REVIEW PLAN

BYRAM RIVER BASIN
Fairfield County, CT; Westchester County, NY
Feasibility Report

New York District

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US Army Corps
of Engineers ®

REVIEW PLAN

BYRAM RIVER BASIN (CT & NY)

Feasibility Report

TABLE OF CONTENTS

1. PURPOSE AND REQUIREMENTS 1
2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION 1
3. STUDY INFORMATION 1
4. DISTRICT QUALITY CONTROL (DQC) 8
5. AGENCY TECHNICAL REVIEW (ATR) 9
6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR) 12
7. POLICY AND LEGAL COMPLIANCE REVIEW 14
8. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION 14
9. MODEL CERTIFICATION AND APPROVAL 15
10. REVIEW SCHEDULES AND COSTS 16
11. PUBLIC PARTICIPATION 17
12. REVIEW PLAN APPROVAL AND UPDATES 17
13. REVIEW PLAN POINTS OF CONTACT 18

ATTACHMENT 1: TEAM ROSTERS 19

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECSION DOCUMENTS 21

ATTACHMENT 3: REVIEW PLAN REVISIONS 23

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS 24

ATTACHMENT 5: DISTRICT CHIEF OF ENGINEERING'S STATEMENT OF FINDING 24

1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Byram River Basin, Connecticut and New York, Flood Risk Management Feasibility Report.

b. References

(1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010
(2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
(3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
(4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
(5) *Project Management Plan, dated June 2012 – approval pending*
(6) *MSC (North Atlantic Division) and/or District (New York District) Quality Management Plan(s)*

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is the Flood Risk Management Center of Expertise, South Pacific Division

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. Because there is potential risk for life safety, the Risk Management Center of Expertise (RMC) will be consulted during the development of the scope of the Type I IEPR to include those Safety Assurance Review factors that should be reviewed for this study.

3. STUDY INFORMATION

a. Decision Document. *The purpose of the feasibility phase study is to describe and evaluate potential solutions and alternative plans that will address the flooding problems in the study area, and to select a recommended project for design and implementation. A Feasibility Report, accompanied by NEPA documentation in the form of an Environmental Assessment, will be produced for this study. Following HQUSACE approval, Congressional authorization will be required for implementation of any Tentatively Selected Plan that would result from the Feasibility Report.*

The current study was authorized by a resolution of the Committee on Public Works and Transportation of the United States House of Representatives adopted 02 May 2007 covering flood damage reduction, storm damage reduction, environmental restoration, navigation, watershed management, water supply, and other allied purposes in the Westchester County Streams study area, of which the Byram River is a sub-basin. The reconnaissance report was approved September 2008. It recommended that a cost-shared feasibility study be undertaken to investigate flood damage reduction for of the river basins within Westchester County Streams, including the Byram River Basin. Accordingly, the name of this study is Westchester County Streams (WCS) – Byram River Basin.

Negotiations are underway with the Town of Greenwich (Greenwich), the Non-Federal sponsor, for the feasibility study. Although the Byram River Basin begins and ends in New York State, most of the damages, alternatives to be considered, and benefits to be realized are within Greenwich. Accordingly, Greenwich has agreed to cost share the study for the entire river basin. The State of New York, represented by the New York State Department of Environmental Conservation, will play an active role as a team member during the study.

b. Study/Project Description. Flooding on the Bryam River primarily affects the Town of Greenwich, Connecticut, just south of the constructed project of levees at Pemberwick. The Byram River and its tributaries were the subject of a General Design Memorandum in 1958, which recommended 3000 ft of levees on the Byram River mainstem at Pemberwick, Town of Greenwich, Fairfield County, Connecticut. Only part of the project at Pemberwick was constructed in the 1960s. The recommendation for flood risk management was reinforced in the 1977 Westchester County Streams Feasibility Report, titled "Feasibility Report for Flood Control, Mamaroneck and Sheldrake Rivers Basins, and Byram River Basin," which recommended channel excavation and the construction of floodwalls and levees at Port Chester, NY and the Town of Greenwich, CT (Map 1, Figure 1) Although the recommended plan, which included continuation of the levee features to the south, was subsequently authorized by Congress, it was not implemented due to local concerns about the negative aesthetic effects of the levees.

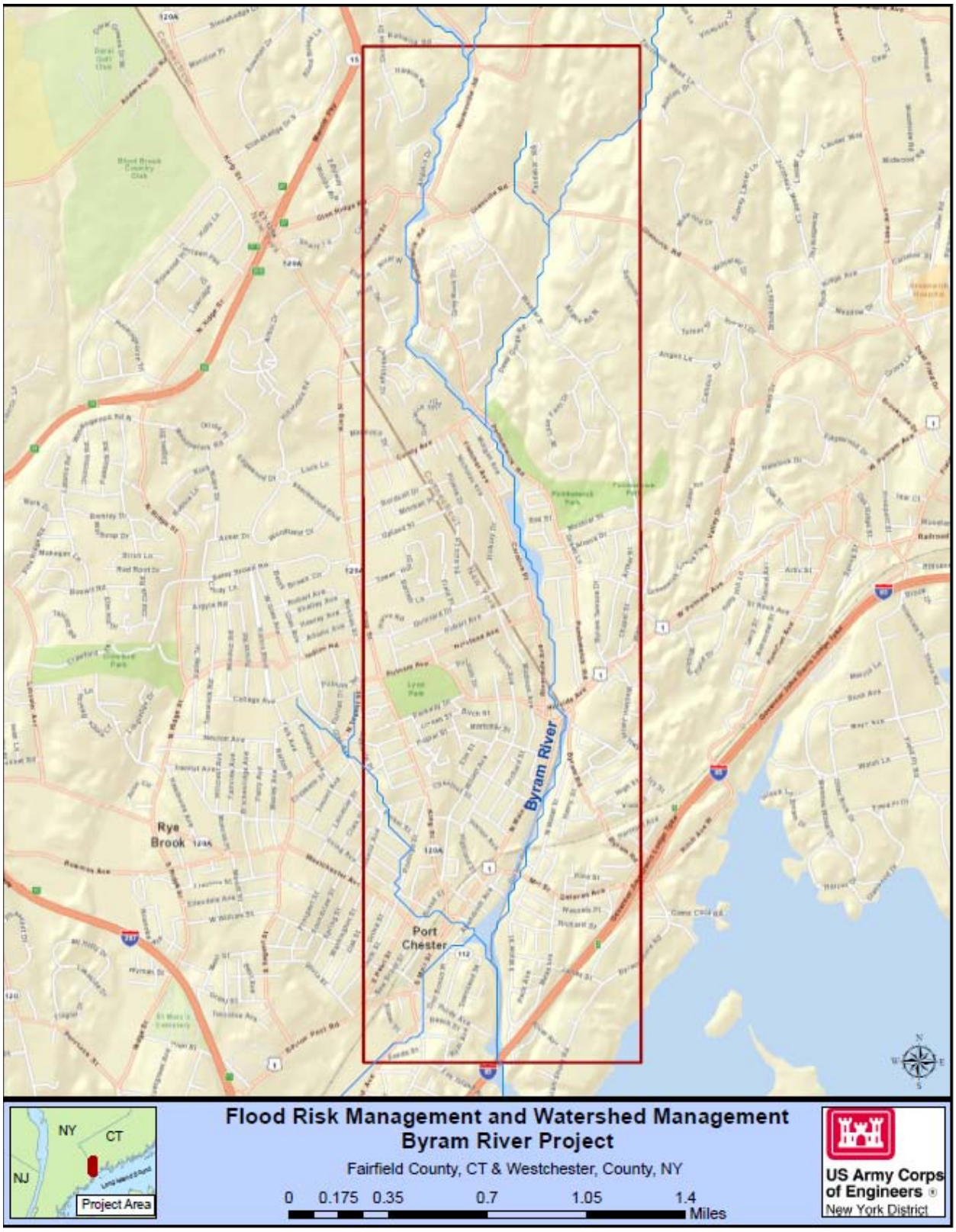
Based on recent discussions with residents in the area, flooding is a much greater concern now than aesthetics. The study team is pursuing a new Feasibility Study because there are new damage areas within the Byram River Basin that were not covered in the previous study and authorization, and to reassess the 1977 recommendation. A secondary damage area was identified to the north, on Bailiwick Bridge within the Town of Greenwich (Figure 2). This bridge is small, with low clearance, and it consequently traps debris on the river course, effectively acting as a dam. Its stone facing was stripped by raging floodwaters during the April 2007 storm. There are also minor tidally induced flood damages at the lower end of the Byram River within the Village of Port Chester, Westchester County, New York. Consequently, the study team is now pursuing a new watershed-wide single purpose Feasibility Study for Flood Risk Management in the Byram River Basin to address current conditions and ensure a comprehensive approach.

This study will focus on FRM alternatives in the Byram River Basin primarily within the Pemberwick area south of the previously constructed USACE levee as well as in the area of the Bailiwick Bridge to the north. At a minimum, the potential FRM measures that may be examined in the feasibility study include channel modification, levees, floodwalls, as well as non-structural measures and the "no action" alternative. Non-structural measures such as "buyouts" and preservation and/or creation of open space in the floodplain will also be considered. As measures to be considered are roughly in

scale with those in the 1977 report, cost estimates from the 1977 report may be used as a guideline to estimate the range of construction costs. Plans considered within the 1977 Feasibility ranged from $3.5 million to $9.5 million. Adjusted for inflation, construction costs for this project are estimated in the range from $14 million to $36 million.[1]

The Byram River Feasibility Study will be conducted in accord with the HQUSACE guidance issued on SMART planning; it will be completed within 3 years, under $3 million, and fit within a 3-inch binder.

[1] http://www.usinflationcalculator.com/



Map 1. General location map showing study area for the Byram River Basin.

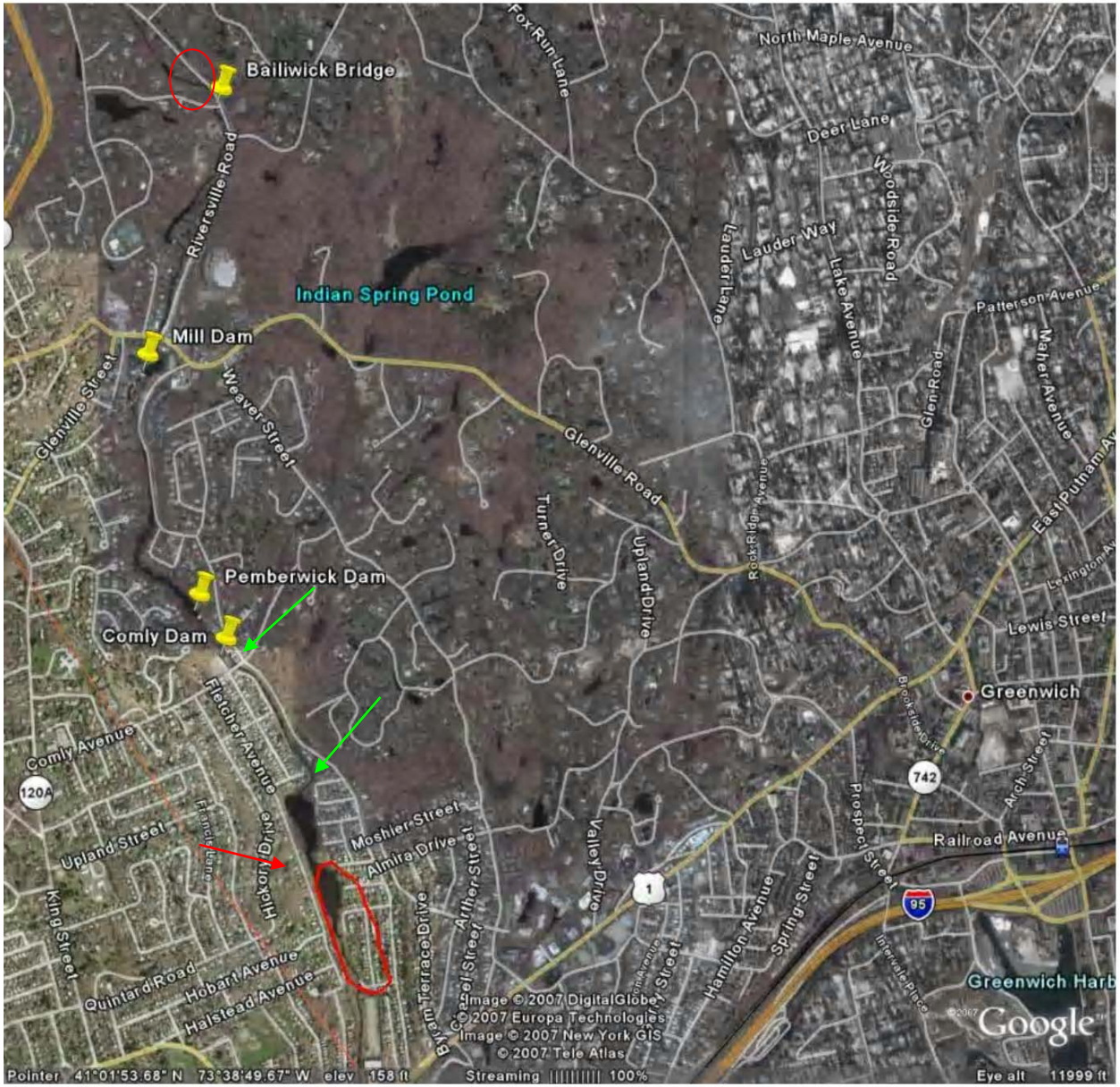


Figure 1. Location view of problem areas in Greenwich. The red outlines indicate areas of flood damages, the green arrows point to constructed works, and the red arrow points to stream bank erosion.

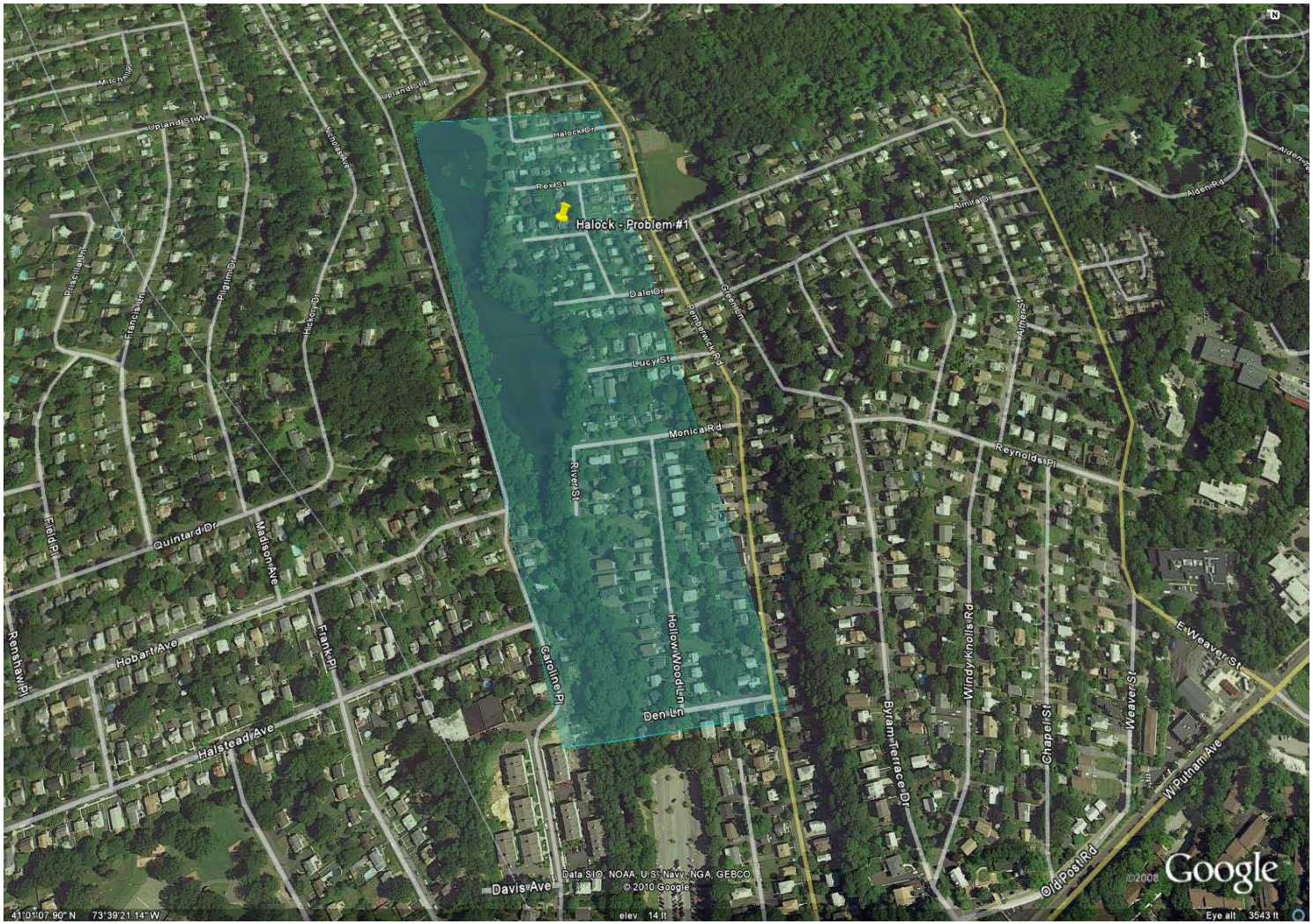


Figure 2 – The first problem area is generally bordered by Den Lane to the south, Lucy Place to the north, and Pemberwick Road to the east. Previous flood risk management on the Bryram River to the north, in the form of rip-rap, channelization, and levees, was recommended in the 1977 Feasibility Report and provides adequate protection for the reach north of Halock Drive. Although included in the recommendations of the 1977 report, such measures were not constructed south of Halock Drive. As a consequence, houses adjacent to the Byram from Lucy Place to Den Lane lack protection from fluvial floods.

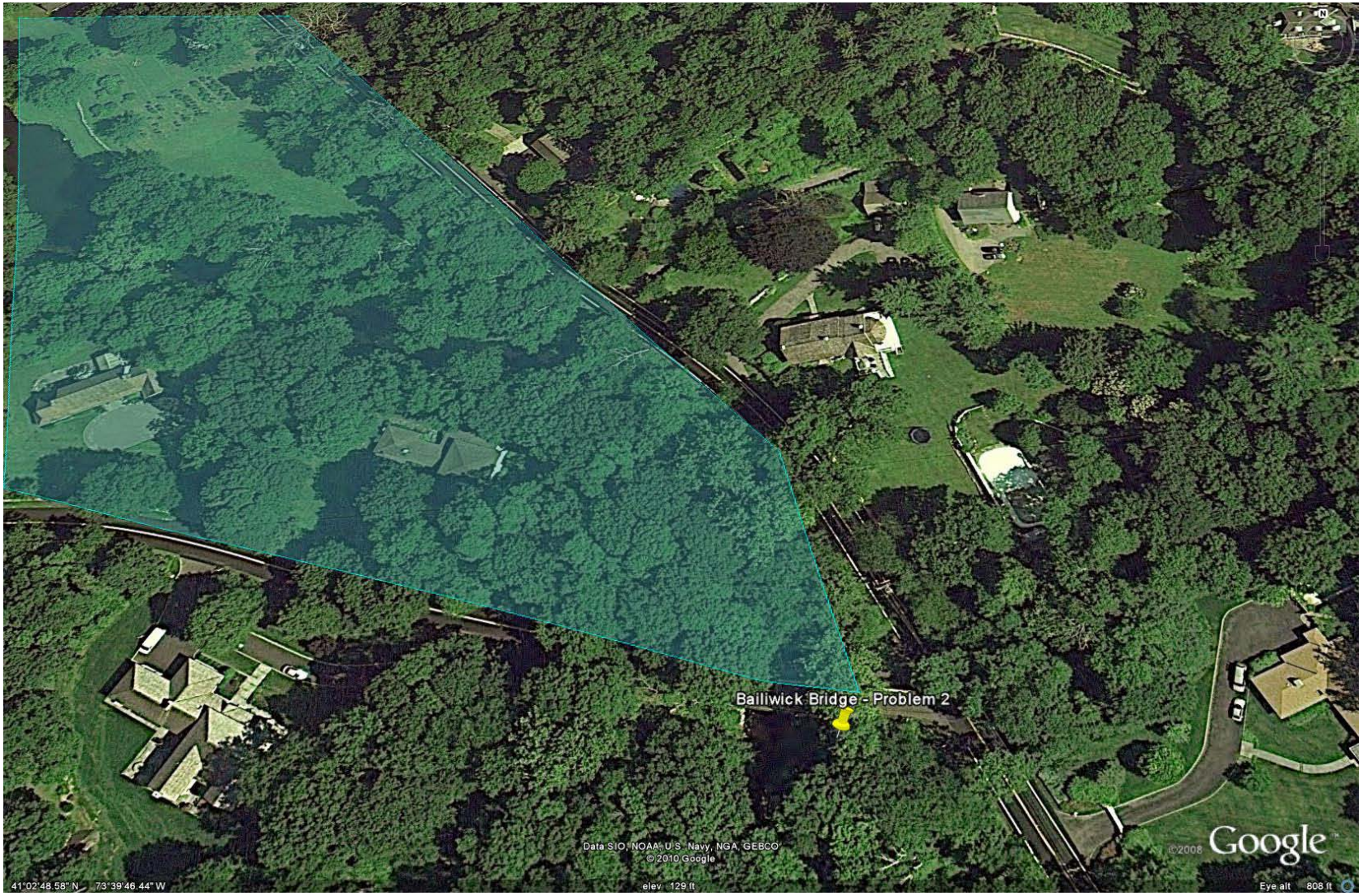


Figure 3. The second problem area is north of Bailiwick Bridge, which is located on Bailiwick Road and Riversville Road. Bailywick Bridge is built for two year storm events. In larger storms, the bridge is clogged and becomes an obstruction in the river, leading to fluvial flood damages to nearby houses. The bridge experienced considerable damage in the spring 2007.

c. Factors Affecting the Scope and Level of Review.

- It is anticipated that this study may have some social challenges, as the recommended plan from 1977 was not constructed due to local concerns over the aesthetic aspects of the flood risk management structures. The challenge will be managing expectations to minimize the risk of local rejection of a Tentatively Selected Plan. Technical or institutional challenges are not expected on the study.
- Based on a preliminary assessment, the most likely risk is local rejection of the NED plan based on aesthetic concerns. In the event of such a rejection, the consequence is that portions of the study area will remain without flood risk management measures, subject to property and potentially personal damages.
- As the proposed project is relatively modest in scale and involves conventional flood risk management measures, significant economic, environmental, and/or social effects to the Nation are not anticipated.
- The determination of significant threat to human life/safety assurance cannot be made at this point of the study because of the need for more information (see statement by District's Chief of Engineering Division in Attachment 5). The determination will be made by the Feasibility Scoping Meeting milestone.
- The project is likely to have significant interagency coordination with the New York State Department of Environmental Conservation (NYSDEC), representing the State of New York, because the watershed is partially in New York. NYSDEC will be an active member of the study team.
- The study is not expected to be highly controversial as long as public expectations are managed effectively, per the Communications Plan Appendix to the Project Management Plan.
- The report is unlikely to contain influential scientific information because the proposed flood risk management measures are conventional and straightforward.
- It is unlikely that the information in the decision document or proposed project design will be based on novel methods, involve the use of innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices because the proposed measures are conventional.
- The proposed project design is unlikely to require redundancy, resiliency, and/or robustness because of its relatively modest scale and use of conventional techniques, however, this assumption may be revisited as more data are collected.
- The proposed project is not expected to involve unique construction sequencing or a reduced or overlapping design construction schedule because of its relatively modest scale and use of conventional techniques.

d. In-Kind Contributions. Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. The in-kind products and analyses to be provided by the non-Federal sponsor include: Surveys, Hydraulics and Hydrology Modeling, Preliminary Designs, and Biological Field Data collection.

4. DISTRICT QUALITY CONTROL (DQC)

All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

a. **Documentation of DQC.** District Quality Control will be conducted on all decision documents and interim reports as noted below in Section 4(b) of this Review Plan. Documentation for all DQC reviews will be provided in DrChecks and included in a Quality Control Appendix of all decision documents and interim reports.

b. **Products to Undergo DQC.** Products under this study to undergo DQC include the FSM equivalent, AFB report, and draft Feasibility Report, and final Feasibility Report.

c. **Required DQC Expertise.** The expertise required for this study will be somewhat extensive. Expertise will/may be required for structural engineering, civil engineering, geotechnical engineering, cost engineering, hydraulic engineering, hydrologic engineering, environmental resources, cultural Resources, HTRW, Plan Formulation, Real Estate and Economics, depending on the alternatives that may be analyzed.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

a. **Products to Undergo ATR.** Products under this study to undergo ATR include the FSM, AFB report, and draft/final Feasibility Report. Additionally, where practicable, technical products that support subsequent analyses may be reviewed prior to being used in the study and may include: surveys & mapping, hydrology & hydraulics, geotechnical investigations, economic, environmental, cultural, and social inventories, annual damage and benefit estimates, cost estimates, etc.

b. **Required ATR Team Expertise.** The appropriate RMO, in cooperation with the PDT, vertical team, and other appropriate centers of expertise, will determine the final make-up of the ATR team. The following table provides the types of disciplines that should be included on the ATR team and the expertise required. The names, organizations, contact information, credentials, and years of experience of the ATR members will be included in Attachment 1 once the ATR team is established.

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	The Planning reviewer should be a senior water resources planner with experience in formulation of flood risk management studies especially in urban, highly developed areas.
Economics	The economics reviewer should have extensive experience in urban flood risk management studies and a thorough understanding of HEC-FDA.
Environmental Resources	Team member will have independently completed EA/EIS's and be well versed in the NEPA process, partnerships with other environmental resource agencies and environmental concerns and constraints within urban settings.
Cultural Resources	Team member will have experience with 106 actions and documentation including mitigation for historical structures and archeological artifacts.
Hydrology	Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of flash flooding and the use of HEC computer modeling systems.
Hydraulic Engineering	Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of open channel systems and the use of HEC computer modeling systems. A certified professional engineer is required
Geotechnical Engineering	Team member should have expertise in levee construction and other local flood risk management techniques. A certified professional engineer is required
Civil Engineering	Team member will have a thorough understanding of design of channel improvements in an urban setting. A certified professional engineer is required.
Structural Engineering	Team member will have a thorough understanding of both structural and non-structural measures to include, but not be limited to retaining walls, channel improvements and levees A certified professional engineer is required.
Risk Reviewer	A team member will be added to the ATR team to assess risk in accordance with the November 2010 memorandum by Mr. James Dalton (USACE)
Cost Engineering	Team member will be familiar with cost estimating for similar projects in MII. Review includes construction schedules and contingencies for any document requiring Congressional authorization. The team member will be a registered Professional Engineer, Certified Cost Technician, a Certified Cost Consultant, or a Certified Cost Engineer. As the Cost Engineering Center of Expertise, Walla Walla District will assign this team member as

	part of a separate effort coordinated by the ATR or IEPR team lead in conjunction with the geographic district's project manager. The team member will also be required to review a cost risk analysis as the total project cost is more than likely to exceed $40M.
Real Estate	Team member will be have experience with flood risk management studies and be familiar with urban planning and acquisition strategies.
Hazardous, Toxic and Radioactive Waste (HTRW)	Team member should have knowledge of HTRW issues common to urban environments and developed areas.

c. Documentation of ATR. DrChecks review software (https://www.projnet.org/projnet/) will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

(1) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
(2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not be properly followed;
(3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
(4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions;
- Identify and summarize each unresolved issue (if any); and

- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the initial IPR, the subsequent IPRs, AFB, draft report, and final report. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-209, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.

- Type II IEPR. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

a. Decision on IEPR. In accordance with Section 2034 of the Water Resources Development Act of 2007 (P.L. 110-114), Independent External Peer Review shall be conducted for all projects with an estimated total cost of greater than $45M dollars. We do not expect the total project costs for this project will be in excess of this amount. However, other criteria, such as innovative solutions and life safety issues could also trigger the requirement for EPR. At this time, innovative solutions are not anticipated. For these reasons, the study team believes at this early stage that Type I IEPR will not be needed for this study. Type II IEPR may be warranted because the study purpose is flood risk

management and may pose threats to human life or safety if the study fails, but it is too early to make the determination on life safety (please see the District Chief of Engineering's statement of finding in Attachment 5 of this Review Plan). The study will revisit these assumptions and coordinate with the FRM PCX at the Feasibility Scoping Meeting. If necessary, IEPR would be conducted to identify, explain, and comment upon assumptions that underlie economic, engineering, and environmental analyses, as well as to evaluate the soundness of models and planning methods. This task would be supported by the New York District's Planning Division for a maximum cost of $500,000 (this task is 100% Federal Cost) if necessary.

b. Products to Undergo Type I IEPR. If determined necessary at the Feasibility Scoping Meeting, Type I IEPR will be performed for the entire decision document (including supporting documentation), which is typically available at the draft report stage.

c. Required Type I IEPR Panel Expertise. The expertise represented on the Type I IEPR panel will be similar to those on the ATR team. The Feasibility Report will be relatively small and not very complex. However, the IEPR panel is anticipated to involve as many disciplines/individuals as the ATR team. At minimum, the panel should include the necessary expertise to assess the engineering, environmental, and economic adequacy of the decision document as required by EC 1165-2-209, Appendix D. The PDT has made the initial assessment of what expertise is needed based on the PMP and the factors affecting the scope and level of review outlined in Section 3 of the review plan. The Outside Eligible Organization (OEO) will determine the final participants on the panel. The following table provides the types of disciplines that might be included on the IEPR team and a description of the expertise required.

IEPR Panel Members	**Expertise Required**
Plan Formulation	The Planning reviewer should be a senior water resources planner with experience in formulation of flood risk management studies especially in urban, highly developed areas.
Economics	The economics reviewer should have extensive experience in urban flood risk management studies and a thorough understanding of HEC-FDA.
Environmental Resources	Team member will have independently completed EA/EIS's and be well versed in the NEPA process, partnerships with other environmental resource agencies and environmental concerns and constraints within urban settings.
Hydrology	Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of flash flooding and the use of HEC computer modeling systems.
Hydraulic Engineering	Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of open channel systems and the use of HEC computer modeling systems. A certified professional engineer is required
Geotechnical Engineering	Team member should have expertise in levee construction and other local flood risk management techniques. A certified professional engineer is required
Civil Engineering	Team member will have a thorough understanding of design of

	levees and channel improvements in an urban setting. A certified professional engineer is required.
Structural Engineering	Team member will have a thorough understanding of both structural and non-structural measures to include, but not be limited to, retaining walls, channel improvements and levees. A certified professional engineer is required.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The DX will assist in determining the expertise needed on the ATR team and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The RMO is responsible for coordination with the Cost Engineering DX.

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

a. Planning Models. The following planning models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5a (Flood Damage Analysis)	The Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans along the Passaic River and major tributaries to aid in the selection of a recommended plan to manage flood risk.	Certified
Habitat Evaluation Procedures (HEP)	HEP is an established approach to assessment of natural resources. The HEP approach has been well documented and is approved for use in Corps projects as an assessment framework that combines resource quality and quantity over time, and is appropriate throughout the United States. The Habitat Suitability Index (HSI) models are the format for quantity determinations that are applied within the HEP framework. This method will be used for determining the effect of alternatives upon habitat and for habitat mitigation calculations, if needed.	New HSI models developed by the Corps are subject to certification. Published HSI models, while peer reviewed and possibly tested by the developers are subject to review and approval by the PCX. Modifications to published HSI models where relationships or

		formulas are changed may be subject to certification.
Stream Impact Assessment - spreadsheet model	Some of the alternatives selected for evaluation may involve river channelization and the creation of a diversion culvert. Currently, there is no state specific or regional method that focuses on quantifying stream function and impacts resulting from channel modification activities that could be applied to this project. Therefore, if necessary, the PDT will create a series of worksheets modeled after those developed and implemented by the Regulatory Divisions at the USACE Kansas City, Little Rock, Omaha and Rock Island Districts that quantifies the adverse impacts caused by the proposed activity and establishes the appropriate level and type of mitigation required to compensate for the impacts.	Not certified; will initiate approval process during FSM documentation.

b. Engineering Models. The following engineering models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.0 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady/unsteady flow analysis to evaluate the future without- and with-project conditions along the Passaic and its tributaries	HH&C CoP Preferred Model
HEC-HMS	This model will be used to define the watersheds' physical features; describe the metrological conditions; interior drainage analysis; estimate parameters; analyze simulations; and obtain GIS connectivity	HH&C CoP Preferred Model

10. REVIEW SCHEDULES AND COSTS (assumes Feasibility Cost Sharing Agreement (FCSA) is executed by 30 October 2012)

a. ATR Schedule and Cost. ATR Schedule and Cost. The following forthcoming products are expected to undergo ATR: FSM, Sep 2013 at a cost of $50k; AFB/ Draft Re-Evaluation Report, Jan 2015 at a cost of $60k; Draft Feasibility Report, June 2015 at a cost of $20k; Final Feasibility Report, Oct 2015 at a cost of $20k. This budget and schedule inlcudes participation of the ATR lead at the AFB meeting, and the CWRB to address the ATR process and any significant and/or unresolved ATR concerns.

b. Type I IEPR Schedule and Cost. Type I IEPR will be conducted on the draft Feasibility Report, EA and appendices. The estimated date for the IEPR (if necessary) to occur is June 2015 at a cost that would not exceed $500K (includes travel to CWRB and participation in the CWRB). For decision documents presented to the CWRB, IEPR comments and responses will be discussed at the CWRB meeting.

c. Model Certification/Approval Schedule and Cost. It is expected that the use of the Stream Impact Assessment model and/or HEP model would require model certification/approval. The District will begin coordination with the Ecosystem Center of Expertise for necessary approvals as part of the preparations for the Feasibility Scoping Meeting. To date, $40,000 has been budgeted for the coordination process, which includes identifying a schedule and budget for model approval. The District has had some experience with the process for Model Approval from the Jamaica Bay, NY, study for the Evaluation of Planned Wetlands (EPW) model. In that instance, the cost for model review was approximately $150,000 and took six months once the review was initiated. The District will make every attempt to use an approved model, as project resources are constrained under the 3x3x3 rule. The District will coordinate with the FRM-PCX on this issue as part of preparations for the Feasibility Scoping Meeting. The HEC-FDA model in use for this study has been previously certified.

11. PUBLIC PARTICIPATION

Public Involvement entails the continuation and expansion of the public involvement started during the Reconnaissance phase. Initially, it will involve introducing and explaining the reconnaissance study results and the direction and goals of the Feasibility phase. It will then continue by conducting meetings and coordination with a broad range of public and private agencies. Scoping efforts are required for coordination between Federal, state and environmental agencies. There will also be meetings between citizens committees and other groups. The Town of Greenwich and NYSDEC will share in the responsibility of these meetings, particularly those involving state agencies and groups. Newsletters will also be issued periodically to keep all interested parties updated on the study status and relevant issues. The Corps will provide the Greenwich and NYSDEC with minutes of meetings similarly as the Reconnaissance study. Public Involvement will also consist of notifying concerned parties (newspapers, police, property owners, etc.) of personnel who may be involved in on-site data collection.

The Town of Greenwich will be responsible for providing representatives at the public meetings, meetings with other agencies and officials, and participation in other local coordination efforts. NYSDEC will also provide representatives for public meetings and facilitate coordination on matters affecting New York State. The Town of Greenwich will also be responsible for providing the facilities for public meetings.

The Feasibility Report, study Review Plan, and associated review reports (IEPR, if needed) will be available for the public to download on the District's website. Significant public comments will be provided to the ATR team and the IEPR panel (if convened) after the public review of the Draft Feasibility Report. The study team will coordinate with the FRM PCX at the Alternatives Formulation Briefing on whether the public will be asked to nominate potential peer reviewers.

12. REVIEW PLAN APPROVAL AND UPDATES

The North Atlantic Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE

members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home District is responsible for keeping the Review Plan up to date. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, will be posted on the Home District's webpage. The latest Review Plan will also be provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

Public questions and/or comments on this review plan can be directed to the following points of contact:

- Section Chief, FRM and ECO, Plan Formulation Branch, 917-790-8720
- Team Leader, NAD Planning and Policy CoP, 347-370-4514
- Leader, Flood Risk Management Planning Center of Expertise, 415-503-6852

ATTACHMENT 1: TEAM ROSTERS

PDT

Name	Role	Phone Number	E-mail
Rifat Salim	Project Manager	917-790-8215	Rifat.salim@usace.army.mil
Elena Manno	Engineering Technical Manager	x-8371	Elena.n.manno@usace.army.mil
Michael Chen, P.E.	Structural Engineer	x-8749	xiaoming.chen@usace.army.mil
Gennaro Cimmino	Geotechnical Engineer	x-8281	Gennaro.j.cimmino@usace.army.mil
Anthony Schiano	Cost Engineering	x-8347	Anthony.Schiano@usace.army.mil
Andre Chauncey, P.E.	Hydrology	x-8353	andre.t.chauncey@usace.army.mil
Jodi McDonald	Section Chief, Plan Formulation	x-8720	Jodi.m.mcdonald@usace.army.mil
Olivia Cackler	Plan Formulation	x-8705	Oilvia.n.cackler@usace.army.mil
Caroline McCabe	Economics	x-8615	Caroline.m.mccabe@usace.army.mil
Nancy Brighton	Section Chief, Environmental Analysis	x-8703	Nancy.J.Brighton@usace.army.mil
Matthew Voisine	Biology/NEPA	x-8718	matthew.voisine@usace.army.mil
Carissa Scarpa	Cultural Resources	x-8612	Carissa.a.scarpa@usace.army.mil
David Andersen	Real Estate	x-8450	David.C.Andersen@usace.army.mil
Ellen Simon	Office of Counsel	x-8158	Ellen.b.simon@usace.army.mil

ATR Team

Name	Role	Review District
TBD	ATR Lead/Plan Formulation	TBD
TBD	Civil Design	TBD
TBD	Biology/NEPA	TBD
TBD	Hydrology/Hydraulics	TBD
TBD	Economics	TBD
TBD	Cost-Engineering*	TBD
TBD	Real Estate	TBD
TBD	Cultural Resources	TBD
TBD	Hazardous, Radioactive & Toxic Waste	TBD
TBD	Risk Reviewer	TBD
TBD	Structural Engineering	TBD
TBD	Geotechnical Engineering	TBD

* The cost engineering team member nomination will be coordinated with the NWW Cost Estimating Center of Expertise as required. NWW will determine if the cost estimate will need to be reviewed by PCX staff. **All resumes will be reviewed and approved by the PCX prior to initiating any ATR.

Vertical Team

Name	Role	Phone Number	Email
Thomas J. Hodson, J.D., pH.D	NAN Plan Formulation Branch Chief	917-790-8602	Thomas.J.Hodson@usace.army.mil
Anthony Ciorra, P.E.	NAN PPMD Civil Works Branch Chief	917-790-8208	Anthony.ciorra@usace.army.mil
Leonard J. Houston	NAN Environmental Analysis Branch Chief	917-790-8702	Leonard.houston@usace.army.mil
Frank Santangelo, P.E.	NAN Civil Resources Branch Chief	917-790-8266	Frank.a.santangelo@usace.army.mil
Cliff Jones	NAD Planning CoP	347-370-4514	clifford.s.jones@usace.army.mil
Joe Forcina	NAD DST Lead	347-370-4584	Joseph.Forcina@usace.army.mil
Pete Luisa	NAD RIT	202-761-5782	Pete.C.Luisa@usace.army.mil
Eric Thaut	FRM PCX Lead	415-503-6852	Eric.w.thaut@usace.army.mil

IEPR Team

Name	Role
TBD	Plan Formulation
TBD	Civil Design
TBD	Biology/NEPA
TBD	Hydrology/Hydraulics
TBD	Economics
TBD	Geotechnical Engineering
TBD	Structural Engineering

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECSION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *<type of product>* for *<project name and location>*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks[sm].

SIGNATURE _____ _____

Name Date
ATR Team Leader
Office Symbol/Company

SIGNATURE _____ _____

Name Date
Project Manager
Office Symbol

SIGNATURE _____ _____

Name Date
Architect/Engineer Project Manager[1]
Company, location

SIGNATURE _____ _____

Name Date
Review Management Office Representative
Office Symbol

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: *Describe the major technical concerns and their resolution.*

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE _____ _____

Name Date
Chief, Engineering Division
Office Symbol

SIGNATURE _____ _____

Name Date

Chief, Planning Division

Office Symbol

[1] Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control/Quality Assurance	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIS	Environmental Impact Statement	PDT	Project Delivery Team
EO	Executive Order	PAC	Post Authorization Change
ER	Ecosystem Restoration	PMP	Project Management Plan
FDR	Flood Damage Reduction	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
Home District/MSC	The District or MSC responsible for the preparation of the decision document	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	RTS	Regional Technical Specialist
ITR	Independent Technical Review	SAR	Safety Assurance Review
IPR	Interim Progress Report	USACE	U.S. Army Corps of Engineers
LRR	Limited Reevaluation Report	WRDA	Water Resources Development Act
MSC	Major Subordinate Command		

ATTACHMENT 5: DISTRICT CHIEF OF ENGINEERING'S STATEMENT OF FINDING

CENAN-EN-MC-F 14 December 2011

MEMORANDUM FOR RECORD

SUBJECT: Byram River Basin Flood Risk Management Feasibility Study, Fairfield County, Connecticut and Westchester County, New York – Risk Informed Assessment of Significant Threat to Human Life

1. **Study/Project Information.** Flooding on the Byram River primarily affects the Town of Greenwich, CT, just south of the USACE-constructed project levees in the Pemberwick neighborhood. A previous recommendation for the construction of levees at Pemberwick was partially implemented in the 1960s, in accord with local interests. Flood damages were investigated again in 1977, resulting in a Federal recommendation for channel excavation and the construction of floodwalls and levees at the Town of Greenwich, CT, and the Village of Port Chester, NY. Although the recommended plan was subsequently authorized by Congress, it was not implemented due to aesthetic concerns raised by local residents. Based on recent discussions with residents in the area, flooding is a much greater concern now than aesthetics. A secondary damage area was identified to the north, in the area of Bailiwick Bridge within the Town of Greenwich. This bridge is small, with low clearance, and it consequently traps debris on the river course, effectively acting as a dam. Its stone facing was stripped by raging floodwaters during the April 2007 storm. The damage areas are primarily within the Town of Greenwich, CT and it is expected that the solutions will reside primarily within the Town of Greenwich as well. Therefore, although the study authority covers both New York and Connecticut, the Town of Greenwich, CT is the non-Federal cost-sharing partner for the Byram River Basin Flood Risk Management (FRM) Feasibility Study, while the State of New York will be no-cost project partner.

2. **Study/Project Description.** The feasibility study will examine structural and non-structural solutions to the flooding problem. Structural measures to be examined include dam modification, floodwalls, levees, diversion, and detention. Non-structural measures include floodproofing, acquisition, and flood warning. As the study has not been initiated yet, the estimated costs are not available.

3. **Risk Informed Assessment.** Since dam modifications, floodwalls and levees are included as possible structural solutions, a Safety Assurance Review (SAR) as part of a Type I IEPR is warranted due to the potential for risk to life safety involved in any FRM study. However, it is too early in the study process to accurately predict the level of risk involved to human life.

4. **Determination**. A SAR is required at this time; however, since a plan has not been selected, the risk informed assessment of significant threat to human life may be revisited once the tentatively selected plan is identified and optimized.

for ARTHUR J. CONNOLLEY, P.E.
C, Engineering Division