



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FORT HAMILTON MILITARY COMMUNITY
302 JOHN WARREN AVENUE
BROOKLYN, NY 11252-6700

CENAD-PD-P (1105-2-10c)

23 Feb 2024

MEMORANDUM FOR Commander, U.S. Army Corps of Engineers, New England
District 696 Virginia Road Concord, MA 01742-2751

SUBJECT: Hartford/East Hartford, Ct (Section 216, Levee Rehabilitation) P2 No. 465097
Review Plan

1. Reference Memorandum, CENAE-PDP dated 2 Feb 2024, Subject: Submission of the Review Plan for the Hartford/East Hartford, Ct (Section 216, Levee Rehabilitation) P2 No. 465097 for Approval.
2. The Flood Risk Management Planning Center of Expertise of the South Pacific Division (SPD) is the lead office to execute the referenced Review Plan. The Review Plan includes Independent External Peer Review.
3. The enclosed Review Plan is approved for execution and is subject to change as study circumstances require, consistent with study development under the Project Delivery Business Process. Subsequent revisions to this Review Plan or its execution require new written approval from NAD.
4. The point of contact is Mr. Larry Cocchieri, NAD Planning Program Manager at 347-370-4571 or Lawrence.J.Cocchieri@usace.army.mil.

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REINHARD W. KOENIG, PE, SES
Programs Director
North Atlantic Division



DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD MA 01742-2751

CENAE-PDP

02 February 2024

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, (CENAD-PD-RB/Mr. Reinhard Koenig), Fort Hamilton Military Community, 301 John Warren Avenue, Brooklyn, NY 11252-8400

SUBJECT: Submission of the Review Plan for the Hartford/East Hartford, Ct (Section 216, Levee Rehabilitation) P2 No. 465097 for Approval.

1. References: ER 1165-2-217, Review Policy for Civil Works, 1 May 2021.
2. Background: The New England District developed the enclosed Review Plan dated 31 January 2024 for the Hartford/East Hartford, CT Section 216 Levee Rehabilitation feasibility study. The Review Plan has been reviewed for technical sufficiency and policy compliance by the National Planning Center of Expertise for Flood Risk Management (PCX-FRM). The PCX's endorsement of the Review Plan is provided in the enclosed memorandum dated 31 January 2024.
3. Request: The New England District requests that the North Atlantic Division approve the attached Review Plan.
4. The point of contact for this action is Janet Cote, Study Manager, at 978-318-8728 or janet.cote@usace.army.mil.

- 2 Encls
1. Final Review Plan
 2. PCX-FRM Endorsement

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Justin R. Pabis, PE
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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
SOUTH PACIFIC DIVISION
450 GOLDEN GATE AVENUE
SAN FRANCISCO CALIFORNIA 94102-3661

CESPD-PDP (FRM-PCX)

31 January 2024

MEMORANDUM FOR Wendy Gendron, Chief Planning Division, New England District, U.S. Army Corps of Engineers (CENAE-PPC)

SUBJECT: FRM-PCX Endorsement of the Review Plan for the Hartford and East Hartford, Connecticut Levee Rehabilitation Section 216 Feasibility Study

1. References:

- a. Engineer Regulation (ER) 1165-2-217, Civil Works Review Policy, 1 May 2021.
- b. CECW-P Memorandum, Subject: Model Coordination for Civil Works Planning Studies, 28 July 2023.

2. The Flood Risk Management Planning Center of Expertise (FRM-PCX) endorses the subject review plan, dated 31 January 2024, for approval by the North Atlantic Division (NAD).

3. The FRM-PCX, as the assigned Review Management Organization (RMO), coordinated with the New England District (NAE) in the development of the review plan and reviewed the enclosed plan for compliance with references 1a and 1b. The FRM-PCX coordination and review were led by Ms. Natalie McKinley, FRM-PCX Regional Manager for the study. All review comments have been satisfactorily resolved.

4. The FRM-PCX concurs with the level and scope of review identified and supported in the review plan, including the decision to perform Independent External Peer Review (IEPR). The anticipated total project cost could exceed the mandatory IEPR trigger of \$200 million if rehabilitation or rehabilitation of pump stations are included in the recommended plan. Additionally, the District Chief of Engineering and Levee Safety Officer have assessed there is a significant threat to human life associated with the overtopping or breach of the Hartford and East Hartford Levee Systems.

5. The FRM-PCX confirmed the models listed in the review plan are reasonable for use in the study and are appropriately approved or certified with one exception. TotalRisk is pending FRM-PCX certification. Certification of TotalRisk is anticipated in the 2nd quarter of FY24 and no certification issues related to study execution are anticipated.

6. The FRM-PCX confirmed NAE has prepared model user checklists, enclosed, to address requirements in reference 1.b. Checklists were provided to the FRM-PCX for all proposed models except RECONS. The FRM-PCX recommends a model user checklist for RECONS be prepared.

7. Please include this memorandum when transmitting the review plan for approval by NAD. Upon approval of the review plan, please provide a copy of the approved plan, a copy of the approval memorandum, and the link to where the plan is posted on the District website to Ms. McKinley.

CESPD-PDP (FRM-PCX)

SUBJECT: FRM-PCX Endorsement of the Review Plan for the Hartford and East Hartford,
Connecticut Levee Rehabilitation Section 216 Feasibility Study

8. Thank you for the opportunity to assist in the preparation of the review plan. Please coordinate the Agency Technical Review (ATR) and IEPR efforts outlined in the review plan, and any future updates to the plan, with Ms. McKinley.

Eric Thaut

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ERIC THAUT

Deputy Director, Flood Risk Management
Planning Center of Expertise

CF:

CELRH-PMD-F (McKinley)

CEMVP-PDF (Knier)

CENAE-PDP (Hatfield, Cote)

CEMVK-EC-P (Calla)

CENAD-PD-P (Young)

CENAD-PD-X (Cocchieri)

**HARTFORD/EAST HARTFORD LEVEE REHABILITATION SECTION 216
FEASIBILITY STUDY**

**Review Plan
JANUARY 31, 2024**

1. Project Summary

Project Name: Hartford and East Hartford, CT Levee Rehabilitation Section 216 Feasibility Study

Location: Hartford and East Hartford, Hartford County, Connecticut

P2 Number: 465097

Decision and Environmental Compliance Document Type: Integrated Feasibility Report and EA/FONSI

Congressional Authorization Required: YES

Project Purpose(s): The purpose of the study is to investigate the feasibility of major reconstruction to continue and/or improve upon the resiliency of the existing levee systems located in the city of Hartford and the town of East Hartford by reducing risk to life and damages to property in portions of Hartford and East Hartford behind the levee systems.

Non-Federal Sponsor: The city of Hartford and the town of East Hartford

Points of Public Contact for Questions/Comments on Review Plan:

District: New England District

District Contact: Study Manager, (978) 318-8728

Major Subordinate Command (MSC): North Atlantic Division

MSC Contact: NAD Planning Program Manager, (917) 543-2305

Review Management Organization (RMO): Flood Risk Management -Planning Center of Expertise (FRM-PCX)

RMO Contact: FRM-PCX Regional Manager for LRD and NAD, 304-399-5842

Key Review Plan Dates

Date of RMO Endorsement of Review Plan	31 Jan 2024
Date of MSC Approval of Review Plan	23 Feb 2024
Date of IEPR Exclusion Approval	TBD
Has the Review Plan changed since RMO Endorsement?	No
Date of Last Review Plan Revision	None
Date of Review Plan Web Posting	23 Feb 2024

Milestone Schedule and Other Dates

	Scheduled	Actual
FCSA Execution	03 Jan 2023	03 Jan 2023
Alternatives Milestone	20 June 2023	20 June 2023
Tentatively Selected Plan	06 May 2025	
Release Draft Report to Public	07 July 2025	
Agency Decision Milestone	06 October 2025	

Final Report Transmittal (to NAD)	05 June 2026	
Final Report Transmitted (to HQ)	05 August 2026	
State & Agency Briefing	25 August 2026	
Chief's Report	14 December 2026	

2. References

Engineer Regulation 1165-2-217 – Water Resources Policies and Authorities – Civil Works Review Policy, 1 May 2021.

Engineer Circular 1105-2-412 – Planning – Assuring Quality of Planning Models, 31 March 2011.

Planning Bulletin 2013-02, Subject: Assuring Quality of Planning Models (EC 1105-2-412), 31 March 2013.

Office of Management and Budget, Final Information Quality Bulletin for Peer Review, Federal Register Vol. 70, No. 10, January 14, 2005, pp 2664-267

The online USACE Planning Community Toolbox provides more review reference information at: <https://planning.ercd.dren.mil/toolbox/current.cfm?Title=Peer%20Review&ThisPage=Peer&Side=No>.

3. Review Execution Plan

The general plan for executing all required independent reviews is outlined in the following two tables.

Table 1 lists each study product to be reviewed. The table provides the schedules and costs for the anticipated reviews. Teams also determine whether a site visit will be needed to support each review. The decisions about site visits are documented in the table. As the review plan is updated the team will note each review that has been completed.

Table 2 identifies the specific expertise and role required for the members of each review team. The table identifies the technical disciplines and expertise required for members of review teams. In most cases the team members will be senior professionals in their respective fields. In general, the technical disciplines identified for a District Quality Control (DQC) team will be needed for an Agency Technical Review (ATR) team. Each ATR team member will be certified to conduct ATR by their community of practice. If Independent External Peer Review (IEPR) is warranted, panel membership will reflect disciplines representing the areas of expertise applicable to the review being conducted. The table is set up to concisely identify common types of expertise that may be applicable to one or more of the reviews needed for a study.

Table 1: Schedule and Costs of Reviews

Product to undergo Review	Review Level	Site Visit	Start Date	End Date	Cost	Complete
FWOP Condition Modeling and Analysis	Targeted District Quality Control (DQC)	No	03/01/2024	04/01/2024	\$10,000	No
FWOP Condition Modeling and Analysis	Targeted Agency Technical Review (ATR)	No	04/01/2024	05/30/2024	\$25,000	No
Draft Feasibility Report / EA	DQC	No	05/06/2025	7/08/2025	\$20,000	No
Draft Feasibility Report / EA	Public Comment under National Environmental Policy Act	Yes For the Agencies	07/08/2025	8/20/2025	N/A	No
Draft Feasibility Report / EA	ATR	TBD	07/08/2025	09/02/2025	\$65,000	No
Draft Feasibility Report / EA	Independent External Peer Review (IEPR)	No	07/08/2025	10/01/2025	\$200,000 ¹	No
Draft Feasibility Report / EA	Policy and Legal Compliance Review	No	07/08/2025	09/02/2025	N/A	No
Final Feasibility Report / EA	DQC	N/A	04/04/2026	04/24/2026	\$30,000	No
Final Feasibility Report / EA	ATR	N/A	04/24/2026	06/05/2026	\$45,000	No
Final Feasibility Report / EA	Policy and Legal Compliance Review	N/A	07/07/2026	8/05/2026	N/A	No
Final Feasibility Report / EA	Release Final Report under National Environmental Policy Act	No	8/25/2026	9/25/2026	N/A	No
Review Management Organization – Coordination and Participation	An RMO will participate in most key meetings including In-Progress Reviews, Issue Resolution Meetings and SMART Milestone Meetings	No	N/A	N/A	\$5,000	No

¹IEPR Cost Estimate includes \$200,000 for the IEPR contract and \$30,000 for PCX and IEPR coordination cost-shared funding.

Table 2: Review Teams - Disciplines and Expertise

Discipline / Role	Expertise	DQC	ATR	IEPR
DQC Team Lead	Extensive experience preparing Civil Works decision documents and leading DQC. The lead may serve as a DQC reviewer for a specific discipline (planning, economics, environmental, etc.).	Yes	No	No
ATR Team Lead	Professional with extensive experience preparing Civil Works decision documents and conducting ATR. Skills to manage a virtual team through an ATR. The lead may serve on the ATR team for a specific discipline (such as planning, economics, or environmental work).	No	Yes	No
IEPR Manager	Planner with extensive knowledge of IEPR policy and procedures and contract management and oversight skills.	No	No	Yes
Planning	Skilled water resources planner knowledgeable in complex planning investigations and the application of SMART principle to problem solving.	Yes	Yes	No
Economics	Experience with applying theory, methods and tools used in the economic evaluation of water resources projects, including assessment of economic damages and life loss.	Yes	Yes	No
Environmental Resources	Experience with environmental evaluation and compliance requirements, national environmental laws and statutes, applicable Executive Orders, and other planning requirements.	Yes	Yes	No
Cultural Resources	Experience with cultural resource survey methods, area of potential effects, National Historic Preservation Act Section 106, and state and federal laws pertaining to American Indian Tribes.	Yes	Yes	No
Hydrology	Engineer with experience applying hydrologic principles and technical tools to project planning, design, construction, and operation. Experience with riverine FRM studies and levee rehabilitation would be useful	Yes	Yes	Yes
Hydraulic Engineering	Engineer with experience applying hydraulic engineering principles and analytic tools to project planning, design, construction, and operation. Experience with riverine FRM studies and levee rehabilitation would be useful	Yes	Yes	Yes
Cost Engineering	Experience using cost estimation software; working knowledge of water resource project construction; capable of making professional determinations using experience.	Yes	Yes	Yes
Geotechnical Engineering	Experience evaluating flood risk management projects including dense urban communities and levee systems. The reviewer should have experience evaluating both structural and non-structural features, as well as nature and natural based features. The reviewer should have knowledge of the risk informed planning process for a General Investigation study.	Yes	Yes	Yes
Civil Engineering	Experience evaluating flood risk management projects including dense urban communities and levee systems as well as existing hardened shorelines. The reviewer should have experience evaluating constructability of structural and non-structural features, as well as nature and natural based features.	Yes	Yes	Yes
Structural Engineering	Experience evaluating flood risk management projects including dense urban communities and levee systems as well as existing floodwalls. The reviewer should have experience evaluating constructability of structural and non-structural features, as well as nature and natural based features.	Yes	Yes	Yes

Discipline / Role	Expertise	DQC	ATR	IEPR
General Engineering	Experience evaluating flood risk management projects including dense urban communities and levee systems as well as existing pump stations. The reviewer should have experience evaluating electrical, mechanical and architectural elements related to the constructability of structural and non-structural features, as well as nature and natural based features.	TBD	TBD	TBD
Real Estate	Experience developing Real Estate Plans and experience in real estate fee/easement acquisition and residential/business relocations for Federal and/or Federally Assisted Programs for implementation of Civil Works projects.	Yes	Yes	No
Climate Preparedness and Resilience	A member of the Climate Preparedness and Resiliency Community of Practice knowledgeable of inland, with an understand of tidally influenced inland areas, hydrology climate change assessment policy and practice.	Yes	Yes	No
Risk and Uncertainty	For decision documents involving hydrologic, hydraulic, and/or flood related risk management measures, include on the ATR team an expert on multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty.	Yes	Yes	Yes

4. Documentation of Reviews

Documentation of DQC. Quality Control will be performed continuously. A specific certification of DQC completion will be prepared at the base conditions (existing and future), draft and final report stages. Documentation of DQC will follow the District Quality Manual and the MSC Quality Management Plan. DrChecks will be used for documentation of DQC comments. An example DQC Certification statement is provided in ER 1165-2-217, Appendix D. Documentation of completed DQC, to include the DQC checklist, will be provided to the MSC, RMO and the ATR Team leader. The ATR team will examine DQC records and comment in the ATR report on the adequacy of the DQC effort.

Documentation of ATR. DrChecks will be used to document all ATR comments, responses, and resolutions. Comments should be limited to those needed to ensure product adequacy. All members of the ATR team will use the four-part comment structure (see ER 1165-2-217, Section 5). If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team to resolve using the issue resolution process in ER 1165-2-217, Section 5.9. Unresolved concerns will be closed in DrChecks by noting the concern has been elevated. ATR documentation will include an assessment by the ATR team of the effectiveness of DQC. The ATR Lead will prepare a Statement of Technical Review (see ER 1165-2-217, Section 5.11, and Appendix D), for the draft and final reports, certifying that review issues have been resolved or elevated. ATR will be certified when all concerns are resolved or referred to the vertical team and the ATR documentation is complete.

Documentation of IEPR. The Outside Eligible Organization will submit a final Review Report no later than 60 days after the end of the draft report public comment period. USACE shall consider all recommendations in the final Review Report and prepare a written response for all recommendations. The final decision document will summarize the Review Report and USACE response and will be posted on the internet.

Documentation of Model Review. Planning models require compliance with EC 1105-2-412. Models developed by the Corps of Engineers are certified and models developed by others are approved. Certifications or approvals may be specific to a single study, a regional application or for nationwide application. Completion of a model review is documented in a memorandum from the Director of a Planning Center of Expertise and should accompany reporting packages for study decisions.

5. Supporting Information

Study or Project Background

Study Authority

The Hartford & East Hartford CT. Levee Rehabilitation Section 216 Feasibility Study is authorized by Section 216 of the Rivers and Harbors Act of 1970. The authority directs the Secretary of the Army, acting through the USACE, to “review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest.”

Initial construction of the Connecticut River, East Hartford, CT Flood Risk Protection Project was authorized by the Flood Control Act of 1938 as modified by Public Law 859, 76th Congress, approved on October 15, 1940, and by the Flood Control Act of 1941. While the construction for the original flood risk protection project located in Hartford, CT was authorized by the provisions of the Emergency Relief Appropriation Acts of June 22, 1936, June 29, 1937, and June 21, 1938, as well as the Flood Control act approved June 28, 1938 (House document No. 455, 75th Congress, Second Session) and modified by the Flood Control Act of August 18, 1941 (House Document No. 653, 76th Congress, third Session). The Act of October 26, 1942 (Public No. 759, 77th Congress, Second Session) further modified the existing project to include construction of Gully Brook Conduit. The construction of the Folly Brook Dike and Conduit was authorized by the Flood Control Act of 1950 (Public Law 516, 81st Congress, 2nd Session). Construction of the Park River Flood Protection Project was authorized by the Flood Control act of 1968 (Public Law 90-483, 90th Congress dated August 13, 1968).

Study Area

The study area includes the local flood risk management projects constructed by USACE in the city of Hartford and the town of East Hartford and the protected areas surrounding the projects.

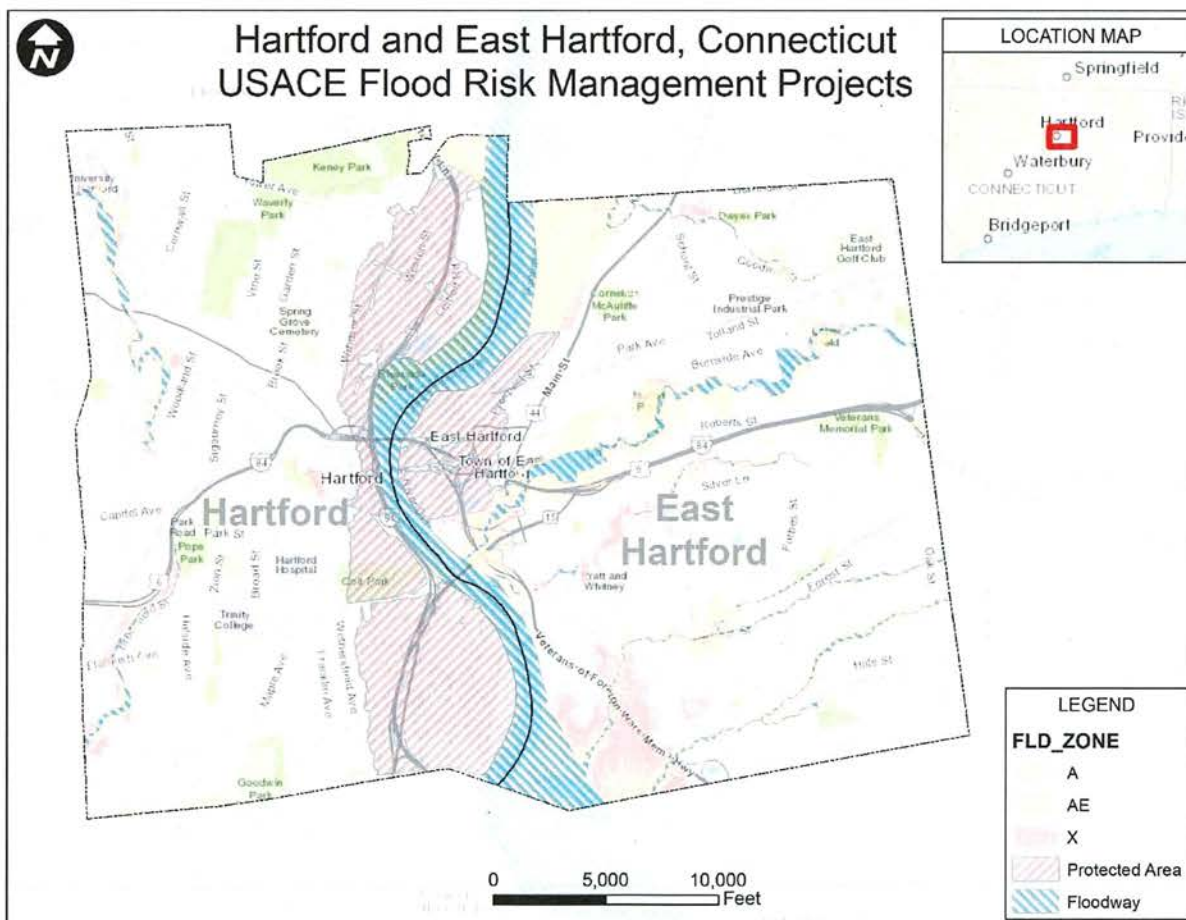


Figure 1 – Study Area Map

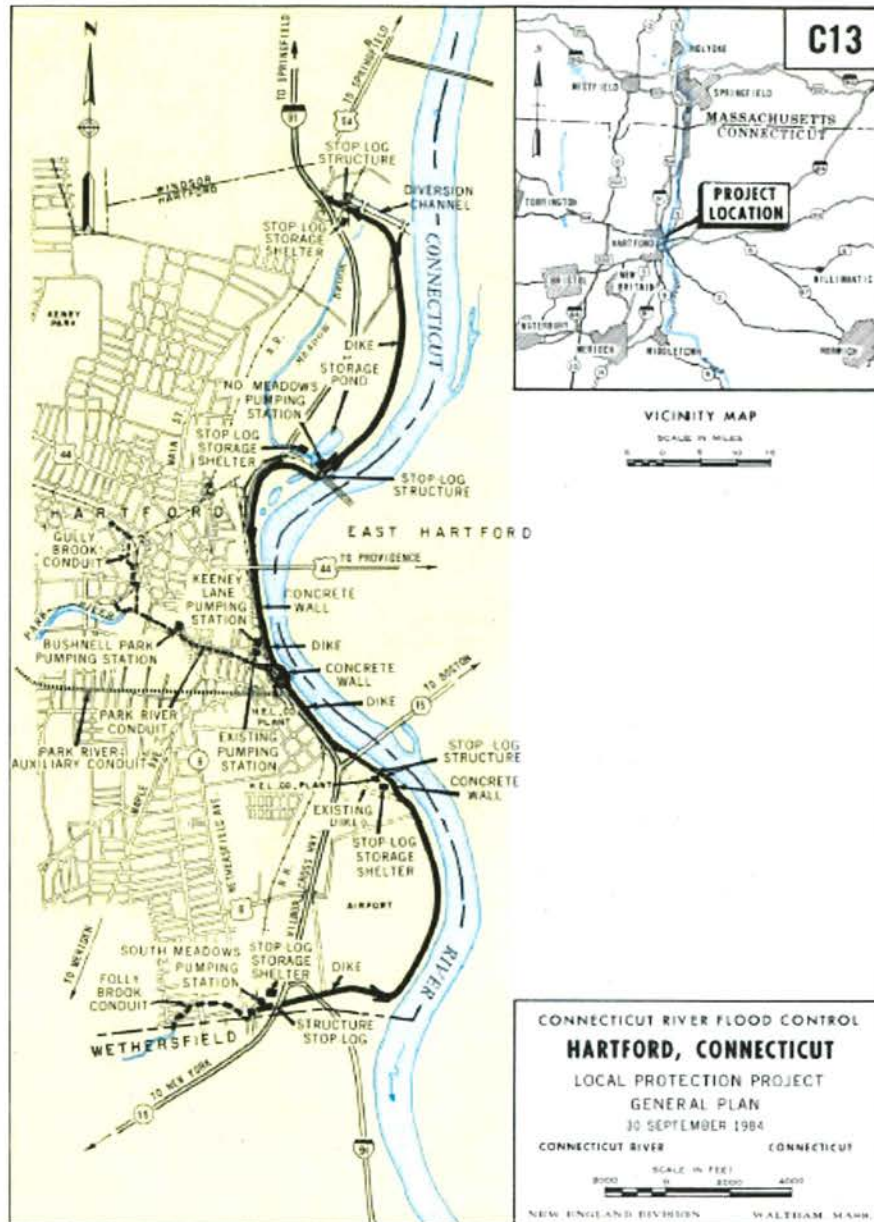


Figure 2 – Map of the Hartford Levee System.



Figure 3 – Map of the East Hartford Levee System.

Problem Statement

The problem to be addressed is increasing flood risk to life and property in areas behind the Hartford and the East Hartford Flood Risk Management levee systems, due to the age of the systems and

changed conditions. Both projects could fail due to overtopping, interior drainage and flood loadings below the top of the levee that are caused by inadequately controlled under seepage and through seepage, collapse of abandoned structures, floodwall structural failure and other mechanisms. Failure of these levee systems would contribute to increased public safety and property damage within the region.

Goals and Objectives

The overarching objective is to find an effective and environmentally acceptable solution to ensure a sustainable and resilient levee systems, which reduces the risk of damages to residences, business, and critical infrastructure and life safety to vulnerable communities. Each planning objectives applies to the study area for the 50-year period of analysis. Specific objectives are to:

- Reduce life safety risk; and
- Reduce potential property damages.

Future Without Project Conditions

Hartford Flood Risk Management Levee System - Hartford is a heavily developed urban area with a large population. The consequences of a breach in the FRM system in terms of lives lost and economic damages would be high. A levee breach today would flood twenty-five percent of Hartford's land base and destroy twenty percent of the city's grand list (taxable property).

Affected areas would include the north Hartford Promise Zone, the \$2 billion South Meadows MDC Wastewater Treatment Facility (the largest such facility in the area and sole processing center for the regions sludge-based waste), the Hartford-Brainard Airport, numerous historical sites including the Mark Twain Museum, and essential city and state government facilities. Also, two Interstate highways: I-84 and I-91 cross the study area.

East Hartford Flood Risk Management Levee System - The existing FRM system protects approximately 756 structures with an estimated value of \$859,800,000 and an estimated population at risk ranging from 6,410 (daytime) to 2,177 (night). Failure or overtopping of the project could result in loss of life and economic losses estimated at \$364,200,000 with areas of inundation over 20 feet deep. Numerous roadways, buildings, and critical infrastructure would be impacted by a levee breach/failure. Estimated life loss with an unexpected breach prior to overtopping is estimated at 16 people. (Source: USACE, New England District, Levee Screening Presentation, October 31, 2013.)

Types of Measures/Alternatives Being Considered

This study will develop a comprehensive plan to address levee rehabilitation. An array of structural and non-structural alternatives will be formulated to address potential failure modes identified for each levee system. Alternatives may include measures such as reconstruction of pump stations, modifications of drainage channels and culverts, improved I-Wall stability, improvements to toe drains and, and improvements to the Emergency Action Plan.

Estimated Cost/Range of Costs

At this point in the study, there isn't enough information to provide an accurate cost estimate. However, there are elements that are currently being studied that, if included in the final recommended plan, could increase the project costs above \$200 million. Specifically, these measures

are the rehabilitation or complete replacement of the pump stations in both the Hartford and East Hartford FRM projects.

6. Models to be Used in the Study

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 are analytical tools used 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 following planning models may be used to develop the decision document:

Table 3: Planning Models.

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
Hydrologic Engineering Center - Flood Damage Analysis (HEC-FDA) 2.0	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 for evaluating damages associated with interior flooding.	Certified
RMC-LifeSim 2.0.5	Consequence model used to calculate event based loss of life and economic damage estimates. This model will be used to screen structural and nonstructural measures. This model will then be used to calculate NED benefits and life loss for the existing conditions, future without action condition (if applicable), and all future with project conditions. This model will be used in conjunction with RMC-TotalRisk 1.0 (see below) to annualize economic damages and expected life loss.	Certified
RMC-TotalRisk 1.0	Risk model that performs risk analysis from user defined hazard, system response, and consequence functions. The software can generate various aspects of risk including Total, Incremental, Failure, Non-Failure, and Background. In conjunction with LifeSim outputs, this software will be used to generate Expected Annual Damages (with uncertainty) and Expected Annual Life Loss values (with	Certification Pending, anticipated in the 2 nd quarter of FY24

	uncertainty). Event-based consequences will be annualized and f-N plots built using TotalRisk.	
Regional Economic System (RECONS)	Economic model that provides estimates of regional economic impacts and contributions associated with Corps projects. Regional economic impacts and contributions are measured as economic output, jobs, income, and value added. Estimates are provided simultaneously for three geographic impact areas: local, state, and national. This model will be used to calculate Regional Economic Development benefits for the existing condition, future without project condition, and all future with project conditions.	Certified

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. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when appropriate. For example, HH&C models need to comply with the requirements of HH&C CoP Enterprise Standard 08101.

These engineering models may be used to develop the decision document:

Table 4: Engineering Models.

Model Name and Version	Brief Model Description and How It Will Be Used in the Study	Approval Status
HEC-RAS 6.34.1 (River Analysis System)	HEC-RAS will be used to estimate flood elevations to be input in the economic analysis. The HEC-RAS model will be a combination of 1D cross sections along the Connecticut River and 2D areas in the inland areas. The simulations will be performed with unsteady flow.	H&H CoP Preferred
Microcomputer Aided Cost Engineering System (MCACES) 2 nd Generation (MII)	The MCACES MII construction cost estimating software, developed by Building Systems Design, Inc., is a tool used by cost engineers to develop and prepare all USACE Civil Works cost estimates. Using the features in this system, cost estimates are prepared uniformly allowing cost engineering throughout USACE to function as one virtual cost engineering team.	Cost Engineering MCX Required Model/Enterprise Model
HEC-HMS 4.11	The Hydrologic Modeling System (HEC-HMS) is designed to simulate the complete hydrologic processes of dendritic watershed systems. The	H&H CoP Preferred

	software will be used to model the watershed within the study areas.	
HEC-SSP 2.3 (Statistical Software Package)	This software allows users to perform statistical analyses of hydrologic data. The software will be used to model interior drainage within the study areas.	H&H CoP Preferred
Reliability Workbench	Reliability Workbench is the software suite for reliability and safety analysis of systems. This software will be used to complete Mechanical Reliability Assessments of the pump stations within study area.	CoP Preferred Model

7. Factors Affecting Level and Scope of Review

All planning products are subject to the conduct and completion of District Quality Control. Most planning products are subject to Agency Technical Review and a smaller sub-set of products may be subject to Independent External Peer Review and/or Safety Assurance Review. Information in this section helps in the scoping of reviews through the considerations of various potential risks.

Objectives of the Reviews

DQC – The DQC review will ensure compliance with current USACE Policy and procedures. The review will assess whether:

- Appropriate assumptions, methods, procedures, computations (including quantities) and materials used in the analyses
- Evaluation of alternative designs, if applicable
- Appropriate data and level of data
- Reasonable results that meet the customer's needs consistent with law and existing USACE policy.

ATR - The ATR will assess whether the analyses are technically correct and comply with guidance, and that documents explain the analyses and results in a clear manner.

Policy and Legal Review - These reviews culminate in determinations that report recommendations 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.

Model Review and Approval/Certification - Ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions.

IEPR – The reviewers will 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.

Assessing the Need for IEPR

Mandatory IEPR Triggers

- Has the Chief of Engineers determined the project is controversial? *No, this study involves the rehabilitation of two existing levee systems, which are currently protecting communities and property in Hartford and East Hartford. There are no elements of this study that have been found to be controversial in nature.*
- Has the Governor of an affected state requested an IEPR? *No, the Governor of Connecticut has not requested an IEPR for this study.*
- Is the cost of the project more than \$200 million? *Due to the uncertainty at this point of the study process, it is unknown if the recommended plan will have a total project cost greater than \$200 million. However, there is the potential that project costs will be greater than that amount if the rehabilitation/replacement of the pump stations are ultimately included in the recommended plan.*

Discretionary IEPR

- Has the head of another Federal agency requested an IEPR? *No, the PDT has held the initial coordinated site visit and early coordination as required by NEPA, which included Federal agencies. During this coordination, no Federal agency has requested an IEPR.*

Potential IEPR Exclusion

A project expected to cost more than \$200 million may be excluded from IEPR under certain conditions.

IEPR Exclusion.

- Does the study include an EIS? **No**, the PDT is confident that an EIS will not be needed for this project. The early assessment of impacts on the human environment will be insignificant. All measures will take place within the existing levee system or on previously disturbed land.
- Is the project controversial? **No**, significant early coordination has been completed to date and no controversies related to the study have been brought to the PDT's attention.
- Does the project have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? **No**, to date a cultural resources review of literature and state site files has been started to identify cultural and historic resources within the study area. The study location includes some historic districts, historic structures and possibly National Historic Landmarks. However, at this point in the study, the PDT does not believe that the Recommended Plan will result in more than negligible adverse impacts to scarce cultural or historic resources. No scarce or unique tribal resources have been located in the study area.
- Does the project have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures; **No**, a preliminary investigation into the impacts of a plan on the fish and wildlife species and their habitats within the study area has not led the PDT to believe that the plan will have substantial adverse impacts to these resources. The study area is located within a densely developed urban environment. The proposed measures will occur within the footprint of the existing levee systems or on previously disturbed land.
- Does the project, before implementation of mitigation measures, have more than a negligible adverse impact on a species listed as endangered or threatened species under the Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.) or the critical habitat of such species designated under such Act. **No**, a preliminary investigation into the impacts of a plan on the threatened and endangered species and critical habitats within the study area has not led the PDT to believe that

the plan will have substantial adverse impacts to these resources. There are three Federally listed species which occur within the study area. These species include the shortnose sturgeon, the Atlantic sturgeon and the northern long-eared bat. To date, there is no in-water work expected to be part of the recommended plan. Therefore, no impacts to the two sturgeon species are expected. The project area is urban, with little usable habitat for the NLEB. Again, no impacts on the NLEB are expected.

Assessing Other Risk Considerations

The risks associated with the study are still being developed. All risk that will affect the success of the project will be captured in the risk register. Prior to each review, a pre-brief will be held with the review team and project risks will be discussed during these meetings. An initial assessment of study risks is provided below based on currently available information.

Study Assumptions:

- This study assumes that the non-federal sponsors and the federal government will be willing and able to provide their respective study funding contribution in full.
- This study assumes that there will be no significant delays that are beyond the USACE's control such as but not limited to funding, coordination/communication, and legal review.
- This study assumes that the District has adequate resources needed to complete the study on time and on budget, and that if it does not have said resources that it will approach other districts and/or external contractors as needed to do so.
- The Federal with and without project conditions will be evaluated using a 50-year period of analysis from the anticipated year of project implementation.
- Sea Level Change will be considered by evaluating with and without project conditions for all three (3) of the USACE sea level change curves and will incorporate locally recognized projections as needed too.

Study Constraints:

- Plans should not increase or induce flooding outside of the Hartford/East Hartford area and on the other levee system.
- Plans should avoid or minimize impacts that negatively affect authorized navigation projects downstream of the project area.
- Plans must comply with constraints of the Section 216 authority.
- Plans must avoid disproportionate impacts to identified Environmental Justice Communities that are affected by the implementation of this project.

Will the study likely be challenging? If so, describe how? Yes, this study will be challenging because the Section 126 authority is a less used authority. The authority includes limitations as to what can be evaluated, but the available USACE policy provides little usable guidance on how it should be executed. Studies under this authority requires significant critical thought, creativity, and judgement to fully develop. Additionally, an understanding of FRM (Levee) systems is extremely helpful to interpret the Section 216 authority.

Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks.

- HTRW concerns: An HTRW evaluation will be completed and will be performed using guidance from ER 1165-2-132: HTRW Guidance for Civil Works Projects, and the American Society for Testing and Materials (ASTM) E1527-13: Standard Practice for Environmental Site Assessment: Phase 1 Environmental Site Assessment Process. Environmental Data Resources, Inc. (EDR) reports have ordered to facilitate review of environmental conditions at properties along the levee systems. The NFS has been advised of USACE regulations related to study sites with HTRW contamination. The measures on the MIRA site, which has the greatest chance of contamination, has been screened due to the recommendation of the NFS.
- Real Estate Relationships: The two study areas are fully developed, urban environments that include complex Real Estate relationships between city/town, federal and private entities. The RE PDT member will need to fully understand and describe these relationships during the development of the Recommended Plan.
- Accurately interpretation of the Section 216 authority
- H&H modeling: Significant H&H modeling will be required during the feasibility phase to describe the impacts of interior flooding and potential levee breach. A complete description of these modeling efforts is included in the white paper entitled “Benefits Analysis and Modeling Requirements” dated September 2023 and in the PMP. To reduce risk of modeling error, the PDT has consulted with the FRM-PCS, has taken on a mentor who is familiar with H&H modeling required for Section 216 studies and will hold a targeted ATR during the spring of 2024.
- Resource management – This project is essentially two projects in one.
- Accurate interpretation of the new Environmental Justice guidance
- Existing, FWOP and changed conditions: There were concerns at the start of the study that there would not be enough existing data to describe the existing, FWOP and changed condition. This does not seem to be the case as the PDT continues to investigate the level systems. In cases where data does not exist, the NFS’s have been willing to collect the information for the PDT.
- Existing H&H interior drainage models are not available, so the PDT must develop these models.

Is the project likely to be justified by life safety or is the study or project likely to involve significant life safety issues? Briefly describe the life risk, including the District Chief of Engineering’s assessment as to whether there is a significant threat to human life associated with aspects of the study or failure of the project or proposed projects.

The project will involve life safety issues. An SQRA was completed in 2019 for Hartford FRM system and an Abbreviated Risk Assessment was completed in spring of 2023 for the East Hartford FRM system. Both systems protect over 10,000 people. The failure of each project would result in significant life loss. A breach prior to overtopping would result in a mean life loss of 16 and 9 for East Hartford and Hartford, respectively. An overtopping failure would result in a mean life loss for 9 and 6 for East Hartford and Hartford, respectively. The District Chief of Engineering and the Levee Safety Officer agree that there is significant threat to human life associated with the overtopping or levee breach at the Hartford and East Hartford Levee Systems.

- Is the information in the decision document or anticipated project design likely to be based on novel methods, involve 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? If so, how? *At this point in the study it is not anticipated that the project design will be based on novel methods, involve innovative materials or techniques. The study is also not anticipated to present complex challenges for interpretation, containing precedent-setting methods or models, or presenting conclusions that are likely to change prevailing practices.*
- Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule? If so, how? *It isn't anticipated that the project design will require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule*
- Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources? If so, what are the anticipated impacts? *No, to date a cultural resources review of literature and state site files has been started to identify cultural and historic resources within the study area. The study location includes some historic districts, historic structures and possibly National Historic Landmarks. However, at this point in the study, the PDT does not believe that the Recommended Plan will result in more than negligible adverse impacts to scarce cultural or historic resources. No scarce or unique tribal resources have been located in the study area.*
- Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures? If so, describe the impacts? *No, a preliminary investigation into the impacts of a plan on the fish and wildlife species and their habitats within the study area has not led the PDT to believe that the plan will have substantial adverse impacts to these resources. The study area is located within a densely developed urban environment. The proposed measures will occur within the footprint of the existing levee systems or on previously disturbed land.*

Is the project expected to have, before mitigation measures, more than a negligible adverse impact on an endangered or threatened species or their designated critical habitat? If so, what are the anticipated impacts? **No**, *a preliminary investigation into the impacts of a plan on the threatened and endangered species and critical habitats within the study area has not led the PDT to believe that the plan will have substantial adverse impacts to these resources. There are three Federally listed species which occur within the study area. These species include the shortnose sturgeon, the Atlantic sturgeon and the northern long-eared bat. To date, there is no in-water work expected to be part of the recommended plan. Therefore, no impacts to the two sturgeon species are expected. The project area is urban, with little usable habitat for the NLEB. Again no impacts on the NLEB are expected.*

8. Risk Informed Decisions on Level and Scope of Review

Targeted ATR.

Will a targeted ATR be conducted for the study? *Yes, a targeted ATR and DQC will be conducted to assess the FWOP condition modeling/analysis, with specific emphasis on the economic damage and life risk assessments. The H&H modeling that will be assessed during the targeted review includes the interior drainage modeling and the levee breach modeling. Risk assessments for the measures associated with the levee breach and initial NED economic modeling for the pump stations will also be included in the targeted review.*

IEPR Decision. The study has the potential of meeting one of the mandatory IEPR triggers by having a total project cost greater than \$200 million. If the rehabilitation/replacement of the pump stations located in the study area are ultimately included in the recommended plan, then the total project costs are expected to surpass the \$200 million mark. However, if the recommended plan exceeds the Project Cost mandatory IEPR trigger but otherwise does not meet any other mandatory triggers for IEPR, the plan could be excluded from needing IEPR using Condition A. At this time, we will continue to assume that an IEPR is required and will continue to revise the review plan as more information is gathered.

Safety Assurance Review. Safety Assurance Reviews are managed outside of the USACE and are conducted on design and construction products for hurricane, storm and flood risk management projects, or other projects where existing and potential hazards pose a significant threat to human life. In some cases, significant life safety considerations may be relevant to planning decisions. These cases may warrant the development of relevant charge questions for consideration during reviews such as ATR or IEPR. In addition, if the characteristics of the recommended plan warrant a Safety Assurance Review, a panel will be convened to review the design and construction activities on a regular schedule before construction begins and until construction activities are completed.

Decision on Safety Assurance Review. A Safety Assurance Review (SAR), also known as Type II IEPR, will be conducted on design and construction activities for any project where potential hazards pose a significant threat to human life (public safety). An SAR is usually conducted during Pre-construction, Engineering and Design (PED) Phase. At this point in the study, it is assumed that a SAR is required. However, the E&C Division will complete an assessment of life safety early in the feasibility study to confirm the requirements of SAR (if any), which will be planned for later on in the study. Additionally, at this point in the study, it is assumed that a risk assessment will be conducted during PED, which also indicates a SAR is required.

9. Policy and Legal Compliance Review

Policy and legal compliance review of draft and final planning decision documents is delegated to the MSC (see Director's Policy Memorandum 2019-01).

(i) Policy Review.

The policy review team is identified through the collaboration of the MSC Chief of Planning and Policy and the HQUSACE Chief of the Office of Water Project Review. The makeup of the Policy Review team will be drawn from Headquarters (HQUSACE), the MSC, the Planning Centers of Expertise, and other review resources as needed.

- The Policy Review Team will be invited to participate in key meetings during the development of decision documents as well as SMART Planning Milestone meetings. These engagements may include In-Progress Reviews, Issue Resolution Conferences or other vertical team meetings plus the milestone events.

- The input from the Policy Review team should be documented in a Memorandum for the Record (MFR) produced for each engagement with the team. The MFR should be distributed to all meeting participants.
- Teams may choose to capture some of the policy review input in a risk register if appropriate. These items should be highlighted at future meetings until the issues are resolved. Any key decisions on how to address risk or other considerations should be documented in an MFR.

(ii) Legal Review.

Representatives from the Office of Counsel will be assigned to participate in reviews. Members may participate from the District, MSC and HQUSACE. The MSC Chief of Planning and Policy will coordinate membership and participation with the office chiefs.

- In some cases, legal review input may be captured in the MFR for the particular meeting or milestone. In other cases, a separate legal memorandum may be used to document the input from the Office of Counsel.

Each participating Office of Counsel will determine how to document legal review input.

10. Public Comment

This Review Plan will be posted on the New England District's webpage. Public comments on the scope of reviews, technical disciplines involved, schedules and other considerations may be submitted to the New England District for consideration. If the comments result in a change to the Review Plan, an updated plan will be posted on the New England District's webpage.

11. Documents Distributed Outside the Government

For information distributed for review to non-governmental organizations, the following disclaimer shall be placed on documents:

“This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It has not been formally disseminated by USACE. It does not represent and should not be construed to represent any agency determination or policy.”

Appendix A - Brief Description of Each Type of Review

This section describes each level of review to be conducted. Based upon the factors discussed in Section 1, this study will undergo the following types of reviews:

District Quality Control. All decision documents and accompanying components will undergo DQC. This internal review covers basic science and engineering work products. It fulfills the project quality requirements of the Project Management Plan. The DQC team will read all reports and appendices. The review must evaluate the correct application of methods, validity of assumptions, adequacy of basic data, correctness of calculations (error-free), completeness of documentation, and compliance with guidance and standards. Districts are required to check all computations and graphics by having the reviewer place a highlight (e.g., place a “red dot”) on each annotation and/or number indicating concurrence with the correctness of the information shown.

Agency Technical Review. ATR will be performed by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. These teams will be comprised of certified USACE personnel. The ATR team lead will be from outside the home MSC.

Independent External Peer Review. IEPR is required for this decision document. This is the most independent level of review and is applied in cases that meet criteria where the risk and magnitude of the project are such that a critical examination by a qualified team outside of USACE is warranted. Certain criteria dictate mandatory performance of IEPR and other considerations may lead to a discretionary decision to perform IEPR. For this study, a risk-informed decision has been made that IEPR is appropriate. The information in Section 1 – Factors Affecting the Scope of Review – informed the decision to conduct IEPR. It’s unknown at this time if an IEPR will be required for the Hartford/East Hartford, CT Levee Rehabilitation Section 216 Feasibility Study.

Cost Engineering Review. All decision documents will be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX assisted in determining the expertise needed on the ATR and IEPR teams. The MCX will provide the Cost Engineering certification. The RMO is responsible for coordinating with the MCX for the reviews. These reviews occur as part of ATR.

Policy and Legal Compliance Review. These reviews culminate in determinations that report recommendations 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.

Public Review. The District will post the Review Plan and approval memo on the District’s internet site. Public comment on the adequacy of the Review Plans will be accepted and considered. Additional public review will occur when the report and environmental compliance document(s) are released for public and agency comment.