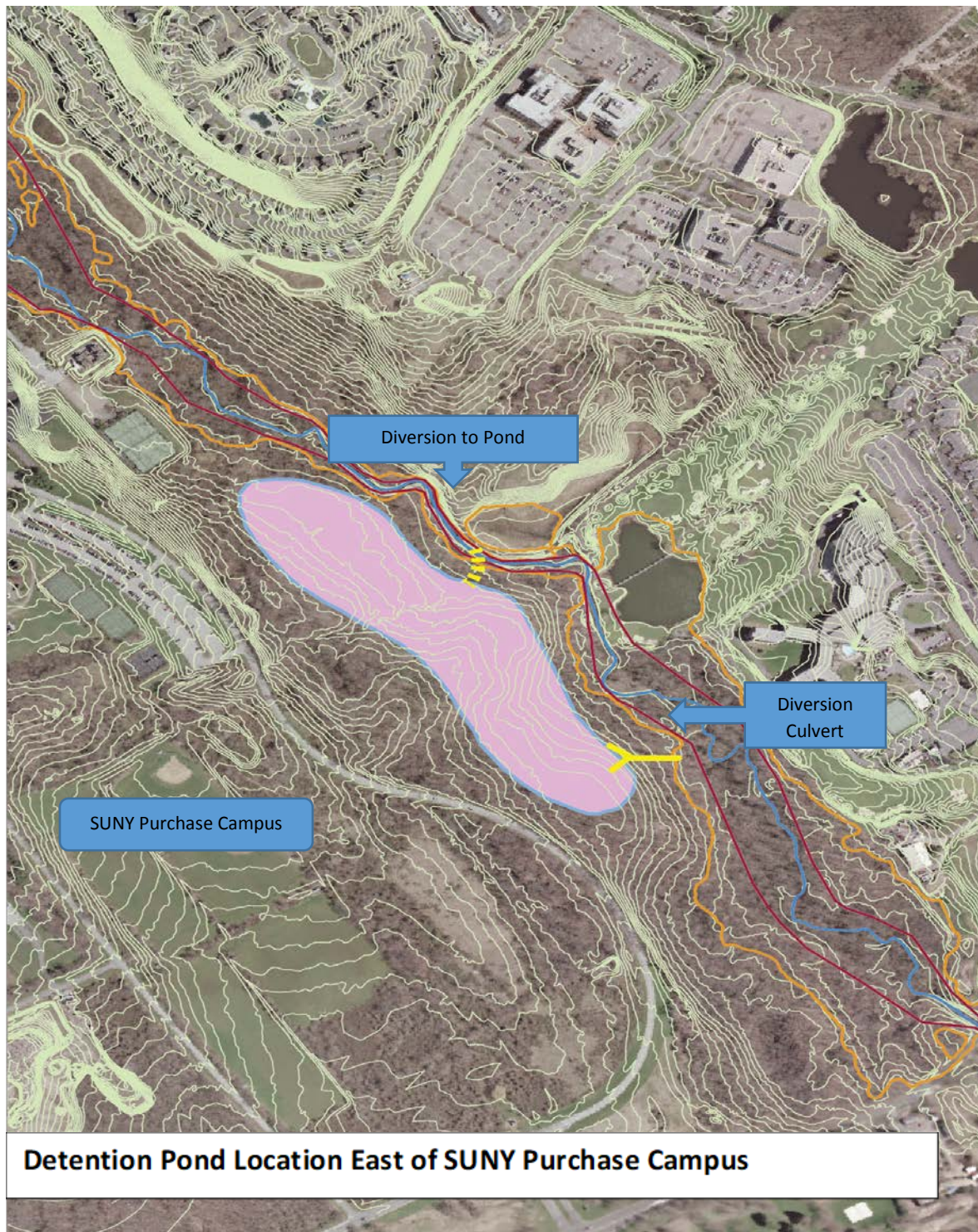


Figure 3 Project Feature Location

PRELIMINARY EVALUATION

This preliminary economic assessment examined the potential economic benefits of constructing a flood risk management project that would reduce flood risk to public health, safety, and property in the vicinity of the City of Rye associated with fluvial flooding. The methods for this economic analysis is to provide an update to benefits and costs identified in the USACE 2009 Blind Brook Watershed Plan study for flood control within the Blind Brook watershed in the City of Rye, Westchester County, New York.

As described in the existing and future conditions section, a more detailed analysis will be conducted should the study proceed to the feasibility phase. This assessment follows USACE guidance for evaluating National Economic Development benefits as contained in ER 1105-2-100, April 2000, Appendix E, Section III – Flood Damage Reduction. All benefits are estimated in annual terms. All costs and benefits are in fiscal year (FY) 2020 price levels.

The 2009 Blind Brook Watershed Management study assumed a 50% content to structure value ratio which applied to structures with basements in the 1% floodplain. Costs and benefits for the detention pond alternative have been escalated to fiscal year 2020 price levels for purposes of evaluation for this FID. The escalation composite was derived using the Civil Works Construction Costs Index System to bring FY 2008 dollars up to date. Table 2 presents annual costs and benefits of the detention pond alternative for fiscal years 2008 and 2020. Costs for FY 2008 were discounted at a rate of 4.875% whereas the costs for FY 2020 are discounted at the prevailing Federal rate of 2.75% which accounts for the lower cost estimate.

Table 2 Benefit Cost Evaluation: Detention Pond Alternative

	Average Annual Costs FY 2008	Average Annual Costs FY 2020*	Average Annual Benefits 2008 PL	Average Annual Benefits 2020 PL	Benefit- Cost Ratio 2020
Detention Pond	\$ 522,100	\$ 484,000	\$ 291,000	\$ 367,000	.76

*October 2019 price levels using FY 2020 discount rate 2.75%

The detention measure considered in the 2009 study has a modeled storage capacity meant to manage flows above the 100-year event. It was estimated that 365,200 cubic yards (CY) of excavation and disposal would reduce those peak flows. At that capacity, detention pond costs would exceed the limits provided for under the 205 authority. However, a basin that manages peak discharge flows of more frequent storms will also be beneficial to the community due to lower associated costs. The 2009 study showed that the primary cost driver for the detention pond lies with excavation and disposal activities. Table 3 presents a range of costs at various acre feet and gallon storage capacities. It is undetermined what recurrence interval is associated with the lower capacity ponds; further study is necessary to evaluate the reduction in peak flows per storm event.

Table 3 Costs at Various storage capacities

Excavation and Disposal			
CY	Acre Feet	Gallons (in millions)	Total Costs
365200	226	65	\$4,382,400
272000	170	55	\$3,264,000
198000	122	40	\$2,376,000
74000	46	15	\$888,000
15000	9	3	\$180,000

While the net benefits of the detention pond seem modest, it is important to note that the flood damage assessment was conducted only for structures within the City of Rye. Also, the analysis for the detention pond alternative (completed in 2009) does not fully account for damages and benefits that could be realized. It does not fully consider future effects, including the potential for damages and benefits associated with sea level rise and coincident tidal influences on the Blind Brook. Further evaluation would also improve the understanding of the relationship between upper Blind Brook, and middle Blind Brook, which could also increase damages, and benefits. A preliminary sensitivity analysis incrementally adjusting benefits for the uncertainty is presented in Table 4 where net benefits and benefit to cost ratios are evaluated in 10% intervals to estimate auxiliary benefits. This shows that a 40% increase in benefits would result in a structural solution that is economically justified. This amount of increase is not unreasonable to expect, given the limitations of the current analysis. In order to better understand the feasibility of alternative solutions, additional flood damage assessment should be performed for the entire watershed with updated hydrologic modelling.

Table 4 Uncertainty Analysis

	Impact on Benefits	Annual Cost	Net Benefits	BCR
Estimated Benefits 2020	\$367,000	\$484,000	(\$117,000)	0.76
Uncertainty Adjustment				
10%	\$404,000	\$484,000	(\$80,000)	0.83
20%	\$441,000	\$484,000	(\$43,000)	0.91
30%	\$477,000	\$484,000	(\$7,000)	0.99
40%	\$514,000	\$484,000	\$30,000	1.1

Given the uncertainty of the structural measure, this also considers the nonstructural alternative of lifting buildings so that their main floor elevations are at a height greater than water surface elevation corresponding to the 1% annual chance flood event. To evaluate the potential for a nonstructural solution, the number of structures sharing a common floodplain were grouped and the estimated costs applied to the number of buildings for each group. Floodplains delineated in the 2009 Watershed study were used for this federal interest determination effort. The Watershed study used 2006 FEMA 100-year floodplain delineation identifying 467 unique structures within the City. It was observed that 368 unique tax parcels contain the structures in the 1% floodplain within the City. The 2%, 4% and 10% floodplains contained 110, 46 and 23 parcels respectively. It is important to note that flood risk varies over time according to

population growth, land use and effects of climate change. An update to the floodplain delineation would be required as part of a further study.

Cost results from nearby Mamaroneck-Sheldrake Feasibility study (USACE 2016) are used here as a comparable proxy for this Blind Brook analysis. The Mamaroneck-Sheldrake community is similar in that it shares the same characteristic vulnerability to riverine and coastal flooding as experienced in the City of Rye. From the Mamaroneck Study, the minimum average cost of structure elevation is estimated to be \$315,000 (FY 2020 PL) per structure. Table 5 lists the number of structures in each floodplain and evaluates the benefits of implementation. For purposes of this preliminary analysis, we assume 100% participation in each floodplain. This table shows that there are non-structural solutions, which have a project cost and benefit to cost ratio that would be consistent with the Section 205 CAP Program.

Table 5 Nonstructural Costs and Net Benefits by Floodplain

Floodplain AEP	Number of Structures	Average Annual Damages 2020 PL	Total Elevation Costs	Net Benefits	BCR
1%	368	\$78,134,000	\$115,920,000	(\$37,786,000)	0.67
2%	110	\$48,800,000	\$34,650,000	\$14,150,000	1.4
4%	46	\$34,003,000	\$14,490,000	\$19,513,000	2.4
10%	23	\$17,195,000	\$7,245,000	\$9,950,000	2.4

RISKS

As described above, there are inherent risks in this analysis, since this relies on prior reports that have been prepared in this area, which do not fully address the flooding risk in the watershed, nor the range of alternatives that could be implemented to address these problems. Nonetheless, a conclusion on Federal Interest can be made.

FEDERAL INTEREST

The Flood Control Act of 1936 established the policy that flood control on navigable waters or their tributaries is in the interest of the general public welfare and is therefore a proper activity of the Federal Government. It provided that the Federal Government, cooperating with state and local entities, may improve streams or participate in improvements “for flood control purposes, if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected.” The 1936 Act, as amended, and more recently the Water Resources Development Act of 1986 and other acts, specify the details of Federal participation.

The Federal objective of water resources project planning is to contribute to national economic development (NED). Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. The best project may be defined as the plan that returns the greatest excess of benefits over costs (total benefits less total costs), i.e., it is not possible to improve upon a plan producing maximum net benefits. The net benefits associated with the detention pond are unclear but could be

positive with further analysis. Net benefits associated with nonstructural elevations result in positive net benefits from the 10-year to 50-year floodplains. It should be emphasized that benefits and costs calculated in a feasibility phase would be more refined and may be higher or lower than those presented here. A feasibility phase study would entail updated hydrology, hydraulics, economic analysis, alternative analysis, and environmental analysis to more accurately reflect the problem, evaluate alternatives, and ultimately recommend a solution to the flood risk problem.

The result of this preliminary analysis is the benefit cost ratio (BCR), which is derived from a project's benefits divided by project cost. The BCR is a numerical expression of the cost effectiveness of a project. A project is cost effective when the BCR is 1.0 or greater (when net benefits are positive). The BCR associated with the detention pond is .76, with the limited analysis done to date. The BCR is 2.4 for a nonstructural solution in the 4% floodplains, which is within the cost limits of Section 205. This supports a conclusion that there is a flood risk problem within the Blind Brook watershed, and that there is a solution that is within the scope of the CAP 205 project authority, which has a BCR that is greater than 1. As highlighted throughout this report, given the limitations of the analysis contained herein, it should be acknowledged that further H&H studies, alternative analysis, economic analysis, and environmental analysis be conducted to establish the optimal plan for this area.

FEASIBILITY PHASE MILESTONES

There are two required milestones the purpose of which is to assure that continuing work on the feasibility phase is consistent with the policies, principles, priorities, procedures, and constraints of Continuing Authorities Program (CAP), thus preventing excessive expenditures on questionable projects.

The first milestone is this Federal Interest Determination that examines whether study efforts are likely to lead to implementation. The second milestone is a Tentatively Selected Plan which is to ensure that plans have been properly formulated, legal and policy issues have been identified and a consensus on resolution has been reached and the plan will proceed into the design and implementation phase.

RECOMMENDATIONS

It is in the Federal interest to pursue a feasibility study for flood risk management within the City of Rye. The study should be performed under the authority of CAP Section 205.

Based on the cost estimates and economic analysis provided in this report, there are sufficient benefits to warrant Federal interest in pursuing a feasibility study. The next steps to project implementation requires the Federal government and the non-Federal sponsor develop a Project Management Plan to define the scope of the study, and execute a Feasibility Cost Sharing Agreement (FCSA) which will designate the funding responsibilities for completion of the study. The costs of the feasibility study above the first \$100,000 (full-Federal) would be cost shared 50/50 between the Federal government and the non-Federal sponsor.